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The impact of place attachment on pro-environmental behavior in educational spaces based on Seamon's theory (Case study: Girls' schools in Urmia)

Furugh Mirzaalipour [a], Razieh Labibzadeh [a,*] , Babak Motiei [b]

[a] *Department of Architecture, Science and Research Branch, Islamic Azad University,Tehran, Iran*
[b] *Department of Architecture, Urmia Branch, Islamic Azad University, Urmia, Iran*

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Abstract

In today's global society, the environment is considered one of the most important components for human communities. The interactions between humans and the environment, which occur continuously, influence human behavior towards the environment and shape environmentally friendly or supportive behaviors. Place attachment as a key structure for explaining environmental behaviors has been identified; however, the precise power of its impact has not been documented. The primary research question is how place attachment influences environmentally friendly behavior, and whether, in general, place attachment can significantly impact environmentally friendly behavior or not? This study aims to investigate Seamon's theory as one of the influential theories in the perspective of place attachment to identify the main factors. Then, based on these main factors with an impact on place attachment, interventions will be conducted to examine their influence on environmentally friendly behavior. To achieve the objectives, two steps are taken. In the first step, a descriptive-analytical research method is employed to examine Seamon's theory through a library study and extract influential components. Then, a semi-experimental design of pre-test-post-test with three-month follow-up was conducted with the intervention group. The results indicated that training in environmentally friendly behavior and environmental advocacy was effective in the post-test phase, and environmental conservation changes continued during the follow-up phase. Additionally, the results showed that even the control group attempted to preserve and maintain plants and the physical structure of classrooms and schools upon observing these changes in the experimental group during the implementation of green spaces and gardening in the classrooms. This demonstrates that strengthening environmental factors increases place attachment, consequently positively influencing environmentally friendly behavior. Given the effectiveness of the interventions, environmentally friendly behaviors can be incorporated into school-based programs to preserve the environment and the future of the world.

Keywords: Place attachment; Environmentally friendly behavior; Educational environment; Girls' school, High school; Seamon's theory; Environment

1. Introduction

The environment is one of the most crucial components for humanity. Interactions between humans and the environment, which occur continuously, influence human behavior towards the environment. Human attitudes and behaviors will determine the well-being of an environment. How humans interact with their environment will impact the quality of human life. The absence of human behavior that values the environment contributes to global environmental damage. Today, global policies are based on encouraging people to reduce harmful effects on the environment (Gifford, R., & Nilsson, A., 2014). Environmental protection and conservation are among the main challenges of our modern society. Therefore, understanding environmentally supportive behaviors in society and the factors influencing them is of paramount importance (Bronfman, N. C., Cisternas, P. C., López-Vázquez, E., De la Maza, C., & Oyanedel, J. C., 2015). In this regard, adolescents are a part of society that holds the potential to protect the environment (Lee, K., 2009).

Attitudes, knowledge, behaviors, and concerns that adolescents have about the environment directly or indirectly influence future decisions regarding natural resources and how to use them (Meinhold, J. L., & Malkus, A. J., 2005). Therefore, adolescents need motivation to become pioneers in environmentally supportive behaviors, and thus, challenges and modifications towards the environment are more easily accomplished at a young age (Ting, D. H., & Cheng, C. F. C., 2017). Researchers have various terms to describe environmental behaviors, such as responsible environmental behavior and valuing the environment, environmentally friendly behavior, and environmentally supportive behavior (Lee, T. H., Jan, F. H., & Yang, C. C., 2013). In this study, environmentally supportive behavior is used to describe behaviors that support and protect the environment.

* Corresponding Author Email: r.labibzadeh@gmail.com

Environmental behavior is a behavior that minimizes harm to the environment to the greatest extent possible and has numerous benefits for the environment (Stoknes, P. E., 2017). In this behavior, individuals pay attention to the environment and its consequences in all aspects of their lives and strive to preserve and sustain it. According to Kaiser's perspective, environmentally supportive behavior has six main characteristics: 1- energy conservation, 2- transportation, 3- waste avoidance, 4- recycling, 5- consumption, and 6- substitution behaviors for environmental protection. These six characteristics can be used to measure the desirable environmental behavior of each individual. These six characteristics can be used to explain environmentally supportive behavior through a widely used theory, the Theory of Planned Behavior (TPB). According to the TPB, multiple variables are used to explain environmentally supportive behavior, including attitude toward behavior, subjective norms, perceived behavioral control, and intention. Furthermore, various theories have been proposed to enhance place attachment, one of which is Seamon's place attachment theory. Now, considering the different influences of behaviors and conditions on environmentally supportive behavior, this study utilizes the most influential component of Seamon's theory of place attachment to assess and measure the extent of its impact on environmentally supportive behavior. The influence of the place attachment reinforcement component is analyzed using a questionnaire on environmentally supportive behavior to determine whether strengthening place attachment and environmental behaviors have a significant impact on environmentally supportive behavior or not.

2. Research Background

In recent years, several studies have examined and evaluated the relationship between place attachment and environmentally supportive behavior. In a study titled "Meta-analysis of the relationship between place attachment and pro-environmental behavior" conducted by Ahmad Daryanto and Zeng Sang in 2021, it was found that the overall effect of place attachment on environmentally supportive behavior is positive and has a significant positive impact. Secondly, the influence in collectivist cultures is greater compared to individualistic cultures. Thirdly, another factor depends on the type of place user, whether tourists or local residents. Fourthly, a general criterion for place attachment compared to measurements focusing on one of its dimensions creates a larger effect size. Ultimately, specific places measured in terms of environmentally supportive behavior have a greater impact compared to non-place factors (Daryanto, A., & Song, Z., 2021).

In another study conducted in 2015 titled "Using the Theory of Planned Behavior to Identify Key Beliefs of Environmental Supportive Behaviors among High School Students: Implications for Educational Interventions" by Leo, Voss, Agen, and Smith, intervention behaviors in educational environments, such as teaching recycling and waste separation, behaviors that foster interest in the environment, non-academic teachings regarding environmental importance, etc., all have positive effects on environmentally supportive behavior (De Leeuw, A., Valois, P., Ajzen, I., & Schmidt, P., 2015).

In another study titled "Visitor Interactions with Nature and Pro-environmental Behavior: Effects of Cultural Ecosystem Services, Place Attachment" conducted by Zhang and colleagues in 2010, the aim was to examine the ability of place attachment to predict environmentally supportive behaviors. The study sample (355 respondents) included visitors to Canadian national parks. In this study, three sub-dimensions: place identity, place dependence, and affective attachment to place were evaluated and analyzed. The results indicate that place attachment, the emotions and feelings of an individual towards a place, generally or pervasively, act, and individuals who have a greater emotional attachment to a place also exhibit more environmentally supportive behaviors (Zhang, H., CAI, L., Bai, B., Yang, Y., & Zhang, J., 2023).

In another study titled "Pro-environmental Behaviors through the Lens of Planned Behavior Theory," it is shown that the Theory of Planned Behavior (TPB) allows researchers to identify determinants of environmental behavior and subsequently target these factors in interventions. The results indicate that more than half of the studies suggest that creating place attachment leads to an increase in environmentally supportive behavior (Yuriev, A., Dahmen, M., Paillé, P., Boiral, O., & Guillaumie, L., 2020).

It is also emphasized that some studies complement the background within the framework of the theoretical foundations of the presented research

Given the importance of place attachment and its implications, researchers have aimed to find answers to the following questions:

Regarding the influence of the influential component of Seamon's theory on place attachment and consequently on environmentally supportive behaviors, how does it manifest? Is there a correlation between the component of Seamon's theory, place attachment, and environmentally supportive behavior?

How do the factors of Seamon's theory affect the pro-environmental behavior?

Which kind of practical training in school can affect pro-environmental behavior according to place attachment factors?

3. Theoretical Framework

It appears that physical and environmental factors present in the environment contribute to diversity and place attachment. According to Seamon's theory, environmental and physical factors are among the most influential factors, and the components of place reinforcement and place understanding have the highest impact. Based on research indicating positive and negative effects and no correlation between place attachment and environmentally supportive behavior, the authors of this study hypothesize that if place attachment increases in schools, environmental preservation and advocacy will increase, resulting in positive environmentally supportive behavior. This phenomenon is expected to be extendable to the

global community in the future.In the following, recent research on the impact of place attachment on extra-environmental behavior according to Simon's theory is discussed.

In a study titled " Associations between sense of place and the geometric shape complexity of corresponding self-reported spatial footprints from Lisbon, Portugal " conducted by René Westerholta and Albert Acedo in 2024, expresses,The article investigates how people translate the complex concept of sense of place into reductionist geospatial footprints. Utilising a mapsupported survey conducted in Lisbon, statistical shape complexity measures, and logistic regression, we show that the number of mapped polygonal footprint vertices correlates with the sense-of-place dimensions of place identity and place attachment. The results show a deep relationship between attachment to a place and extra-environmental behavior that people miss even when they are away from the place. When a person is in that place, he protects that place and does not want to harm the environment(Westerholt & Acedo ,2024).

One of the potential behavioral consequences of place attachment is the tendency to show positive environmental behavior, and therefore research on pro-environmental behavior has been conducted in the place attachment literature.Most of these studies reported different forms of behavioral measures that used place attachment for pro-environmental behaviors. Some studies rely on a general assessment of people's willingness to engage in pro-environmental behaviors and use multi-item scales.

Other researchers distinguish different types of behaviors or focus on a specific type of pro-environmental behavior and follow different criteria for classification. (Song, Z., & Soopramanien, D., 2019) According to the different levels of effort or commitment required by extra-environmental behavior, they distinguish between effortful and low-effort behavior. Koven et al. (2020) categorize pro-environmental behaviors into three types of behaviors: individual behavior, collective behavior, and policy support behavior (Koven et al,2020).

Halpin (2007) classifies behavior in the environment as opposed to location specific. Depending on whether the behavior is placed in a specific place with a specific purpose or not? (Halpin, D., 2007). Previous literature shows several theoretical perspectives in support of a hypothesized positive link between place attachment and environmental behavior. According to place attachment theory (Lewicka, 2011), people's emotional ties to a place can create positive behavioral tendencies to protect the place. Similarly, if a person is attached to a place and identifies with its community, we assume that he or she is more likely to prioritize the interests of the place/community over personal interests.

Taking into account that nowadays the environment is very important in the world society and also there is a lack of teaching on environmental protection issues in Iranian schools, this research was formed. Also, considering that students in schools are looking for destruction and damage to the environment, perhaps it is possible to reduce these damages by increasing pro-environmental behavior.

4. Research Methodology

In this study, initially, by conducting field observations and examining the behavior of students, a school that, compared to other schools, faces problems in terms of environmental behaviors is identified. Despite the presence of waste separation bins, waste separation is not practiced in schools, and students cause damage to the school environment and property. Then, using a researcher-made questionnaire, environmental behaviors among students of two classes in the school are assessed. Subsequently, through the place reinforcement factor, activities are carried out to strengthen the place.

With the help of the place reinforcement factor from Seamon's theory, changes are made in various aspects of the school. These changes include adding green spaces inside and outside classrooms, changing the colors and decorations in classrooms and the school environment, implementing extracurricular and group classes in school programs, organizing trips for students, and increasing collective activities. Over the course of three months, efforts will be made to implement these changes in one of these classes and maintain them. Then, after three months, the environmental behavior questionnaire will be completed by students in both classes.

To achieve the objectives, two steps are taken. In the first step, a descriptive-analytical research method is used, and effective components are formulated as a theoretical framework through library research and Seamon's theory examination. Then, in the next step, a semi-experimental design of pre-test-post-test with three-month follow-up was conducted with the experimental group. The sample consisted of 90 first-grade high school students selected purposively and randomly assigned to two groups (experimental group of 45 and control group of 45). A researcher-made questionnaire on environmental behavior was used to determine the homogeneity of the subjects, indicating the homogeneity of the data.

In the next step, the experimental group received 12 sessions of 30 minutes each over a period of 3 months of environmental behavior training, including waste separation and its benefits and drawbacks, maintaining the physical structure of the school and not damaging school property and furniture, maintaining green spaces, conserving water resources, saving electricity, and practical and theoretical training on fuel resources in the school. The control group did not receive any training on environmental behavior during this period and only witnessed the changes in the experimental group. After the end of the post-test sessions and three months later, follow-up was conducted.

The questionnaire consisted of closed-ended questions with a five-point Likert scale from completely agree to completely disagree. It was designed and then reviewed by experts to express the importance of each criterion and indicator based on the options specified in the questionnaire.

After collecting the questionnaire responses, the data of each criterion and indicator were entered into Excel software quantitatively, and the weights of the criteria and indicators were calculated based on the Likert scale and the formula provided in the entropy technique theory. Finally, the prioritization of criteria and indicators was determined based on the obtained weights.

In this study, to examine the internal consistency of the questionnaire items, Cronbach's alpha coefficient was used, which, with a value of 0.87, indicated the reliability of the questionnaire.

For data collection, the researcher-made environmental behavior questionnaire with a Cronbach's alpha coefficient of 0.87 was used. Covariance analysis tests were used for data analysis. Figure 1 illustrates the general stages of the research process.

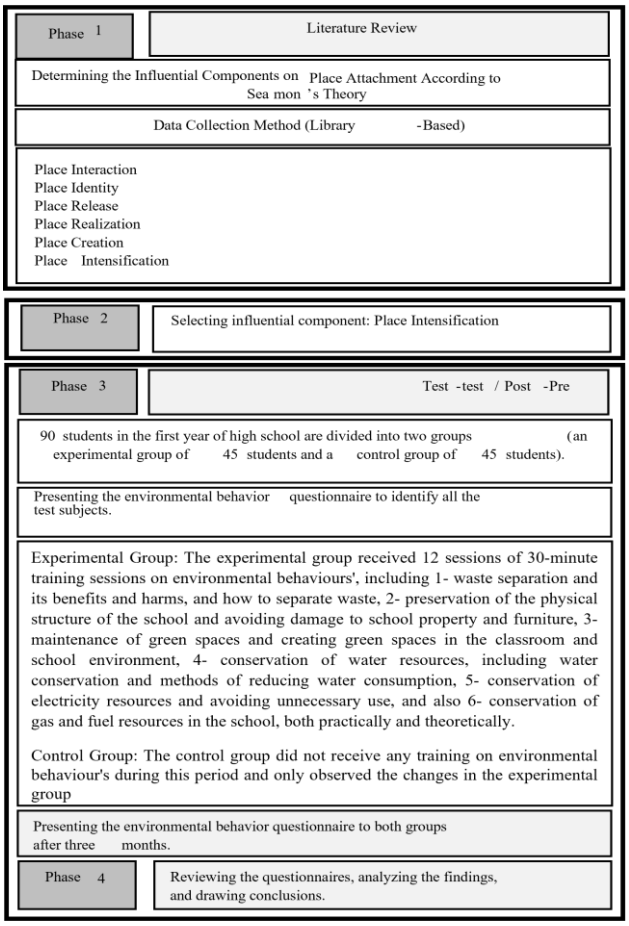

Fig.1. General phases of the research

5. Theoretical Foundations

Today, the emergence of the place attachment perspective in the design of educational spaces, as well as the increasing importance of the psychological dimension of architectural spaces, has drawn the attention of researchers to concepts such as place attachment and its effects, including environmental behavior, and the relationship between these two concepts. In this study, to elucidate the subject, it is necessary to become familiar with these themes, and subsequently, brief definitions of the concepts according to researchers' studies will be provided.

5.1 Factors influencing environmental behavior

There are multiple factors that influence an individual, which can have either positive or negative impacts on environmental behavior. Various identifiable factors affect interpersonal behaviors, such as demographic factors (gender and educational years), external factors (organizational, social, economic, and cultural), and internal factors (motivation, environmental knowledge, awareness, values, attitudes, emotions, locus of control, responsibility), and the priority of factors within individuals can be noted (Kollmuss, A., & Agyeman, J., 2002). According to Abedi-Sarvestani, A., & Shahvali, M. (2009), beliefs, values, and individual attitudes influence human behavior, including environmental behaviors. Personal values shape attitudes towards the environment, but they do not always lead to pro-environmental behavior. Situational factors outside of individuals' control also influence environmental behavior. Therefore, an intervention strategy is needed to support and overcome barriers to environmental behavior (Mtutu, P., & Thondhlana, G., 2016).

5.2 Theory of planned behavior

The existence of various types of influential factors on environmental behavior motivates multiple theories to explain or predict which variables are significantly involved. The theory used in environmental behavior includes three theories: the Norm Activation Model (NAM)[1], the Theory of Planned Behavior, and the Values-Beliefs-Norms Theory (VBN)[2] (Palupi, T., & Sawitri, D. R., 2018).

The NAM explains that there are three variables that influence the occurrence of a behavior. These three variables include personal norms, awareness of consequences, and responsibility attribution (responsibility for negative consequences if they are not antisocial). Another related theory is the Theory of Planned Behavior (TPB), which explains that there are three variables: (1) attitude towards the behavior, (2) subjective norms, and (3) perceived behavioral control (White, M. P., Pahl, S., Ashbullby, K., Herbert, S., & Depledge, M. H., 2013). The three aforementioned variables influence the formation of individual behavioral goals, which in this case is environmental behavior.

The Values-Beliefs-Norms Theory includes several variables for predicting environmental behavior, including social value orientation and pro-environmental activities; individual and altruistic value orientation; hedonic orientation; developed behavior (individuals' and public behavior) (Stern, P. C., 2000).

Some previous studies on environmental behavior have been explained through the TPB. Boldero (Boldero, J., 1995) states that the goal of newspaper recycling can be directly predicted from recycling activities, and attitudes towards recycling activities predict the goal of

environmental behavior. Tonglet et al. (2004) demonstrate that attitudes can predict behavior, thus indicating the significant role of attitudes in behavior. Davis et al. (2009) state in their research that among attitudes, there are relationships between behavioral mental norms. Another study on predicting environmental behavior by Sparks and Shepherd shows that attitudes, mental norms, and control over "green consumption" are significantly related to individuals' green vegetable consumption. A positive attitude towards the environment can directly impact environmental behavior with low cost, such as recycling. Attitudes resulting from life experiences and education significantly influence behavior (Newhouse, N., 1990).

De Leeuw et al. (2014) showed that the TPB model (attitude, mental norms, and perceived behavioral control) has an independent contribution to predicting the concept of environmental behavior. Behavioral beliefs, normative beliefs, and perceived control predicted behavioral goals, attitudes, mental norms, and perceived behavioral control, respectively. Sympathetic concern indirectly influences behavioral, normative, and control beliefs outcomes and behaviors. Based on the data, it was shown that high school students have a positive inclination towards pro-environmental behaviors but have failed in practice. High school students, as a young community, are important populations because the initial formation of pro-environmental behavior occurred due to the habit of using pro-environmental behavior. The examination of the effects of specific beliefs showed important implications for designing effective intervention strategies for behavior change.

5.3 Transenvironmental Behavior and Place Attachment

One of the potential behavioral consequences of place attachment is a tendency to demonstrate positive environmental behavior (Lewicka, 2011). Hence, research on environmentally supportive behaviors has been conducted in the literature of place attachment. Most of these studies have reported various forms of behavioral actions that utilize place attachment for environmentally friendly behaviors. Some research relies on an overall assessment of individuals' willingness to engage in environmentally supportive behaviors and employs various multi-item scales (Takahashi & Selfa, 2015). Other researchers distinguish different types of behaviors or focus on specific types of pro-environmental behaviors and follow different criteria for classification. For instance, Song and Soopramanien (2019) distinguish between efforts or commitment levels required for environmental behaviors, categorizing them as high or low effort. Koven et al. (2020) categorize environmentally supportive behaviors into three types: individual behavior, collective behavior, and policy support. Halpin (2007) classifies environmental behavior concerning a specific place depending on whether the behavior is aimed at a particular purpose or not. Previous literature suggests several theoretical perspectives supporting a hypothetical positive link between place attachment and environmental behavior. According to the theory of place attachment (Lewicka, 2011), emotional bonds with a place can foster positive behavioral inclinations towards protecting that place. Specifically, place attachment can instill a sense of personal responsibility towards the environment of that place, consequently encouraging activities that contribute to environmental sustainability. The Social Identity Theory (SIT)[3] predicts that if individuals identify with a group, they are more likely to act in the group's interests (Brown, 2000).

Similarly, if an individual is attached to a place and identifies with its community, it is assumed that they would likely prioritize the interests of that place/community over personal benefits (Carrus et al., 2014).

In particular, a person who is place-attached may engage in environmentally friendly behavior in favor of that place, even if pro-environmental behavior requires more time, effort, or financial input. Indeed, this positive influence of social identity on environmental behavior has been demonstrated in social dilemmas literature, where identification with a group or community encourages individuals to act environmentally in the group or community's interest (Kelsey, Kor, & Cordano, 1995). Consistent with the above theoretical predictions, the results of most empirical studies have shown that individuals with higher levels of place attachment are more likely to exhibit pro-environmental behavior (Stedman, 2002)..

However, some empirical studies do not show any positive or negative correlation between place attachment and pro-environmental behavior.

For example, Uzzell and colleagues (2002) found that place attachment may not necessarily lead to pro-environmental behavior: "In the village of Onslow, the relationship between place-related social identity and environmental sustainability is much weaker and negative. In this particular neighborhood, although place identification fundamentally contributes to identity, it does not necessarily lead to pro-environmental attitudes." The authors argue that individualism may explain the negative relationship: "One explanation is that the values used were very individualistic in the village of Onslow, leading to introverted individualism rather than an outward societal perspective" (Moser, G., & Uzzell, D., 2003).

Additionally, individuals with strong place attachment may perceive the environmental issues of the place less severely and therefore may not see the need for pro-environmental behavior (Junot, A., Paquet, Y., & Fenouillet, F., 2018). Furthermore, individuals may become attached to a place that can fulfill their functional, recreational, or social goals. As long as these goals are met, people may easily be satisfied with the existing environmental conditions and disregard the need for environmental behavior (Ramkissoon, H., Smith, L. D. G., & Weiler, B., 2013).

Table 1 summarizes prominent researchers' studies in terms of positive and significant correlation, no correlation, and negative correlation.

Table 1
researchers' studies (positive and significant correlation, no correlation, and negative correlation)

Directions	authors	results
Positive correlation	Ramkissoon et al. (2013a)	"The positive relationship between place social bonding and high effort pro-environmental behavioural intentions may be explained by the fact that some environmental behaviours are constructed through social interactions (Nye & Hargreaves, 2009)." (p.448)
	Walker et al. (2015)	"Controlling for RD, both local and global place attachment were positively related to pro-environmental behaviours." (p.843)
Negative correlation	Uzzell et al. (2002)	"What is surprising, though, is that the relationship between place-related social identity and social cohesion is not just weak but negative" (p.12).
	Junot et al. (2018)	"The results indicated that place identity is negatively related to general pro-environmental behaviors" (p.53).
No significant correlation	Tonge et al. (2015)	"…place dependence, the non-significant relationship between this place dimension and pro-environment behaviors may be explained by individuals who are more place dependent than place identity oriented, tending to overlook negative conditions or behaviors encountered at a place." (p.740)
	Ramkissoon et al. (2013a)	"Thus, the finding that place identity is not significantly related to pro-environmental behavioural intentions is not surprising." (p.448).

The above discussions indicate that place attachment can foster a behavioral inclination toward environmental protection and improvement. However, it may also lead to potential oversight regarding the need for environmentally friendly behaviors. Therefore, it is reasonable to assume that when environmental issues are prominent (such as reminding individuals of environmental threats to a place), oversight diminishes, and the positive role of place attachment in promoting pro-environmental behavior predominates (Stedman, 2002; Scannell & Gifford, 2013). Given the widespread concerns about environmental degradation over the past two decades, we believe that place attachment can engender a protective behavioral tendency. Thus, it leads to our prediction that the overall impact of place attachment on pro-environmental behavior is positive.

Researchers have proposed various theories in the field of place attachment, with Seamon's theory being one of the most influential. In this research, Seamon's approach (2012, 2014, 2018) outlines six interrelated processes of place attachment, providing a conceptual framework and cognitive method to understand place attachment as a constructive process in what Seamon terms the "triple interpretation of place attachment." Table 2 provides a brief summary of the six processes for establishing place attachment, derived from Seamon's theory, to elucidate the six-pronged approach.

Table 2
Seamon's theory

Being of place	Place interaction	Routine actions and behaviours between people in a place that support strong social bonds
	Place identity	Taking up the dominant culture and values of a place to reflect personal identity and self-worth
	Place realisation	Place character that reflects its history and cultural context. Nostalgia based on past experiences that support "situatedness"
Becoming of place	Place release	Deep feelings or a surprise from place encounters that trigger a decision for change
	Place creation	Physical determinism by human action to design or shape place to improve its performance and prosperity
	Place intensification	Independent power to use policy or projects to revive, reconfigure and strengthen place prosperity

As previously mentioned, the main focus of this research is on the principle of strengthening place. In Figure 2, these relationships are depicted in a diagrammatic form.

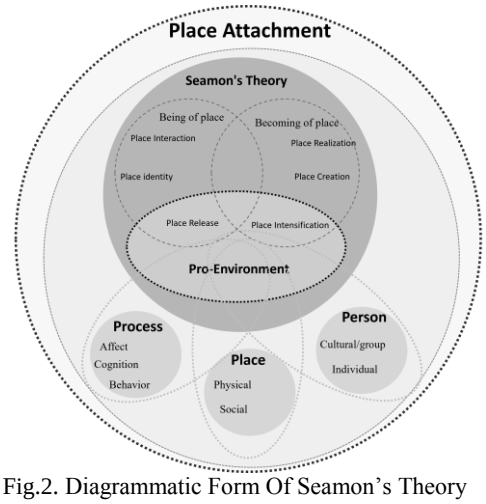

Fig.2. Diagrammatic Form Of Seamon's Theory

6. Studies and Investigations

In this research, data are collected from two groups of students, each consisting of 45 individuals. One group is considered as the control group, and the other group as the experimental group. Initially, the author's questionnaire on environmental behavior is distributed among students in both groups. This questionnaire includes six main factors of environmental behavior, such as plant conservation, conservation of the environment, and energy and fuel

resources, each consisting of three questions. Each question has a Likert scale with scoring from 1 to 5 .
For each student, if the scores of the questions are summed up, they will be categorized as follows:

- Score 90-75: Indicates a high level of attention to the environment and a commitment to improving it (internalization of values and crystallization of organized values in personality).
- Score 74-59: Shows that the environment is very important to the individual (organization of values and valuing).
- Score 58-43: Indicates moderate attention to the environment (reacting and responding).
- Score 42-27: Indicates low attention to the environment and not considering its importance (receiving and paying attention).
- Score below 26: Indicates that the environment has no value for the individual (indifference to the subject).

The results of the questionnaire are presented in Table 3.

Table 3
Results of the questionnaire

Control Group	Pre-test	Post-test	Experimental Group	Pre-test	Post-test
1.	33	43	**1.**	31	84
2.	28	38	**2.**	30	64
3.	24	34	**3.**	24	33
4.	22	30	**4.**	22	50
5.	21	29	**5.**	21	30
6.	19	26	**6.**	19	81
7.	19	19	**7.**	19	86
8.	18	18	**8.**	18	32
9.	18	18	**9.**	18	50
10.	18	24	**10.**	18	52
11.	18	18	**11.**	18	52
12.	18	18	**12.**	18	84
13.	18	18	**13.**	18	54
14.	18	18	**14.**	19	54
15.	18	24	**15.**	18	63
16.	18	18	**16.**	20	81
17.	18	18	**17.**	18	56
18.	18	18	**18.**	18	47
19.	18	18	**19.**	19	40
20.	18	18	**20.**	18	59
21.	18	18	**21.**	18	55
22.	18	18	**22.**	19	40
23.	18	18	**23.**	18	75
24.	18	18	**24.**	18	48
25.	18	18	**25.**	18	75
26.	18	18	**26.**	18	59
27.	18	23	**27.**	18	59
28.	18	18	**28.**	18	76
29.	18	18	**29.**	18	63
30.	18	18	**30.**	18	39
31.	18	18	**31.**	18	42
32.	18	18	**32.**	18	41
33.	18	18	**33.**	18	41
34.	18	18	**34.**	18	35
35.	18	18	**35.**	18	43
36.	18	18	**36.**	18	37
37.	18	18	**37.**	18	40
38.	18	18	**38.**	18	37
39.	18	24	**39.**	18	31
40.	18	18	**40.**	18	37
41.	18	18	**41.**	18	31
42.	18	20	**42.**	20	38
43.	18	20	**43.**	18	31
44.	18	18	**44.**	18	59
45.	18	20	**45.**	18	59

7. Research Finding

In this study, two control and experimental groups were used, and the descriptive results are presented in Table 4.

Table 4
Results of the questionnaire

	No.	Minimum	Maximum	Average	Standard Deviation
			Pre-Test		
Control Group	45	16	22	19/02	**1/777**
Experimental Group	45	14	25	18/71	**2/302**
Total	90	14	25	18/87	**2/051**
			Post-Test		
Control Group	45	17	22	20/18	**1/302**
Experimental Group	45	22	28	23/44	**1/374**
Total	90	17	28	21/81	**2/114**

For examining the relationship between students' opinions, analysis of covariance (ANCOVA) was employed, and the results are presented subsequently. To test the normality assumption, the Kolmogorov-Smirnov test was conducted, and the results are provided in Table 5.

Table 5
Analysis of covariance

	Statistic	Degree of freedom	Significance
Pre-test	0/977	90	0/107
Post-test	0/978	90	0/137

Given the higher significance level of 0.05, the normality of the data is confirmed at a 95% confidence level. To examine the homogeneity of variance between the two variables, the Levene's test has been utilized, and its results are presented in Table 6.

Table 6
Result of Levene's test

	Levene's statistic	Degree of freedom 1	Degree of freedom 2	Significance
Pre-test	1/908	1	88	0/171
Post-test	0/218	1	88	0/642

The higher significance level of 0.05 indicates that at a 95% confidence level, the pre-assumption of homogeneity of the two variables is acceptable. Therefore, we proceed to calculate the reliability of the variable's scatter using the Kuder-Richardson formula. For this purpose, we first need to calculate the mean and variance, which are 1.97 and 0.763, respectively, with a sample size of 95. Using

the appropriate formula, the reliability is calculated to be 0.950, which is acceptable. Next, the pre-assumption of homogeneity of regression slopes is tested using the analysis of covariance and the results are presented in Table 7.

Table 7
Analysis of covariance

Source	Sum of Squares	df	Mean Square	F	Significance
Corrected Model	/167 226	2	/084 113	/325 57	0/376
Intercept	/639 555	1	555/639	/67 281	0/001
Pre-test Group	/167 226	2	113/084	/325 57	0/376
Error	/622 171	87	1/973		
total	43213	90			
Overall corrected model	/789 397	89			

The F statistic value for the interaction between the independent variable and the homogeneity of variances is 57.325, which is not significant at the 0.05 level. Therefore, it is not statistically significant. Consequently, we can conclude that the null hypothesis is accepted, and the alternative hypothesis is rejected. Thus, the assumption of regression slope homogeneity is maintained, indicating the linearity of the correlation between the homoscedasticity variable and the independent variable. In the final stage, the linearity of the correlation between the homoscedasticity variable and the independent variable is examined, and the results are presented in Table 8.

Table 8
Result of correlation between the homoscedasticity variable and the independent variable

Source	Sum of Squares	df	Mean Square	F	Significance
Corrected Model	/913 240	2	/457 120	66/803	0/001
Intercept	532/33	1	532/33	295/22	0/001
Pre-test Group	0/813	1	0/813	2/451	0/005
Error	/583 236	1	/583 236	/204 131	0/001
total	/876 156	87	1/803		
Overall corrected model	43213	90			
	/789 397	89			

The Fisher statistic value for the pre-test is 2.451, indicating a significance level less than 0.05, thus it is significant, showing a correlation between the covariate and the independent variable. The effect size value for the independent variable (control and experimental groups) is 131.204, which has a significance level less than 0.05, indicating significance. This suggests that after removing the pre-test effect, there is a significant difference in the average scores between the two groups in the post-test.
In the figure.3 the relationship between place attachment factors and pro environmental behavior is presented.

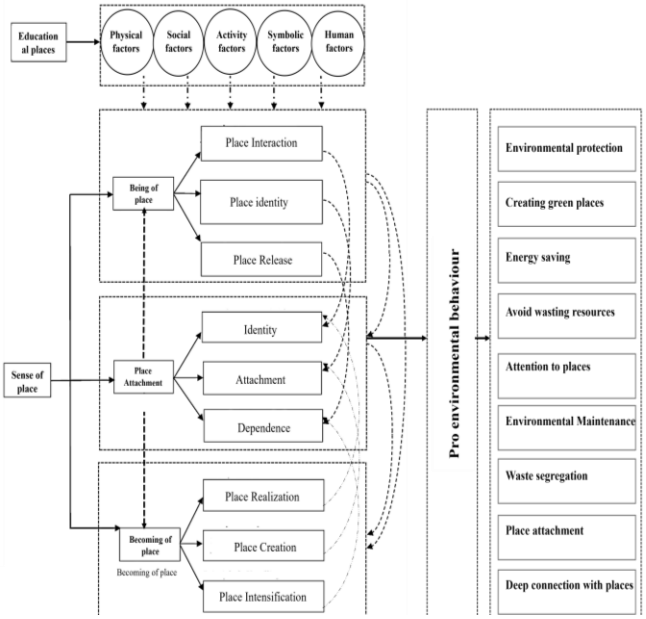

Fig..3. Model of factor's relationship

8. Conclusion

The relationship between environmental attachment and pro-environmental behavior has attracted extensive attention from researchers over the past two decades in response to global environmental challenges. However, variance in individual studies has led to conflicting findings regarding the effectiveness of environmental attachment and its relationship with environmental preservation.
Therefore, to provide informative and generalizable results, this study employs a pre-test and post-test analysis to examine the relationship between environmental attachment and pro-environmental behavior among students.
Table 9 shows the practical exercises to be done in classrooms to increase pro-environmental behavior.
In class exercises, it was tried to carry out activities in the field of extra-environmental behavior through work and technology lessons. Among these activities, we can mention the making of cloth bags for buying and carrying school supplies. In the next exercise, planting and maintaining the plant was a priority. In the next exercise, resource protection and energy conservation were practiced.

Table 9
Practical training

Practice1 Designing fabric bags instead of using plastic	Practice2 Training on planting saplings in green spaces and maintaining them
	
Practice3 Designing on pottery directions of creating space in the school walls	Practice4 Ideal interior design as a replica
	

The research findings indicate that the assumptions of normality, variance homogeneity, reliability of the covariate, and correlation between the covariate and independent variable are all significant. This indicates the positive effect of theoretical and practical training in pro-environmental behavior in the classroom environment, particularly for the experimental group.

Considering that the results of pro-environmental behavior are different in different researches, they will be analyzed in the following. Halpiny(2007) showed that attachment to a place has a positive relationship with pro-environmental behavior. But it is definitely not effective. Uzzell et al. (2002) found that place attachment may not necessarily lead to pro-environmental behavior.

The results of this study demonstrate that despite positive, negative, and non-significant relationships between environmental attachment and pro-environmental behavior found in previous research, one semester of pro-environmental behavior training can increase environmental attachment and consequently enhance pro-environmental behaviors. This indicates a positive relationship between environmental attachment and pro-environmental behavior among 11-12-year-old students. Overall, the results show that pro-environmental behavior training was effective in the post-test phase, and environmental conservation efforts continued in the follow-up phase. Additionally, even the control group showed attempts to preserve and maintain plants and classroom infrastructure after observing these changes in the experimental group, indicating that strengthening environmental factors increases environmental attachment and consequently influences pro-environmental behavior positively. Considering the effectiveness of these interventions, pro-environmental behavior programs can be utilized in schools to promote environmental conservation and the future of the world.

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Footnote
1. Norm Activation Model
2. Value-Beliefs-Norm
3. Social Identity Theory

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