

Presentation a Public Education Model Based On Social Participation for the Resilience of Tehran's Urban Society in Earthquakes

Fariba Shahmohammadi¹, Saeed Safarian Hamedani², Mohammad Salehi³

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Abstract

INTRODUCTION: This research was conducted with the aim of providing a model of public education based on social participation for the resilience of Tehran's urban society in natural disasters especially earthquakes.

METHODS: This qualitative research was done by Delphi method. About 15 experts and decision-makers in the field of natural disasters and crisis management were selected to participate in the research through a targeted process by using the snowball method.

FINDINGS: The findings showed that the participation of the public including mental and objective participation and having a cooperative spirit can have an impact on public education. In addition, this education is effective on the resilience of the public with social, economic, cultural, and institutional components and can bring the consequences of sustainable development.

CONCLUSION: According to the results, the resilience fields such as information and communication infrastructure, physical infrastructure and supportive policies can provide a platform for resilience in the society; however, interveners such as demographic characteristics and geographical characteristics should not be ignored.

Keywords: Public education model; Resilience; Social participation

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Introduction

Since natural disasters such as earthquakes have a completely complex and unavoidable nature are out of human control. Meanwhile, the performance of human factors related to natural disasters can control and manage its vulnerability to some extent. Therefore, it can be said that the level of public knowledge and awareness of people during crises resulting from natural disasters to a large extent depends on the level of public education or public education by the relevant institutions. Researches have shown that the performance of developed countries in facing crises is far different from developing countries. So that time to return to the pre-crisis situation is shorter for them or in other words, their tolerance and resilience is higher

than least developed countries.

According to Kaviani (2011), in recent years, special emphasis is placed on resilience instead of vulnerability. The urban resilience approach emphasizes on providing solutions for improving and empowering local urban communities and promoting more efficient supervision in urban communities by local governments (1). Therefore, pure attention to the physical elements of the society will not be possible without raising the tolerance thresholds of its social capacities. The main point in this approach is that a local community should be resistant enough in the event of an unforeseen crisis to be able to recover in a short time cycle with the help of its own powerful internal forces and the participation of

1 PhD student in Educational Management, Sari Branch, Islamic Azad University, Sari, Iran

2 Assistant Professor, Educational Sciences Department, Sari Branch, Islamic Azad University, Sari, Iran

3 Associate Professor, Department of Educational Sciences, Sari Branch, Islamic Azad University, Sari, Iran

Correspondence to: Saeed Safarian Hamedani, Email: snhrm3000@yahoo.com

forces outside the community quickly returned to the pre-crisis conditions (2).

To know how the social, economic, institutional, political and executive capacities of urban communities influence in increasing resilience and to identify different dimensions of resilience in cities. Meanwhile, the type of attitude towards the resilience and the way of analyzing it, on one hand, plays a key role in how to understand the resilience of the existing situation and its causes, and on the other hand, it fundamentally affects the policies and measures of risk reduction and how to deal with it (3). Therefore, how to deal with natural disasters such as earthquakes to a large extent depends on the participation of the public and their resilience.

Many of the existing contradictions on the meaning of resilience are due to cognitive biases, perspectives in social ecological systems and methods, and fundamental conceptual differences (4). Hence, in order to have a greater impact on people's resilience measures in the society during disasters or natural disasters, it is better that the resilience measurement indicators are coordinated with decision makers and the public (5).

Meanwhile, natural disasters including earthquakes create crises that return to the previous state depends on the resilience level in any community. The bad condition of the establishment of physical elements and inappropriate urban uses, worn-out urban textures, high urban density, inappropriate condition of the establishment of city infrastructure and inappropriate distribution of urban open spaces play major role in increasing the cities vulnerability due to earthquakes (6). Social participation is one of the fields that should be considered in order to create the resilience of urban communities, which will prevent indifference, social and cultural alienation from occurring (7). With the mobilization of organized popular forces, participation empowers people and the sustainable growth and development of the society depends on the strengthening of social structures (8).

Meanwhile, creating educational models to educate public for social participation in the direction of resilience during the occurrence of various disasters, especially earthquakes, is of particular importance. Earthquake is one of the most important natural disasters in our country. Iran is always under the threat of earthquake due

to its location in the Alpine-Himalaya seismic zone. As the crisis risk index of the United Nations Development Program (2004) shows, Iran after Armenia has the highest earthquake vulnerability among countries in the world (9).

The surveys conducted on people's reaction to earthquakes have shown that most people were surprised when faced with this phenomenon and could not react properly. Therefore, getting prepared in order to perform the right actions during an earthquake is considered one of the basic solutions in reducing casualties and financial losses in earthquake-prone areas (10).

The statistical population selected in this research is the metropolis of Tehran. It does not have favorable conditions due to being in a high seismic risk zone and failure to comply with safety principles such as construction in the boundaries of faults and areas prone to geological instabilities. In order to design a public education model to increase social participation, studying the situation of Tehran city in terms of effective physical and geographical characteristics during disasters should be one of the issues considered by the authorities and those involved. In return, paying attention to environmental changes, increase in variety and nature of events, strategic thinking in planning managers is necessary for formulation, implementation, and evaluation of strategic plan. According to the content raised, the main goal of this research is to present a public education model based on social participation for the resilience of the urban society of Tehran in an earthquake as one of the natural disasters.

Methods

In this qualitative research, Delphi technique was used. In the beginning, the research indicators were extracted from the theoretical literature and sent to the relevant experts and they were asked to express their opinion regarding the research topic. During this process, 152 indicators were identified and designed in the form of a questionnaire and presented to 15 experts for approval. In the following, the experts were asked to announce their agreement or disagreement and to add the required indicators of each part to the table. In the first step, after receiving the questionnaires, the data were analyzed using SPSS software. By comparing the obtained averages, it was decided that the questions with a rating of 51% and above were kept and the rest were deleted. From the

second round onwards, most of the structured questionnaires were used, the same people were asked in the first round to comment on each topic using a Likert scale. With this work, a space was created to identify new ideas, correct, interpret, eliminate, and explain their strengths and weaknesses. In the third round, the participants were asked to review the answers again. As mentioned, 15 experts, opinion leaders, and decision-makers in the field of natural disasters and crisis management, were selected to participate in the research through a targeted process by the snowball method. In this research, face and content validity have been used.

Findings

The findings of the research were obtained as follows: fields of resilience, dimensions of resilience, social participation, public education, consequences, and interventionists of the implementation of the public education model. According to the results, the majority of experts agreed with the factors and indicators. In order to achieve the results of the second Delphi round, the previous indicators that were provided to the experts were sent to them again for reviewing along with the indicators suggested by the experts. In addition, a Likert scale of 1 to 5 was considered for the experts' opinions. The indicators that scored more than 4 (more than the average) were accepted and the rest were removed. The results of experts' opinions after summarizing and statistical processing came in the form of Tables 1 to 6.

After summarizing and statistical processing, the opinions of experts in the category of public education were shown (Table 1). In planning the training courses, the initial measurement and evaluation of needs as the first step; in needs assessment process, accurate and detailed planning based on the latest content as well as extracurricular activities of schools in different fields that he importance of the role of students in promoting resilience among the priorities of community-based education design; in the steps of implementing and evaluating training courses, indicators of standardization of space and educational equipment and educational aids in the branches of the province and quality assessment are of primary importance.

In this research, the fields of resilience means the infrastructures based on which resilience can

be grown and strengthened in a society in public education based on social participation.

According to Table 2, the highest scores in the field of information and communication infrastructure are related to the establishment of information channels and communication technology, and in the field of technology infrastructure, encouraging investment in the development of innovation and technology. As well as, the need to manage critical facilities is one of the primary indicators in the field of supportive policies. In addition, in the field of physical infrastructure, integrated actions between the physical structure and the content of the society in dealing with the crisis should be provided so that public education is spread in the society in order to witness the improvement of the society resilience as a whole and to increase of social participation in the society.

In the qualitative analysis of Table 3, the issue of resilience and its dimensions, the amount and manner of response of people in the society, during unpredictable situations, which can be converted into response by people's reactions at the time of the disasters. In other words, after the disaster, people should increase their resilience. In this research, the indicators extracted in the economic dimension, distribution of power and wealth; in the cultural dimension, it is of great importance to promote the attitude of resilience culture instead of vulnerability. As well as creating social networks and promoting disaster risk knowledge through the campaign and the presence of social media as the most important indicator in improving the level of social resilience and the issue of laws and regulations that prevent and preventive and encouraging laws and regulations in the matter of housing construction has received the most comments in organizational resilience.

The meaning of social participation in this research is the level of people participation of a society in different social and cultural forms. However, it seems these contributions are voluntary and rational but in the time of disasters, participation is influenced to a great extent by the environment, society culture, and people's motivations, as shown in Table 4. After summarizing and the statistical processing of experts' opinion, 3 indicators of the appearance of mental mobility and mental readiness to drink, having a working group spirit, membership in

audio-visual groups, respectively, obtained the highest points from the components of mental participation, cooperative spirit and objective

participation. This indicates that by training and creating the above, people can be led to the direction of proper participation in disasters.

Table 1. Results of data analysis of research literature and experts (public education)

Standard deviation	Average	Indicators	Component	Variable	
0.	4.47	Primary measurement and evaluation of the needs	Needs assessment	Public education	
0.816	4.33	Up-to-date training			
0.961	4.27	Determining people capacity to learn from experiences			
0.704	4.27	Investigating the awareness, attitude and performance of people in the target community			
0.407	4.27	Examining the current situation of the community in terms of the level and amount of safety culture			
1.335	4.27	The scientific nature of needs assessment			
0.775	4.20	Awareness of needs & Educational demands of the target group			
1.414	4	Paying attention to the needs of audience diversity			
0.743	4.53	Accurate planning and relying on the latest content			
0.64	4.53	Extracurricular activities of schools in different fields			
0.617	4.33	Reviewing and making the necessary reforms for rescue curricula	Educational Designing		
0.775	4.20	Trainers diversity			
0.862	4.20	Applicability of syllabus for education			
0.743	4.13	Teaching educational methods to instructors			
1.69	4	Using new methods of education and teaching			
0.799	3.93	Scientific documentation of experimental skills of relief workers			
1.759	3.67	Strengthening the educational standards of rescue and relief			
0.414	4.80	Standardization of space and educational equipment and educational aids in the branches of the province			
0.724	4.67	Use of up-to-date educational equipment and educational aids			Implementation (Rescue & Relief Training)
0.516	4.53	Getting prepared to perform the correct actions during an earthquake			
0.737	4.40	Considering all reconstruction experiences as a learning process			
0.743	4.13	Creating the necessary skills in the field of buddy-aid			
0.64	3.87	Creating the necessary skills in the field of self-aid			
0.743	3.87	Public information and information management			
0.862	380	Conducting natural disaster Maneuver through the Ministry of Education			
0.64	4.47	Controlling the symptoms of poisoning and saving the poisoned			
0.816	4.33	Fracture control			
0.775	4.20	Prevent bleeding			
0.676	4.20	Removing the injured from the danger environment if necessary	Implementation (First Aid)		
0.834	4.13	Examination of the Respiratory System and control of vital signs of the body			
0.799	4.07	Help to improve the patient condition Until his arrival or transfer to medical centers			
0.64	3.87	Rescuing and keeping an injured or sick person alive			
0.64	3.87	Prevention of complication severity			
0.414	4.80	Evaluation based on attention to the quality of training courses			
0.743	4.53	The visit of experts and officials to the educational problems of the provinces			
0.828	4.40	Systematic monitoring and evaluation of training courses			
0.507	4.40	Suitability of the type of evaluation with the education level of the audience			
0.799	3.93	Examining the effectiveness of training courses			Assessment
0.704	3.73	Lack of proportional evaluation of the audience			

According to Table 5, the highest score of the indicators related to five components shows that the consequences of public education implementation of the model in all dimensions leads to sustainable development in a society

because it leads people and conditions to a direction where they can create a useful and protective shield against natural hazards. Education in order to increase the level of knowledge and social skills can improve people's

Table 2. The results of data analysis of research literature and experts (resilience fields)

Standard deviation	Average	Indicators	Component	Variable
0.632	4.60	Establishment of information channels	Information & communication infrastructure	Fields of resilience
0.507	4.60	Communication technology		
0.743	4.47	Strengthen existing information		
0.743	4.47	Distribution of disaster risk information based on location		
0.816	4.33	Related data management		
0.884	4.07	Assessing and recording information on damages caused by accidents and disasters	Technology infrastructure	
0.743	4.53	Encouraging investment in the development of innovation and technology		
0.834	4.47	Preparation of risk maps using information technology		
0.862	4.20	Access to geographic information technology systems		
0.862	4.20	Strengthening technical and scientific capacities		
0.845	4	Promoting accessibility in the application of information and space innovations	Supportive policies	
0.594	4.73	Management of critical facilities		
0.617	4.67	Strengthen access to technology		
0.737	4.40	Presence and full participation of national executive and strengthening institutions		
0.816	4.33	Governance and leadership for disaster risk management		
0.799	4.27	Insurance to help the recovery process	Physical infrastructures	
0.775	4.20	Support for innovation and technology		
0.915	4.13	Supporting the creation of appropriate systems and services at the national and regional levels		
0.458	4.73	Integrated actions between the physical structure and the content of the society in dealing with the crisis		
0.617	4.67	Environmental and built components of the city		
0.632	4.60	Buildings and land use planning		
0.816	4.33	Creating a structure or resilient buildings		
0.799	4.27	Forces, Trained people and volunteer		
0.834	4.13	Design and implementation of appropriate buildings and vital facilities		
0.884	3.93	Correct location and design of settlements		
0.862	3.80	Protection of critical facilities		
0.799	3.73	The number of local institutions		

skills in various fields and strengthen their problem-solving skills and meeting the needs of life. In addition, a safe society and stable livelihood can be the consequences of the public education model because it reduces the mortality rate in a society and protects the people and their assets.

The interveners of the public education model implementation based on social participation for the resilience of the society are the factors that influence the model implementation process.

According to Table 6, the indicators of age, gender, race, economic status of residents, identification of areas prone to geological instability such as worn texture, or the locating an area in the fault line are the important interveners that cannot be ignored on the resilience of the society.

The conceptual model of the research is shown in Figure (1) based on the literature review and background and experts' opinions.

After summarizing the final results from the

items extracted from the research literature and experts in order to draw a pattern of public education, 23 components were identified in the form of six variables as follows:

• **Fields of resilience:** a) information & communication infrastructure; b) technology infrastructure; c) supportive policies; d) physical infrastructures

• **Inventors:** a) demographic characteristics of residents; b) geographical features

• **Resilience:** a) economical; b) cultural; social; institutional

• **Social participation:** a) Mental participation; b) collaborative spirit; c) objective participation

Table 3. Results of data analysis of research literature and experts (resilience)

Standard deviation	Average	Indicators	Component	Variable
0	5	Distribution of power and wealth	Economical	Resilience
0.743	4.47	Risk cost reduction strategies		
0.737	4.60	Revival of the local economy of the damaged society		
0.884	3.93	Help to choose the tools to achieve the expected levels with the least cost		
0.775	3.80	Investing in disaster risk reduction		
0.64	3.53	The ability of an organization's resources to adapt to changes in its economic environment		
0.258	4.93	Promoting the attitude of resilience culture instead of vulnerability		
0.724	4.67	The usefulness of understanding how society responds positively to post-traumatic change	Cultural	
0.743	4.47	Interaction of cultural commons		
0.862	4.20	Spreading the culture of disaster prevention, resilience, responsible citizenship		
0.834	4.13	Promoting the culture of relief and citizenship behavior		
0.458	4.73	Creating social networks		
0.458	4.73	Promoting disaster risk awareness through social media campaigns		
0.737	4.60	Sharing people's experiences		
0.632	4.60	Interaction of local institutions with people and government institutions	Social	
0.961	4.27	Cooperation between local community groups		
0.862	4.20	Expanding the participation of the scientific community		
0.884	3.93	Establishing local community organizations		
0.834	3.87	Locally available resources and skills		
0.915	3.87	The capacity of social groups and societies to respond positively to incidents		
0.414	4.80	Preventive and encouraging laws and regulations in the matter of housing construction		
0.458	4.73	Institutions' responsibility during accidents & disasters		
0.737	4.60	Timeliness of laws and regulations		
0.64	4.53	Agile management decisions		
0.64	4.53	Recovery with the help of powerful internal forces		
0.828	4.40	Creating opportunities for change and acceptance after the accidents & disasters		
0.91	4.40	Recovering the participation of resources outside the society		
0.737	4.40	The degree of system ability in self-organization		
0.799	4.27	Ability to respond to changes in urban systems		
0.862	4.20	Testing planned programs		
0.941	4.20	Leadership and crisis management		
0.962	4.20	Emphasis on promoting more efficient supervision in urban communities		
0.884	4.02	Adherence to crisis management instructions		
0.816	3.67	Structure and organizational capacities		

• **Public education:** a) needs assessment; b) educational designing; c) implementation «1) rescue & relief training and 2) first aid»; d) assessment

• **Consequences:** a) sustainable development, b) increasing the level of knowledge, c) increasing the level of social skills; d) stable livelihood; e) safe society

Table 4. Results of data analysis of research literature and experts (social participation)

Standard deviation	Average	Indicators	Component	Variable
4.60	0.507	The emergence of mental mobility and mental preparation for renewal	Mental participation	Social participation
4.13	0.915	Preventing indifference and social alienation		
4.00	0.845	The amount of mental and emotional involvement of a person towards group situations		
4.47	0.743	Having a teamwork spirit	Collaborative spirit	
4.40	0.828	Participation and involvement of people in various social processes		
4.07	0.884	Persuading and engaging activists in participation and activities		
3.87	0.834	Solidarity, unity and cooperation in activities		
4.67	0.488	Membership in audio-visual groups		
4.47	0.915	Citizen involvement in public affairs voluntarily	Objective participation	
4.07	0.884	People membership in various groups and social organizations		
4.07	0.799	Individual's membership in occupational and trade unions, advocacy groups		
4.07	0.799	Encouraging public and private stakeholders for active participation		
4.00	0.845	The amount of participation in the membership of associations		
3.93	0.884	Involvement of citizens in different levels of decision-making		

Table 5. Results of data analysis of research literature and experts (results)

Standard deviation	Average	Indicators	Component	Variable
0.594	4.27	Directing the current to the desired situation with sustainable development	Sustainable Development	Consequences
0.884	4.07	Accepting the new concept of development and trying to realize it		
0.926	4.00	Paying attention to ecosystems as a protective shield against natural hazards		
0.594	4.73	Training and improvement of organizational resources	Increasing the level of knowledge	
0.676	4.20	Training and organizing knowledgeable and efficient specialists		
0.458	4.73	Strengthen problem solving skills	Increasing the level of social skills	
0.488	4.67	Emotion management skills		
0.704	4.27	Social participation skills		
0.756	4.00	Improving basic life skills		
0.862	3.80	The skill to meet the needs of life		
0.9	3.67	Anger management skills	Stable livelihood	
0.516	4.87	Gaining the trust of citizens		
0.64	4.13	Fair distribution of income and property in societies		
0.834	3.87	Economic growth		
0.507	4.40	Protection of people and their assets		
0.9	4.33	Reducing the mortality	Safe society	
0.884	4.07	Preservation of cultural heritage		
0.862	3.80	A cost-effective investment in preventing future losses		
0.458	3.73	Disaster risk reduction		

Discussion and Conclusion

Finally, the conceptual model of the research was designed, (Figure 1), in the initial part of this

model, attention has been paid to the concept of social participation and its three sub-components to start any planning regarding public education and basic measures to improve and increase it

among citizens. In the other part, considering the concept of education and 4 steps of its process, a topic titled intervening indicators regarding public education based on social participation for resilience was presented which includes two parts

such as demographic characteristics of the residents and geographical characteristics including the level of education, income, population density, physical health, poverty and wealth, facilities and other cases.

Table 6. Results of data analysis of research literature and experts (interveners)

Standard deviation	Average	Indicators	Component	Variable
0.816	4.33	Age, gender, race and economic status of residents	Demographic characteristics of residents	Inventors
0.915	3.87	The number of immigrants and tourists		
0.64	3.53	Social capital of educated people in a community		
0	5.00	Identifying areas prone to geological instabilities		
0.737	4.60	Soil	Geographical features	
0.743	4.47	Observing safety principles such as construction in fault boundaries		
0.743	4.47	Land and raw materials		
0.862	4.20	Resistance and ecosystem construction		
0.884	3.93	Location of Iran in the Alpine-Himalaya seismic zone		
0.775	3.80	The presence of many vulnerable and worn tissues		

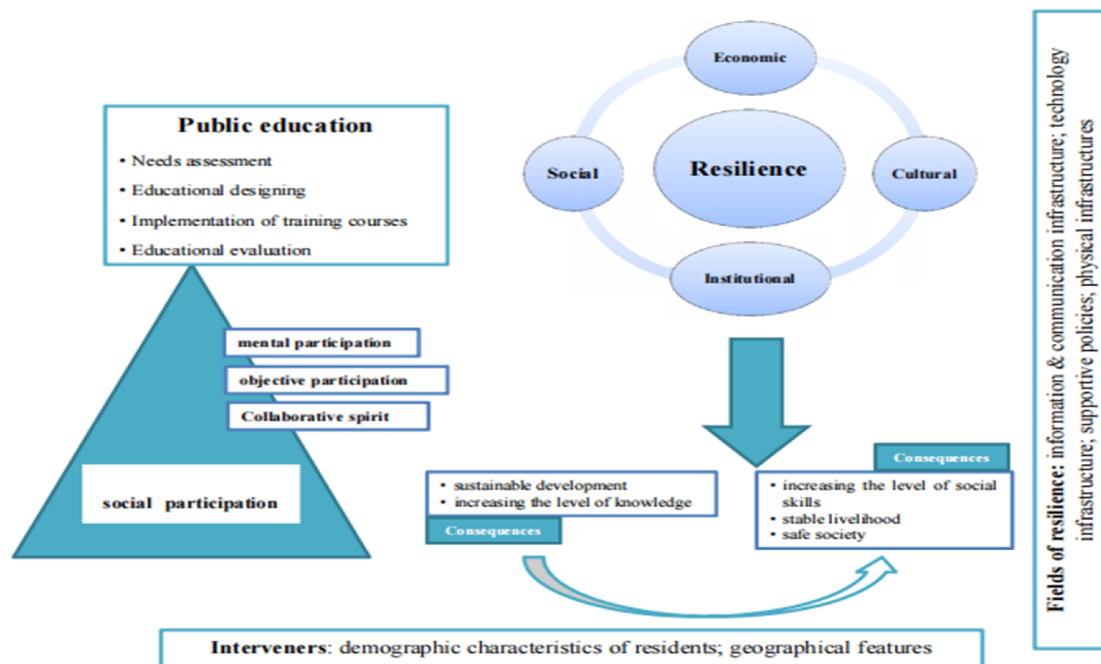


Figure 1. Qualitative research model based on research literature and experts' opinion

This model was drawn according to the concept of resilience and its four components, to formulate the content of public education against disasters and mention areas for effective resilience in improving the level of resilience. In the final part of the model, the index of consequences of public education was taken into account with emphasis on resilience and social participation in five categories.

As mentioned before, this research was conducted based on the Delphi technique, which extracted the indicators of public education, social

participation, resilience, fields of resilience and related consequences in natural disasters (earthquake) from the research literature and sent to the research experts to get their opinion. Finally, the indigenous model of public education based on social participation for the resilience of Tehran's urban community in natural disasters (earthquake) was obtained.

The research results showed that the social participation of people including mental and objective participation and having a cooperative spirit is desirable in promoting the resilience of

the city of Tehran. In addition, public education is effective on the resilience of the public with social, economic, cultural, and institutional components and can bring the consequences of sustainable development, increasing the level of knowledge, stable livelihood, increasing the level of social skills and a safe society. In the meantime, resilience fields including information and communication infrastructures, physical infrastructures, and supportive policies can provide a platform for resilience in society. Of course, interveners such as demographic characteristics and geographical characteristics should not be ignored. In the results of the research, social resilience was obtained, which is similar to the results of Hosseini et al. (2016) (11) and Rezaei (2013) (12) who investigated the social factors of resilience in their research.

At the end, in order to increase the resilience of society and promote public education, it is suggested that by providing different sources, the mass media should increase the level of awareness of the public regarding this issue in order to promote the culture of safety and resilience in critical situations. In addition, encouraging people to participate in the First Aid courses in order to reduce risks can be fruitful. In the meantime, if the courses are held for free, it will be more likely to be welcomed.

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Conflict of Interests

The authors declare that there is no conflict of interest in this study.

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