

## Article

# Recycling Reinforced: The Synergistic Dynamics of Sustainable Behavior

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**Abstract:** Recent research has specifically targeted the decision-making process of eco-friendly individuals, emphasizing the significance of recycling and its impact on sustainability. Our study extends this inquiry by examining the correlation between recycling participation and pro-environmental behavior among consumers, integrating the concepts of self-efficacy, feelings of pride, and social pressure into our analysis. We utilized targeted sampling to collect data from a diverse sample of 378 participants, ensuring representation across key demographic groups. By employing Partial Least Squares–Structural Equation Modeling (PLS-SEM), we aimed to explore the intricate relationships underpinning recycling behaviors and pro-environmental actions. The results suggest that self-efficacy and feelings of pride significantly influence individuals’ recycling behaviors, highlighting the role of psychological and social factors in promoting environmental sustainability. It was concluded that social pressure did not have the expected moderating effect on increasing consumers’ feelings of pride and self-efficacy toward recycling activities. This study sheds light on the underlying mechanisms that drive pro-environmental actions, contributes to understanding sustainability promotion through recycling, and offers insights for policymakers and environmental advocates to help foster environmental responsibility and behavior change. The findings emphasize that individuals often value personal achievement and development more when addressing environmental responsibilities and that social pressure does not achieve its expected effects.

**Keywords:** pro-environmental behavior; recycling; sustainability; self-efficacy; social pressure; feelings of pride



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## 1. Introduction

Environmental degradation, the consequences of climate change, and increasing energy needs are among the increasingly important issues of our times. Recycling efforts are seen as a widespread and effective way to combat these concerns, preventing pollution, saving energy, and conserving natural resources [1]. Recycling is “collecting, processing and converting materials that would otherwise be thrown away into new products” [2]. Researchers estimate that in 2019, the production and burning of plastic globally emitted over 850 million tons of greenhouse gases into the atmosphere; these emissions could rise to 2.8 billion tons by 2050, but this could be partially mitigated through more effective recycling methods [3]. Governments and environmental organizations worldwide have invested significant resources to promote, support, and, more importantly, encourage public participation in recycling activities [4–6]. At this point, understanding consumers’ motivations for recycling and the obstacles they encounter could help direct environmental conservation efforts more effectively transition toward sustainable consumption patterns.

Building upon the above-mentioned significance of recycling as a mechanism for addressing ecological concerns, pro-environmental behavior (PEB)—alternatively termed green, sustainable, or eco-friendly behavior—encompasses actions executed by individuals with the intent of environmental preservation [7]. Such behaviors manifest as conscientious interactions with the environment, including, but not limited to, the recycling of domestic

refuse [8]. Moreover, these actions are crucial for reducing the harmful effects of climate change, are exemplified by choosing sustainable products, and are essential, not just supplementary, in tackling the complex challenges of global environmental changes [9,10].

On the other hand, a meta-analysis studying the increase in pro-environmental behaviors has revealed that previous environmentally friendly actions may weaken individuals' intentions to engage in similar actions in the future and do not necessarily lead to an increase in such behaviors [11]. This outcome suggests that there might be different dynamics underlying consumers' pro-environmental behaviors. Individuals who have once performed an environmentally friendly action might feel rewarded for doing 'good,' leading them to justify less eco-friendly behaviors later on [12]. Engaging in one eco-friendly action might give them a perceived 'right' to partake in environmentally harmful behaviors later. Moreover, individuals falling into the trap of sufficiency misconception might believe that their single eco-friendly action is enough for their overall contribution to the environment, thus feeling no need to engage in further actions [13]. From a broader perspective, social norms [14,15] can be thought of as external factors that both encourage and, at the same time, inhibit actual beliefs and intrinsic motivations toward pro-environmental behaviors. For instance, an individual might recycle to meet societal expectations yet need to develop a broader sense of responsibility towards the environment. This scenario could create challenges for the sustainability and effectiveness of pro-environmental behaviors.

Recent research has examined the factors influencing participation in recycling [4,16–18]. Cases where previous pro-environmental actions restrict subsequent pro-environmental behaviors [8] demonstrate that consumers' recycling efforts in influencing pro-environmental behavior are determined by a series of intrinsic or extrinsic [19] or social motivations [20]. For instance, individuals conscious of their previous environmental actions may develop a more pronounced sense of environmental self-identity [21]. This new self-perception reflects their belief in self-efficacy to impact the environment positively and facilitates the adoption of pro-environmental behaviors [22].

However, if an individual incurs a higher cost at the point of past pro-environmental behavior, it can generate a stronger environmental self-identity and positive emotions, leading to more substantial positive spillover effects [4]. This aims to reduce environmental impact and highlights the individual's contribution to fulfilling societal responsibilities and increasing environmental consciousness [23]. Thus, recycling becomes a meaningful and rewarding action for individuals and society.

This study will highlight the role of social pressure in consumers' recycling efforts based on the premise that it can be a significant factor in their pro-environmental behaviors. This is a dynamic that previous studies have often overlooked. The impact of social pressure on consumers' recycling activities can be explained by the complex dynamics of social interaction and the convergence of individual environmental responsibility awareness [24]. People generally tend to conform to the norms and expectations of others in their environment [25], which includes eco-friendly behaviors like recycling. The widespread environmental consciousness and sustainable practices in society significantly influence individuals, encouraging them to be more responsible towards the environment [26] and to participate in conservation activities like recycling [27].

Social pressure significantly influences individual environmental behavior by reinforcing societal norms like recycling, which then become regular habits. For instance, in communities where recycling is a common practice, it spreads among individuals and solidifies into a social norm [26]. This normative pressure encourages individuals to fulfill their environmental responsibilities and exhibit behaviors consistent with their environmental identities [28,29]. However, the cost associated with pro-environmental behaviors, particularly recycling efforts [11], can deter even the most environmentally sensitive individuals. Strong negative emotions in individuals possibly forced into high-cost pro-environmental behavior owing to social influences, including norms and the attitudes of peers, may lead to the avoidance of pro-environmental behavior [30].

The research presented herein, which is crucial for understanding consumer recycling efforts and promoting and developing eco-friendly behaviors, builds upon previous studies by Ma et al. which focus on the positive emotions and environmental self-identity generated by recycling activities among individuals [4]. It also examines in more detail the impact of social pressure on these dynamics and expands on previous findings on the influence of individual actions on future behaviors [11]. The current study aims to illuminate the complex interactions between social dynamics and individual awareness of environmental responsibility, which shape pro-environmental behaviors. This approach provides a nuanced perspective on the determinants of eco-friendly practices by evaluating the effects of social norms and perceptions of environmental responsibility on recycling behaviors. It seeks to comprehensively analyze the reasons behind and the obstacles to recycling, aiming to develop more targeted and effective environmental conservation strategies. The insights presented herein will enhance both micro- and macroenvironmental consciousness and contribute to developing robust environmental protection policies.

## 2. Study Background

The increasing environmental challenges and the severity of climate change have underscored the significant impact of human behavior, emphasizing the need for substantial behavioral changes to mitigate these issues [31,32]. In this context, this study aims to explore the roles of the psychological factors underlying individuals' recycling efforts and how they influence their pro-environmental behaviors. The fact that pro-environmental behaviors can be costly, time-consuming, and only sometimes pleasurable for the individual [33] presents a significant challenge in promoting eco-friendly actions toward sustainability. Although environmentally friendly behaviors often contradict personal interests, especially in the short term, this is not always true.

This study introduces a conceptual framework to help better understand the link between consumers' recycling efforts and their pro-environmental behaviors. The model suggests that recycling can boost further eco-friendly behaviors, mediated by feelings of pride and self-efficacy. It also hypothesizes that focusing on future outcomes can mitigate the negative aspects of recycling. The subsequent sections detail the theoretical foundations and hypotheses for each variable, all of which were derived from the existing literature.

## 3. Hypothesis Development

According to Festinger's cognitive dissonance theory, proposed in 1957, individuals tend to act in a manner consistent with their previous actions; otherwise, they experience discomfort or unrest. Accordingly, once individuals exhibit eco-friendly behavior, they will continue such behaviors. However, such an action may not always lead to a continuous obligation to undertake other actions aimed towards protecting the environment [34]. Mullen and Monin [35] have highlighted a paradox where past pro-environmental behaviors weaken subsequent green actions. Additionally, some studies have found that implementing and even anticipating recycling behavior can lead to waste in green funds [36] or less support [37]. Evidence has been found that encouraging households to classify their waste leads to a significant increase in household energy consumption [38]. Catlin and Wang [39] discovered that offering a recycling option for a product could lead to individuals consuming significantly more resources. Similarly, Tiefenbeck et al. [40] concluded that individuals reducing water consumption recorded higher electricity usage levels.

Given the intricate dynamics between individual recycling efforts and broader pro-environmental behaviors, we felt prompted to question the direct correlation between these two elements. Festinger's cognitive dissonance theory suggests that while individuals might strive for consistency in their actions, this does not always result in a sustained pattern of eco-friendly behavior [37,41]. However, the authors of [8] revealed that recycling efforts positively impact promoting environmentally friendly behaviors through mechanisms such as a sense of pride and environmental self-identity. However, negative emotions

brought about by high costs diminish the effectiveness of previous recycling efforts, thereby weakening this perception.

This notion, coupled with findings from recent studies, led us to formulate the following hypothesis:

**H1.** *Consumers' recycling efforts are positively related to pro-environmental behaviors.*

### 3.1. Emotions Caused by Extravagant Behaviors

Waste is the imbalance between an individual's resources and the amount they need. This encompasses the use of resources beyond what is necessary (i.e., excessive consumption) or the inefficient use of resources [42]. Many individuals are conscious of and dislike wasting resources [36]. For instance, people experiencing negative emotions such as guilt and shame while generating waste may seek reasons to store used items instead of discarding them or consuming food past its expiration date [36]. Therefore, reducing negative emotions associated with wasteful consumption may lead consumers to adopt more pro-environmental behaviors. This perspective is an essential factor in transitioning to sustainable consumption models.

#### 3.1.1. Self-Efficacy

The Protection Motivation Theory, proposed by Rogers in 1975, integrates individual and social factors to explain the determinants of risk-averting behaviors [43]. It employs a cognitive decision-making process wherein individuals weigh the costs and rewards of behaviors, leading to a decision based on "threat appraisal" and "coping appraisal" [44]. "Perceived severity" refers to the seriousness of potential harm, while "perceived vulnerability" reflects an individual's susceptibility to these harms [45]. "Coping appraisal" involves assessing one's ability to respond effectively to threats [46].

Self-efficacy, defined as the belief in one's capacity to manage specific situations [47], plays a critical role in this theory. Greater self-efficacy and perceived response efficacy can encourage individuals to undertake protective behaviors, especially when the response costs are low [44,46].

Applied initially to health-related risk behaviors, the Protection Motivation Theory is now widely used in environmental research for tasks such as defining pro-environmental behaviors [48]. Research findings consistently show that self-efficacy and response efficacy are vital in promoting harm-preventive behaviors [46,49,50]. Bockarjova and Steg [35] highlighted the theory's value in identifying pro-environmental behaviors, emphasizing the need for multifaceted approaches to enhance environment-protecting actions.

Additionally, the Self-Efficacy Theory suggests a more measured worldview, proposing that opportunities to experience or witness success can support positive assessments of an individual's capacities for future success, thereby increasing the likelihood of continual positive outcomes [51]. In this regard, Shafiei and Maleksaeidi [48] have found that environmental attitude and self-efficacy positively and significantly affect consumers' pro-environmental behaviors. With this in mind, the following hypothesis was suggested:

**H2.** *People's self-efficacy perceptions will affect their pro-environmental behavior.*

Individuals typically undergo a decision-making process involving a series of consecutive choices, implying that initial decisions can guide subsequent choices [4]. The first choice can influence the likelihood of individuals engaging in recycling activities focused on a specific goal (for example, visiting a local facility for paint recycling) or refraining from such eco-friendly behaviors.

Previous studies in social cognition have shown that an individual's perception of self-efficacy, formed through their last actions, can influence their subsequent behaviors [52–54]. Research on moral identity suggests that engaging in morally positive behavior strengthens an individual's self-concept and enhances positive emotions [55]. Consumers develop a

“perception of meaning” by evaluating the value and significance of recycling behaviors within their value judgments and standards. Additionally, the “perception of self-efficacy” is assessed based on success in waste separation and recycling [56].

Recycling can help people feel more connected to the environment and confident in their ability to make a difference. Individuals can build a positive environmental identity and sense of self-efficacy by recognizing their past recycling efforts with items like paper, cups, and aluminum cans, leading to a more significant commitment to pro-environmental behaviors [42]. This will lead consumers to believe they are already successful when they make a pro-environmental recycling effort and strengthen their sense of self-efficacy in meeting their goals. Therefore, the following hypothesis was proposed:

**H3.** *Consumers’ recycling efforts affect their self-efficacy perceptions.*

### 3.1.2. Feelings of Pride

Pride is a self-conscious emotion stemming from a particular achievement or pro-social behavior [57]. Appraisal Theory suggests that this positive emotion is primarily based on individuals’ evaluations of their actions as achievements [58]. Individuals are more likely to feel pride when they believe their actions are valuable and moral, and an increased sense of pride can influence individuals’ attitudinal responses [59]. Conversely, when individuals recognize their actions as morally wrong and inappropriate, they may experience feelings of shame or guilt [60]. These findings are consistent with previous studies that found that individuals feel pride when they achieve positive outcomes [61,62].

Recycling activities are socially responsible behaviors that can benefit the environment [63]. When deeply engaged in positive and socially desirable behaviors—in this context, recycling efforts—consumers feel they have contributed to progressing toward environmental goals, resulting in increased feelings of pride [4]. In their study, Wei et al. [64] concluded that consumers’ recycling efforts positively influence their feelings of pride. These studies align with a recent trend of research exploring the relationship between sustainable consumption and the feeling of pride in depth [65–67]. Hence, the following hypothesis was assumed:

**H4.** *Consumers’ recycling efforts related to products positively influence their feelings of pride.*

Self-efficacy theory is based on a triadic reciprocal determinism theory, which suggests a continuous interaction among personal, behavioral, and environmental factors [51]. Self-efficacy represents an individual’s knowledge about their abilities, leading to a positive appraisal of the future and, subsequently, a feeling of good mental pride [68]. Therefore, for an environmentally conscious person, participating in recycling activities could increase self-efficacy, leading to pride.

Specifically, people compare their behaviors with relevant standards; if they align with them, they will feel good about themselves [69]. The sense of achievement stemming from an individual’s self-efficacy related to controllable and changeable factors such as the effort a consumer puts into participating in environmentally friendly consumption can lead to a greater sense of pride [70]. Therefore, the sense of efficacy derived from successfully completing a task arising from a self-assessment [71] and the sense that participating in recycling is good can enhance consumers’ feelings of pride. All this led us to hypothesis 5:

**H5.** *Consumers’ perceptions of self-efficacy positively influence their feelings of pride.*

As a self-conscious emotion, the feeling of pride plays a vital role in self-regulation [4]. Sun and Trudel [36] argued that positive emotions related to recycling can reduce the negative emotions experienced by consumers when wasting resources. Therefore, feelings of pride can increase pro-environmental behaviors by reducing the negative emotions associated with wasteful behavior.



The same conclusion can be drawn based on the norm of equity in the Social Exchange Theory. Pride often involves a social comparison of feeling superior compared to others [72]. According to the norm of equity in the Social Exchange Theory, individuals in higher positions will feel entitled to privileges they believe are commensurate with their importance in the hierarchy [73]. The sense of pride derived from high levels of involvement in recycling could subsequently enable individuals to feel more empowered to make environmentally responsible decisions and perceive engaging in more pro-environmental behaviors as reasonable. Therefore, as pro-environmental behavior is a morally and socially desirable positive behavior, individuals will feel that they have contributed to progressing towards achieving environmental goals when actively engaged in pro-environmental behaviors, increasing their pride. Additionally, in their study involving 426 participants, Bai et al. demonstrated a strong relationship between individuals' feelings of pride and their pro-environmental behaviors [8]. Therefore, the following hypothesis was proposed:

**H6.** *Consumers' feelings of pride from their recycling efforts positively influence their pro-environmental behaviors.*

### 3.2. The Moderating Role of Social Pressure

Individuals attempt to avoid spending on resources that do not facilitate a beneficial future outcome or can only be used inefficiently [74]. Individuals, consumers, organizations, and, ultimately, the global ecosystem must evaluate and at least partially internalize the long-term benefits of recycling efforts. This only forms the basis or rationale for incorporating the habit of recycling into an individual's value structure. However, specifically, the diffusion of pro-environmental behaviors is the observable causal effect of one pro-environmental behavior on other related pro-environmental behaviors, where the emergence of the first behavior is often subject to some policy or business intervention [75]. According to Shackelford's argument, people's short-term survival motivations override their long-term thinking, and therefore, recycling efforts, which require a long-term focus, are not natural [76]. To overcome innate resistance to recycling, Shackelford [76] suggests using social pressure to encourage participation in recycling efforts. His rationale is as follows:

Contrary to common belief, social pressure may not influence an individual's engagement in environmentally friendly activities like recycling. Instead, these actions are often driven by intrinsic motivations rooted deeply in the person's values and convictions [77]. Thus, consumers may engage in this behavior whether or not there is societal pressure.

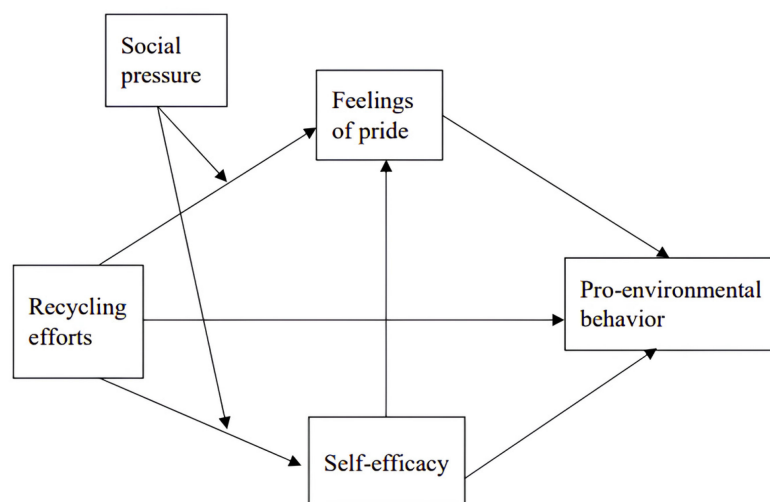
Concerning the concept of social norms that underlie social pressure, several different types of norms have been defined in social psychology. It is believed that the social pressure exerted by the knowledge that others are recycling (descriptive norm) is stronger than the expectation that we should recycle (injunctive norm) [78]. Therefore, social pressure, a type of descriptive norm, may increase consumers' recycling efforts. Studies have shown that social pressure or group norms can predict recycling efforts and the continuity of recycling behavior [79]. Barr et al. [80] concluded that social norms are a crucial determinant since recycling is a visible activity; that is, the visible nature of "putting out recyclable materials for collection" encourages people to recycle. White et al. [81] concluded that social pressure arises from the attitudinal and behavioral characteristics of a psychologically relevant reference group rather than perceived pressure from other individuals. In the context of recycling, consumers under high social pressure may feel more entitled to psychological benefits, positive self-concept, and feelings of pride in exchange for their recycling efforts. In contrast, those under less social pressure are likely to be less concerned about the environmental impact of their recycling behaviors. Finally, consumers need to produce the successful performance gains they desire from their recycling efforts—that is, their self-efficacy—which can vary with social pressure when executing the necessary behaviors. Thus, the following hypotheses were assumed:

**H7.** *Social Pressure positively moderates the effect of consumers' recycling efforts on their self-efficacy. The greater the social pressure, the greater the positive effect of recycling efforts on self-efficacy.*

**H8.** *Social Pressure positively moderates the effect of consumers' recycling efforts on their feelings of pride. The greater the social pressure, the greater the positive effect of recycling efforts on feelings of pride.*

### 3.3. The Mediating Role of Self-Efficacy and Feelings of Pride

A research model was created by developing a conceptual framework to better understand the relationship between consumers' recycling efforts and subsequent pro-environmental behavior (Figure 1). According to the model, it is suggested that recycling efforts can increase pro-environmental behavior by mediating consumers' feelings of pride and self-efficacy. Pro-environmental behavior will occur when consumers feel that they are making progress towards achieving environmental goals due to their recycling efforts, resulting in increased feelings of pride [8] and strengthening their self-efficacy with a sense of accomplishment that will facilitate goal attainment in terms of environmental resource use. Previous research suggests that an individual's self-efficacy and feelings of pride can influence their environmental behavior [47,82,83]. Ultimately, an individual's environmental self-efficacy will encourage pro-environmental behavior through a sense of pride, bringing the individual closer to the environmental goal by reducing the negative emotions resulting from wasteful behavior [36]. Accordingly, the following hypothesis was assumed:



**Figure 1.** Conceptual model.

**H9.** *Consumers' recycling efforts mediate pro-environmental behavior through their feelings of pride and self-efficacy.*

Drawing from the preceding discussion, a detailed model was constructed to scrutinize the hypothetical relationships depicted in Figure 1.

## 4. Materials and Methods

### 4.1. Sample and Data Collection

This study focused on individuals aged eighteen and above who have demonstrated active engagement in recycling initiatives. We employed a two-stage targeted sampling [84,85] process to ensure that participants met these specific criteria. This approach was chosen to systematically select individuals who actively engage in recycling efforts, thus ensuring

the representativeness and relevance of the sample and helping to address the study's objectives [86].

Initially, an online screening questionnaire was administered to a broader pool of potential respondents recruited via social media platforms and environmental forums known for discussions on sustainability and recycling. This preliminary screening was designed to identify individuals who actively participate in recycling activities.

The preliminary screening questionnaire was meticulously designed to ascertain the level of participants' active involvement in recycling activities. It queried participants on several key aspects: the frequency of their recycling activities (options ranged from daily, weekly, and monthly to rarely or never), the types of materials they regularly recycled (including paper, plastic, metal, glass, and electronics), the duration of their active recycling engagement (with choices of less than a year, 1–3 years, or over 3 years), their motivations for recycling (such as environmental concern, social influence, personal benefits, or other), and their knowledge about the impact of recycling on environmental sustainability, which was measured on a Likert scale ranging from 1 (not knowledgeable) to 5 (highly knowledgeable).

Respondents who affirmed frequent and varied recycling practices, demonstrated a sustained commitment to recycling, and exhibited a significant understanding of its environmental impacts were then invited to participate in the main survey. This method allowed us to refine our sample to ensure that it consisted solely of individuals genuinely engaged in recycling, thus aligning with our study's focus.

Out of the 386 completed questionnaires, 8 were deemed invalid and thus excluded from subsequent analysis. Table 1 delineates the demographic profiles of the respondents, ensuring that our sample was representative of a diverse population engaged in pro-environmental behaviors.

**Table 1.** Participants' demographic characteristics.

Variables	Categories	Number of Participants (n)
Gender	Male	176
	Female	202
Age	18–25	22
	26–35	174
	36–45	102
	46–55	44
	56–65	29
	≥66	7
Education	High school and below	24
	Vocational college	16
	Bachelor's graduate	255
	Master's degree and above	83
Income	≤13.414	22
	13.415–20.500	46
	20.501–30.500	105
	31.501–50.500	93
	50.501–70.500	54
	≥70.501	58
Occupation	Student	17
	Private sector employees	212
	Government employees	45
	Educational professionals	68
	Traders	12
	Entrepreneurs of small enterprises	16
	Unemployed	8

The table delineates demographic data derived from 378 respondents, encompassing a spectrum of variables, such as gender, age, educational attainment, monthly income, and occupation. Data were collected in the year 2023.



#### 4.2. Instrument

The current study aims to understand the psychological factors influencing consumers' pro-environmental efforts as determinants of their pro-environmental behaviors. To this end, it measures a total of five constructs, including consumers' perceptions of self-efficacy, feelings of pride, and sensations of social pressure. The scale items we used, comprising items used in previous research that have been validated and found to be reliable, were originally (see Appendix A) translated from English into Turkish (see Appendix A) and then re-translated back into English to minimize semantic losses [87]. All items were adapted to fit the context of the specific research topic in question.

The scales used in the survey were ranked on a 5-point Likert scale ranging from "strongly agree" to "strongly disagree".

### 5. Results

#### 5.1. Data Preparation and Cleaning

In the preparatory phase of this research, we diligently executed a series of data preparation steps prior to implementing PLS-SEM. This comprehensive data preparation included meticulous inspection for duplicate entries and inconsistencies within the dataset, followed by precise manual corrections to uphold the accuracy and adherence to the expected data format. This preliminary data integrity check was critical for laying the groundwork for a reliable PLS-SEM analysis.

To contend with missing values, our approach utilized multiple imputations [85]—a method lauded for its capacity to preserve the original data's variability and intercorrelations. This approach facilitated the generation of multiple plausible datasets, thereby circumventing potential biases associated with incomplete data and ensuring a faithful representation of our target population within the dataset. Additionally, a systematic approach was adopted for outlier detection utilizing Z-scores. Data points that deviated more than three standard deviations from the mean were not removed but instead capped, minimizing the distortion of data analysis results while safeguarding valuable information. This method maintained the dataset's integrity, striking an essential balance between the data's purity and comprehensiveness [88]. Having thoroughly cleansed and curated the data, we confidently advanced to the PLS-SEM analysis, assured that our dataset was a dependable proxy for the population under study.

#### 5.2. Validation of the Measurement Model

This study utilized the PLS-SEM method due to the need to examine complex relational structures and test theoretical hypotheses. The SmartPLS 4 software package was chosen for the analyses. This method offers advantages such as adapting to flexible data distribution conditions and obtaining reliable results even with small sample sizes [88]. In this part of the study, details regarding the application of the model and the analysis process are discussed. Figure 2 illustrates the graphical results of the PLS-SEM analysis, providing a visual representation of the model's structural relationships.

The measurement model enables the examination of the consistency and accuracy of the connections between latent variables and their corresponding observable variables. To ensure the validity and reliability of these measurements, three types of tests are proposed: reliability, discriminant validity, and convergent validity. The model in question comprises six latent variables, including social pressure (SP), recycling efforts (REs), self-efficacy (SE), pro-environmental behavior (PEB), and feelings of pride (FP). In evaluating the measurement model, factor loadings were assessed alongside the composite reliability (CR), convergent validity (AVE), and discriminant validity (Table 2). The analysis revealed that the factor loadings for each variable exceed 70 percent [89].

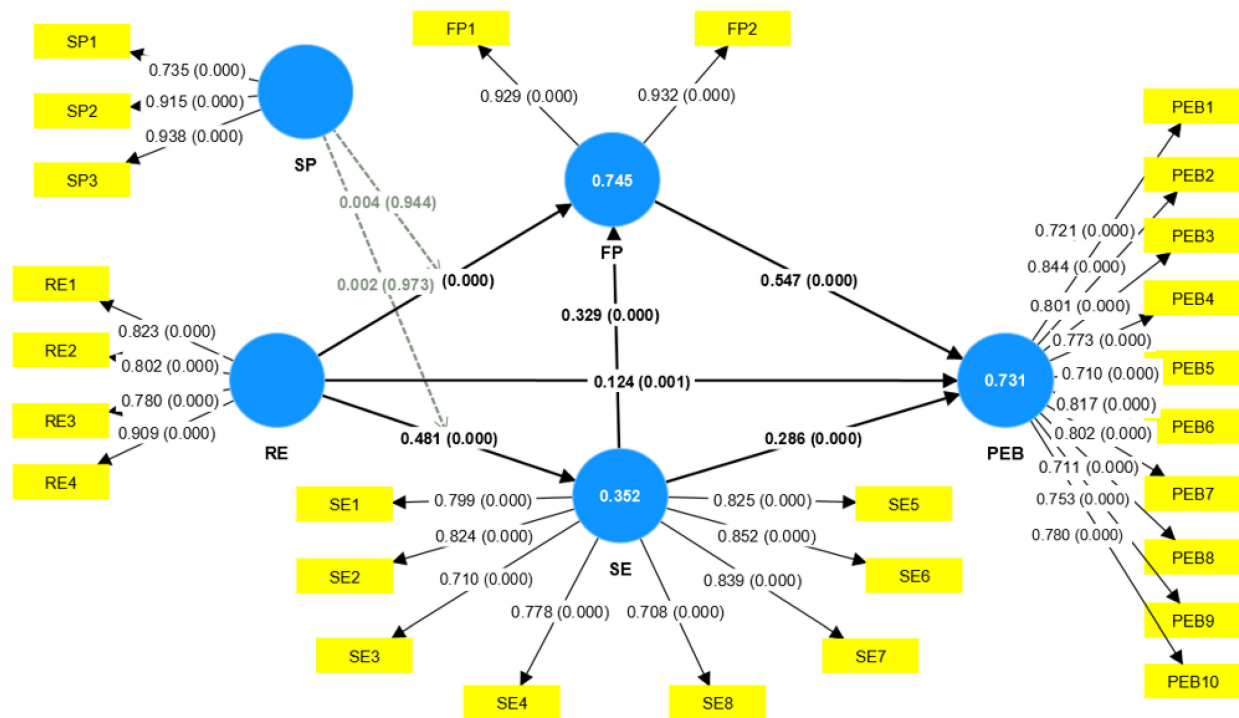


Figure 2. PLS-SEM path model with loadings and path coefficients.

Table 2. The assessment of the reliability of the scales.

Constructs/Indicators	Items	Mean	St. dev.	Loading	VIF
Feelings of Pride: $\alpha = 0.845$ ; CR = 0.928; AVE = 0.866	FP1	1.845	0.786	0.930	1.428
	FP2	1.478	0.670	0.932	1.428
Pro-Environmental Behavior: $\alpha = 0.875$ ; CR = 0.904; AVE = 0.622	PEB1	1.804	0.746	0.724	1.799
	PEB2	2.079	1.026	0.842	1.393
	PEB3	1.460	0.651	0.801	1.509
	PEB4	2.220	0.999	0.774	1.465
	PEB5	2.337	0.910	0.710	1.895
	PEB6	2.138	0.833	0.817	1.646
	PEB7	1.540	0.725	0.802	1.498
	PEB8	1.530	0.660	0.712	1.431
	PEB9	2.030	0.730	0.753	1.478
	PEB10	3.710	0.658	0.781	1.528
Recycling Efforts: $\alpha = 0.854$ ; CR = 0.898; AVE = 0.689	RE1	1.455	0.599	0.823	1.523
	RE2	1.674	0.647	0.803	1.571
	RE3	1.677	0.686	0.780	1.793
	RE4	1.900	0.699	0.909	2.315
Self-Efficacy: $\alpha = 0.913$ ; CR = 0.929; AVE = 0.624	SE1	1.472	0.517	0.798	1.588
	SE2	1.334	0.513	0.824	1.763
	SE3	1.721	0.647	0.710	1.912
	SE4	1.757	0.656	0.777	2.395
	SE5	1.795	0.626	0.825	2.645
	SE6	1.405	0.525	0.851	1.782
	SE7	1.733	0.647	0.839	1.834
	SE8	1.320	0.531	0.709	1.532
Social Pressure: $\alpha = 0.781$ ; CR = 0.872; AVE = 0.701	SP1	1.384	0.703	0.735	1.581
	SP2	1.416	0.610	0.915	2.043
	SP3	1.232	0.455	0.938	1.415

Abbreviations: FP = feelings of pride, PEB = pro-environmental behavior, REs = recycling efforts, SE = self-efficacy, SP = social pressure, AVE = average variance extracted, and CR = composite reliability.

To assess the psychometric soundness of the five measurements' constructs, we implemented confirmatory factor analysis (CFA). The data in Table 1 reveal that each factor loading was notably significant ( $p < 0.001$ ), with values spanning from 0.710 to 0.938. Subsequently, in this study, we applied the stringent convergence criterion established by Fornell and Larcker [90]. Convergent validity assesses the degree of correlation among various indicators of a specific construct, ensuring a consensus in their measurement. According to these criteria, non-convergent variables exhibit absolute correlation coefficients less than 0.5. To fulfill the conditions of convergent validity, the composite reliability (CR) values must exceed 0.70, and the average variance extracted (AVE) values must surpass the 0.50 threshold [91,92]. This indicates internal consistency among the questions posed for each variable. The AVE condition represents a rigorous test for convergent validity, requiring that all observed variable ratios to the latent variables exceed the value of 0.50 [93]. This confirms that all scales used in our research possess convergent validity. Moreover, when both convergent validity and internal consistency reliability are confirmed, the homogeneity of the scale used to measure a construct is validated [94].

Further reinforcing this notion, the composite reliability (CR) indices for these constructs varied between 0.872 and 0.929. The Cronbach's alpha values were consistently 0.781 or higher (refer to Table 2), significantly surpassing the standard threshold of 0.7, indicating robust measures. Additionally, the average variance extracted (AVE) for each construct was between 0.622 and 0.866, surpassing the advised benchmark of 0.50. Furthermore, the constructs demonstrated discriminant validity, as evidenced by each construct's AVE being higher than its highest squared correlation with any other construct.

The Fornell and Larcker criterion was employed to assess discriminant validity. Discriminant validity examines the strength of the relationship between observable variables and their associated constructs and compares this relationship with other latent variables [95]. It involves comparing the square roots of the relevant constructs' average variance extracted (AVE) values with their correlations with other constructs [96]. If the square root values of the AVE values are more significant in these comparisons, discriminant validity is achieved [90]. The discriminant validity results are presented in the table below (Table 3). The cross-values represent the square root values of the AVE values, which are greater than the correlations between latent variables. The discriminant validity of the models discussed in Tables 3 and 4 were confirmed.

**Table 3.** Discriminant validity—the Fornell and Larcker criterion.

	FP	PEB	RE	SE	SP
FP	<b>0.931</b>				
PEB	0.828	<b>0.788</b>			
REs	0.819	0.715	<b>0.830</b>		
SE	0.698	0.726	0.583	<b>0.790</b>	
SP	0.596	0.501	0.665	0.473	<b>0.837</b>

Abbreviations: FP = feelings of pride, PEB = pro-environmental behavior, REs = recycling efforts, SE = self-efficacy, and SP = social pressure. The diagonal in bold displays the square roots of the average variance extracted (AVE) values.

**Table 4.** HTMT ratio for assessing discriminant validity among constructs.

	FP	PEB	REs	SE	SP	SP × REs
FP						
PEB	0.785					
REs	0.625	0.775				
SE	0.778	0.800	0.596			
SP	0.696	0.565	0.769	0.541		
SP × REs	0.474	0.376	0.531	0.334	0.651	

Abbreviations: FP = feelings of pride, PEB = pro-environmental behavior, REs = recycling efforts, SE = self-efficacy, and SP = social pressure.

Additionally, we tested the HTMT (Heterotrait–Monotrait) criterion for a more rigorous discriminant validity analysis. This ratio assesses whether the constructs have discriminant validity by being below 0.85 or, in some cases, below 0.90 [91]. If the HTMT ratio exceeds this threshold, it may indicate insufficient discriminant validity between the constructs. In other words, if there is a high correlation between the constructs, it may be inferred that they are not distinctly different and might be measuring the same concept. Upon examining Table 3 and taking the 0.85 threshold as a reference, it can be observed that there is no high correlation among all the constructs.

In statistical modeling represented in Table 5 the R-squared ( $R^2$ ) and Q-squared ( $Q^2$ ) values are used to measure a model's goodness of fit [88]. The R-square value reflects the percentage of variance in the dependent variable that can be predicted from the independent variables. At the same time,  $Q^2$  assesses the model's predictive power and generalizability to new datasets [89].

**Table 5.**  $R^2$  and  $Q^2$  Metrics for endogenous variables in structural models.

Latent Constructs	R-Square ( $R^2$ )	Adj. R-Square	Q-Square ( $Q^2$ )
FP	0.745	0.742	0.622
PEB	0.731	0.728	0.558
SP	0.353	0.347	0.311

Abbreviations: FP = feelings of pride, PEB = pro-environmental behavior, and SP = social pressure.

The analysis results suggest that the FP and PEB models account for a significant portion of the variance in the dependent variable. The R-squared values for these models are 74.5% and 73.1%, respectively, with adjusted  $R^2$  values of 74.2% and 72.8%, indicating the independent variables' effectiveness in explaining this variance. Moreover, the  $Q^2$  values of 62.2% for FP and 55.8% for PEB denote that the predictive power of these models is quite robust and that they can be generalized to new datasets.

On the other hand, as a moderating variable, the low  $R^2$  (35.3%) and  $Q^2$  (31.1%) values for SP suggest that it explains a smaller amount of variance in the dependent variable when it interacts with the main independent variables in the model. This suggests that the role of SP is more limited regarding the model's overall explainability and predictive capability. SP's lower values indicate a more nuanced role that requires further exploration, particularly when examining how it moderates the relationship between the independent and dependent variables.

### 5.3. Hypothesis Testing

In environmental psychology, the focus often lies on how various factors contribute to pro-environmental behavior. This can include personal factors such as an individual's sense of self-efficacy or collective factors like perceived social pressure. Statistical analysis allows us to measure the direct effects of these factors on environmental behaviors and explore whether any intervening or moderating variables might influence these effects.

The following table illustrates the outcomes of such hypothesis testing, demonstrating the interplay between personal and social factors in shaping pro-environmental behaviors.

Table 6 reports path coefficients, the significance levels of the relationships, and t-statistics. According to our analysis, recycling efforts (REs) have a modest impact on pro-environmental behavior (PEB), with a path coefficient that suggests a positive but not strong relationship ( $\beta = 0.124$ ,  $p < 0.001$ ). Therefore, H1 is accepted. Similarly, self-efficacy (SE) shows a more substantial influence on PEB ( $\beta = 0.286$ ,  $p < 0.001$ ), indicating that as individuals' belief in their capabilities increases, so does their engagement in behaviors that are beneficial to the environment. This confirms H2.

**Table 6.** Path coefficients and statistical significance of hypothesized relationships in pro-environmental behavioral model.

Hypothesis	Path Coefficient	t-Value	p Values	Results
Direct Effects				
H1. REs -> PEB	0.124	2.522	0.001 ***	Supported
H2. SE -> PEB	0.286	7.435	0.000 ***	Supported
H3. REs -> SE	0.481	7.056	0.000 ***	Supported
H4. REs -> FP	0.597	12.411	0.000 ***	Supported
H5. SE -> FP	0.329	7.023	0.000 ***	Supported
H6. FP -> PEB	0.547	7.851	0.000 ***	Supported
Moderating Effects				
SP × REs -> SE	0.002	0.034	0.973	Not Supported
SP × REs -> FP	0.004	0.071	0.944	Not Supported
Mediating Effects				
REs -> SE -> FP -> PEB	0.086	3.538	0.000 ***	Supported

Note: Sig. level: \*\*\*  $p < 0.001$ . Abbreviations: FP = feelings of pride, PEB = pro-environmental behavior, REs = recycling efforts, SE = self-efficacy, and SP = social pressure.

Furthermore, the results reveal that REs have a direct and significant effect on SE ( $\beta = 0.481$ ,  $p < 0.001$ ) and feelings of pride (FP) ( $\beta = 0.597$ ,  $p < 0.001$ ), with FP having a relatively higher degree of influence, as shown by its t-statistic ( $t = 12.411$ ). These findings support H3 and H4, respectively. Additionally, SE was found to have a significant positive effect on FP ( $\beta = 0.329$ ,  $p < 0.001$ ); thus, H5 is supported. More notably, FP have a strong positive impact on PEB ( $\beta = 0.547$ ,  $p < 0.001$ , the highest among the direct effects), suggesting that the emotional response of pride is a powerful motivator for engaging in pro-environmental behaviors. Hence, H6 is accepted.

Contrary to the direct effects, the moderating effects of social pressure (SP) on the relationships between REs and both SE and FP are not supported, as indicated by the insignificant path coefficients ( $\beta = 0.002$ ,  $p = 0.973$ ;  $\beta = 0.004$ ,  $p = 0.944$ ). Therefore, both H7 and H8 hypotheses are not accepted, implying that social pressure does not alter the impact of recycling efforts on self-efficacy and feelings of pride.

Finally, the mediating effect of REs through SE and FP on PEB is significant ( $\beta = 0.086$ ,  $p < 0.001$ ), suggesting that the chain of influence from recycling efforts to pro-environmental behavior is partially driven by self-efficacy and feelings of pride. This supports H9 and indicates a complex interplay of cognitive and emotional factors in adopting pro-environmental behaviors.

This study's findings align with the prevailing trends in environmental psychology and offer distinctive insights into consumer behavior. The results indicate that in a cultural context where social and individual actions are closely intertwined, personal factors like self-efficacy and feelings of pride significantly motivate pro-environmental behavior. This suggests a societal framework where individual action and self-perception are esteemed and play a crucial role in driving environmental initiatives.

## 6. Discussion

This study illuminates the interplay between cognitive and emotional factors in shaping pro-environmental behaviors among consumers. The findings support the hypothesis that personal and social factors are critical in shaping pro-environmental behaviors. The substantial effect of SE on PEB suggests that individuals' belief in their capabilities significantly enhances their engagement in environmental behaviors. This aligns with the broader literature, which often highlights the importance of self-efficacy in behavioral change [97–99].

The pronounced positive influence of pride on pro-environmental behavior underscores the significance of integrating emotional appeals into environmental campaigns and policies. This strategy encompasses emphasizing the personal satisfaction and sense of



pride associated with contributing to environmental protection, which resonates effectively with audiences. Such an approach highlights the pivotal role of emotional engagement in enhancing the effectiveness of environmental initiatives.

Interestingly, while FP emerged as a strong motivator for PEB, the moderating effects of social pressure (SP) on the relationships between REs and both SE and FP were not supported. This suggests that the impact of recycling efforts on self-efficacy and feelings of pride is not significantly altered by social pressure, indicating that internal factors such as pride may have a more pronounced impact on pro-environmental behavior than external social influences. This may indicate that individuals place more importance on their internal motivations and emotional responses than external social pressures when engaging in pro-environmental behaviors. This aligns with the finding that normative influences can potentially increase the frequency of recycling yet do not lead to a significant increase in absolute participation levels, and these effects can be easily masked by natural variations [100]. However, these results may suggest that societal and cultural values and norms are decisive in individual environmental protection actions. Particularly in developing societies like Turkey, as the value of individual achievement and personal development is emphasized, this situation may have led individuals to act with internal motivations that surpass social pressure [101,102]. However, cultural norms and values can deeply influence individual and collective environmental actions. In some cultures, communal efforts towards sustainability may be more prevalent, thereby enhancing the adoption of pro-environmental behaviors. Conversely, in societies where individualism is more emphasized, personal benefits and incentives might play a more significant role in promoting such behaviors. Similarly, socio-economic status can impact access to the resources needed to engage in environmentally friendly practices, making it easier for some demographic groups to participate than others [101].

Additionally, increasing awareness and education about the environment can make individuals more sensitive to the importance of environmental issues, directly affecting their behavior. Personal experiences, especially for individuals who have encountered the direct effects of environmental problems, can function as a motivating force independent of social pressure. Media diversity and access to information are critical in enhancing environmental awareness and education, which can direct individuals toward environment-protecting actions [103,104]. Finally, economic factors might be a significant motivation for adopting eco-friendly products or recycling, suggesting that individuals may prefer such behaviors due to financial advantages.

The significant mediating effect of REs through SE and FP on PEB suggests a complex interplay between cognitive and emotional factors, where the chain of influence from recycling efforts to pro-environmental behavior is partially driven by self-efficacy and emotional responses like pride. Hence, it highlights a dynamic where cognitive assessments of one's abilities are profoundly influenced by the emotional rewards of action, creating a feedback loop that strengthens environmental commitment [105,106]. This complex interaction suggests that interventions to promote pro-environmental behaviors must address both the cognitive perceptions of ability and the emotional outcomes of environmental actions to be effective. Moreover, this mediating effect also hints at the role of social and cultural influences in shaping environmental behaviors. In societies where environmental consciousness is highly valued, the social recognition associated with recycling can further amplify feelings of pride, thereby enhancing the impact of self-efficacy on pro-environmental behaviors [26]. This adds another layer to the cognitive–emotional interplay, indicating that the social environment can significantly modulate the psychological pathways leading to environmental action.

The intricate relationship dynamics elucidated by this study offer profound insights for policymakers and marketers, underscoring the pivotal role of emotional engagement, particularly pride, in fostering pro-environmental behaviors. Recognizing the power of such emotions suggests that crafting initiatives and narratives that elevate the visibility and societal appreciation of recycling efforts could yield remarkable effectiveness. Strategies

might extend beyond mere rewards, encompassing comprehensive public acknowledgment schemes and innovative campaigns that intertwine personal environmental contributions with broader narratives of national pride and ecological progress, thereby incentivizing and culturally embedding these practices.

## 7. Future Implications

This research establishes a foundation for a comprehensive examination of the cultural foundations of psychological motivators and advocates for an intersectional approach. Recognizing the varied socio-economic conditions in developing societies is crucial. This approach refines environmental programs to align with the collective ethos, enhancing their effectiveness in fostering sustainable actions.

The insights gained deepen our understanding of the psychological framework supporting pro-environmental behavior. They emphasize the synergy between cognitive beliefs and emotional rewards in environmental engagement. To advance this understanding, future studies should explore the mechanisms by which emotions like pride catalyze environmental stewardship. These findings can help formulate more effective environmental policies and initiatives by strategically integrating psychological insights with cultural intelligence, aiming to foster a sustainable ethos across developing societies.

The role of pride in various cultural settings may serve as a model for leveraging emotional drivers to develop robust environmental policies and practices. This approach combines psychological insights with cultural intelligence, nurturing a sustainable ethos in societies where traditional and contemporary values frequently converge.

However, this study has limitations in comprehensively addressing the influences of cultural diversity, socio-economic status, and geographic location on pro-environmental behaviors. Future research should delve deeper into these dimensions, expanding the framework to include diverse cultural backgrounds, varying economic conditions, and different geographic settings. This expansion could significantly enhance our understanding of the drivers behind pro-environmental behaviors globally, leading to tailored and effective strategies that are sensitive to local contexts and conditions.

Economic dimensions are also vital for policy development. Assessing economic incentives like subsidies and tax breaks for their effectiveness across different socio-economic backgrounds is necessary. If perceived as ethically correct and economically advantageous, these incentives might promote the wider adoption of eco-friendly practices.

Further research could explore the dual role of social norms as both a mechanism of pressure and a supportive framework. Studies might investigate how community-led initiatives or public acknowledgment of eco-friendly actions enhance the positive emotions associated with them, consequently increasing their frequency. Developing interventions that utilize the power of social norms could be a promising direction, involving social marketing campaigns that employ normative messages to emphasize the widespread acceptance and endorsement of sustainable practices. Highlighting community leaders or influencers who exemplify pro-environmental behaviors could establish a behavioral standard for others to emulate.

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## Appendix A

**Table A1.** Constructs and items.

Constructs/Indicators	Items
Feelings of pride (adapted from [107])	I am proud of my recycling efforts. I feel good about my recycling efforts.
Pro-environmental behavior [108]	Turn off the lights at home when they are not in use. Ask my family to recycle some of the things we use. Ask other people to turn off the water when it is not in use. Close the refrigerator door while I decide what to get out of it. Recycle at home. Choose and environmental topic when I can choose a topic for an assignment in school. Talk with my parents about how to do something about environmental problems. Ask others about things I can do about environmental problems. Walk for transportation. Bike for transportation.
Recycling efforts [4,16,64]	I usually separate and dispose of all recyclable materials. I have high-level involvement in recycling activities. I tend to buy products which can be recycled in the future. I have high adherence levels to separating and disposing recyclable materials.
Self-efficacy (adapted from [109,110])	I am able to achieve most of the goals that I set for myself. When facing difficult tasks, I am certain that I will accomplish them. In general, I think that I can obtain outcomes that are important to me. I believe I can succeed at most any endeavor to which I set my mind. I am able to successfully overcome many challenges. I am confident that I can perform effectively on many different tasks. Compared to other people, I can do most tasks very well. Even when things are tough, I can perform quite well.
Social pressure (adapted from [16,111])	If my family and friends are involved in e-waste recycling, I will also engage in it. The media influences me to recycle e-waste. The community where I live would influence me to participate in recycling e-waste.

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