
The Public Sphere (Virtual and Non-Virtual) and Responsible Environmental Behaviors of Citizens (A Study among Citizens Over 18 Years Old in Tehran)

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Purpose: With the spread of environmental issues attention to the responsible environmental behavior of citizens to reduce environmental pollution it has become very important. Therefore, the purpose of this study was to explain the relationship between the public sphere (virtual and non-virtual) and responsible environmental behaviors of citizens.

Methodology: The present research method was a quantitative from type of survey. The research population was all the citizens over 18 years old of Tehran city in 2021 year with the number of 6348162 people, which the sample size based on the Cochran's formula was determined 384 people, and in this study due to possible dropouts 400 people were selected as a sample. The samples of this research were selected by multi-stage cluster sampling method and responded to demographic information form and researcher-made questionnaires of virtual and non-virtual public sphere (32 items) and responsible environmental behaviors (32 items). Data were analyzed with tests of Pearson correlation coefficient, multiple regression by stepwise method and analysis of variance in SPSS software.

Findings: The findings showed that the virtual and non-virtual public sphere had a positive and significant relationship with responsible environmental behaviors of citizens ($P < 0.001$). Also, the virtual and non-virtual public sphere significantly could predict 31% of changes of responsible environmental behaviors of citizens ($P < 0.001$). In addition, there was no significant difference between responsible environmental behaviors of citizens in terms of the type of virtual network and marital status ($P > 0.05$), but there was a significant difference in terms of education level ($P < 0.05$).

Conclusion: The results of this study indicated a significant relationship between virtual and non-virtual public spheres and responsible environmental behaviors of citizens. Therefore, in order to improve the responsible environmental behavior of citizens can be provided the ground for the improvement of the public sphere.

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1. Introduction

Today, environmental threats, crises, and disasters pose a threat to human peace and security, making responsible environmental behaviors a significant topic in the current era. Irresponsible human behaviors have alarmingly drawn public attention and heightened global sensitivity towards the environment (Capstick, Nash, Whitmarsh, Poortinga, Hagggar & Brugger, 2022). Environmental conservation and responsible environmental behaviors are complex and multifaceted issues, which, before 1960, received little attention and are inseparable from social, economic, and cultural matters. Human environmental behaviors have become one of the most important and influential environmental factors, gaining considerable attention from sociologists (Ponce, Alvarado, Ponce, Alvarado, Granda & Yaguana, 2019). Nowadays, denying the critical state of the environment is impossible, and even those unaware of the catastrophe's depth recognize that clean air has become scarce, the Earth is significantly warmer, fewer animals are seen in the environment, silence is less found, and in cities' skies, only a few dim stars are visible at night. For several decades, the existence of a serious and pervasive environmental crisis has been acknowledged, but every day, more catastrophic dimensions of it are revealed (Moore & Rutherford, 2020). In every society, individuals exhibit a certain attitude towards the environment, which may range from completely responsible to completely irresponsible. This wide spectrum of attitudes towards the environment is influenced by numerous variables and factors related to the social and cultural environment (Yu, Yu & Chao, 2017). Environmental behaviors encompass a broad range of individuals' actions towards the environment, including a wide spectrum of feelings, inclinations, and specific readiness for behavior towards the environment (Li, Zhao, Ma, Shao & Zhang, 2019). Alternatively, environmental behaviors refer to actions aimed at minimizing the negative impacts of human actions and behaviors on the natural and built environment (Yan & Jia, 2021).

Environmental behaviors play a rapid role in societal changes and transformations, as they consciously seek to minimize negative impacts on nature, reduce resource and energy consumption, decrease waste production, and avoid using toxic materials (Zgolli & Zaiem, 2018). Environmental researchers believe that environmental crises threaten human life and other creatures alarmingly. Environmental threats and crises, such as climate change, ozone layer thinning, deforestation, food crises, overpopulation, exploitative and unprincipled natural environment usage by capitalists, irresponsible human behaviors, excessive energy use in homes, disposable product usage, personal vehicle use, pesticide use, unsanitary waste disposal, and failure to segregate waste for recycling, have alarmingly drawn global public attention (Daryanto & Song, 2021). Article fifty of the Constitution of the Islamic Republic of Iran, considered a progressive principle in environmental issues, states that protecting the environment, where current and future generations should have a growing social life, is a public duty. Thus, economic activities associated with environmental pollution or irreversible destruction are prohibited. Nevertheless, issues like air pollution in Iranian industrial cities, fires in the forests of Gilan and Mazandaran provinces, waste pouring into rivers, industrial sewage effluents, littering in public spaces, parks, and alongside roads, the drying of Lake Urmia, and the emergence of salt tsunamis are among the environmental challenges in Iran (Rezadoost, Navah, Boudaghi & Alidadi, 2023).

Environmental behaviors are the actions individuals exhibit in dealing with the environment, and people in any society have different attitudes towards the environment based on their social, cultural, and personal conditions. These behaviors can be entirely positive, eco-friendly, and responsible, or conversely, entirely negative, anti-environmental, and irresponsible, or fall somewhere in between (Lee & Jan, 2023). Responsible environmental behaviors are vital elements in the sustainable development process of the environment in modern and developing societies. Governments should devise plans and programs to protect the environment to reduce environmental threats and hazards, with community members participating and cooperating in their implementation (Wang, Zhang, Cao, Hu & Yu, 2019). These behaviors are key elements in environmental development, where authorities and people should strive to protect the environment and reduce environmental threats and dangers (Liu, Wu & Che, 2019). The

relationship between the environment and responsible environmental behaviors is a complex and multifaceted issue, and the interaction of environmental development and sustainability in various fields is a constant concern for different countries, impacting their economic growth (He, Hu, Swanson, Su & Chen, 2018). Responsible environmental behaviors include various actions like waste reduction, recycling, energy conservation, and encouraging colleagues and friends towards eco-friendly behaviors. These actions are a set of societal actions towards the environment, encompassing a broad range of feelings, inclinations, and specific readiness for behavior towards the environment (Wu, Wu, Hsieh & Ramkissoon, 2022). Participation in environmental protection leads to the internalization of responsible environmental behaviors, which are voluntary actions by an individual or group that directly or indirectly impact or benefit the environment (Su, Hsu & Boostrom, 2020).

One of the factors associated with responsible environmental behaviors is the public sphere, where people gather openly and critically to discuss public issues for participation, debate, and cooperation (D'Arco & Marino, 2020). Generally, there are three spheres in life: private, governmental, and public. The private sphere refers to personal privacy and the activities of companies and economic firms. The governmental sphere pertains to government presence and law, and the public sphere refers to activities of non-governmental organizations and associations aimed at meeting the needs of the entire society or specific groups (Lakzaee, Ghasemi & Nawydia, 2021). The public sphere is an area of social life where individuals can shape or change public opinion (Syed Alavi & Naghibossadat, 2012). It typically refers to institutions and relationships that organize social life between government and family, where citizens in this sphere engage in uncontrolled discussions with guaranteed freedom of assembly and expression, exchanging views on matters of public interest and behaving accordingly (Mohammadi & Pashaei, 2021). The public sphere is a political space where individuals' rights as free and equal citizens are recognized, and a political community is formed. Since interactions in the ideal speech situation are free from coercion, dialogue in the public sphere can lead to democratic development at all social levels. This sphere addresses the necessities of democratic societies for stabilizing the circulation of information, exchange of opinions, and establishment of dialogue (Khaniki, Atabak & Azizi, 2017). Public spheres are realms where all citizens, regardless of age, gender, ethnicity, etc., can gather and critically engage in discussion, exchanging ideas, and expressing their viewpoints and thoughts (Khademzadeh, Shekari, Navah, Hashemi & Koochi Rostami, 2021).

Communication in the public sphere occurs in two forms: cyber and non-cyber. The increasing expansion of the cyber space and its concurrent presence alongside the real or non-cyber space has become an integral part of modern life, leading to transformations and consequences in society through both cyber and non-cyber forms (Bashiri, Abtahi & Morshedizad, 2020). Today, the phenomenon of the communications revolution, primarily the internet, is creating significant and widespread changes in the nature, forms, and structures of power in various societies, both developed and developing, resulting in increased attention to the public sphere (Varheim, Skare & Lenstra, 2019). Cyber media can revitalize and expand the public sphere, create communicative action, and prevent its decline. The unparalleled role of the cyber public sphere in guiding public opinion has gained more attention than ever before (Dekker & Bekkers, 2015).

Research on the public sphere and responsible environmental behaviors has been conducted, and some of the most important results are reported here. D'Arco and Marino (2022) found a positive and significant relationship between awareness of consequences, responsibility, personal norms, and environmental citizenship behavior in both private and public spheres. Gholizade, Nourozi and Dehqan (2022) found a significant positive relationship between participation in environmental conservation and the extent of use of cyber social networks, trust in cyber social networks, activity in cyber social networks, and environmental knowledge. Tsai, Li and Wu (2021) concluded that citizens' pro-environmental behaviors had a significant relationship and impact with both public and private spheres, with the variable of willingness to sacrifice for the environment playing an effective mediating role. Dastras and Khajenoori (2019) found that sociological factors including age, environmental awareness, environmental knowledge,

emotional attachment to the environment, environmental attitudes, locus of control, environmental values, priority, responsibility, and motivation, as well as background factors like gender, employment status, and income level, had a significant relationship with citizens' environmental behaviors. Abbaszadeh and Alavi (2017) found a positive and significant correlation between responsible environmental behavior in the public sphere and private environmental behaviors and their components, including place attachment, place dependence, and place identity. Blazekiene and Telesiene (2012) concluded that individuals are more inclined to engage in private environmental behaviors than public environmental behaviors, and moreover, responsible environmental behaviors are influenced by gender, age, and education level.

Although Article fifty of the Constitution declares environmental protection as a public duty, the environmental situation in Iran is extremely concerning. According to the Environmental Performance Index, Iran's rank dropped from 53 among 133 countries in 2006 to 68 in 2008 (down 15 places) and further to 78 in 2010 (down 10 places), continuing to decline in subsequent years (Asadi, Naghizadeh, Mazloomi & Ghazanfari, 2018). Another important point is that while most studies emphasized the relationship between the public sphere and responsible environmental behaviors, the main variables focused on cyber social networks and social and cultural capital, neglecting the role of both cyber and non-cyber public spheres. Consequently, with the expansion of environmental issues, attention to citizens' responsible environmental behaviors to reduce environmental pollution has become significantly important. Therefore, the purpose of this study was to explain the relationship between the public sphere (cyber and non-cyber) and citizens' responsible environmental behaviors.

2. Methodology

The method of the current research was quantitative survey. The study population comprised all citizens above 18 years in Tehran in the year 2021, totaling 6,348,162 individuals. The sample size was determined to be 384 based on the Cochran formula, and considering potential dropouts, 400 individuals were selected for this study. The statistics of citizens above 18 years from Tehran's 22 districts were obtained from Tehran Governorate, and the research samples were chosen using a multi-stage cluster sampling method. For this purpose, residential areas in Tehran were first divided into three categories: low, medium, and high, and one or two neighborhoods were selected from each for sampling. To randomly select individuals, maps of Tehran's districts were prepared, marking areas, neighborhoods, blocks, and streets. On each district map, blocks and streets were marked, and interviewers randomly chose a house in the designated block or street to survey the first person present at the house entrance, provided they were over 18 years old. After neighbors of the selected individuals were also surveyed.

The research process involved preparing research tools, mapping, and sampling from Tehran citizens above 18 years, categorized into low, medium, and high areas. Subsequently, the importance and necessity of the research were explained to the samples, ethical considerations were committed, and they were asked to answer the research tools completely and honestly. After completing the tools, they were collected, and participants were thanked for their time and cooperation.

The research tools included a researcher-made demographic information form with questions about gender, age, education, and housing, and researcher-made questionnaires on cyber and non-cyber public spheres (32 items each) and responsible environmental behaviors (32 items). Each of these questionnaires comprised 32 items, constructed based on theoretical foundations and research conducted in that area. Responses were obtained using a five-point Likert scale, ranging from strongly disagree (score of 1) to strongly agree (score of 5). Responsible environmental behaviors included questions about energy consumption, environmental protection behavior, environmental behavior in travel, and environmental shopping patterns. Cyber and non-cyber public spheres included questions about presence in halls, cafes, gatherings, and protest campaigns (non-cyber) and access to public information, public dialogue, and public action (cyber). The validity of the researcher-made questionnaires on cyber and non-cyber public spheres and responsible environmental behaviors was calculated using the method of average variance extracted as

0.84, 0.83, and 0.84 respectively, and their Cronbach's alpha reliability as 0.78, 0.73, and 0.79 respectively, and their composite reliability as 0.96, 0.94, and 0.95 respectively. Therefore, the results indicated the validity and reliability of the researcher-made questionnaires on public spheres and responsible environmental behaviors.

The data of this research were analyzed using Pearson correlation coefficients, stepwise multiple regression, and analysis of variance tests in SPSS software.

3. Findings

The frequency and percentage results of the demographic information form of the citizens were reported in Table 1, indicating that most of the citizens were male (62.50%) with ages between 46-55 years (33.75%) and holding bachelor's degrees (42.50%).

Table 1. The results of frequency and percentage of subjects' demographic characteristics

Variable	Value	Frequency	Percentage (%)
Gender	Male	250	62.50
	Female	150	37.50
Age (Year)	26-35	100	25.00
	36-45	130	32.50
	46-55	135	33.75
	55 or above	35	8.75
Education	Secondary School	15	3.75
	Diploma	35	8.75
	Associate degree	50	12.50
	Bachelor's	170	42.50
	Master's	124	31.00
	PhD	6	1.50

The results of the mean, standard deviation, and Pearson correlation coefficients of the public sphere and responsible environmental behaviors of citizens were reported in Table 2. According to these results, both the cyber and non-cyber public spheres had a significant positive correlation with citizens' responsible environmental behaviors ($P < 0.001$).

Table 2. Results of mean, standard deviation and Pearson correlation coefficients of the public domain, non-public domain and responsible environmental behaviors of citizens.

Variable	Mean	Standard Deviation	1	2	2
1. Public cyber domain	17.20	3.94	1		
2. Non-public cyber domain	21.46	4.35	(0.001) 0.21	1	
3. Responsible environmental behaviors	88.54	18.76	(0.001) 0.38	(0.001) 0.53	1

The results of the step-by-step multiple regression analysis for predicting citizens' responsible environmental behaviors based on the public sphere were reported in Table 3. These results showed that the cyber and non-cyber public spheres significantly predicted 31% of the variations in citizens' responsible environmental behaviors ($P < 0.001$).

Table 3. The results of the step-by-step multiple regression analysis for predicting citizens' responsible environmental behaviors based on the public and non-public spheres

Variable	Multiple correlation	R ²	F	p	Beta	t	p
Public	0.56	0.31	341.21	0.001	0.16	5.07	0.001
Non-public					0.48	23.79	0.001

The results of the analysis of variance for comparing the responsible environmental behaviors of citizens in terms of the type of cyber network were reported in Table 4. According to these results, there was no significant difference in the responsible environmental behaviors of citizens based on the type of cyber network ($P > 0.05$).

Table 4. The results of the analysis of variance for comparing the responsible environmental behaviors of citizens in terms of the type of cyber network

Source	SS	df	MS	F	p
Between-groups	2878.15	3	959.38	2.43	0.330
Within-groups	156741.40	397	394.81		
Total	1437856.55	400			

The results of the analysis of variance for comparing the responsible environmental behaviors of citizens in terms of marital status were reported in Table 5. According to these results, there was no significant difference in the responsible environmental behaviors of citizens based on marital status ($P > 0.05$).

Table 5. The results of the analysis of variance for comparing the responsible environmental behaviors of citizens in terms of marital status

Source	SS	df	MS	F	p
Between-groups	23738.58	3	7912.86	1.78	0.330
Within-groups	1764835.71	397	4445.43		
Total	16890560.24	400			

The results of the analysis of variance for comparing the responsible environmental behaviors of citizens in terms of educational level were reported in Table 6. According to these results, there was a significant difference in the responsible environmental behaviors of citizens based on educational level ($P < 0.05$).

Table 6. The results of the analysis of variance for comparing the responsible environmental behaviors of citizens in terms of educational level

Source	SS	df	MS	F	p
Between-groups	48087.69	3	16029.23	3.74	0.002
Within-groups	1699993.71	397	4282.10		
Total	16990560.24	400			

4. Discussion

Nowadays, considering the occurrence of environmental crises and disasters, attention to responsible environmental behaviors is of great importance. Therefore, this study aimed to explain the relationship between the public sphere (cyber and non-cyber) and citizens' responsible environmental behaviors.

The findings showed that both the cyber and non-cyber public spheres had a significant positive correlation with citizens' responsible environmental behaviors. These findings are consistent with research studies by D'Arco and Marino (2022), Gholizade et al. (2022), Tsai et al. (2021), Dastras and Khajenoori (2019),

Abbaszadeh and Alavi (2017), and Blazekiene and Telesiene (2012). It can be inferred that the cyber and non-cyber public spheres strengthen horizontal and vertical relationships among individuals and cognitively prepare citizens for predictable actions and activities, predominantly occurring in the public sphere. These actions and activities, by facilitating platforms for the emergence of environmental movements, can promote a specific lifestyle that integrates nature and the environment as part of every citizen's life, preventing the dominance of individualism and instrumental rationality over the environment. Hence, the cyber and non-cyber public spheres are not only arenas for citizen activism but also for learning and motivation. By changing attitudes and generating specific values around the environment, these spheres actively reduce social indifference and foster platforms for dialogue and consensus, leading to what can be termed an environmental culture according to the cultural approach. Given these considerations, it seems logical that an increase in the cyber and non-cyber public spheres would enhance citizens' responsible environmental behaviors, and conversely, a decrease in these spheres would reduce them.

Furthermore, the cyber and non-cyber public spheres significantly predicted 31% of the changes in citizens' responsible environmental behaviors. No research was found in this area, but it can be inferred that the public sphere and cyber indicate the presence of social capital and social networks that significantly impact environmental conservation through social actions and even protest campaigns. Actions and activities of individuals in the public sphere, both cyber and non-cyber, can influence the extent of citizens' environmental behaviors and lead to their increase. These spheres, by creating spaces for logical, reasonable, and goal-oriented actions and activities, can enhance responsible environmental behaviors. Therefore, it is conceivable that the cyber and non-cyber public spheres can significantly predict and explain citizens' responsible environmental behaviors.

Moreover, there was no significant difference in citizens' responsible environmental behaviors in terms of the type of cyber network or marital status, but there was a significant difference based on educational level. This finding is consistent with the research by Blazekiene and Telesiene (2012) in terms of the difference in environmental behaviors based on education. It can be inferred that modern human actions and activities are the result of collective thinking in the form of social capital and social networks derived from the cyber and non-cyber public spheres. By displacing instrumental rationality and individualism, these not only prevent encroachment on nature but also lead to its preservation. These actions and activities are located in the cyber and non-cyber public spheres, where the most important pillars are dialogue and collective ethics in the cyber public sphere and reciprocal norms in the form of campaigns and groups in the non-cyber public sphere. Given the discussed points, it seems logical that the level of citizens' responsible environmental behaviors would not differ based on the type of cyber network used or even marital status, but would differ based on educational level. This is because individuals with higher educational levels participate more realistically in groups and social networks, and consequently, their level of responsible environmental behaviors is higher than those with lower educational levels.

Ethical Considerations

Ethical considerations and points were explained to the citizens participating in this research, and the researchers committed to their implementation.

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Authors' Contributions

In this article, the first author was responsible for data collection and analysis, and the other authors were responsible for the final writing of the article.

Conflict of Interest

There was no conflict of interest among the authors of this article.

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