

Investigation of the Relation of Secondary Territory Spatial Quality in Enhancing the Sense of Environmental Safety among Students in Educational Spaces*

Jamaledin Soheili^{a**} - Tannaz Talebie^b

^a Assistant Professor of Architecture, Department of Architecture, Qazvin Branch, Islamic Azad University, Qazvin, Iran (Corresponding Author).

^b M.A. of Architecture, Department of Architecture, Qazvin Branch, Islamic Azad University, Qazvin, Iran.

Received 19 January 20221;

Revised 24 July 2022;

Accepted 26 November 2022;

Available Online 21 June 2023

ABSTRACT

Safety and security in educational spaces and schools are underlying undeniable factors keeping the mental and psychological health of students. CPTED approach that addresses crime prevention through environmental design is an efficient theory used to enhance environmental safety. Humans are always interacting with the environment. The territory is a part of the environment with which we are connected. Secondary territories that mainly have group ownership and collective application are more seen in schools. The following questions have been raised regarding the purpose of the study which is addressing the nexus between components and indicators of environmental safety and secondary territory in educational environments: 1) which factors in the design of secondary territories of educational spaces affect the enhanced environmental safety? 2) what is the nexus between environmental safety indicators and secondary territory indicators in increasing environmental safety and security? This is applied research in which, the survey method is used. The data have been collected from the studied books and papers written about this topic using a researcher-made questionnaire. Sample size has been measured based on the Cochran formula and computations have been done through SPSS software. The reliability of the questionnaire was examined through Cronbach's alpha, which equaled 0.8. Moreover, the indicators were ranked at the final step by using the Friedman test. The results indicated that the interaction index in secondary territories had the highest impact on the sense of safety among students.

Keywords: Educational Space, Environmental Safety, Secondary Territory, Physical Design, CPTED.

* This paper has been derived from the M.A. dissertation by the second author under the title of "Design of Female High School with an Approach to Increased Environmental Safety with Emphasis on the Secondary Territory" in Islamic Azad University, Department of Architecture and Urbanism that was guided by the first Author.

** E_mail: soheili@qiau.ac.ir

1. INTRODUCTION

The cultural changes that occurred in the contemporary era led to evolutions in the architecture of schools. These changes and evolutions are necessary because modern society requires new educational headings. The subject of safety was introduced by Abraham Maslow who considered the safety value in the next rank of vital human needs (Sajjadzadeh et al. 2016). Lurene Martin has defined safety as a guarantee for future prosperity. Walter Lippmann believes that nations feel safe when a war occurs and they are not forced to leave their values, while can keep their values by reaching victory in the war. Finally, Wolfers states that safety means no risk can threaten the values obtained through life not in the mind or real-world (Ahmadi Moghadam 2014).

Crime Prevention Through Environmental Design (CPTED) is one of the new attitudes in environmental prevention of law-breaking and criminality. This theory was introduced by C. Ray Jeffery. The environmental prevention of crime relies on the thought that law-breaking and criminal acts occur when the environment allows a criminal to do a criminal act. Hence, it is possible to reduce crime by changing the body of the environment (Colquhoun, 2004). Principles of design and CPTED have been used for a long time and the background of safety measures in CPTED style may go back to the first human settlements. An example is the construction of forts and castles of the Iron Era used walls, landscaping, moats, and drawbridges to limit access. In general, CPTED is a holistic approach to preventing criminal behavior focusing on the planning for places and their appearance and feeling (Reevan et al. 2022). The territory is a part of the environment with which are connected and we have the right to surveillance, inspect, and verify the will of shaping transformation concerning it. In such territories, strangers must be permitted by us to enter (Pakzad 2015). Territoriality refers to the design of spaces in way of distinguishing private space from public or semi-public space creating a sense of ownership for users, so strangers and intruders can be identified easily (Chen 2021). The secondary territory does not play a vital role and resembles the secondary categories in sociology. Some secondary territories are simultaneously used by the public and regular users (Altman 1975). Many studies have been conducted on environmental safety based on the CPTED and most previous studies have examined the case on the neighborhood scale. However, few studies are available about safety and security through environmental design in educational spaces. Although some researchers have investigated

this topic and expressed that reasonable design and proper planning for physical space can alleviate unsafe events, few studies have examined the physical properties of secondary territories in schools.

This study aims to find whether crime prevention through environmental design is a reliable approach to creating a sense of safety and security among students. It can be explained that the physical properties of secondary territories that increase their spatial quality are effective in creating environmental safety and increasing a sense of safety among users of that environment. The purpose of this study is to examine the relationship between secondary territories and environmental safety to increase environmental safety in educational spaces. To do this, this paper tends to answer two questions:

1. Which factors of the secondary territories' design of educational spaces are effective in increasing environmental safety?

2. What kind of nexus exists between indicators of environmental safety and secondary territory regarding the increase in environmental safety?

The following assumptions have been determined based on the research questions:

1. It is assumed that a mutual and effective relationship exists between indicators of secondary territory and environmental safety that can increase the sense of safety among students in the school.

2. It is assumed that physical safety in secondary territories would increase its quality and subsequently the environmental safety in educational spaces.

2. BACKGROUND

Investigation of environmental safety in its current connect form became contemporary with criticisms concerning urban development in the modernist era. The founder of studies conducted on environmental safety, Jane Jacobs criticized American cities and accused them of forgetting about humans in the shape of streets. She described the issue of "watchful eyes" and mentioned the considerable effect of environmental design in reducing crime and law-breaking cases (Sajjadzadeh et al. 2016). Moreover, some Iranian studies have been conducted on environmental safety reported in Table 1. Except for some cases, other studies have examined urban spaces on the neighborhood scale. Few studies about educational spaces and schools have considered this space as a part of a neighborhood or city at a larger scale, while no study has paid attention to the safety and security in this place especially the spaces with more public use in schools.

Table 1. Iranian Studies

Authors	Title	Results
Mostafa Arghyani (2021)	Evaluating the Effect of Physical Components on the Promotion of the Sense of Security in Educational Spaces from the Perspective of Students; Case Study: High Schools of Bojnourd	The territoriality index has the highest coefficient of correlation with security and access control has the lowest coefficient of correlation with a sense of security from the viewpoint of students.
Farzaneh Yaser (2020)	Some solutions for increasing safety in the redesign of residential complexes based on the theory of creating defensible space and CPTED (case study: Basijian Town in Amol)	Findings indicated that suitable architecture design and zoning of public, semi-public, semi-private, and private spaces led to a sense of insecurity and fear among criminals, and also affect the psychological factors leading to crime.
Azita Rajabi (2015)	Application of CPTED Theory reducing urban crimes	By using this theory, one can address the professional design-based techniques to minimize crimes instead of preventive methods used to cope with unsafety in urban spaces, such as police-based systems.
Hamed Hayati et al. (2018)	Factors affecting the reduction in personal crimes and increase safety in urban spaces using CPTED theory	This approach can be effective if is part of a comprehensive policy in addition to other strategies for crime prevention.
Ali Zalaghi et al. (2007)	Enacting Indicators of public safety in high schools of Tehran	Indicators that include behavioral and psychological aspects are more effective.

3. METHOD

The data were collected through library and survey methods through field study. According to the results of this study, this can be considered applied research. A questionnaire was designed to gather the information. The statistical study comprises first-grade high-school students in Allameh Helli in District 6 of Karaj City. This high school is located on Heydar Abad Street. This sample was chosen because it could be analyzed based on the theoretical foundations and obtained indicators. The sample size equaled 168 members (n=168) based on the Cochran formula.

3.1. Validity of Questionnaire

The designed questionnaire was given to the professors to determine its validity and reliability then confirmed by them.

3.2. Reliability of the Questionnaire

Cronbach's alpha test is one of the techniques used to assess the reliability of the questionnaire. The greater this coefficient than 0.7, the more reliable the questionnaire will be. This formula is written as follows:

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum_{I=1}^N S_I}{S_T} \right)$$

where k indicates the number of items or questions of the questionnaire or test, ST shows the variance of data, and SI indicates the variance of data of each questionnaire.

3.3. Measuring Cronbach's Alpha

Among 168 selected sample sizes, 126 members answered the questions. The calculated Cronbach's alpha coefficient of environmental safety equaled 0.847, while this rate equaled 0.817 for secondary territory. Therefore, this questionnaire has suitable items and an internal consistency exists between items.

Table 2. Reliability Test Based on Cronbach's Alpha

Variable	Number of Items	Cronbach's Alpha
Environmental Safety	34	0.847
Secondary Territory	24	0.817

4. THEORETICAL FOUNDATIONS

Various origins and roots exist regarding environmental safety and unsafe environment. Unsafety and insecurity have two objective and subjective extremes. The objective extreme consists of some incidents, such as theft and robbery, aggression and misbehavior, while the subjective extreme is about the place's safety. The more transparent the space, the higher the environmental safety would be (Almasifar and Ansari 2010).

4.1. CPTED

The principles and strategies of the CPTED approach are as follows:

1. Territoriality, 2. natural surveillance, 3. light, 4. access control, 5. encourage activities, 6. environmental quality, 7. landscaping, and 8. physical safety.

The advent of CPTED theory was supported by Elizabeth Wood and Sclamo Angel. Angel believed that crime can be effectively reduced by highlighting the ownership borders, reducing or increasing accesses, and enhancing surveillance of residents (Mirhosseini and Jahanbakhsh 2017). Angel thought that a higher number of crimes in some areas occur due to available opportunities abused by criminals. The criminals examine the required effort and possible risk of a criminal act and then do it (Salehi 2008). One of the purposes of Elizabeth Wood for the environmental defense was the progress of the building's façade in the opinion of residents. She built some realms where residents could gather together that increased their surveillance. Wood believed in control of the environment and community by residents based on their attendance (Salehi 2008).

Jane Jacobs introduces the factor of the street and believes that the city is safe when the streets are safe. She explains that CPTED is based on a city with secure streets (Ziari et al. 2016).

The general idea of CPTED mentioned by Dr. Jeffery in his book under the title of crime prevention through environmental design is based on this developed hypothesis indicating that a suitable efficient design of the built environment can reduce the fear of crime and crime cases, and improve the life (Khelghatdoost et al. 2013). Oscar W. Newman introduces the defensible space suggesting changing the city form and template in a way that the environment is designed and protected by people who are present in those spaces rather than by the police. He considered three factors that affect crime occurrence:

Alienation and unfamiliarity: people are not familiar with each other and are strangers.

Lack of surveillance: the criminal can commit the crime without being seen.

Available way to escape: criminals can escape from the place of the crime (Salehi 2008).

Clarke expresses a different type of prevention called situational prevention. In the opinion of Clarke, large spaces and environments can be divided into smaller sections entrusted to individuals to be controlled by people (Heshmati 2005).

Two Canadian researchers called Wekerle and Whitzman explained the issue of a safe city by introducing three factors of knowledge about the environment, surveillance by others, and the ability to receive aid from others easily that are effective in increasing safety in the urban environment (Pourjafar et al. 2009).

In 1982, Wilson and Kelling introduced the theory of broken windows. According to this theory, the unpleasant and chaotic urban environment is related to the rate of crime commitment. It means that lack of control, inhibition, and social surveillance over the environment provide the field for criminal acts (Wilson and Kelling 1982).

The viewpoint of Sherman, Gartin, and Buerger was shaped based on a type of crime etiology. According to this hypothesis, the city's hot spots are considered criminal areas due to some physical, social, and economic factors; these are some spaces such as terminals for urban transportation and suburbs (Pourahmad et al. 2003).

Taylor and Holl emphasized the crime occurrence and conducted some studies on changes in the physical and social environment to prevent crime through the following factors:

1. Surveillance and supervision, 2. presence of citizens in urban spaces, 3. access control, and 4. stimulating factor (Salehi 2008).

Table 3 reports the discussion and viewpoints expressed by the scholars.

Table 3. Theorists' Viewpoints about Environmental Safety and CPTED

Theorist	Year	Viewpoint
Elizabeth Wood	1961	Improved façade of buildings in the opinion of residents; Social control of the environment is based on the presence and surveillance of residents. The hidden areas that no control exists over them.
Jane Jacobs	1961	In the book "The Death and Life of Great American Cities," need for safe streets in the city, separation, and distinction between public and private places, the use of diversity and their integration in the city, effective and preventive application of pedestrians' presence in urban areas for reducing crime possibility are factors creating environmental safety.
Sclamo Angel	1961	Angel believed that it is possible to directly reduce crimes by determining ownership limits, increasing or decreasing access to the place, or increasing citizens' surveillance through the physical environment.
Oscar Newman	1973	(Sense of ownership): neighborhood residents protect and control the spaces they feel they belong to. The more the number of users of a shared territory, the lower the right to that territory. It would be better if that neighborhood is divided into smaller neighborhoods to encourage residents of a neighborhood to interact with their neighbors.

Theorist	Year	Viewpoint
Jeffery	1971	His book "crime prevention through environmental design" has been developed based on the hypothesis that a suitable efficient design of a built environment can reduce crime fear and rate, and improve life.
Wilson and Kelling	1982	They introduced the theory of broken windows. According to this theory, some signs such as a lack of social control and surveillance over the environment like broken windows of a building, trashes in the street, etc. allow criminals to commit crimes.
Sherman, Gartin and Buerger	1989	Some specific areas or hot spots of the city experience more crime due to some physical, social, and economic elements; these areas include urban nodes (terminals and turban transportation stations), some passages, and suburbs that share such features.
Taylor and Holl	1992	Changes in the physical and social environment occur based on the four principles that prevent crimes: 1) surveillance and control, 2) presence of citizens in urban spaces, 3) access control, and 4) stimulating factor (Salehi 2008).
Clarke	1992	he believed that large spaces and environments can be divided into smaller sections entrusted to individuals to be controlled by people.
Weckerle and Weitzman	1995	They express three factors for increasing safety and security in urban space: 1) awareness of the environment, 2) being watched by others, and 3) easy access if required.
Gregory Saville	2000	Residents are responsible to create and maintain the safety in the neighborhoods.
International Crime Center	2006	This center considers the design and use of the built environment as the suitable factor for reducing crimes and improving quality of life; this center also mentions safety as the most important principle for the design of the built environment.

According to the opinions of scholars about environmental safety with emphasis on the CPTED approach, the relevant indicators have been introduced in Figure 1.

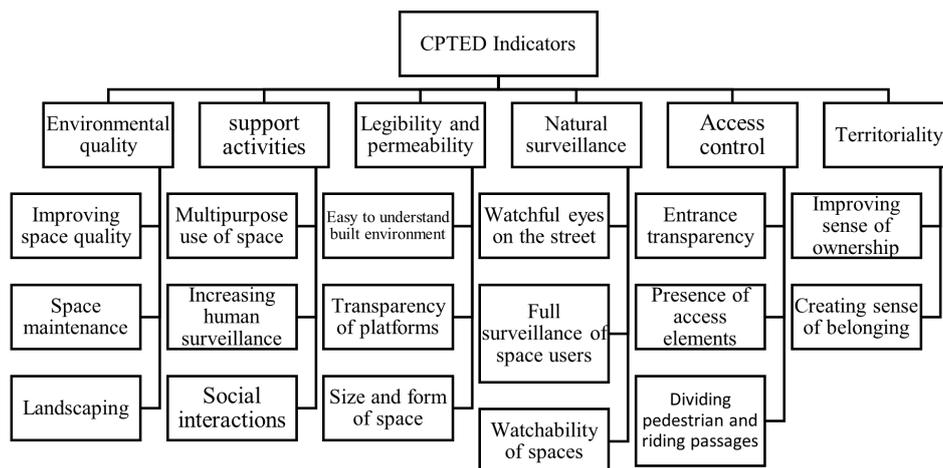


Fig. 1. Conceptual Model of Environmental Safety Indicators

4.2. Territory Concept

We always deal with the human and experience various feelings in different environments. We feel a sense of ownership in some spaces and try to control them while considering other public spaces with public use

(Pakzad 2015, 248). Territories have various models. The length of use is the most important criterion for grouping territories. Accordingly, territories can be divided into transient and regular territories (Lang 1983).

Altman classifies the territory into three types primary, secondary, and public territories.

Primary territory: primary territories are under the supervision and authority of a person or a group of individuals who specifically use it, and are considered legal and regularly owned by this group. This type of territory is called a personal or private territory, such as a house. In such territory, the personality of the owner is clear, so strangers are not allowed to enter this territory where inspection of commutation is highly important (Altman 1975).

Secondary territory: secondary territory does not specify a certain task and resembles the secondary categories in sociology. Some secondary territories are available to the public simultaneously and also are under the surveillance of regular users. Secondary territories create a connection between primary territory that is under the surveillance of a person and public territory that most people can use it. Therefore, it is possible that people cannot distinguish the borders in secondary territories and law-breaking may lead to serious struggles between individuals. Lyman and Scott describe a different form of secondary territory that is an interactive territory. It means

any territory in which, a mutual relationship exists between some individuals. Brower and Goffman used different terms; however, they also believe that a secondary territory is a place located between primary and public territories. In other words, the secondary territory is available for both the public and its owners. The secondary territory is where a person or group of people can have surveillance, inspection, and ownership over it but is not similar to the primary territory. In secondary territories, other individuals are also legally or friendly allowed to enter and users will be changed over time. This territory is not always attributed to a unique group of users. Due to the complexity of the surveillance and ownership in these territories, improper and face-to-face relationships may be created between users. In such territories, some measures leading to surveillance over privacy may be widely used because individuals constantly define the limits and boundaries around them so that they can create accurate, required, and desired relationships with others (Altman 1975). According to mentioned definitions, Figure 2 indicates the properties of secondary territories.

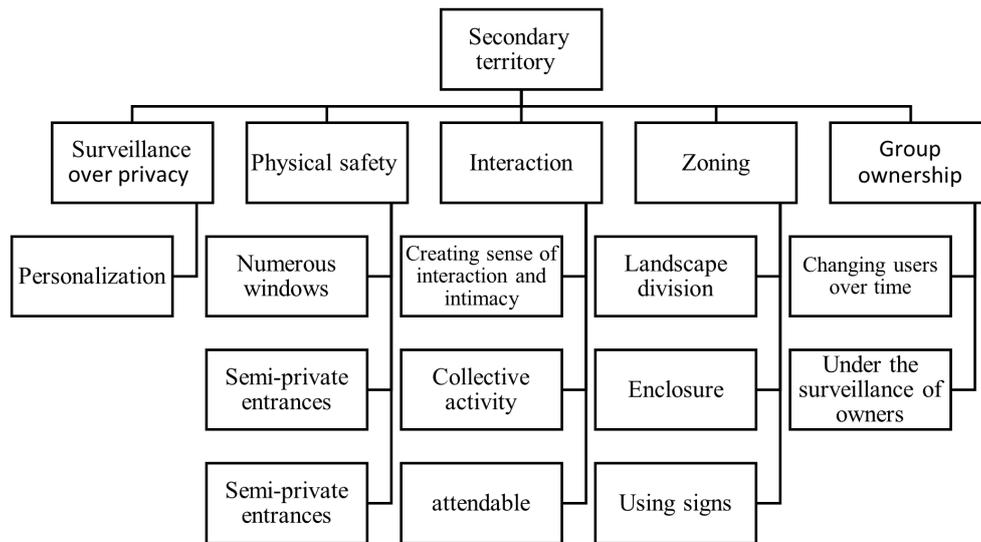


Fig. 2. Conceptual Model of Secondary Territory Indicators

5. STUDIES AND ASSESSMENTS

Research variables: according to mentioned points,

objectives, and questions of research, variables have been defined as follows.

Table 4. Research Variables

Research Variables		
Independent Variable	Dependent Variable	Intervening Variable
Physical Factors	Environmental Safety	Secondary Territory

After designing indicators of secondary territory and CPTED, a conceptual model is used to indicate the

nexus between variables from two sides in a proposed method.

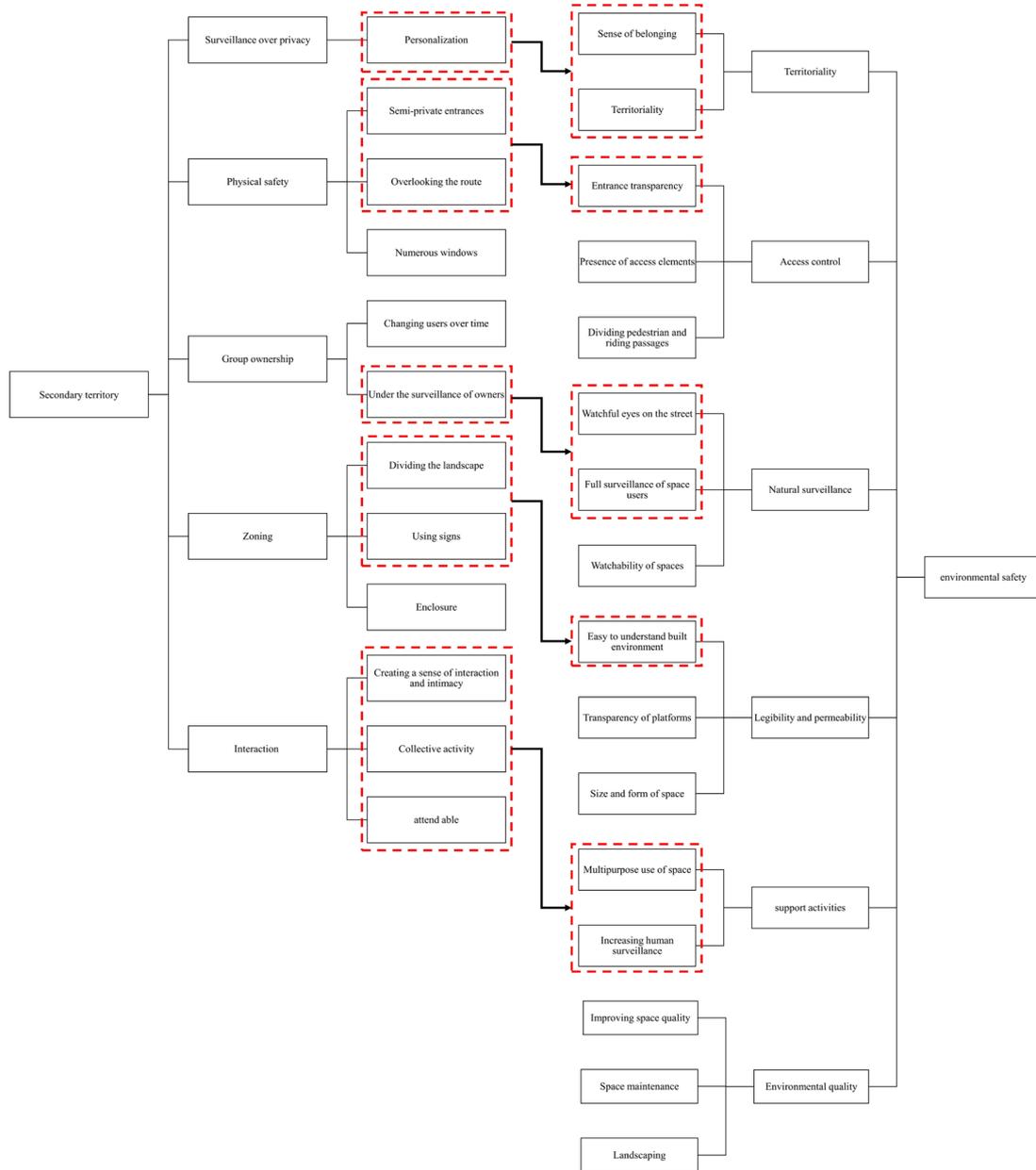


Fig. 3. Relationship between Variables

6. RESULTS

A data collecting instrument that was a 58-item questionnaire was used to test hypotheses and questions were answered based on a five-point scale. This questionnaire was distributed among 168 students in Allameh Helli High School. The considered questionnaire has been designed based on the CPTED indicators and secondary territory explained in the theoretical foundations and graphs 1 and 2. In this questionnaire, items 1-34 were about

CPTED, and items 35-58 were related to secondary territory.

6.1. Descriptive Statistics

- Age

Among 126 respondents, 19 members were 13 years old, 32 members were 14 years old, 47 members were 15 years old, and 32 members were 16 years old. The following graph indicates the age frequency and percentage of respondents.

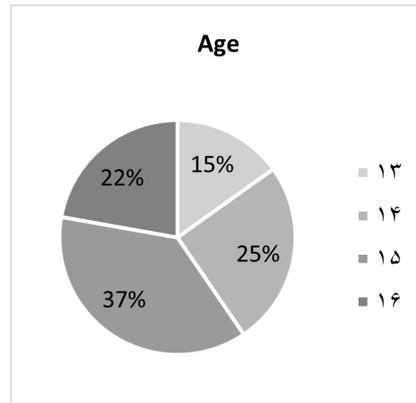


Fig. 4. Frequency Distribution of Respondents in Terms of Age

- Education Grade

Among respondents, 35 members were from seventh grade, 45 members from eighth grade, and

46 members from ninth grade. The following graph depicts the frequency of education grades.

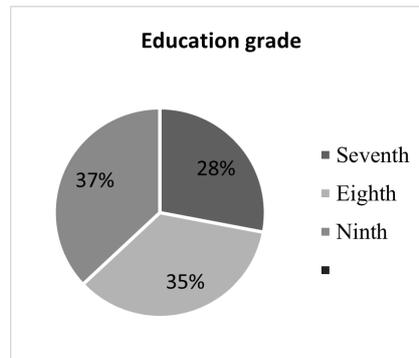


Fig. 5. Frequency Distribution of Respondents in Terms of Education Grade

6.2. First Hypothesis

1. It is assumed that a mutual and effective nexus exists between indicators of secondary territory and environmental safety, which contributes to a higher sense of security among students in the school.

The secondary territory resembles some interior public spaces, such as corridors, elevators, stairs, lobbies, green spaces, and meeting spaces. This

hypothesis addresses the coefficient of correlation between secondary territory and environmental safety. The lower the significance coefficient than 0.05, the more significant the nexus between variables will be. According to computations conducted through SPSS software and the obtained signification rate, an effective nexus exists between the concept of secondary territory and environmental safety in educational spaces, so this hypothesis is confirmed.

Table 5. Test of Pearson Correlation between Secondary Territory and Environmental Safety

Variable	Pearson Coefficient	Sig.
Environmental Safety	0.752	0.000
Secondary Territory		

Table 6 reports the coefficient of correlation between indicators of secondary territory and environmental safety. According to the data obtained from the significance level, the coefficient of correlation between environmental safety and indicators including surveillance over privacy, physical safety, zoning, and group ownership was less than 0.05

indicating the significant nexus between these indicators of secondary territory and environmental safety in educational spaces. On the other hand, the significance between interaction and environmental safety equaled 0.000, implying that this index had the highest effect on environmental safety.

Table 6. Confirmation of the First Hypothesis by Pearson Correlation Test

		Environmental Safety	Surveillance over Privacy	Physical Safety	Interaction	Zoning	Group Ownership
Environmental Safety	Correlation Coefficient	1	.323**	.248*	.553**	.475**	.408**
	Signification		.001	.026	.000	.000	.000
	N	121	111	81	97	100	110
Surveillance over Privacy	Correlation Coefficient	.323**	1	.028	.048	.197	.147
	Signification	.001		.810	.644	.053	.136
	N	111	116	76	96	97	104
Physical Safety	Correlation Coefficient	.248*	.028	1	.344**	.466**	.296**
	Signification	.026	.810		.004	.000	.010
	N	81	76	84	68	70	75
Interaction	Correlation Coefficient	.553**	.048	.344**	1	.386**	.246**
	Signification	.000	.644	.004		.000	.017
	N	97	96	68	102	85	93
Zoning	Correlation Coefficient	.475**	.197	.466**	.386**	1	.324**
	Signification	.000	.053	.000	.000		.001
	N	100	97	70	85	104	97
Group Ownership	Correlation Coefficient	.408**	.147	.296**	.246*	.324**	1
	Signification	.000	.136	.010	.017	.001	
	N	110	104	75	93	97	114

- Significance Level

The significance level is expressed by the signification coefficient; the more this coefficient equals or is less than 0.05, the more significant relationship exists between the dependent and independent variables. However, a significance coefficient higher than 0.05

indicates no significant nexus between variables. According to the values and coefficient reported in the Table above, this hypothesis is confirmed, and secondary territory indicators can affect the environmental safety of educational spaces.

Table 7. Results of Significance between Secondary Territory Indicators and Environmental Safety

One-Sample Test						
Test Value = 0						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Environmental Safety	122.340	120	.000	110.51240	108.7239	112.3009
Group Ownership	79.795	113	.000	9.86842	9.6234	10.1134
Zoning	85.430	103	.000	17.40962	17.1031	17.91611
Interaction	81.744	101	.000	2030392	19.8112	20.7966
Physical Safety	53.309	83	.000	14.75000	14.1997	15.3003
Surveillance over Privacy	63.213	115	.000	5.87069	5.87069	6.0547

6.3. Second Hypothesis

1. It is assumed that physical safety in secondary territories would increase its quality and environmental safety in educational spaces. Questions 51-56 are related to physical safety in the secondary territories:

51) how much you are satisfied with the number of windows in corridors, libraries, prayer rooms, and libraries?

52) how much of the interior space of corridors, library, prayer room, and laboratories are watchable through windows?

53) how much do you are satisfied with the location of the indoor and secondary entrances of the school?

54) how much the semi-private entrances would increase the sense of safety?

55) how must you overlook the route of your movement inside the school or outside environment?

56) how much lighting in the route reaching the school, environment, and interior space of the building provide the surveillance?

According to the computations, the physical safety index is effective in the secondary territory because the obtained Sig value equaled 0.000, and this hypothesis is confirmed.

Table 8. Pearson Correlation between Physical Safety and Secondary Territory

Variable	Pearson Coefficient	Sig.
Physical Safety	0.751	0.000
Secondary Territory		

Table 9 reports the coefficient of correlation between indicators of secondary territory and physical safety. According to the data obtained from the significance level, the coefficient of correlation between physical

safety and this index was less than 0.05 indicating the significant nexus between this index of secondary territory and physical safety in educational spaces.

Table 9. Confirmation of the Second Hypothesis by Pearson Correlation Test

Questions Related to the Physical Safety in the Secondary Territory	51	52	53	54	55	56
Correlation Coefficient	.495**	.333*	.489**	.284*	.337*	.456**
51 Signification	.000	.019	.000	.048	.018	.001
N	49	49	49	49	49	49
Correlation Coefficient	1	.153	.143	.062	.215*	.071
52 Signification		.106	.133	.521	.025	.467
N	117	113	112	108	108	108
Correlation Coefficient	.153	1	.139	-.005	.095	-.046
53 Signification	.106		.134	.958	.316	.632
N	113	122	117	112	113	112
Correlation Coefficient	.143	.139	1	.039	.258**	.242*
54 Signification	.133	.134		.684	.006	.011
N	112	117	121	112	112	111
Correlation Coefficient	.062	-.005	.039	1	.190*	.309**
55 Signification	.521	.958	.684		.050	.001
N	108	112	112	116	107	107
Correlation Coefficient	.215*	.095	.258**	.190*	1	.367**
56 Signification	.025	.316	.006	.050		.000
N	108	113	112	107	117	108

- Significance Level

The significance level is expressed by the signification coefficient; the more this coefficient equals or is less than 0.05, the more significant relationship exists between the dependent and independent variables. However, a significance coefficient higher than 0.05

indicates no significant nexus between variables. According to the values and coefficient reported in the table above, this hypothesis is confirmed, and physical safety is effective in secondary territories.

Table 10. Results of Significance between Physical Safety and Secondary Territory

Test Value = 0						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
	51	54.167	116	.000	2.974	2.87 3.08
	52	54.728	121	.000	3.303	3.18 3.42
	53	35.003	120	.000	2.562	2.42 2.71
	54	26.132	115	.000	1.621	1.50 1.74
	55	30.928	116	.000	2.265	2.12 2.41
	56	24.539	115	.000	1.914	1.76 2.07

6.4. The Signification of the Friedman Test

The significance of the Friedman test is examined before ranking the variables. According to Table 11,

the Chi-squared values equaled 1527.112 and 471.373 for environmental safety and secondary territory, respectively and the significance coefficient was less than 0.05 indicating the significance of this test.

Table 11. Significance of the Friedman Test

Environmental Safety		Secondary Territory	
Test Statistics ^a		Test Statistics ^a	
N	82	N	49
Chi-Square	1527.112	Chi-Square	471.373
df	33	df	23
Asymp. Sig.	0.000	Asymp. Sig.	0.000

6.5. Ranking Indicators

The priority of each indicator has been determined based on the Friedman test. In environmental safety, the index of natural surveillance with a mean value of 20.79 is at first rank, so is the most effective component of environmental safety. Activities

support (19.34), access control (18.60), legibility and permeability (16.97), environmental quality (14.29), and territoriality (13.73) are in the next ranks. In secondary territory, moreover, interaction (15.99) is the first rank followed by zoning (12.90), surveillance over privacy (12.7), physical safety (10.25), and group ownership (10.18).

Table 12. Ranking Indicators of Environmental Safety and Secondary Territory

Indicators of Environmental Safety	Components	The Mean Value of each Criterion	Indicators of Secondary Territory	Components	The Mean Value of each Criterion
Territoriality	Sense of Belonging; Sense of Ownership	13.73	Group Ownership	Changing users over time; Under the surveillance of owners	10.18
Access Control	Entrance Transparency; Presence of Access Elements; Dividing Pedestrian and Riding Passages	18.60	Zoning	Dividing the landscape; Enclosure; Using signs	12.90

Indicators of Environmental Safety	Components	The Mean Value of each Criterion	Indicators of Secondary Territory	Components	The Mean Value of each Criterion
Natural Surveillance	Watchability of Spaces; Surveillance of Users over the Space; Watchful Eyes on the Street	20.79	Interaction	Creating a Sense of Interaction and Intimacy; Collective Activity; Attendable	15.99
Legibility and Permeability	Easy to Understand the Environment; Size and Form of Space; Transparency of Platforms	16.97	Physical Safety	Numerous Windows; Semi-Private Entrances; Overlooking the Route	10.25
Support Activities	Increasing Human Surveillance; Multiple Uses of Space; Social Interactions	19.34	Surveillance over the Privacy	Personalization	12.17
Environmental Quality	Landscaping; Improving the Quality of Space; Space Maintenance	14.29			

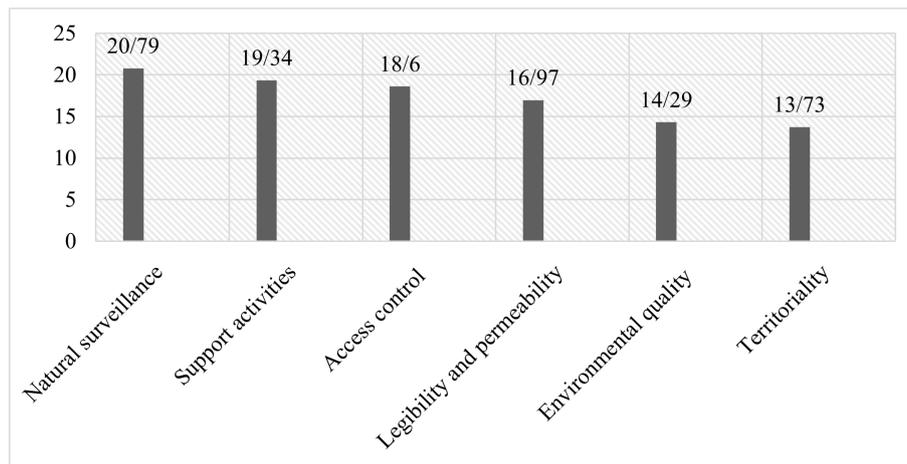


Fig. 6. Ranking Indicators of Environmental Safety

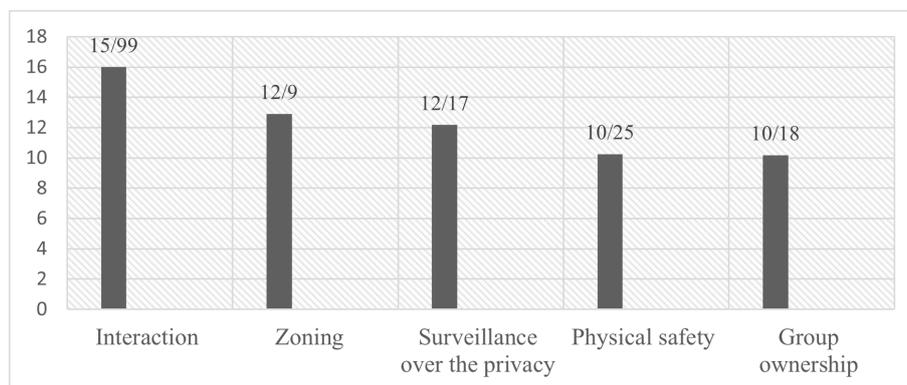


Fig. 7. Ranking Indicators of Secondary Territory

7. CONCLUSION

This study aims to answer these two questions:

1. Which factors in the design of secondary territories

of educational spaces are effective in increasing environmental safety?

2. What kind of nexus exists between indicators of environmental safety and secondary territory in

increasing environmental safety?

Two hypotheses have been designed in the next step: First, a mutual and effective nexus exists between components of environmental safety and secondary territory.

Second, physical safety in secondary territories increases its quality and subsequently enhances environmental safety in educational spaces.

Accordingly, this study examined a school in a case study and tested the mentioned hypotheses in it.

Regarding the first question, assessments indicate that the quality of secondary territory can be considered as the outcome of some indicators, such as surveillance over privacy physical safety, group ownership, zoning, and interaction, while the interaction has the highest coefficient of correlation with safety and security of students. This result confirms the first hypothesis. Physical changes in the design of the spaces known as the secondary territory can indeed increase the sense of safety among students. Application of furniture in a way that encourages students to interact with each other and create collective and meeting activities, creation of spaces for collective activities and formation of relationships, and projection of places in the courtyard allowing for sitting and shaping some group movements are suitable techniques in response to some components, including the sense

of interaction and intimacy, collective activity and attendance place in the definition of interaction index. Zoning is at second rank in ranking the indicators. Zoning is defined by some components, such as the division of landscape, enclosure, and using signs. To achieve these components in the design following options can be considered: using different materials, plants, and porticos to separate spaces, using fences, vegetation, hedges, etc. to create a sense of enclosure, and using visual signs in buildings and facades, such as nodes as a sign that is familiar for the audience.

The second question can be answered in this way providing physical safety in secondary territories of educational spaces considerably enhances its spatial quality and safety in the environment. According to the correlation between the physical safety index and the secondary territory variable, the second hypothesis can be confirmed. Bright and accurate lighting, the use of bright and transparent materials, and the visibility of these spaces indeed lead to higher safety and security of these environments. Physical safety includes some sub-indicators such as numerous windows, semi-private entrances, and overlooking the routes. It is suggested to use glass walls, entrances, and exit gates in sub-fronts, and the ability to see the route when selecting it.

REFERENCES

- Afsharkoham, Javad, and Mohammad Rahighi Yazdi. 2014. The Effect of Environmental Factors on Neighborhood Resident's Feeling of Security (Case Study: Selected Neighborhoods in the city of Yazd). *Urban Sociological Studies* 3(8): 59-78. <https://www.magiran.com/p1226985>. [in Persian]
- Ahmadi Moghadam, Ismaeil. 2010. National Unity, Islamic Coherence and Social Security. *Societal Security Studies* 1(3): 133-163. <https://www.magiran.com/p1963452>. [in Persian]
- Almasifar, Nina, and Mojtaba Ansari. 2010. Analysis of environmental safety of County Parks as an urban landscape based on womankind viewpoint (on the Basis of CPTED); Case study: Saie Park, Iran. *Urban Management* 8(25): 21-34. <https://www.magiran.com/p884725>. [in Persian]
- Altman, Irwin. 1975. *The environment and social behavior: privacy, personal space, territory crowding*. Boston: Brooks/Cole.
- Colquhoun, Ian. 2004. *Design Out Crime: Creating Safe and Sustainable Communities*. London and New York: Routledge Taylor and Francis group.
- Chen, Guoyi, Zhang Shangmin, Yan Bangquan, and Miao Shengzhen. 2021. Environmental safety evaluation of geopark based on CPTED concept and fuzzy comprehensive analysis. *Plos one* 16(11): 1-17. <https://doi.org/10.1371/journal.pone.0260316>
- Heshmati, Mohammad. 2005. The impact of urban design on the prevention and reduction of crimes and anomalies. *Soffeh* 15(3-4): 82-89.
- Divshali, Hosseini, Seyede Fargol, and Amirreza Karimiazari. 2018. Analysis of the relationship between physical factors of crime with space syntax method (Case study: Neighborhood of Sagharizazan in Rasht). *Societal Security Studies* 9(1): 459-476. <https://www.magiran.com/p2127358>. [in Persian]
- Khalilabad, Kalantari, Hossein Ronak Ardalani, Sarveh Seraji, and Atieh Pourahmad. 2013. Planning urban safe spaces based on gender integration with CPTED approach (case study: Farhangian neighborhood, Benab city) *Journal of Studies On Iranian - Islamic City* 3(12): 15-26. [in Persian]
- Karimaei, Amir Azam. 2006. A reflection on the knowledge of social security. *Journal of Research Police Sciences* 7(4): 139-162. [in Persian]
- Khelghatdoost, Rouzbeh, Afsaneh Zamanimoghadam, and Tannaz Shamsabadi. 2013. The relationship between the "urban spatial structure and permeability" and the rate of social safety according to citizen's opinions and on the basis of CPTED model (Case study: Karaj). *Urban Planning Studies* 5(15): 59-79. [in Persian]
- Kiani, Mohammad Yosef. 2000. *Iranian Architecture (Islamic Period)*. Tehran: samt pub. [in Persian]
- La Lamoreaux, Daniel, and Michael L. Sulkowski. 2019. An alternative to fortified schools: Using crime prevention through environmental design (CPTED) to balance student safety and psychological well-being. *Psychology in the schools* 57(1): 152-165.
- Lang, Jon T. 1987. *Creating architectural theory: the role of the behavioral sciences in environmental design*. Washington: Van Nostrand Reinhold.
- Mahdaviniezhad, Mohammad Javad, Mohammad Hossein Ghasem Pourabadi, and Aisa Mohammadlouye Shabestari. 2013. Typology of Mosque-school of Qajar Period. *Journal of Studies On Iranian - Islamic City* (11): 5-15. [in Persian]
- Mahmoodi Janaki, frouz, and Majid Ghorchi Baigi. 2009. Environmental Design and Crime Prevention. *Journal of Private law studies* 39(2): 345-367. [in Persian]
- Malekian, Framarz. 2018. Description and Analysis of Criteria for Designing Educational Space Based from the Viewpoint of Educational Technology Professionals on Creative Thinking. *Quarterly Journal of Research in Educational Systems* 12(40): 731-748. [in Persian]
- Minnery, John R., and Bill Lim. 2005. Measuring Crime Prevention Through Environmental Design. *Journal of Architectural and Planning Research* 22(4): 330-341.
- Mirhoseini, Zeinab, and Heydar Jahanbakhsh. 2017. The Effect of the physical Components of the Historical Context on the Environmental Security of Tourists (Case study: Ardakan, Charkhab Neighborhood). *Hoviate shahr* 10(28): 89-104. <https://www.magiran.com/p2284256>. [in Persian]
- Navidnia, Manijeh. 2003. An income on social security. *Journal of Strategic Studies* 6(1): 55-76. [in Persian]
- Pakzad, Jahanshah, and Hamideh Bozorg. 2015. *Alphabet of environmental psychology for designers*. Tehran: Armanshahr. [in Persian]
- Pourahmad, Ahmad, Mohammadtaghi Rahnamaie, and Mohsen Kalantari. 2003. Geographical investigation on crime in Tehran. *Geographical research quarterly* 35(44): 81-98. [in Persian]
- Pourjafar, Mohammadreza, Hadi Mahmoodinegad, Mojtaba Rafieian, and Mojtaba Ansari. 2009. Promotion of environmental security and reduction of urban crimes with emphasis on CPTED approach. *International Journal*

- of *Industrial Engineering & Production Management* 19(6): 73-82. [in Persian]
- Rajabi, Azita. 2017. Application of CPTED Theory reducing urban crimes. *Amayesh Journal* 10(38): 27-46. <https://www.magiran.com/p1778525>. [in Persian]
 - Reevean Seelen S.O. Jagamogan, Hafiza Abas, and Saiful Adli Ismail. 2022. Systematic Literature Review (SLR) on Crime Prevention Through Environmental Design (CPTED) in Residential Areas. *Open International Journal of Informatics (OIJI)* 10(1): 63-72.
 - Sadaghian, Seyyed Jalal. 2003. An income on security and its dimensions and scope. *Journal of Research Police Sciences* 5(1): 45-75. [in Persian]
 - Sajjadian, Nahid, Saeid Amanpour, and Masoud Modanlou Joybari. 2015. Analysis of the environmental protection function of urban parks based on CPTED approach (Case Study: Sari City). *Journal of Police Geography* 3(10): 87-110. <https://www.magiran.com/p2168450>. [in Persian]
 - Sajjadzadeh, Hasan, Mohammad Saeid Izadi, and Mohammad Reza Haghi. 2016. The Relationship between Spatial Configuration and Environmental Variables in Informal Settlements, Case study: Hesar Neighborhood in Hamedan. *Honar-ha-ye-ziba Memari-va-shahrsazi* 21(3): 19-28. <https://www.magiran.com/p1679468>. [in Persian]
 - Salarifar, Mahya, and Massihallah Masoomi. 2017. An investigation into the impact of physical-environmental factors in designing urban open spaces on increasing social safety in informal settlements (Case Study: Informal settlements in Sabzevar). *Research and Urban Planning* 8(30): 145-162. <https://www.magiran.com/p1775036>. [in Persian]
 - Salehi, Ismail. 2008. *Environmental characteristics of safe urban spaces*. Tehran: Urban Planning and Architecture Study and Research Center.
 - Sami Azar, Alireza. 1997. *History of the development of schools in Iran*. Tehran: Organization of modernization, development and equipping of schools in the country. [in Persian]
 - Vasiq, Behzad, and Reza Ghadrdan Gharamaleki. 2016. The Concept of Education and its impact on the Architecture of Islamic Schools - (A comparative comparison between Seljuk and Safavid Schools). *Journal of Islamic Architecture Research* 4(3): 40-58. <https://www.magiran.com/p2121467>. [in Persian]
 - Wilson, J. Q., and G. L. Kelling. 1982. Broken windows. *Atlantic monthly* 249(3): 29-38.
 - Wyne Jones, Richard. 1999. *Security, Strategy, and Critical Theory*. London: Lynne Rienner Publications.
 - Ziari, Keramatollah, Asghar Heidari, Ismail Najafi, and Peyman Mohammadi. 2016. Evaluation of the first generation components of CPTED in crime prevention (case study: Dashtghib neighborhood of Tehran). *Journal of Police Geography* 4(15): 1-28. [in Persian]

HOW TO CITE THIS ARTICLE

Soheili, Jamaledin, and Tannaz Talebie. 2023. Investigation of the Relation of Secondary Territory Spatial Quality in Enhancing the Sense of Environmental Safety among Students in Educational Spaces. *Armanshahr Architecture & Urban Development Journal* 16(42): 59-73.

DOI: 10.22034/AAUD.2022.269447.2404

URL: https://www.armanshahrjournal.com/article_173183.html

**COPYRIGHTS**

Copyright for this article is retained by the author(s), with publication rights granted to the Armanshahr Architecture & Urban Development Journal. This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution License.

<http://creativecommons.org/licenses/by/4.0/>



