



The Influence of Self-Control and New Ecological Paradigms on Pro-Environmental Behavior

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ABSTRACT

Background: Environmental challenges are increasingly seen as a result of human mismanagement, posing a significant threat to the planet. This study examines the relationship between self-control and pro-environmental behaviors (PEBs), as well as the influence of the New Ecological Paradigm (NEP) on PEBs in employees of public spaces and food preparation and distribution centers.

Methods: This cross-sectional study surveyed 341 employees in the city of Khodabandeh in the year 2023 using convenience sampling. Data collection involved the NEP, the short version of self-control, and PEBs scales. Analysis was performed using multiple linear regression via SPSS 26 at a significance level of $p < 0.05$.

Results: The multiple linear regression showed that self-control ($\beta = 0.379, p < 0.001$) and NEP ($\beta = 0.233, p < 0.001$) had significant positive impacts on PEBs. The mean scores for self-control, NEP, and PEBs were 58.89 ± 14.06 , 60.65 ± 11.14 , and 58.73 ± 16.45 out of 100, respectively. In addition, Age was not significantly related to PEBs, while men exhibited fewer PEBs than women ($\beta = -0.203, p < 0.001$).

Conclusion: The findings underscore the importance of self-control and environmental attitudes in promoting PEBs, guiding strategies to enhance PEBs, particularly by strengthening self-control and changing negative attitudes among men.

1. Introduction

Contemporary environmental challenges, such as global warming and air pollution, are partly attributable to human behavioral practices (Alimardani et al., 2024). A key issue in studying pro-environmental behaviors (PEBs) is understanding the relationship between humans and the environment. As part of this ecosystem, humans have a considerable capacity to change and impact the environment. In fact, one of the most effective ways to prevent environmental harm and degradation is to shift human behaviors towards nature-friendly and pro-environmental actions (Nazari & Kiani, 2022). PEBs are actions taken by individuals to minimize their negative impact on the environment. These behaviors aim to promote the sustainability of natural systems. They can range from simple actions like recycling and conserving energy to more complex decisions, such as supporting environmental

policies and adopting sustainable lifestyles (Steg & Vlek, 2009). PEBs are shaped by multiple interrelated factors, including environmental knowledge, attitudes, social norms, and individual motivations (Han, 2015). Among these factors, environmental attitudes are widely regarded as a key motivational determinant influencing pro-environmental behaviors (Yadav & Pathak, 2017). Environmental attitudes are commonly defined as individuals' cognitive evaluations of the importance and value of environmental protection, which play a critical role in shaping behavioral intentions and actual behaviors (Milfont & Duckitt, 2004).

From the New Ecological Paradigm (NEP) perspective, environmental attitudes are expected to play a central role in shaping pro-environmental behaviors. Environmental attitudes reflect concerns for the conservation of wildlife and natural resources and the broader protection of the environment. This view is consistent with the NEP proposed by Catton and Dunlap (1978), which challenged the Human



Exemptionalism Paradigm by emphasizing that humans are embedded in, and dependent on, the global ecosystem, with reciprocal interactions between social processes and environmental conditions. Studies indicate a strong, positive relationship between the NEP and PEBs. Evidence shows that individuals who score higher on the NEP are more likely to participate in environmental behaviors, such as recycling, conserving resources, and using sustainable technologies. This relationship holds across various populations, including children, students, and adults in diverse cultural settings. Additionally, the NEP plays a crucial mediating role in theoretical frameworks that link personal values to environmental actions. In this context, the NEP acts as a psychological mechanism through which environmental attitudes are transformed into concrete behaviors. Moreover, cross-cultural research reveals that while the NEP consistently predicts pro-environmental intentions, its impact may be influenced by socio-economic factors and cultural norms. These findings highlight the importance of fostering ecological worldviews as a strategy for enhancing environmental management and sustainable behaviors globally (Agissova & Sautkina, 2020; Wang et al., 2023).

Wang et al. (2023) demonstrated in their study that NEP plays a fundamental role in motivating sustainable and PEBs. However, in some studies, the relationship between NEP and PEBs has been reported to be weak (Ahmadi et al., 2022; Chaudhary & Sharma, 2020). The strength of this relationship is influenced by cultural differences (Jiang & Kassoh, 2023) and the cultural and social environment (Wang et al., 2024).

Behavior is determined not only by individuals' motivation and attitudes but also by their ability to overcome obstacles to desired behaviors or self-control. For this reason, self-control is often essential for turning motivations into actual behaviors (Fishbach & Trope, 2005). Self-control is the ability to regulate one's impulses and desires. Individuals with self-control can adjust their wants to avoid extremes. While it appears that people are inclined to engage in PEBs, many have cited barriers to these behaviors, underscoring the importance of self-control (Peattie & Crane, 2005). PEBs typically demand more sacrifice, time, and effort than conventional behaviors (Gleim et al., 2013; Peattie & Crane, 2005). Chiang et al. (2019) discovered in their study that individuals with a stronger internal locus of control are more actively engaged in PEBs. Similarly, Hines et al. (1987) and Nazneen and Asghar (2016) found that individuals with greater control over their lives are more inclined to engage in environmental protection. Although there have been numerous studies on PEBs and environmental attitudes in Iran, no study has explored the relationship between self-control, NEP, and PEBs. Employees in public spaces and food preparation and distribution centers play a key role in managing and maintaining public spaces and food-related facilities. This group includes individuals responsible for parks, offices, shopping centers, hotels, restaurants, and other public establishments. Given their direct interaction with various segments of society, they can play a significant role in PEBs. This study was designed to examine the relationship between NEP, self-control, and PEBs among

employees in public spaces and food preparation and distribution centers in the city of Khodabandeh.

2. Materials and Methods

2.1 Study Design and Participants

This cross-sectional study was conducted in 2023, in Khodabandeh, Zanjan, Iran, with 341 employees from food preparation and distribution centers and public spaces participating. The inclusion criteria were: (1) at least six months of employment in one of these settings, (2) being 18 years of age or older, (3) literacy in reading and writing, (4) the ability to respond to questions, and (5) consent to participate in the study.

2.2 Sample Size and Sampling Method

The sample size for this study was determined using the Cochran formula, considering the defined population of 3,204 employees in food preparation and distribution centers and public spaces covered in Khodabandeh city. With an assumption of 50% for both p and q in PEBs and a 5% margin of error, the calculated sample size was 341 participants. Although the initial sample size was calculated for estimating a single proportion, the final sample was sufficient for conducting multivariate regression analyses. With six predictors in the final models and a recommended guideline of 10 to 15 participants per predictor, the sample size provided adequate statistical power.

2.3 Measurement Tools

The data collection tool comprised a four-part questionnaire. The first section gathered demographic information about the participants, including age, gender, education level, and occupation.

The second section assessed environmental attitudes using the Persian version of the NEP questionnaire. The validity and reliability of this Persian version were evaluated by Hosseinneshad (2017) in the Iranian population. The items of this tool were validated across four dimensions: growth limitations (4 items), anti-anthropocentrism (4 items), fragility of nature's balance (3 items), and the possibility of an ecological crisis (4 items). The responses were measured on a 6-point Likert scale (Strongly Agree = 6 to Strongly Disagree = 1), with higher scores indicating more favorable environmental attitudes.

The third section measured self-control using the Persian version of the Brief Self-Control Scale (BSCS), which includes 13 items based on a Likert scale ranging from 1 (Never) to 5 (Always). The validity and reliability of the Persian version were established by Asgarian et al. (2020) in the Iranian population. Items 2, 3, 4, 5, 7, 9, 10, 12, and 13 were reverse-coded. Higher scores reflect better self-control.

The fourth section assessed PEBs using a questionnaire developed by Neisi et al. (2020), whose validity and reliability were confirmed. This tool evaluates PEBs across five dimensions: energy consumption, water conservation,

soil conservation, recycling, and environmental activities, comprising 33 items. Responses were rated on a 5-point Likert scale (Strongly Disagree = 1 to Strongly Agree = 5), with higher scores indicating better pro-environmental behaviors. The reliability of the questionnaires was evaluated by 30 participants from the target group, and Cronbach's alpha coefficients were computed. The coefficients obtained were 0.937 for the PEBs, 0.734 for the NEP, and 0.830 for the self-control questionnaire.

2.4 Statistical Analysis

Data analysis was conducted using SPSS 26 software. Descriptive results were presented as frequencies, percentages, means, and standard deviations. To examine the relationship between the independent variables (NEP, self-control, and demographic characteristics) and PEBs, multiple linear regression was used. Categorical variables were coded using dummy variables (0 and 1). Initially, univariate linear regressions were performed, and variables with $p < 0.05$ were included in the multivariate models. Regression was conducted using the Enter method. Multicollinearity was assessed using Variance Inflation Factors (VIF). The regression assumptions, including normality, homogeneity of variance, and independence of residuals, were tested and confirmed. Normality of the data was confirmed by skewness (< 2) and kurtosis (< 7) values (Kim, 2013). Statistical significance was set at $p < 0.05$.

3. Results and Discussion

A total of 341 employees from public spaces and food preparation and distribution centers in Khodabandeh participated in the present study. The mean age of the participants was 36.42 ± 9.71 years, with an age range of 18 to 71 years. Overall, 80.6% of the participants were male. The demographic characteristics of the study population are summarized in Table 1.

Self-control, the NEP, and PEBs were evaluated among the participants. The findings showed that the highest PEBs mean scores were observed in the domains of energy

consumption and water conservation, whereas the lowest mean score was related to environmental activities. Furthermore, with regard to NEP, participants achieved the highest mean score in the anti-anthropocentrism dimension and the lowest mean score in the growth limitations dimension (Table 2).

In the present study, the relationships between self-control, the NEP, and demographic characteristics and PEBs were examined using multiple linear regression analysis (Table 3). The results showed that self-control ($\beta = 0.379, p < 0.001$) and the NEP ($\beta = 0.233, p < 0.001$) were positively and significantly associated with PEBs. Age was not significantly related to pro-environmental behaviors. However, gender had a significant effect, such that men exhibited lower levels of pro-environmental behaviors than women ($\beta = -0.203, p < 0.001$). Furthermore, participants with a high school diploma or university education demonstrated more favorable pro-environmental behaviors compared with those with less than a high school education. The final model accounted for 37.7% of the variance in PEBs.

In the subsequent phase of the analysis, the mediating role of the NEP was examined. A mediator is a third variable that explains the mechanism through which an independent variable influences a dependent variable. In this study, the mediating role of the NEP in the relationship between self-control and PEBs was assessed using the three-step mediation framework proposed by Baron and Kenny (1986). Within this framework, the direct association between the independent variable (self-control) and the dependent variable (PEBs) was first examined, followed by an evaluation of the mediating role of the NEP. In the first step, the relationship between self-control and the NEP, as the proposed mediator, was assessed using univariate linear regression. In the second step, the association between self-control and PEBs was examined. In the third step, multiple linear regression analysis was performed to evaluate the mediating effect of the NEP, and the Sobel test was applied to determine the statistical significance of the mediation effect. The results of the regression analyses and the Sobel test are reported in Table 4.

Table 1. Demographic Characteristics of Participants

Variable	Category	Frequency (n)	Percentage (%)
Gender	Female	66	19.4
	Male	275	80.6
Education level	Less than high school diploma	148	43.4
	Diploma	108	31.7
	University education	85	24.9
Type of workplace (public spaces and food preparation/distribution centers)	Juice and ice cream shop	3	0.9
	Hair salon	60	17.6
	Grocery store	127	37.2
	Restaurant, kebab shop, catering	39	11.5
	Fast food outlet	22	6.5
	Butcher / poultry shop	27	7.9
	Confectionery	17	5.0
	Swimming pool	2	0.6
	Kindergarten	6	1.8
	Fruit shop	21	6.2
	Bakery	17	5.0

Table 2. Mean and Standard Deviation of Self-Control, Environmental Attitudes, and Pro-Environmental Behavior Scores by Dimensions among Participants (n = 341)

Variable	Dimension	Possible Score Range	Observed Score Range	Mean	SD	Mean (out of 100)	SD (out of 100)	Kurtosis	Skewness
Self-Control	—	13-65	21-64	43.62	7.31	58.89	14.06	0.078	0.252
Environmental Attitudes (NEP)	Anti-anthropocentrism	4-24	6-24	17.72	3.44	68.58	17.20	0.054	-0.575
	Growth limitations	4-24	4-21	13.34	2.82	46.70	14.10	-0.700	1.250
	Possibility of an Ecological crisis	4-24	5-24	16.62	2.46	63.09	12.32	-0.258	1.321
	Fragility of nature's balance	3-18	7-18	12.53	2.52	63.54	16.82	0.243	-0.198
	Total environmental attitude score	15-90	38-82	60.49	8.55	60.65	11.40	0.052	-0.125
Pro-Environmental Behaviors (PEBs)	Energy consumption	5-25	8-25	19.24	3.42	71.22	17.10	-0.574	0.271
	Water conservation	5-25	9-25	19.01	3.91	70.07	19.58	-0.453	-0.389
	Soil conservation	3-15	3-15	10.19	2.60	60.00	21.70	-0.057	-0.312
	Recycling	9-45	10-45	28.72	7.50	54.80	20.84	-0.229	-0.149
	Environmental activities	11-55	16-55	33.34	8.31	50.78	18.90	0.156	-0.388
	Total pro-environmental behavior score	33-165	48-160	110.52	21.72	58.73	16.45	-0.193	0.059

Note: Data are presented as mean and standard deviation. For ease of comparison, all scores were converted to a 0-100 scale. Skewness and kurtosis were used to assess data normality (skewness < 2, kurtosis < 7). Higher scores indicate higher levels of self-control, more positive environmental attitudes, and stronger pro-environmental behaviors.

Table 3. Association between Environmental Attitudes, Self-Control, and Demographic Characteristics with Pro-Environmental Behaviors

Predictor	B	SE	β	t (df = 335)	p	95% CI (Lower - Upper)	Tolerance	VIF
Environmental Attitudes (NEP)	0.569	0.113	0.233	5.038	< 0.001	0.347 to 0.792	0.872	1.147
Self-Control	1.071	0.127	0.379	8.456	< 0.001	0.821 to 1.320	0.924	1.082
Age	0.125	0.104	0.059	1.206	0.229	-0.079 to 0.330	0.774	1.292
Gender (Male)	-10.628	2.451	-0.203	-4.337	< 0.001	-15.449 to -5.807	0.844	1.185
Education: Diploma	6.586	2.363	0.148	2.787	0.006	1.937 to 11.235	0.659	1.517
Education: University	13.710	2.414	0.289	5.678	< 0.001	8.960 to 18.459	0.718	1.393
Model statistics	R = 0.623		R2 = 0.389		ADJ.R2 = 0.377		Durbin-Watson = 1.536	
Dependent Variable: PEBs								

The Sobel test yielded a Z value of 2.26. As this value exceeded the critical threshold of 1.96, the mediating effect of attitudes on the relationship between self-control and PEBs was statistically significant. Moreover, although the direct effect of self-control on PEBs was attenuated after the NEP were entered into the model, it remained statistically significant, indicating partial mediation. Thus, the NEP plays a partial mediating role in the association between self-

control and PEBs. The present study aimed to investigate the association between self-control and the NEP with PEBs among employees of public spaces and food preparation and distribution centers in Khodabandeh. The results demonstrated that participants exhibited a moderate level of self-control, which is consistent with findings reported in previous studies (Gillebaart & Kroese, 2020; Strömbäck et al., 2023).

Table 4. Regression Analysis and Sobel Test Results for Examining the Mediating Role of Attitude in the Relationship between Self-Control and Pro-Environmental Behaviors

Step	Variables	Standardized Regression Coefficient (β)	Standard Error (SE)	p-value
Step 1	Mediator: Attitude Independent variable: Self-control	0.199 -	0.062 -	0.001 -
Step 2	Dependent variable: Pro-environmental behaviors Independent variable: Self-control	0.474 -	0.136 -	0.001 -
Step 3	Dependent variable: Pro-environmental behaviors Independent variable: Self-control Mediator: Attitude	- 0.434 0.200	- 0.136 0.118	- 0.001 0.001
Sobel test statistic: Z = 2.26, p = 0.001				

Note: The Sobel test confirmed that attitude significantly mediates the relationship between self-control and pro-environmental behaviors

Assessment of environmental attitudes using the NEP showed that participants obtained the highest mean scores in the anti-anthropocentrism dimension and the lowest in the growth limitations dimension, indicating an overall moderate level of environmental attitudes. These findings are consistent with those reported by Hosseinneshad (2017), who similarly observed moderate environmental attitudes,

with the lowest scores in the growth limitations dimension. Similarly, Abedi Sarvestani and Shahraki (2022) reported that the environmental attitudes of forest protection personnel in Golestan Province were at a relatively adequate level, though not strong. Nosratinejad et al. (2020) similarly reported that residents of Tehran demonstrated moderate to relatively high environmental attitudes; however, they

scored low in the growth limitations dimension, a key component of environmental attitudes. This indicates that participants had not yet developed a strong belief in the finite limits of nature or the need to regulate human growth and environmental intervention.

Participants demonstrated a moderate level of pro-environmental behaviors (PEBs), with the highest mean scores observed in energy consumption and water conservation and the lowest in environmental activities. Similar findings were reported by Bronfman et al. (2015), who found that PEBs in a Chilean community were most prominent in water and electricity conservation. This pattern may be attributed to urbanization-related increases in household income and energy use, along with heightened public awareness driven by extensive media coverage of water scarcity and climate change (Satterthwaite et al., 2010; Soltani et al., 2019). Because energy and water conservation are directly linked to household costs, individuals may be more motivated to adopt such behaviors due to both economic considerations and perceived social responsibility (Olsson, 2015; Wang et al., 2018). However, lower engagement in environmental activities may reflect the lack of coherent and structured national programs promoting broader environmental participation.

In the present study, the associations between self-control, environmental attitudes, and PEBs were examined. The results demonstrated that both self-control and environmental attitudes were positively associated with PEBs. Moreover, self-control was found to have not only a direct and statistically significant relationship with PEBs but also an indirect positive and significant effect through its influence on environmental attitudes. These findings are consistent with the results reported by Siregar et al. (2022). Previous studies suggest that individuals with a moderate locus of control exhibit more favorable attitudes toward cleanliness, conservation, and wildlife, while those with an external locus of control tend to show more positive attitudes toward energy resources (Nazneen & Asghar, 2016). Environmental attitudes may be understood through individuals' perceived sense of responsibility toward the environment (Pavalache-Ilie & Unianu, 2012). Consequently, individuals who believe they have control over their actions are more likely to engage in responsible PEBs and contribute to maintaining a clean and healthy environment. These individuals also demonstrate greater confidence in their ability to implement effective strategies to address environmental challenges (Siregar et al., 2022).

Although the findings of the present study did not reveal a statistically significant association between age and pro-environmental behaviors (PEBs), evidence from large-scale research indicates substantial generational differences in climate-related attitudes and engagement. For example, data from the Pew Research Center show that Generation Z exhibits greater concern about climate change than older age groups, prioritizes climate issues, and engages more with climate action-related content on social media (Tyson et al., 2021). The lack of a significant association between age and PEBs in the present study may be related to contextual

factors such as occupational homogeneity, shared social environments, and similar access to environmental information among participants, which could reduce observable age-related differences. Moreover, since PEBs were assessed at the individual level rather than specifically within workplace settings, age-related effects may have been attenuated or masked by other influential psychological factors, such as self-control and environmental attitudes.

In examining the association between gender and PEBs, the findings of the present study showed that women exhibited more favorable PEBs than men. This result is consistent with existing research (Kennedy & Kmec, 2018; Schulz et al., 2024), which has demonstrated that women report stronger intentions to engage in PEBs compared with men (Schulz et al., 2024). This finding can be explained through social role theory, which posits that individuals' behaviors are shaped by gender roles, as conformity to these roles is socially rewarded, whereas deviation from them is often sanctioned (Swim et al., 2020). In this context, engagement in PEBs has frequently been perceived as inconsistent with traditional masculine norms. For example, one study reported that men who participated in pro-environmental activities were labeled as feminine and subjected to ridicule (Rome, 2006). These findings suggest that PEBs are more commonly associated with feminine traits, and deviation from prescribed gender roles may result in social consequences such as marginalization or social distancing. Consequently, fear of negative social reactions may discourage men from engaging in PEBs (Schulz et al., 2024).

The findings of the present study indicated that individuals with a high school diploma or university education exhibited significantly better PEBs compared with those whose educational attainment was below the diploma level. In support of this finding, previous studies have consistently reported a positive association between education and PEBs, including consumption patterns, conservation practices, and sustainable lifestyles (Wang et al., 2022; Xu et al., 2012). Individuals with higher levels of education generally possess greater awareness and understanding of environmental issues and recognize the importance of environmental protection in promoting overall social well-being. Exposure to higher education often familiarizes individuals with concepts related to environmental sustainability, climate change, ecology, and conservation, which may enhance their awareness of the importance of protecting the environment (Varela-Candamio et al., 2018). Moreover, many universities offer formal courses and programs focused on environmental issues and sustainability, which can further prepare individuals to engage in PEBs (De Silva & Pownall, 2014). In addition, higher education may foster critical thinking skills and encourage a long-term perspective rather than immediate gratification. This orientation can enhance self-control, as individuals become better equipped to prioritize future environmental benefits over short-term convenience. With a deeper understanding of environmental consequences, individuals may develop stronger intrinsic motivation, thereby increasing self-regulatory behaviors

such as resisting convenience in favor of sustainable practices, including recycling and reducing plastic use.

This study has some limitations. First, convenience sampling may restrict the generalizability of the findings beyond the Khodabandeh region. Second, the reliance on self-report questionnaires introduced the potential for social desirability or recall bias; however, assurance of Participants' anonymity and data confidentiality served to reduce these potential biases. Third, workplace type was omitted from the analytical model, which represents a limitation, as unmeasured occupation-related factors may partially explain variance in pro-environmental behaviors. Finally, the cross-sectional design precludes causal inferences between PEBs, self-control, and environmental attitudes. Future studies incorporating probability sampling in different regions, employing longitudinal designs, and accounting for workplace-related variables are recommended to further validate these findings.

4. Conclusion

This study aimed to examine the relationship between self-control and environmental attitudes and PEBs in Khodabandeh, Zanjan, Iran. The findings indicated that participants generally exhibited moderate levels of self-control, environmental attitudes, and PEBs. The highest PEBs were observed in energy consumption and water conservation, whereas the lowest were related to environmental activities. Regarding environmental attitudes, the highest and lowest mean scores were observed in anti-anthropocentrism and growth limitations dimensions, respectively. The study also found that demographic factors, particularly gender and educational level, influenced PEBs. Women and individuals with a high school diploma or higher education demonstrated more favorable PEBs. Based on these results, it is recommended that policymakers and environmental authorities prioritize educational and empowerment programs aimed at strengthening PEBs, especially among men and individuals with lower educational attainment. Furthermore, public awareness campaigns focused on enhancing environmental knowledge, fostering positive environmental attitudes, and establishing visible social norms across different societal groups, particularly men, could effectively promote sustainable environmental behaviors.

Authors' Contributions

Mehran Mohammadian Fazli: Conceptualization; Funding acquisition; Investigation; Methodology; Project administration; Resources; Supervision; Writing-review & editing. **Ali Nazari:** Data curation; Investigation; Writing-original draft; Writing-review & editing. **Khadijeh Hajimiri:** Conceptualization; Formal analysis; Investigation; Methodology; Project administration; Software; Supervision; Validation; Visualization; Writing-original draft; Writing-review & editing.

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Conflicts of Interest

The authors declare that they have no conflict of interest.

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Ethical Considerations

This study, conducted as part of a master's thesis in Environmental Health Engineering, was approved by the Ethics Committee of the Research and Technology Vice Presidency at Zanjan University of Medical Sciences (ID code: IR.ZUMS.REC.1402.111). Before data collection, the research objectives were fully explained to the participants, and they were assured that their participation was entirely voluntary. The confidentiality of the data was ensured, and informed consent was obtained from all participants.

Using Artificial Intelligence

ChatGPT was used solely to improve grammar and language clarity.

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