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Explaining the relationship between the concepts of smart city and citizens' mental health

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ABSTRACT

Urban development has already led to a change in the physical environment of cities and, subsequently, to the mental health of citizens living in these environments. In such a situation, the correction of the negative effects of unplanned and unintelligent urban growth is an inevitable necessity, but few solutions have been proposed to counteract the negative effects of this phenomenon. In this regard, strategies such as smart growth, intelligent management, green belts and land use planning are considered as solutions to the problem of urban dispersal and unhealthy urban environments. This is while the mental health of citizens is a vital issue that should be considered as essential to any development program. The main purpose of this study is to determine the nature of the relationship between urban smart growth and mental health of citizens living in such cities. Meanwhile, the role of social capital formation as a moderator is discussed. The methodology of this research is quantitative and this study was selected as a sample for conducting a Gisha neighborhood study in the Region 2 of Tehran Municipality. In order to use structural equation modeling (SEM), 200 questionnaires distributed among 200 residents of this neighborhood. Through a pilot study, 13 questions were finally included in the final questionnaire. Of these, 5 questions were used to measure the citizen's attitude to the smart city, 5 questions to measure social capital and 3 questions to measure mental health (which were extracted from the GHQ questionnaire). The first hypothesis of the study, namely, the existence of a strong and direct relationship between the attitude of citizens towards the smart city and mental health, was confirmed. It was also found that social capital in the Gisha neighborhood as a moderating variable in the process of influencing residents' attitudes towards the intelligence of their living environment and their mental health was not very effective, but the smart city is effective on the formation of these social capital among influential inhabitants. In the Gisha neighborhood, it is suggested that the development of public spaces, social protection and public health services and housing quality indicators be promoted in order to make urban intelligence as secure as possible.

Key words: *Mental health, Smart city, Urban development, Smart citizen.*

Introduction

The issue of health has always been important since the advent of humanity and in the centuries and ages. But when it comes to it, the physical dimension of it is generally considered, and less attention is paid to its psychological dimension. Health is a multi-dimensional concept that, in addition to the absence of illness and disability, includes a sense of happiness and well-being (World Health Organization, 2004). Most psychiatrists, psychologists, and mental health professionals ignore the positive as-

pects of health (Patrick and Erickson, 1993). However, over the past 10 years, and with the spread of positive psychological topics, the desire to study positive aspects of health has been increased and along with its negative dimensions. Widespread research has been done on mental health and quality of life in the country and abroad, but most studies are one-dimensional and do not provide a complete and comprehensive view to the issue (Wilson and Cleary, 1995). Despite few studies on multidimensional scales of research, it has not been investigated the relationship between these multidimensions in any research. Therefore, research in order to investigate the relationship between mental health and quality of life in environment is very important in all dimensions and scales. WHO, while paying attention to the authorities of the countries to provide physical, psychological and social health of the community, always emphasizes that none of these three dimensions is superior to the other (World Health Organization, 2001). According to the organization, the prevalence of mental disorders in industrialized and developing countries is increasing. However, they are given the lowest priority in social and economic development planning. Undoubtedly, the physical and mental health of the people in a specific community is important and one of the most important issues in the world today, and providing the health of the social strata is one of the main issues of every country that should be considered from three dimensions of physical, mental and social. Various studies have been conducted about urban smart city development and health assessment, the most important of which is the study of 72 cities in Europe by the Institute for Economic and Social Studies of the European Union, which ranked these cities based on six indicators. But in recent years many criticisms have been made on this theory, one of the most important of which is that this theory has not focused on citizens, but only on a set of buildings, infrastructures and information services and the category of intelligent citizen who is in the essence of this theory are neglected. There are many differences in the acceptance of this theory in different societies. In the Table 1, the most important studies that have criticized the theory of urban smart growth in relation to the health of citizens have been listed. At the same time, it should be noted that the principles of smart urban development are acceptable in many ways, and only are criticable in cases involving the healthy citizen and the social and cultural characteristics of citizens, which neglects this category.

In most of the domestic and foreign studies, only the positive effects and the benefits of smart urban growth have been addressed, and very limited researches can be found that criticized this theory. The fact is that many urban smart growth indicators have many benefits to urban communities, but the emphasis on communication infrastructure and the provision of services to the city by the state can pass the citizens and also overemphasize on this issue have caused to forget the citizens themselves and their role in the city's smart process. It even has led to neglect of the physical and psychological health of citizens. So that even in the smart index, it tries to reduce jurney production and hence it preserve the environment. According to the discussed topics, this research tries to evaluate the development of smart cities in urban spaces and in the same area in Gisha neighborhood in the city of Tehran, which is one of the most enjoyable neighborhoods in Tehran.

So far, different definitions of mental health have been provided such as: lack of illness, emotional balance, social harmony, comfort, personality integrity, self-awareness and environment (Cooper and Marshall, 2013; Martin and Daniels, 2014; Barnes *et al.*, 2016). It is in the real world that with the advent of technology and the manifestation of this progress in the body and spirit of the cities, the diseases and mental disorders that are endangered by today's urban populations; also these difficulties have increased and, at the same time, have became more complicated. The city's population has also been rising, to the point where, according to World Bank estimates, the urban population of the world by 2020 will account for more than 60% of the world's population (Taylor Buck and While, 2017). Also, the increasing expansion of cities, the reduction of natural resources, masses and traffic congestion are just some of the destructive effects of the unpopular growth of the population and its disproportionate distribution on the natural and cultural environments of the communities have had. Parks, woods and wetlands will disappear in any case, and plants, animals, and agricultural lands give their homes to stores and highways. In such a situation, the correction of the negative effects of unreasonable dispersion is inevitable, but few solutions have been proposed to counteract the negative effects of this phenomenon (the excessive population increase). In this regard, strategies such as smart growth, intelligent

management, green belts and land use planning are considered as solutions to the problem of dispersion (Kitchin, 2014).

Growth-related activities will have some effects on rural and urban areas such as isolation of rural communities, the threat of urban centers and urban cores, weakening of small communities, destruction of open spaces and natural areas. Smart growth suggests a sustainability method for urban development, emphasizing on proper use of available resources, increased urban services, and development of neighborhoods with mixed land-uses, also using the creation of public transport facilities and integrated human-scale design. The question that arises in this area and the current research is to respond to this that whether the smart city and urban smart growth will improve the mental health of citizens living in these cities or it may have a damaging effect on the non-physical health of citizens? In order to answer this question, we plan to investigate the relationship between the attitude of citizens and the smart city indicators. Also, considering that urban growth and development through urban smart growth will have a major impact on human communities (Solanas *et al.,* 2014), we will also examine the relationship between citizen's attitudes and the formation of social capital. Finally, the relationship between citizen's attitude towards urban smart growth indicators and their mental health indicators will examined directly and also through the moderating relationship between social capital and citizens' mental health, indirectly.

Research methodology

The research methodology is quantitative and in terms of its purpose is considered practical. Data

Table 1. Criticism of urban growth in early studies with smart city approach

Results	Case of study	Title	Scholars
This research studies the theory of smart growth and, along with the numerous benefits that it brings to the community from smart growth, it also provides criticisms that are related to the health of the citizens, including that smart growth is a kind of social trap because it prevents citizens from making decisions. Local decisions are not made as a result of the citizens' ability to change the situation.	–	Criticism of assessment of smart growth	Litman (2015)
The results of this study indicate that societies do not equally welcome smart growth, and the reason is that access to its benefits is not the same for all. Smart growth does not seem appropriate for small communities, and the passivity of citizens is one of the most important consequences. This is while that we must seek a theory that guarantees the physical and mental health of citizens.	30 small communities in America	Assessment of smart growth and Its consequences in Small communities	Edward and Haynes (2007)
The results of the research show that in New York, due to the urban governance approach, which is the urban smart growth, the value of the land has increased, and land ownership has increased, while surveying this research suggests that most residents do not support smart growth and interest In the same old alleys, they live with a lot of traffic and social interactions and a sense of belonging to the past. Meanwhile, the choice of the region is dominated by local choices and policy-making is carried out from the top to bottom, and as a result, participation and social interactions are reduced.	New York	Smart growth	Hussey (2004)
In this study, which studies the advantages and disadvantages of urban smart growth, it cites some issues that are noteworthy. Among the disadvantages and consequences of urban smart growth are: increasing density, reducing citizens' freedom, reducing the purchasing power of people, and increasing the ample regulations in urban areas.	–	Smart growth strategy in urban development, Principles and solutions	Ghorbani and Noushad (2008)

Source: author, 2017, using different sources

and information are collected in two ways: library (including review of domestic and foreign articles, books, archives, etc.) and field (questionnaire). The statistical population of this study is residents of Gisha neighborhood in Tehran's second municipality of 17432 with a sample size of 360 according to the Cochran's formula. According to our use of structural equation model, 200 of them were randomly selected to participate in the study. The collected data were entered into the SPSS software using a questionnaire (based on Likert spectrum) and descriptive statistics are as follows:

According to questionnaire data, 42% of the sample size is women and 58% of them are men. 64.5 percent of the participants are married and 35.5 percent are single. The range of age groups shows that the age group of 25 to 40 years old was 37.5% and more than 60 years old comprised 15.5%, respectively, the highest and the lowest sample size. The bachelor's degree education is 39.5% and the subordinate is 9.5% as the highest and lowest amount of literacy level of the sample. 30.5% of the respondents were between 3 to 6 years old and 7% of them were resident in the Geisha district for less than a year. Demographics of the respondents can affect the mental health of individuals as individual variables. For example: The length of stay in the neighborhood is an indicator that may increase the sense of belonging and ultimately affect the mental health. In this study, the individual variables presented in the questionnaire will be examined to determine its relationship with the mental health of the citizens.

Research hypotheses

- It seems that citizens' attitudes towards urban smart development indicators can significantly increase their mental health.
- Citizens' attitudes toward smart urban growth indicators will have a strong positive effect on the formation of social capital among them.
- The relationship between citizens' attitudes toward urban smart growth indices and the formation of social capital between them moderates the direct relationship between their attitudes toward smart growth and their mental health.

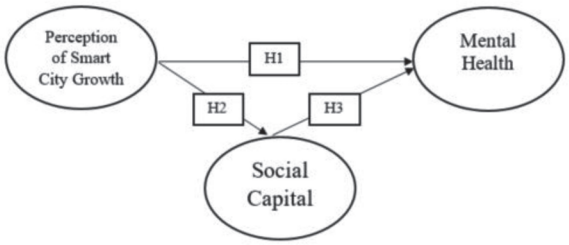

Diagram 1. Conceptual model of research, direct and iIndirect impact of citizen's attitude about smart city on their mental health

Table 2. Descriptive statistics of participants in the Gisha District

Percent	Sample member attributes		Percent	Sample member attributes	
9.5	Under the diploma	education	42	Female	Sex
24	Diploma				
39.5	Bachelor				
27	Master or higher		58	Male	
7	Less than a year	Accommodation term in the neighborhood	35.5	Single	marital status
24.5	1 to 3				
30.5	3 to 6		64.5	Married	
26.5	6 to 10				
11.5	More than 10 years		18	15-25	Age
			37.5	24-40	
			29	40-60	
			15.5	More than 60	

Introducing Geisha District

The structure of this neighborhood is such that most of its spaces are planned to be developed and over the last few years there is a high level of development, which is one of the indicators of urban smart growth. According to the statistics of 2016, 91% of the building permits issued by the Tehran municipality in the Gisha district belong to 3 floors or more, the main part of which is 5 floors and more, which indicates the vertical growth of the neighborhood in several past years (the Center for Statistics of Iran).

Geisha neighborhood is known as a suitable place to measure the mental health of citizens. This is because, on the one hand, it has extensive infrastructure and easy access (considering the economic level of residents) to most services provided by government institutions (according to field observations of researchers) and on the other hand is considered as one of the urban spaces of Tehran. Most of its inhabitants are cultural, scientific, capitalist and student groups, and can be considered as excellence in both sides in Tehran. Figure 1 shows the location of the Geisha neighborhood in Tehran region two municipality.

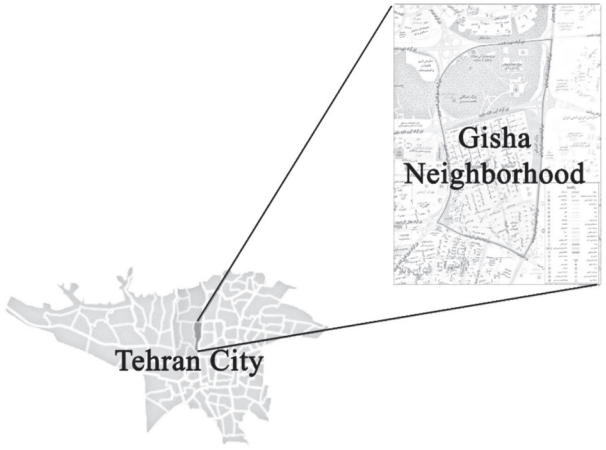

Fig. 1. Location of Gisha district in Tehran
Source: Authors, 2017

Validity and reliability of the questionnaire

A field study was conducted using a 13-questionnaire. To measure the mental health of citizens living in the Gisha neighborhood, the Mental Health Questionnaire (GHQ), (was designed by Gooldberg in 1987) was applied to measure mental health (Khamisa *et al.,* 2015). The mental health questionnaire contains 28 questions. In this study, we used those questions that had the highest Cronbach alpha in the pilot study. Using the questionnaire questions in the structural equation model, only three final questions were remained and used in this questionnaire. The scale of the questions was desiged in Likert scale as it will be explained later. In order to study the variables of attitudes of citizens towards smart cities, 5 questions were designed based on smart city indicators. Economic, social and environmental indicators were used to assess the attitudes of the inhabitants to Geisha neighborhood.

The validity of the questionnaire indicates that using the questions presented in the questionnaire, we could answer the questions and reach our goals. In this regard, the views of the professors and experts were used and the validity of the questionnaire was confirmed. Cronbach's alpha method was used to determine the reliability of the questionnaire, which was calculated by 0.767, indicating the reliability of the tool used in the research.

The data gathering system in the community is through a questionnaire. The statistical analysis of these questionnaires examines the conceptual model of this research among 200 inhabitants of Gisha neighborhood in Tehran's second municipality in 2017. Regarding the aim of this study, which intends to examine the hidden variables formed in the minds of citizens according to urban smart indicators, the structural equation modeling technique was selected as our research analytical technique. Structural Equation Modeling is a specific causal structure between a set of invisible structures that consists of two components: a structural model that defines the causal relationships between the hidden variables and a measurement model that defines the relationships between hidden variables and observed variables (Byme, 2013). Determining the minimum sample size needed to distribute the questionnaire and collecting data related to the modeling of structural equations, is very important. Although there is no general agreement on the sample size needed for factor analysis and structural models, many researchers believe that the minimum sample size is 200. The Kline believes that exploratory factor analysis is required for each variable of 10 or 20 samples, but at least a sample size of 200 can be defended (Kline, 2015).

The answers are also in the form of a five-point Likert scale in terms of attitude towards smart city, social capital, and mental health (eg, very, high,

moderate, low and very low). The reason for the use of the five-dimensional spectrum is due to the very positive scores of this spectrum relative to the same spectrum, such as the seven-dimensional spectrum, and the response to them is more faithful to the audience. The statistical population of this study is 200 citizens living in the Gisha neighborhood in the second region of Tehran. Considering that the subject of the study, namely, the study of the relationship between citizens' attitudes towards urban smart growth indicators and mental health, and considering the moderating role of the social capital variable, thirty 18-questionnaire were distributed to 30 primary questionnaires. As mentioned earlier, the Cronbach's alpha coefficient for these questionnaires was calculated to be 0.767. Therefore, to investigate the relationship between smart city development and mental health, 5 questions with the lowest alpha coefficient were eliminated, and finally 13 questions in the form of a final questionnaire were reamined. It included 5 question to measure citizens' attitude toward smart city, 5 questions to measure social capital variable among residents of Geisha neighborhood and 3 questions to measure the mental health of citizens. The final coefficient of Cronbach's alpha was 0.767, which showed a suitable and desirable reliability, indicating the suitability of the research tool and the reliability of its results. Scores were set at Likert scale for numbers 1 to 5 in which score 5 was defined as the highest score and meant "very good". Finally, for the final analysis of the proposed model, AMOS 22. Software, (student version), was used as a student version.

Research findings

As shown in Table 4, the Chi-square value with a degree freedom of 65 is 88.034, which is statistically significant because it is at a significant level below 0.01. Therefore, it can be assumed with certainty that the Chi-square test confirms the fit of the model assumed. In addition, the Chi-square value divided into degree of freedom is 1.2 and less than 2, which will confirms the validity of the model. The root mean square error (RMSEA) index was calculated was calculated by 0.03 at a significant level of 90% and is in the range of 0.039 and 0.87. The mean root square (RMR) is less than 0.07, which indicates a slight error of the assumed model.

Also, as shown in Diagram 3 and Table 5, the coefficient of the two main variables, (the attitude of

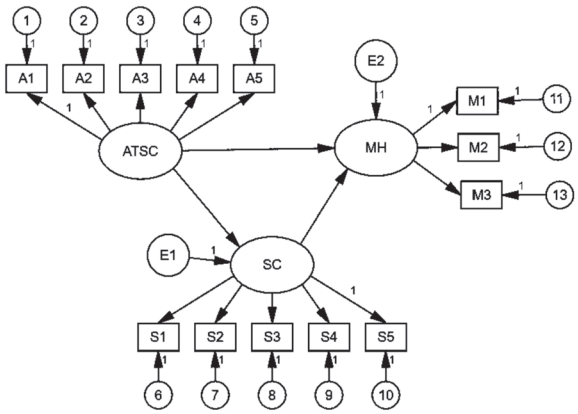

Diagram 2. Conceptual model of research drawn in AMOS software

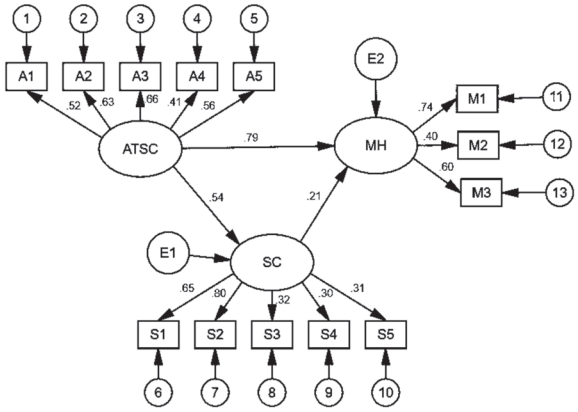

Diagram 3. Conceptual model of research after analysis in AMOS 22 software with standardized coefficients

Table 3. Indices of model fitness in acceptable range and present model

Fitness Indices	Acceptable	Calculated
Chi square (X2)	Smaller is better	88.034
Chi square / degree of freedom	Less than 0.2	1.03
Root Mean Square Error of Approximation (RMSEA)	Less than 0.05	0.03
Root mean residual (RMR)	Less than 0.07	0.05
CFI	More than 0.9	0.94

Source: Author, 2017

Table 4. Path coefficients and the amount of error in each relationship

Variable	Variable	Path coefficient	Error
Citizen's mental health	Citizen's attitudes towards smart city	0.79	0.03
Social capital	Citizen's attitudes towards smart city	0.54	0.04
Citizen's mental health	Social capital	0.21	0.03

the citizens towards the smart city and mental health) is higher than 0.3 which indicates a significant and strong relationship between the two. On the other hand, the factor load between the variable of citizen's attitudes towards smart city and the social capital is also significant with moderate intensity, but social capital and mental health have a poor regression relationship.

Research purposes

The main purpose of this study is to determine the nature of the relationship between urban smart growth and mental health of citizens living in such cities. To achieve the main goal of the research mentioned above, we intend to study the relationship between citizens 'attitudes toward smart city development and social capital formation as a moderating role in the main relationship between citizens' attitudes towards smart growth And their mental health.

Mental health. One of the basic concepts of the complex world of man, whose age is its man's life duration, is the concept of health. The World Health Organization considers health as a "complete physical, psychological and social well-being, not just a lack of disease or disability" (World Health Organization, 2004). In the definition of the World Health Organization, health is considered as a unified approach aimed at maximizing individual's ability. According to WHO, health requires that the person maintains the balance of the target and the path to the environment, that is, where his action is revealed (Nam and Pardo, 2011). The great psychological culture of "Larous", describes mental health as: the ability to work coherently, comfortably and effectively, working in difficult situations, flexibility, and the ability to balance itself (World Health Organization, 2005). Health in the holistic pointof view is concerned with psychosocial and physical aspects; its relationship with the environment is also considered (Taylor and Brown, 1988). Psychological health is also defined by psychologists and behavioral scientists about the appropriateness of human psychology and performance. The concept of health and mental illness has changed over time. In an ethics book, Aristotle says: "Every human being is healthy enough to develop human actions" (Hoagwood *et al.,* 2001). Since humanity has the highest intelligence, then the best life is wisdom life, and mental health is a kind of life in which reasoning fully governs it. The naturalistic concept of mental health was ignored by Aristotle in the middle Ages, and from the seventh and sixth centuries psychological health was defined as righteousness. After the sixteenth century, psychological health was redefined naturally. At the same time as psychiatric renaissance at the end of the 19th century, psychological health was typically defined as the absence of mental illness.

Usually psychological health can be defined in three ways:

1. First, the meaning of self-consciousness, as defined by Freud (1856); Mc Dougall (1871); George Brekli (1685), and many of the ontologists and role theorists, like Lorentz, was accepted (Bem, 1972; Silvia and Duval, 2001).
2. The second definition involves self-actualization and self-realization, that is, the actualization of internal and internal psychological abilities through a kind of psychological transformation. Jung (1875); Allport (1897) and some humanists like Maslow (1908) have accepted this view (Lichtenberg *et al.,* 2016).
3. The third definition of mental health is the extent to which one has been able to integrate with the "sustainable social network." Adler (1879), and many other sociologists have accepted this definition (Kramer *et al.,* 2014).

Patterns and mental health theories. In general, health definitions have emerged from patterns that have been contributed to the theories of various scholars. Based on these theories, three major patterns in the definition of health have always been considered:
Medical pattern. This pattern mainly focuses on the biological and physiological explanation of health.
Environmental pattern. This pattern has emerged from analysis of ecosystem and environmental hazards to the human health. In this model, health is

defined according to the quality of individual compromise with the environment when circumstances are changing. *Holistic pattern*. It defines the health on the basis of individual totality and focuses on the biological, physiological, psychological, emotional, social, spiritual and environmental aspects of the individual and focuses on optimal health, disease prevention, and psychological and positive emotional (Kapur *et al.,* 2014). This pattern believes that health is not static, it is a dynamic process that reflects everyday decisions and activities (McGorry *et al.,* 2013). The establishment of this model has given rise to the emergence of a new interdisciplinary realm, which, by accepting a general approach and applying this strategy in research methodology, seeks to respond to unresolved riddles of one-dimensional views about health and disease (Corker, 2013).

Existing theories about mental health

Freud's view (1856). In Freud's view, self-awareness is essential for individuals'mental health. That is, everything that may cause the problem in the subconscious must be turned as conscious. Self-awareness is the main element of psychological health. Of course, psychological health is not adequate, but the final criterion of mental health is another characteristic of Freud's view that is the logical alienation of public interest and enthusiasm. In Freud's opinion, the normal man is the one who has successfully completed the stages of sexual development. It is, of course, that the person should not be unduly fixed at any stage of growth. So, from Freud's point of view, few people are consired normal, and each person is somehow far from normality (Townsend and Morgan, 2017).

Adler's biological point of view (1870): From Adler's point of view, mental health means having certain goals in life, having a solid and stable philosophy of living, having a favorable and stable social and family relationship, being useful to one another, dare and courage, decisiveness, control on emotions and feelings, having the ultimate goal of perfection and self-realization, accepting mistakes and trying as much as possible to solve mistakes (Adler *et al.,* 2014).

Erikson's theory (1963): As Freud gives his unconscious ideas in his theory, Erikson also believes in that. He describes mental health in relation to "I" and defines his variable in relation to "I". In general, Erikson believes that there are certain traits that distinguish a person with mental health from someone who does not have this attribute. In his opinion, these attributes are meaningful in the community and, accordingly, a person who has mental health, is living in society that is free from conflict and has a strong talent and ability. This healthy person is skilled in his work, an unlimited initiative and receive positive feedback from the moment of his career, and ultimately understands the process of life (spiritual theory) (Wolpert *et al.,* 2014).

Kurt Lewin's theory (1890): He is well-known for field theory among health theorists. From Lewin's point of view, "field theory" is not limited to a particular field, but includes concepts that can be used to illustrate various psychological truths. However, Lewin's theory of mental health suggests that psychological health and well-being create a greater distinction between the person and his psychological environment, and the firmness of the boundaries that are existed in individual's psychological system. According to Lewin, from a psychological point of view, healthy person is a person who can distinguish between himself and his psychological environment (Kohut, 2014).

Carl Rogers (1902), according to him, the greater the mental health of a person is, he feels and experiences more of freedom of action and choice. For Rogers, a healthy person is who has unlimited thought and action (Herrman *et al.,* 2005).

City Smart Growth

In relation to urban sprawl, the role of economic should nor be overlooked. Many urban thinkers believe that urbanization and horizontal development are not an independent process, therefore, it must be analyzed in the light of economic developments (Hollands, 2008).

The migration of people leads to the horizontal expansion of cities, because urban wages are generally 40 to 50 percent more than traditional labor income on farms. In response to urban spawl, the World Bank has stated that cities are being large and scattered because they are doing an economic job that increases its importance to non-urban areas (Jepson and Edwards, 2010).

In the year 1970, urban planners and transporters began to promote the idea of compaced communities and cities. Subsequently, the idea of Peter Calthorpe, called the idea of rural-town, based on

public transport, walking and cycling instead of using a car, was met with public interest. Another architect, Andres Duany, proposed the idea of changing design rules to promote the concept of community and reduce the use of cars (Downs, 2005).

The problem of providing land and its high costs for building and upgrading highways (in particular, the destruction of valuable historical and protected lands), has led some organizations to have other ideas for redefining transportation plans to use public transportation.

The US Environmental Protection Agency has proposed smart growth as a way to reduce air pollution. Growth is a type of planning that uses social, economic, and environmental factors to direct development to underdeveloped areas with the necessary infrastructure or areas that can be fitted to the required facilities (Geller, 2003).

Major municipalities, business groups in the central urban areas and nongovernmental investors often focus on smart growth as a means of regenerating neighborhoods and urban centers without having a negative impact on social or environmental conditions.

Ultimately, smart growth is the most common term for integrating transportation and land use systems, which supports compact development and mixed use in urban areas and is in contrast to car-centric and peripheral developments on the city's outskirts.

Smart growth leads to the creation of accessible land use patterns, improving transportation opportunities, creating living communities and reducing public service costs (Chourabi et al., 2012).

John Hopkins, member of the American Institute of Ecology, has listed the following goals for smart growth:

- Creating Living Communities: Communities that focus on humans instead of cars, on the scale of the communities, while have have shops, restaurants, and offices that have a short distance from residential areas and are available by foot or bikes to most residents.
- Proximity to nature and sustainable conservation of valuable lands: Proximity to natural lands is vital to most of people. Having access to natural lands is not contradictory with dense development. Green paths along the rivers provide residents with access to these places.
- Public transit: Public transit in the city and metropolitan area scale are necessary to support a dense form of development.
- Renewal of the countryside, urban centers and old commercial districts.
- Boundaries of urban growth: These boundaries set a line around the city, which is set to grow in the next 20 to 30 years. But such boundaries will be effective when they are coordinated over time with the evolution of communities and elements of development.
- Having long-term perspectives for communities (Danielsen *et al.*, 1999).

According to Anthony Dawn, head of the Brookings Institution, urban growth is a development that has the following characteristics:

- It limits the development of the suburbs.
- Use the land with high density.
- It emphasizes mixed land-uses.
- Reduces trips made with personal belongings.
- Focus on the reconstruction and restoration of old areas.
- Protects open spaces (Jepson and Edwards, 2010).

Research show that the principles lead to financial savings and economic growth. The Brookings Institution's recent report presents three effective ways in which smart growth leads to local or regional economic growth.

In the first method. With the focus of development around existing infrastructure, public service costs are reduced. As a result, less roads will be needed, people's traffic and police patrol will be reduced.
In the second method. Idification of labor market, more healthy urban centers, lower densities, more employee productivity and higher incomes in the area over time would be more applicable.
In the third method. Seeking to improve the economic situation of a city, poverty will be reduced and in urban suburb it will led to an increase in house prices and population (Hollands, 2008).

Smart growth is a reaction to sprawl. Sprawl has been criticized for rising housing costs, high traffic congestion and unnecessary infrastructure costs. While the goal of smart growth is to balance the needs of individuals with providing jobs and economic development (Qiang & Xunchu, 2004). The main differences between the two land use patterns are compared in Table (5). Smart growth emphasizes accessibility that this means those activities that people are constantly dealing with near them. That is why the main unit in planning of smart

growth, is local communities or villages. This is in contradiction with conventional programs since these programs emphasize mobility as a gateway to transportation problems. In larger societies, the use of vehicles is necessary and the pedestrians are less been emphasized.

Smart growth offers the most suitable transportation option, which includes mixed land-use patterns that offer a number of options related to the size and cost of urban development. By implementing smart growth programs, destructive effects on green spaces are minimized. Smart growth can cause road trips per person to travel down (Sun, 2011).

Smart growth actually is seeking to build a high perceived environment to interpret and enhance the legibility of the environment. It do this with the goal of building a community with a single concept of location and emphasizing the minimum use of cars.

According to definitions and indicators provided about urban smart growth, a city is smart when authorities invest heavily in ICT infrastructures and various technologies that are used to improve the citizen's quality of life (Tregoning *et al.*, 2002).

Social capital

The concept of social capital has, over the past decades, created many controversies in the social sciences, especially in sociology. A group of sociologists and other thinkers in America and Europe, as well as some Iranian writers, believe that the concept of social capital can help sociologists in the scientific study of the disruptions of today's society and can, like the key master, be at the hands of policymakers and the executive directors of the community to provide a platform for correct struggle with these disruptions. Discussions about the concept of social capital according to the views or approaches of the providers of the discussion have been divided into two categories: first, those who examine the whole range of small or large human collections, such as school, city, and society. The latter are those who, by searching for the relationship between the individual and his community, once again put forward the concept of social structure and its impact on the individual and his behaviors and tried to reveal more or less new dimensions of the undeniable role of this social phe-

Table 5. Comparison of smart growth indicators and urban sprawl growth

Indicator	Sprawl Growth	Smart Growth
Density	Low density, scattered activities	Compact Development
Growth Pattern	Development around the city	Internal Development
Mixed land-uses	Land use homogeneous(Stand-alone and single-function applications)	Mixed land-uses
Scale	Large scale, large blocks and buildings, and wide roads	Human scale, buildings, blocks and smaller roads
Public services (stores, schools and parks)	Neighborhoods, homogeneity, bigger and need access to cars	Local, smaller and consistent with pedestrian access
Transportation	Car-based transportation and land use patterns that do not work well for walking, cycling and transit.	Provides different transportation methods and land use patterns for walking, cycling.
Connections	A hierarchical road network with countless rings and endless streets, unrelated roads and sidewalks, and obstacles to non-motorized travel.	Roads, sidewalks and highly interconnected routes that make it possible to drive motorized and non-motorized travel.
Street Pattern	The streets are designed to increase the speed and volume of motor vehicle traffic.	The streets are designed to adapt to diverse activities.(Traffic volume reducer)
Planning Process	Without program	With program
Public Spaces	Emphasis on private areas (yards, shopping malls, closed spaces, private clubs)	Emphasis on public services (pedestrian environment, parks and public facilities)

Source: Alexander & Tomalty, 2002

nomenon in society (Ellison *et al.,* 2014). This study focuses on social convergence and social solidarity (Maskell, 2000). In relation to the definition of social capital, despite the many sympathizers and widely used in the texts of social sciences, including sociology, political science, economics, etc., the concept has not yet been defined. The authors have used it in various ways such as good faith, trust, social convergence, social solidarity, social norms, social networking, social structure, and the source that supports behaviors (Stam *et al.*, 2014).

Urban smart growth, social capital, and mental health of citizens

The psychological recognition of human behavior in relation to the physical environment is discussed in the field of psychology of the environment. Gifford (1997) defines the psychology of the environment to examine the relationship between the individual and his physical location (Gifford, 1997). In this interaction, the individual changes the environment, and at the same time, his behavior and experiences are transformed by the environment. In his definition, the physical base means physical space with defined organizational and functional goals. Environment is the most important factor that affects the health or lack of health of a person. Favorable environments impose the context in which the inheritance is desirable and disrupts the inappropriate environment of this process. Control of environmental factors has a key role in promoting human health. Many of us do not pay attention to the environment, while our environment has the greatest impact on our body, and our neglect does not diminish its effect (Anttiroiko *et al.,* 2014). Proshansky (1970) believes that psychology is a discipline that deals with the interactions between people and their environment. According to him, every physical environment is considered as a social environment, and sometimes it is not possible to isolate these two aspects of the environment from each other (Proshansky, 1970).

From the above definitions, it can be concluded that human behavior and physical environment are closely related. In fact, the emphasis in the psychology of the environment has been on how the behavior, feelings and sense of well-being of humans are influenced by the physical environment (Jackson *et al.,* 2013). Environmental psychologists, from different perspectives, directly and indirectly, examined the effects of physical environment on human behavior and health. According to Russell & Snodgras, 1987, emotional quality of the environment is the most important part of the person's relationship with the environment. This is because the emotional quality of the environment, which is the main factor in determining the mood and memories associated with a position, can affect the health and well-being of the individual (Russell and Snodgras, 1987). Since the origin of "urban renaissance", as a contemporary account of urban conservation and redevelopment, is England we can find its similar samples in the other countries. In the United States, the inclusion of the concept of "smart development" in the late 20th century is partly a reflection of the idea of urban conservation and urban regeneration, if urban regeneration is considered as an urban regeneration. Smart development refers to the type of development in which the promotion of civil and social vitality, public transport and the reduction of adverse environmental impacts is at the forefront of urban designers' considerations and restores the city as a healthy and the main objective is the activist who can provide a decent future for all citizens (Nieuwenhuijsen, 2016).

Discussion and Conclusion

About the hypotheses presented in this research, the first hypothesis of the research is confirmed in which the strong and positive realtionship between citizens' attitudes toward smart city indicators and their mental health was assumed. The second hypothesis of the research is confirmed as well, but the aforementioned relationship is approved with moderate intensity. About the third hypothesis, the the moderator role of social capital, the third hypothesis is rejected. As the research findings show, smart city has a positive and powerful effect on the citizens' mental health. As stated in theoretical, mental health is a state of complete physical, psychological and social well-being, which will be provided when a person dwells in a healthy environment. It worth to notice that mental health and the healthy living environment are directly related to each other, and as environmental psychologists, such as Proshamsky, 1978, stated, if the components of the environment are of a quality, the mental health of the citizens will be provided to a high potential level. Smart city discussion is also underway in the context of high environmental quality in the city and the need for the formation of healthy cities. It

also aims to provide the necessary conditions for improving citizens' quality of life. As improving the citizens' quality of life is an important step towards the realization of the smart city, therefore, according to the items used in the analysis of this research, it seems that the following components are the basis for the formation of a smart city that provides the citizens' mental health, so that they have the highest rating in the analysis of the structural equations used in this research. The factors that have contributed to the impact on citizens' mental health, especially in the study area (Geisha neighborhood), are as followed:

- Public spaces and buildings
- Civil and social partnership
- Transportation
- Housing
- Social support and medical services
- And medical services

Public spaces and buildings. Exterior spaces and public buildings have a great effect on the mobility, independence and citizens' quality of life. There are some factors for suitable urban areas where are appropriate for citizens, as following: clean and welcoming environment, green spaces, good walking, especially for the elderly, recreational areas, quality of access, environmental security and quality of buildings are all among the suggested components for having public spaces in smart cities. Also, in the smart city, which is considered to be a mental health issue for citizens, residents have the right to choose a number of economic or voluntary activities. In other words, there is a right for them to work in the field of their economical interest and not lose the opportunity of volunteering. This is the case in some cities through the deployment of appropriate infrastructure and facilitating organizations. Such a feature exists in the Gisha neighborhood as the smart city context studied in this study, and it seems that the majority of residents and households in this neighborhood can be economically desirable according to descriptive statistics.

The issue of public transportation also affects a healthy citizen. In this regard, public transportation, reliability, and travel destinations, quality of vehicles, special services and vehicle drivers as the necessary qualities in the smart city to meet the citizens' mental health can all be suggested. Housing is also an important component of the security and welfare of citizens. The total amount of housing in smart and healthy cities includes affordable housing, essential housing facilities, housing design, housing and housing options. In addition, the ability to communicate with family and community and the right to choose housing along with a healthy residential environment are all components of healthy housing in the smart city. Support services and medical-health care have an important role in the health and autonomy of citizens in the community. The availability of quality, fit and accessible services is a concern of many residents. In this context, the availability of services, wider coverage of health services and voluntary services are among the most important components of the smart city for health and medical services. Although the role of social capital formation in providing mental health of humans and their quality of life is undeniable, in relation to the cause of the ineffectiveness of social capital variables on the citizens' mental health in the present study, it can be stated that according to descriptive statistics, majority of residents in Gisha neighborhood are newcomers to the neighborhood, and only three to six years of their presence in the neighborhood are passed. Due to its high-rise building structure, effective communication between inhabitants has not been established for the rapid formation of social capital, and the low level of this variable has not been able to have a significant impact on improving the mental health of residents.

Of course, the impact of citizens' attitudes toward smart city indicators on the formation of social capital was modest, which indicates the importance of the smart city in forming trust and building a healthy human society. Finally, it can be concluded that urban smart growth ensures the citizens' mental health and directly and strongly guarantees the citizens' well-being and quality of life. The fulfillment of the individual's needs will be possible in relation to the community, and the living environment is a physical environment. Dispersed and non-smart urban development makes it harder for the city to ensure physical and mental well-being and make it more difficult to achieve smart planning for smart growth. In the Gisha neighborhood, it is suggested that the development of public spaces, social protection and public health services and housing quality indicators be promoted in order to make the city smart as secure as possible.

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