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The Effect of Physical Stimuli on Citizens' Happiness in Urban Environments: The Case of the Pedestrian Area of the Historical Part of Tehran

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SUMMARY OF PRACTICAL IMPLICATIONS

We introduce a new, comprehensive approach to improve the quality of pedestrian areas based on factors of urban spaces and public characteristics of urban life associated with happiness. The results indicate the need for multi-disciplinary collaboration to improve pedestrian area quality, provide a primary context for urban managers to think about Iranian urban spaces in different way, and offer insights for urban managers globally who are interested in increasing happiness through urban design and management.

Abstract

The uncontrolled growth of urbanisation in recent decades has exerted negative and harmful effects on the environmental-physical structure of cities, and thus the physical and mental health of citizens. An overview of the literature on mental health indicates that there is a strong connection between mental health and happiness. This literature has been largely produced as a result of the experiences in urban planning and design. This paper aims to investigate the physical stimuli that affect citizens' happiness and provide an evaluation of their effects.

Global data are indicative of the unfavourable situation of Iran in terms of happiness, with the country ranked 110th out of 158 countries. This situation may be partly explained by the physical aspects of urban environments through which happiness can manifest. As **one of the first studies in the field of urban happiness in Iran**, this paper aims to investigate the physical stimuli that affect happiness and evaluate influence of these stimuli on urban spaces in Tehran. The pedestrian area of central Tehran was selected as the site of this study for its basic qualities and pedestrian-orientedness, providing a realistic insight into the factors of happiness in urban environments. Field observation, interview, and a conceptual model were used to investigate relationships between the factors. The findings suggest that, according to Veenhoven model, the average level of happiness among Tehran's citizens is 5.9 out of 10.

The physical factors in the urban space that were identified to influence happiness included: environmental elements, pedestrian-orientedness, bicycle-orientedness, flexibility, legibility, variety, and place identity, of which the most influential factors seem to be pedestrian-orientedness and environmental elements.

Introduction

According to the United Nations. in 2009 the urban population of the world overtook the rural population (UNFPA, 2007). Contemporary studies suggest that cities may be the most important places for human development, creativity, progress, and health of people (Corburn 2009; Landry 2012; Duhl 1986). Therefore, a sound and healthy urban environment is necessary to support human welfare (Völker and Kistemann 2013). At the global level, urban life is a powerful force that influences people's health (Akpinar 2016; Vlahov et al. 2007; Cummins et al. 2007; Diez Roux 2003; Macintyre et al. 2002; Perdue et al. 2003; Rao et al. 2007). Uncontrolled urban development, an increase in the number of vehicles, deterioration of the environment, fear of crime, and noise pollution have all negatively affected the environmental-physical aspects of cities as well as the physical and mental health of its citizens (Marin et al. 2011; Tafet and Bernardini 2003). Since good mental health is an urgent need of human beings (Riahi et al. 2009), and in light of the

fact that urban development and planning can, and should contribute to citizens' mental and physical health (World Health Organisation Center for Health and Development, 2011), improvement of the daily activities of citizens has emerged as a major priority in designing public spaces all over the world (Beaghole et al. 2011; World Health Organisation 2010; Kooshari et al. 2013). It is therefore obvious that mental health is as important as physical health in these considerations (Abbaszadeh et al. 2003).

Recent studies confirm that there is a close link between happiness and mental health (Fordyce 1977; Soraki et al. 2016; Pernegar et al. 2004). As a multifaceted concept, happiness has been widely discussed by philosophers and psychologists (Deleire and Kalil 2010; Frey and Stutzer 2002; Kahnemean, Diener, and Schwanz 1999; Powdthavee 2007; Rojas 2011). Although terms such as happiness, well-being, life satisfaction, and positive thinking are used interchangeably (Andrews and Withey 1976; Diener 2000; Argyle 1987; Lu 2001; Easterlin 2003; McGillivray and Clarke 2006) and the definition of happiness varies from one person to another, people usually tend to find their happiness from similar sources (Conceição and Bandura 2008; Lyubomirsky et al. 2005; Easterlin 2001; Frey and Stutzer 2002).

It is only recently that the literature on happiness has seriously drawn on the role of place, local communitites, social cohesion, and sense of belonging (Ballas 2013). Enrique Peñalosa, the Mayor of Bogota from 1998 until 2001, developed the notion of 'city's happiness' and proved the potential of happiness and well-being in governmental planning and policy-making (Gardner and Assadourian 2004). Research and experience at a global level shows that physical stimuli in the urban environment are central to the promotion of happiness and creation of lively spaces can contribute to citizens' happiness on a scale broader than public spaces, thereby improving citizens' mental health (Montgomery 2013; Rappaport 1997; White et al. 2013; Wernick 2008). In fact, a mutual relationship can be claimed between happiness and physical stimuli in the urban environment so that these two may characterise and reinforce each other.

Environmental stimulus refers to a trigger that directly affects one of our five senses (Dijkstra, Pieterse, and Pruyn 2006). There is a belief in the philosophy of environmental planning and design that the form of a city leads to radical changes in social behavior and interaction, thereby increasing happiness among citizens (Kuo Wei Tchen 1990; Rappaport 1997; Montgomery 2013). According to contemporary points of view, the built environment can act as a context for human activities and as a catalyst for restricting senses and behaviors (Cassity 2010). Maller believes that physical stimuli in an urban environment consist of physical features (geometric shape, size, material, etc.) as well as their content (their uses, activities, etc.) (Maller 1998). In fact, physical stimuli include the physical elements of the environment, natural elements, as well as physical qualities such as variety, legibility, flexibility, and place identity. Physical qualities are a combination of physical elements, urban activities, and environmental elements which are formed as a result of

an interaction between concrete physical stimuli, on the one hand, and the observer's mental codes and patterns, on the other (Smith, Nelischer, & Perkins,1997, Handy, Boarnet , and Ewing 2002). According to the World Happiness Report 2016, Iran is ranked 105th among 157 countries, showing an improvement of five ranks in comparison to the previous report (World Happiness Report 2016). A substantial portion of this seems to be rooted in physical stimuli, which indicates that the physical stimuli of the urban environment in large cities such as Tehran need to be revised to keep up with global standards.

Based on the international data regarding the status of happiness in Iran and with reference to the small number of studies about urban environments in Iran, this paper seeks to offer a comprehensive view of the effect of the physical stimuli of urban environments on citizens' happiness. Such a comprehensive view of the physical stimuli that promote happiness in Iranian urban environments, particularly in Tehran, can pave the way for making policies and developing strategies to improve the physical qualities of cities and ameliorate the status of happiness and mental health among citizens.

The Theoretical Background of the Concept of Happiness

Happiness is a multifaceted issue that has been widely discussed by scholars of philosophy, psychology, and social sciences (Deleire and Kalil 2010; Frey and Stutzer 2002; Kahneman, Diener, and Schwarz 1999; Powdthavee 2007; Rojas 2011). It refers to the extent to which an individual feels satisfied with his or her life (Mousavi 2013). Concepts such as happiness, welfare, life satisfaction, and positive effect are often used interchangeably (Andrews and Withey 1976; Diener 2000; Argyle 1987; Lu 2001; Easterlin 2003; McGillivray and Clarke 2006). Although defined differently from person to person, there is a general belief that there are common sources of happiness (Conceição and Bandura 2008). Objective happiness includes psychological approaches that seek to define mental wellbeing, particularly by means of measuring an individual's cerebral signals (Frey and Stutzer 2002). In urban development however, it is a topic that has only recently come to the centre of attention.

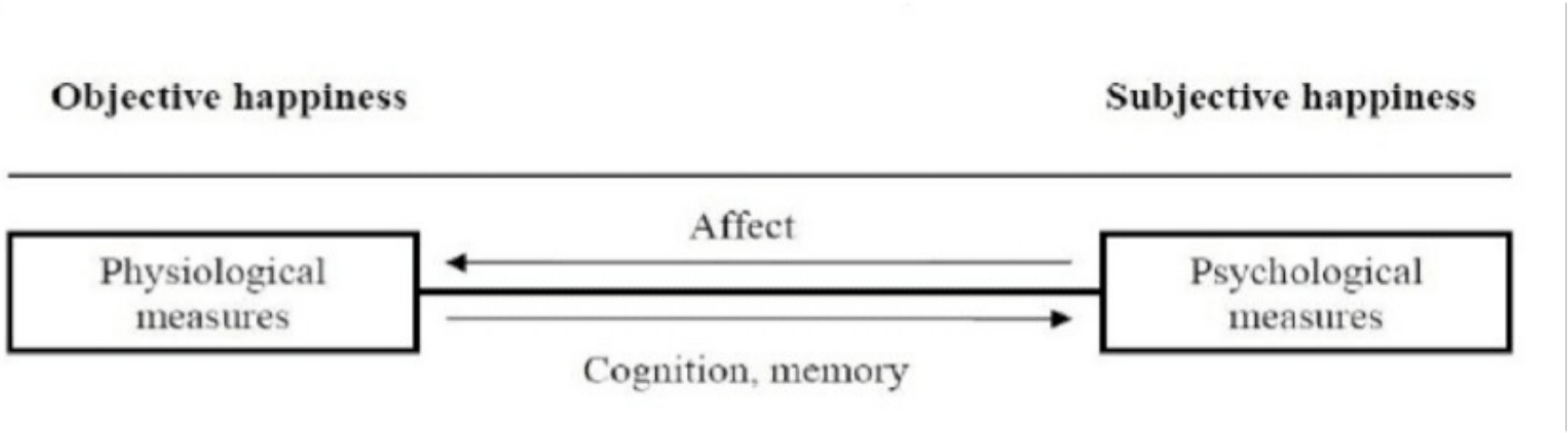


Fig. 1. The notion of happiness. Frey and Stutzer 2002.

Philosophy and happiness

Philosophers, above all, have been thinking about happiness for a long time. In *The Republic*, for example, Plato presents his tripartite model of human soul, consisting of reason, spirit, and appetites. Plato described a state of happiness as being harmony among these three parts (Dickey 1999: 55). Aristotle defined happiness as a spiritual life, whilst John Locke and Jeremy Bentham believed that happiness could be quantified in terms of a person's pleasant experiences (Diener et al. 2002). Additionally, Matlin and Gawron (1979) and Argyle and Lu (1995) describe happiness as a positive excitement accompanied by a sense of life satisfaction (Kahneman 2003; Veenhoven 2006).

Factors that create happiness

The literature in this field reveals the ongoing interest in happiness, and there is an agreement that a range of factors are implicated in creating happiness. These factors may include: personality factors, social factors (e.g. education, quality of social networks), and situational factors (e.g. health or marital status) (Diener and Fujita 1995; Diener and Lucas 1999; Frey and Stutzer 2002; Lyubomirsky, Tkach, and Dimatteo 2006; Murrell, Salsman, Meeks, and Craighill 2003; Oishi, Diener, Suh, and Lucas 1999; Taylor and Funk 2006; Wilson 1967, Fowler and Christakis 2008; Ballas and Dorling 2007; Diener and Seligman 2002; Fernández-Dols and Ruiz-Belda 1995). Other factors such as a reliable government, democracy, human rights, and social capital may also positively influence happiness in a society (Diener and Seligman 2002; Helliwell 2003).

Psychology and happiness

Happiness, as a key component of good mental health, is central to the field of positive psychology (Safari-Shali 2010). Happiness refers to a measure by which the individual judges the general desirability of their life (Mousavi 2013; Powdthavee 2007). In *The Geography of Bliss* (2008), Eric Weiner states that happiness was a central concern for the ancient Greeks and Romans - and that thinkers such as Aristotle, Plato, and Epicurus attempted to answer the question of what a good life is (Galati 2006; Weiner 2008). There is a general distinction in the literature among short-term and long-term happiness (Csikszentmihalyi 1990). Some scholars believe that happiness is a sensual manifestation, while others believe that it is a cognitive phenomenon (Kahnaman 2003; Veenhoven 2006). Frey and Stutzer distinguish between inner determinants of happiness (such as their coping skills and satisfaction with life) and outer determinants (such as living conditions, and having a meaningful life, for instance volunteering to help others) (Kahneman 2000: 4; Frey and Stutzer 2002).

Happiness factors in environmental planning and design

Happiness is not only created by the person, but also by environmental elements (National Research Council 2000: 16). In the philosophy of environmental planning and design, it is widely believed that the form of buildings and cities can lead to radical changes in behaviour, increased levels of happiness, and improved social interaction (Rappaport 1997; Montgomery 2013). As Montgomery puts it, "a happy city is a green zero-carbon city that can protect us. There are many ways to increase happiness such as building a small park or making a pedestrian area" (Samavati and Ranjbar 2016). Research supports the positive effect of green spaces on the happiness and welfare of the inhabitants as well as on decreasing improving their mental health by reducing their stress (Mitchell and Popham 2008). These spaces also influence general life satisfaction and happiness on a public scale (White et al. 1990; Bertram and Rehdanz 2014). In addition, they contribute to social welfare (Madanipour 1996; Carmona 2003; Worpole and Knox 2007; Leslie and Cerin 2008), social cohesion, and identity. Charles Landry, the prominent thinker in the field of urban planning, writes about the layout of the value of feelings in a spatial project (Landry 2008). In *Who's Your City*, Richard Florida discusses the geography of happiness. His findings indicate that the physical environment strongly influences happiness, activities, adaptation, and sense of place, thereby improving the general level of happiness (Florida 2008).

As the mayor of Bogota, Enrique Peñalosa proposed the notion of 'city's happiness' and proved the potential of happiness and well-being in governmental planning and policy-making (Gardner and Assadourian 2004; Samavati and Ranjbar 2016) and in recent years, the notion of happiness has been widely discussed in international forums and events (World Happiness Report 2015). From Bhutan to England, and from Seattle to Hong Kong, policymakers across diverse societies seek the 'causes' of happiness, as well as the best circumstances for the manifestation of happiness in society (Happiness Research Institute). The central question is how the form of

urban environment can shape our daily social interactions. If designed properly, the public territory can provide favourable opportunities for social life and development of social networks, which are necessary for a social immune system, thereby leading to both physical health and life satisfaction (Samavati and Ranjbar 2016).

A survey of the literature on the notion of happiness in cities shows that a large portion of theoretical discussions are based on practical experiences. Our methodology here is based on the case study and comparison of two cities (Copenhagen, Denmark and Bogota, Colombia), and a country (Bhutan) as these places have made some of the most important efforts at attempting to understand the happy city. Attempts to improve happiness have been made in Copenhagen through the qualities of urban spaces, in Bogota through public participation and building parks, and in Bhutan through urban policies.

- **Copenhagen** is recognised by its inhabitants as a happy city, with many opportunities for recreation and leisure activities. It enjoys wide streets, an efficient transportation system, easy access to all parts of the city, numerous bicycles, fewer cars, as well as clean air (Fung et al. 2014: 4). In addition to the use of sustainable materials, the urban design of Copenhagen is based on supporting pedestrians, bicycle-riding, and alternative means of transportation (Gehl 2013).Denmark has the highest status with regard to the indicators of supporting happiness. Statistics show that happiness has remained at a stable level of 8 out of 10 over the last 40 years (World Happiness Report 2012).
- **Bogota** is the capital city of Columbia and the sixth largest city of South America (Rezaee 2009). Peñalosa suggests that to promote happiness, the skeleton of a desirable city model should consist of its pedestrians and parks, supported by public transportation. He considered creation of public spaces, particularly parks, to be central to the establishment of true democracy (Montgomery 2013).
- **Bhutan** lies in South Asia among India, Tibet, China, and Nepal. It is the only country in the world that has defined an index of gross national happiness (GNH) (Ezechieli 2003; Kelly 2012). Bhutan's GNH is a manifold index that refers to a number of policies, plans, and instruments. Bhutan has adopted a macro- and medium-level approach to establish a happy city which focuses on retaining cultural identity and traditional values, improving mental and physical health, and managing environmental plans.

An analysis of the plans of urban space improvement in Copenhagen and Bogota shows that some of the most important physical stimuli of happiness include: emphasis on pedestrians, bicycles and development of bike paths, improvement of environmental elements and activities, designs with the aim of increasing social solidarity, and flexibility in urban spaces. The experience of these cities suggests that investment in the quality of urban space may lead to an increase in citizens' satisfaction that, in turn, may improve the quality of life and create happiness in a city. Their practical experiences in trying to improve happiness are summarised in Table 1.

Table 1: Plans for improving happiness in urban spaces in the two cities under study (source: authors)	
Copenhagen	**Bogota**
- Developing bike paths - Developing pedestrian paths - Holding ceremonies and cultural events - Focusing on variety in urban spaces - Focusing on the role of tourism in urban spaces - Focusing on ethnic and cultural variety in urban spaces - Considering the needs of different age and gender groups in designing urban spaces - Emphasizing people's participation in designing urban spaces - Improving the quality of physical stimuli such as pavements and urban furniture by using stable materials - Maximum access to natural and green spaces - Changing parking lots to plazas - Planning weather conditions by using renewable energies and environment-friendly materials as well as by reducing CO_2 release	- Planning a "Ciclovía" - Increasing the number of urban and local parks - Changing abandoned land plots to green spaces and parks - Child-oriented design of urban spaces - A coherent design of pedestrian and bike paths - Allocating enough space for citizens to take part in recreational and leisure activities (sports, recreation, art) - Creating social solidarity and a sense of belonging to urban spaces through increasing the liveliness of such spaces - Decentralization - Trying to overcome informal settlements - Decreasing construction density - Special plans for public transport and bike paths - Special plans for per capita green spaces which are equally distributed all over the city

The indicators that have been proposed in the literature with regard to the improvement of happiness in urban spaces are summarised in Figure 2. Some of these stimuli, such as environmental elements, pedestrian-orientedness, bicycle-orientedness, and green spaces - have objective instances. Meanwhile, others stimuli such as legibility, place identity, and variety - are consequences of physical qualities.

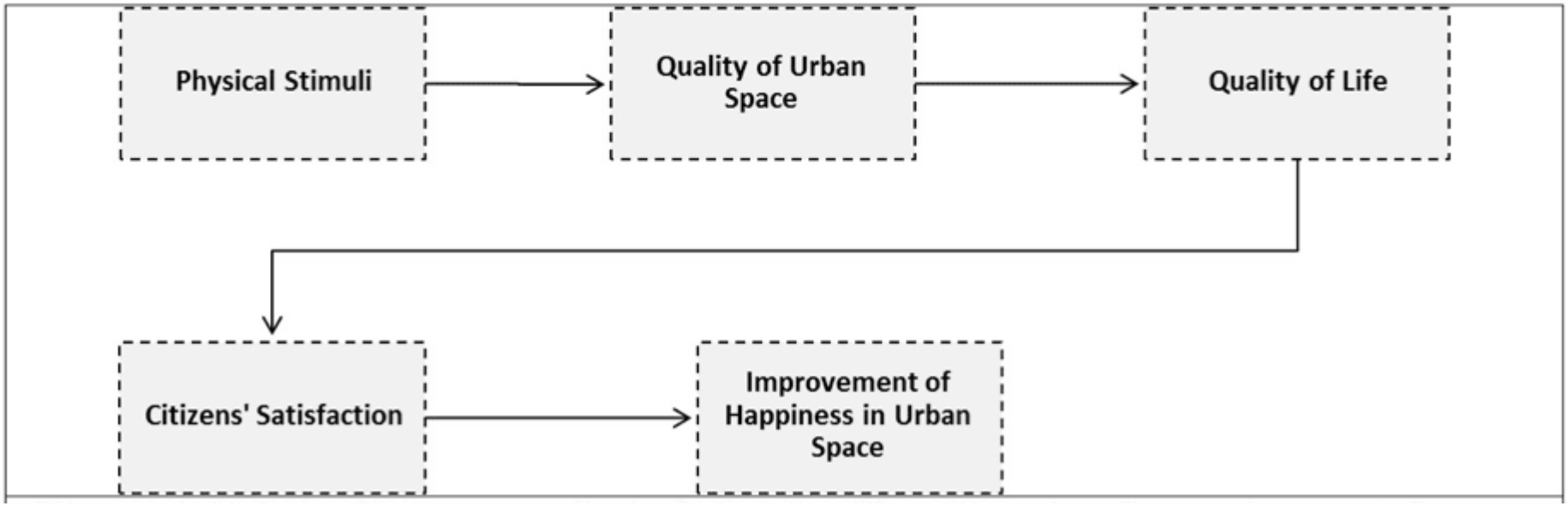


Fig 2. Relationships among physical stimuli and happiness in urban environment

The following indicators (Table 2) have been proposed in the literature to improve happiness in urban spaces. Some of these stimuli, such as environmental elements, pedestrian-orientedness, bicycle-orientedness, and green spaces, have objective instances. Meanwhile, others stimuli such as legibility, place identity, and variety - are consequences of physical qualities.

Table 2: Summary of the indicators of happiness in urban spaces (source: authors)		
Indicator	**Component**	**Scholars**
Physical features	Environmental elements	Costanza et al. 2007: 269; National Research Council 2000: 16
	spatial cohesion	Vaziri 2015; Behzadfar and Ghazizadeh 2011
	Pedestrian-orientedness	Montgomery 2013
	Bicycle-orientedness	Montgomery 2013
	Good vegetation	Montgomery 2013; Gross National Happiness 2014
	Variety	Miri 2013; Vaziri 2015; Gross National Happiness
	Physical penetrability	Gardner and Assadourian 2004: 172; The Happiness Research Institute 2013
	Flexibility	Vaziri 2015; Bentham 2007
	Legibility	Vaziri 2015; Bentley 1985
	Place identity	Vaziri 2015

Methods

Conceptual model

Based on a comprehensive survey of the literature and the global experiences, we developed a conceptual model for the physical stimuli that may affect happiness in urban environments (Figure 3):

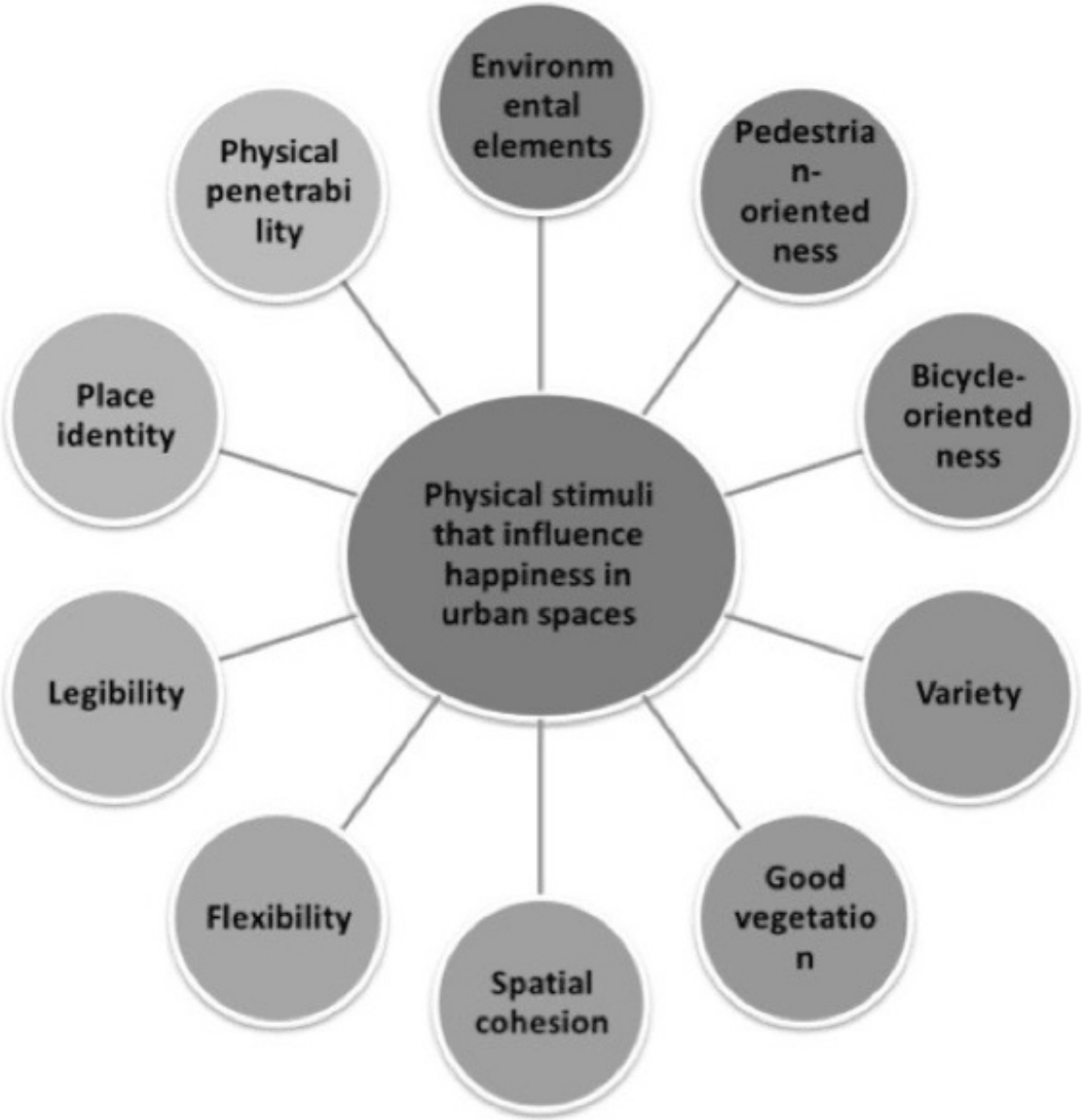


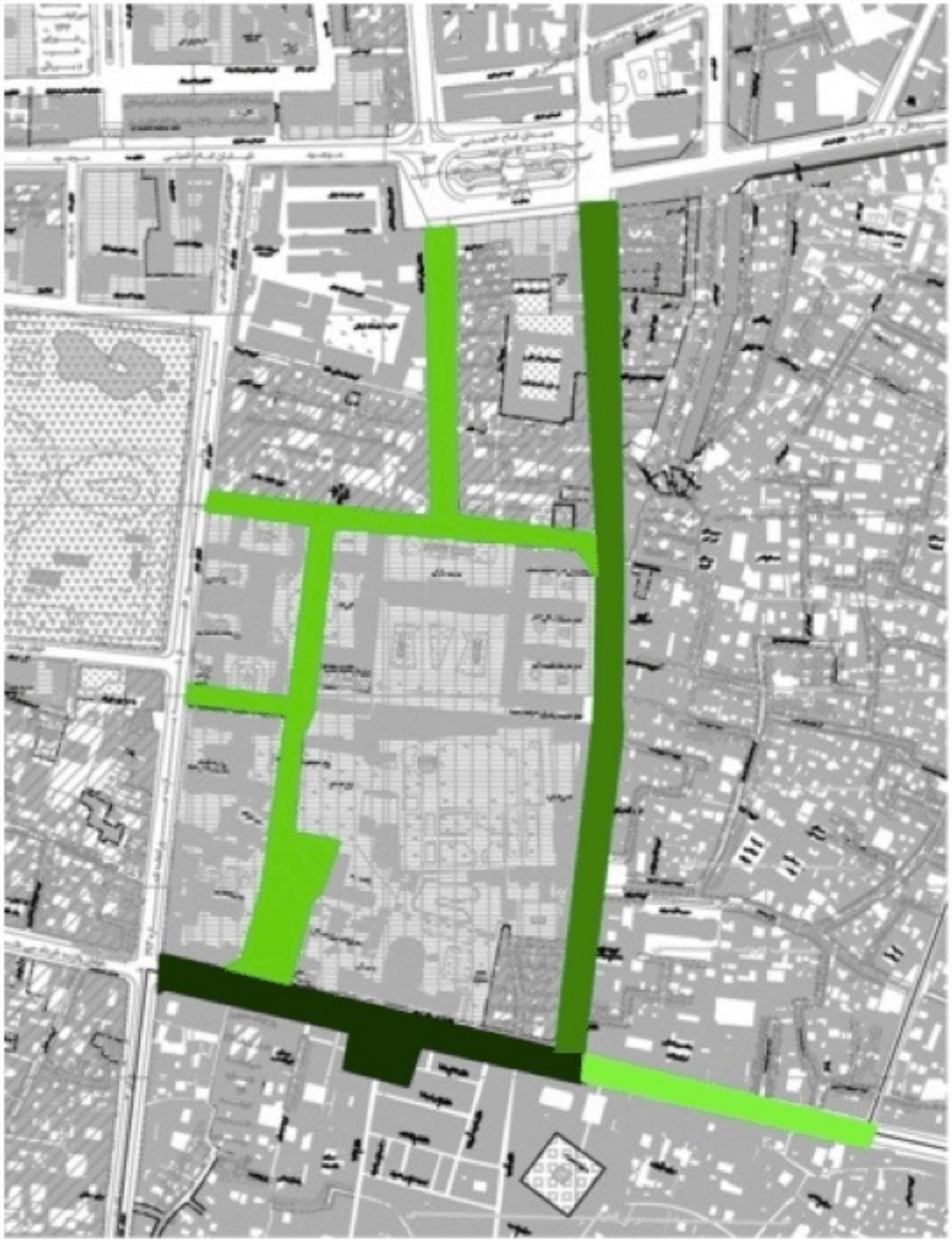
Fig. 3. Physical factors that influence happiness in urban spaces

Selection of the study site, with emphasis on pedestrian-orientedness

In order to investigate the status of happiness in Tehran the pedestrian area of the city, which includes Naser-Khosrow, 15 Khordad,

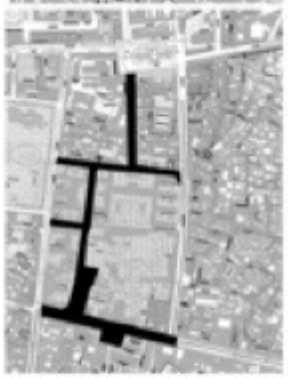
Bab-Homayoun, and Sour-Esrafil, was selected as the case study of this research project. Neo-urbanists believe that the development of pedestrian areas is a major step toward creating more lively and dynamic places (Haas et al. 2005; Talen 2005), and the basic physical qualities of urban environments are usually more manifest in pedestrian areas than in roads and streets. Moreover, pedestrian routes are widely considered as passages with the most prominent social roles (Ranjbar and Esmaeeli 2010), places for social activities (Pakzad 2007), and realisations of civil life (Izadi et al. 2012). Pedestrians are the means for improvement of urban economy, social health, and environmental qualities (Abbaszadeh and Tamri 2013). On this basis, it can be said that pedestrianised areas are one of the most important urban spaces to target to improve the general level of happiness.

An analytical view of the development of pedestrian areas in central Tehran is indicative of the remarkable growth of total pedestrian-orientated spaces in this region, the rate of which can be compared to global examples in the same time period. This area of Tehran is a historically valuable area that accommodates various functions, users, and cultures. (Figure 4)

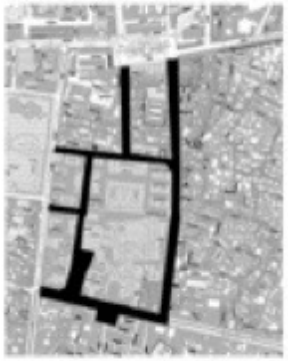


15khordad:2010

Baab-Homayoun-sor esrafil:2012



Nasser-khosro:2014



-Nasser-khosro Pamenar:2015

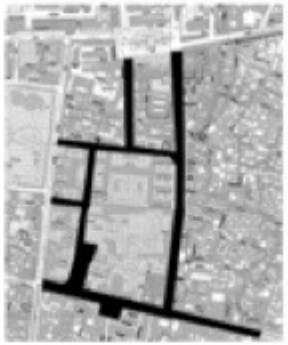


Fig. 4 The development map of the process of building the pedestrian area in Arg district, Tehran

. TIn order to determine the validity of the model for the particular case study, field observations and interviews with citizens were conducted. The observations indicated that all components and subcomponents of the model could be investigated in the area in question.

This review focused on two aspects. First, we tried to describe a general notion of urban happiness on the basis of major studies from all over the world, ased on the literature. Secondly, we paid particular attention to case studies of urban happiness in different cities and extracted their proposed indicators.

Data Collection

Quantitative and qualitative data were collected simultaneously, largely through a questionnaire and a survey. A questionnaire with 24 statements was developed based on the variables listed in Table 1 to produce quantitative data that would enable measurement of the effect of physical stimuli on citizens' happiness, and base our planning of urban spaces on this measurement. Field surveys were used to collect relevant information about the physical stimuli of urban happiness in the area under investigation. Interviews were also conducted with a number of participants in the surveys.

Based on the author's field observations in the area and counting people after recording videos, the number of people present at the site during the peak hour was estimated to be 900. From this population, the number of subjects was decided as 200. Cronbach's alpha of the questionnaire was calculated to be 0.938 (greater than 0.70), indicating sufficient reliability. The questionnaire was administered to 200 users of the pedestrian area in central Tehran, which includes the districts of Naser-Khosrow, Khordad 15th, Bab-e Homayoun, and Sour-e Esrafil.

The data were coded, then analysed using SPSS v19.0.

General characteristics:

- **Gender:** 51.3 % male, 48.7 % female.
- **Age:** 7 % under 20 years old, 42.5 % between 20 and 30, 23.5 % between 30 and 40, 8.5 % between 50 and 60, and 7.5 % above 60 years old.
- **Familiarity:** 40 % of subjects have been familiar with this urban space for more than 10 years

- **Frequency of use:** Approximately 30 percent of subjects attend this area at least once a month.
- **Access:** More than 50 percent of subjects use the subway to access the area.

Spatial cohesion

Spatial cohesion is a systemic concept that refers to combination of spatial structure, analysis of spatial relationships, analysis of spatial processes, and integration of urban space (Esfandiyari 2012). It entails the cohesion of social, economic, and cultural relationships (Faludi 2010). This can lead to social cohesion, one of the main components of mental health and happiness among citizens (Ghaffariyan-Shoaee, Mohammadi, and Tajdar 2014). (Figure 5)

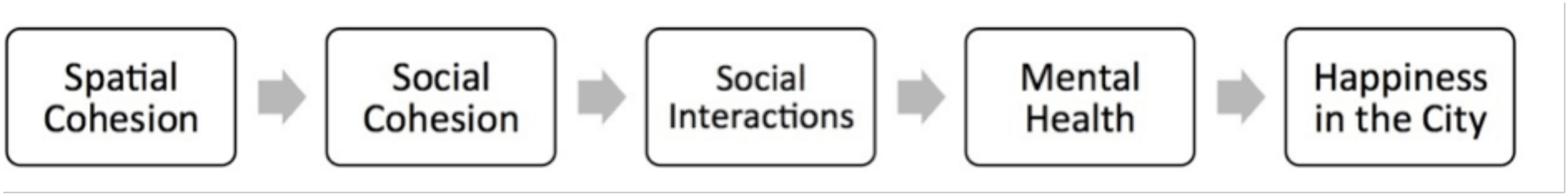


Fig 5: The effect of spatial cohesion on the improvement of happiness in urban spaces

Pedestrian and bicycle-orientatedness

Pedestrian-orientedness directly influences physical and mental health as well as happiness among citizens (Shoaee et al. 2014). (Fig 6)

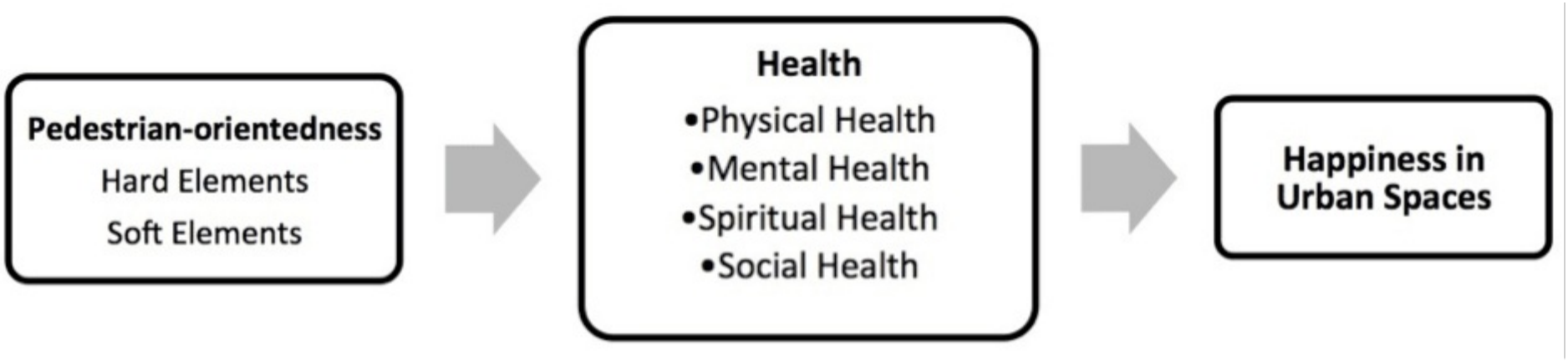


Fig 6. The effect of pedestrian-orientedness on the improvement of happiness in urban spaces

Bicycle-orientedness results in physical activities, promotion of the habit of cycling, as well as a sense of comfort and happiness among cyclists (Gehl 2014; Fung et al. 2014; Shoaee et al. 2014; Montgomery 2013). (Figure 6)

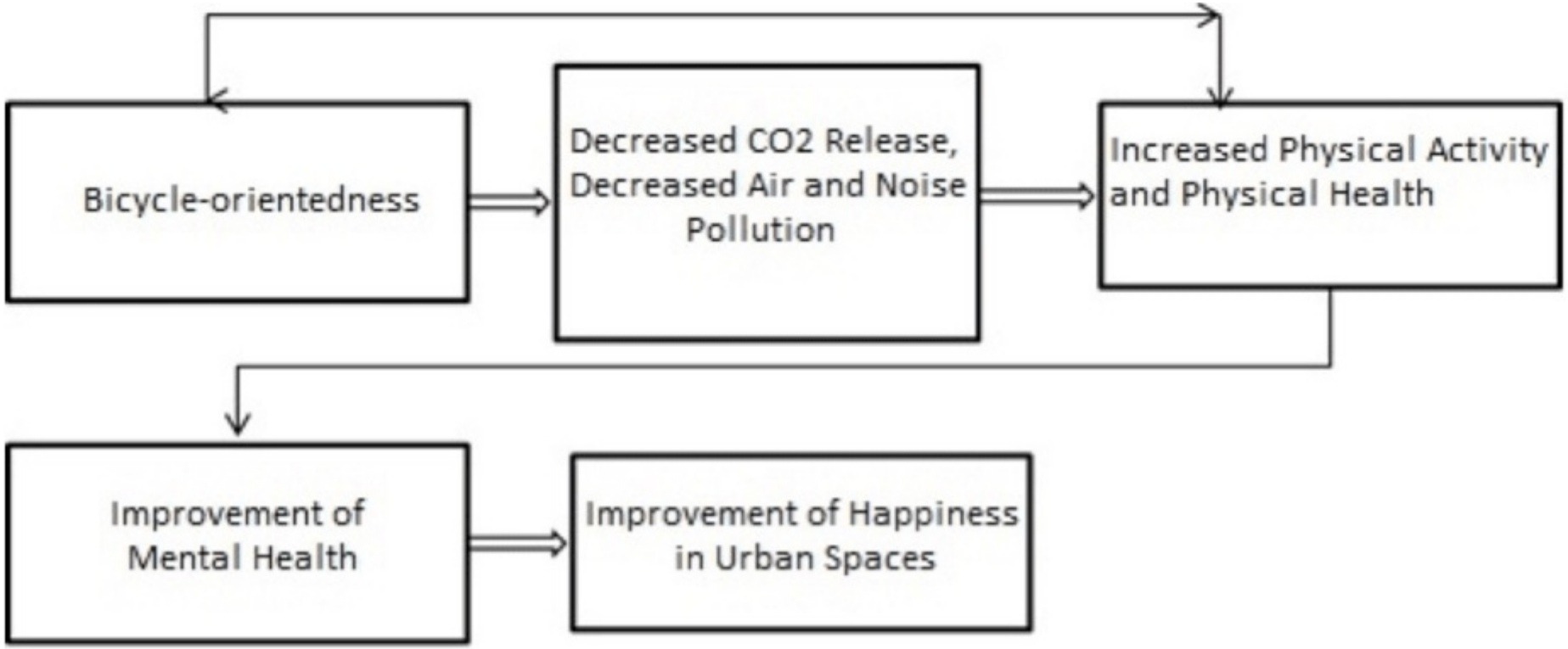


Fig 6. The effect of bicyle-orientedness on the improvement of happiness in urban spaces

Qualities of urban design are involved in a process that is formed through the interaction between the physical stimuli of the environment and the observer's cultural and mental patterns and codes (Golkar 2000). Physical variety, flexibility, legibility, penetrability, and place identity are stimuli that may result in the improvement of the quality of urban spaces, the improvement of the quality of life, and citizens' mental health - thereby increasing happiness in urban spaces. (Figure 7)

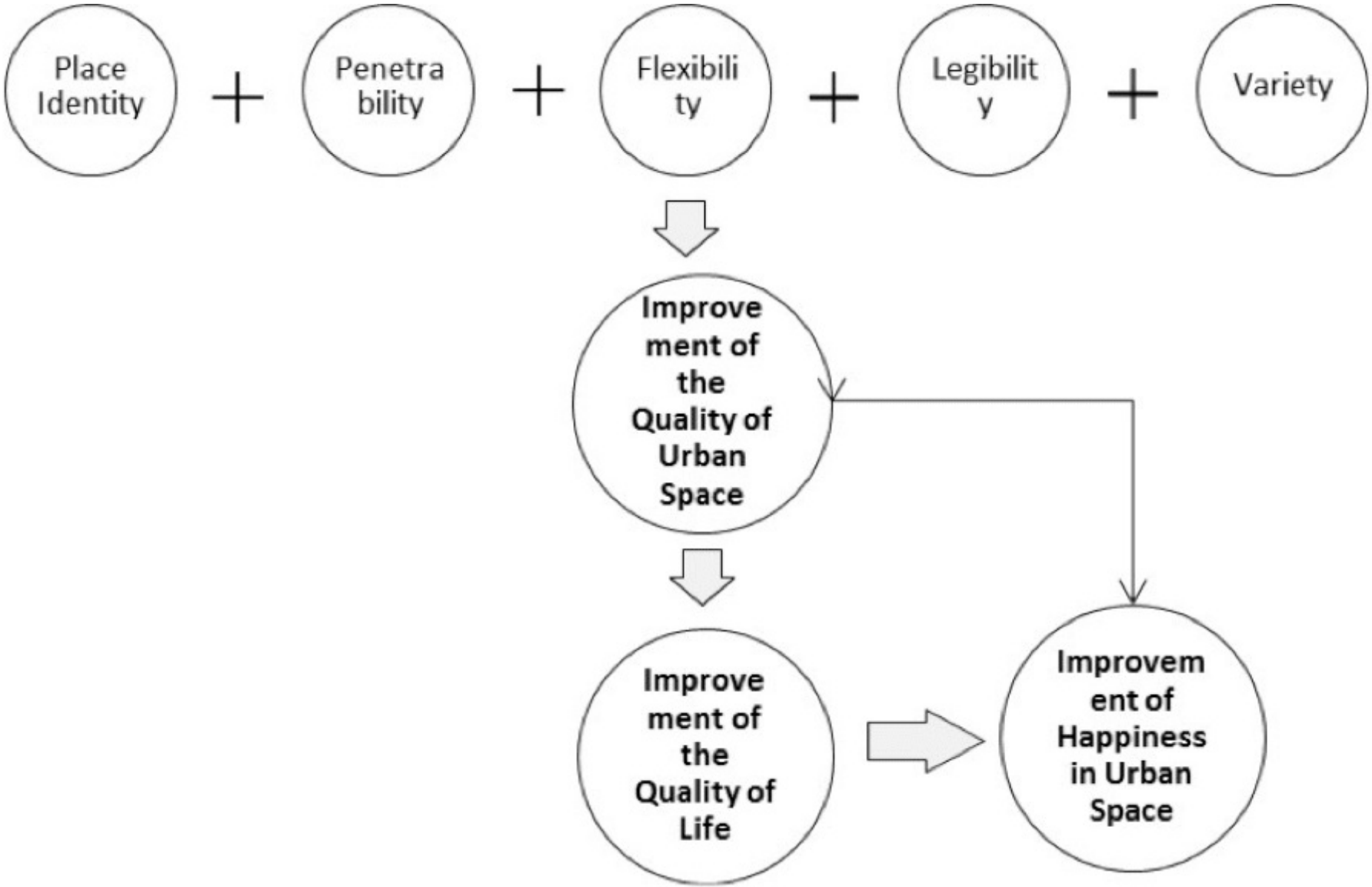


Fig 7. The effect of the quality of urban spaces on the improvement of happiness in urban spaces

As with vegetation, research findings show that green spaces positively influence the happiness and wellbeing of citizens, and particularly their mental health, by reducing stress (Kaplan 1995) and improving their behaviour (Ulrich et al. 1991), as well as physical health (Mitchell and Popham 2008). Recently it has also been demonstrated that green spaces have a positive influence on life satisfaction (White et al. 2013; Bertram and Rehdanz 2014) and social welfare (Worpole and Knox 2007; Leslie and Madanipour 1996;

Carmona Cerin 2008) due to increased social interactions and cohesion.

Data Analysis

Regression analysis

Linear regression is a statistical technique for the analysis of linear relationships among several independent variables and one dependent variable, in a way that the relationships among the independent variables can also be investigated (Pasha-Sharifi et al. 2000; Habibpour and Safari 2012).

One of the output tables of multivariate regression test is model summary table that includes the correlation coefficient of variables (R) and R Square. This shows that R (i.e. correlation coefficient) for the variables is 0.748, indicating a strong correlation between the independent variables and the dependent variable. In addition, R Square equals 0.647, indicating that 64.7 percent of all changes in the index of happiness in the pedestrian area of central Tehran is due to our ten variables:

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.748	0.647	0.523	0.838

The fit of the model is then evaluated in ANOVA table. As F is significant for $p<0.002$, it can be inferred that the regression model of the research is appropriate and the independent variables can efficiently explain the citizens' happiness in the urban environment:

Model		df	F	Sig.
1	Regression	10	22.856	0.000
	Residual	189		
	Total	199		

The next output is the coefficients table that represents the effect of each physical stimulus. A level of significance less than 0.05 confirms a relationship among the variables. β determines the type and intensity of the relationship. The table shows that all variables stand in a significant relationship to the index of citizens' happiness in the urban environment of central Tehran. Analysis of β values shows that pedestrian-orientedness, environmental elements, and spatial cohesion have the strongest effect on citizens' happiness whereas flexibility has a weaker effect than the other variables:

Model	Non-standard coefficients		Standardized coefficients	t	Sig
	B.	Std. Error	Beta		
Constant	0.105	0.296		0.356	0.020
Pedestrian-orientedness	0.210	0.039	0.482	5.419	0.000
Bicycle-orientedness	0.109	0.042	0.251	2.635	0.009
Environmental elements	0.024	0.013	0.361	1.865	0.05
Spatial cohesion	0.282	0.071	0.288	3.978	0.000
Good vegetation	0.183	0.069	0.155	2.193	0.008
Flexibility	0.104	0.048	0.113	0.124	0.03
Variety	0.007	0.058	0.247	0.124	0.04
Legibility	0.029	0.042	0.113	0.702	0.004
Physical penetrability	0.198	0.070	0.197	2.836	0.005
Place identity	0.189	0.060	0.180	3.126	0.002

The index of environmental elements is composed of factors such as: benches, appropriate pavement, façade of buildings and shops, cleanliness of environment, access to lavatories, access to trash bin, possibility of sitting on edges, fountains, works of art, as well as presence of restaurants and cafés. Regression analysis was used to investigate the effect of each of these factors on the happiness of people. The results suggest that restaurants and cafés ($\beta=0.421$), works of art ($\beta=0.192$), access to lavatories ($\beta=0.120$), façades ($\beta=0.225$), suitable benches for sitting and talking ($\beta=0.354$), and the illumination of space ($\beta=0.237$) are significantly related to happiness. From among these, the most influential environmental elements are restaurants and cafés as well as suitable benches for sitting and talking.

Pearson correlation analysis

Pearson correlation coefficient was used to examine the relationships among the physical factors that affect happiness in urban environments. This is a statistical index that determines the type and degree of correlation between two quantitative variables. The degree is represented by a number from 0 to 1 and the direction is shown by a sign, positive sign referring to positive correlation and negative sign referring to negative correlation (Biyabangard 2005; Delavar 1999; Mansourfar 2005).

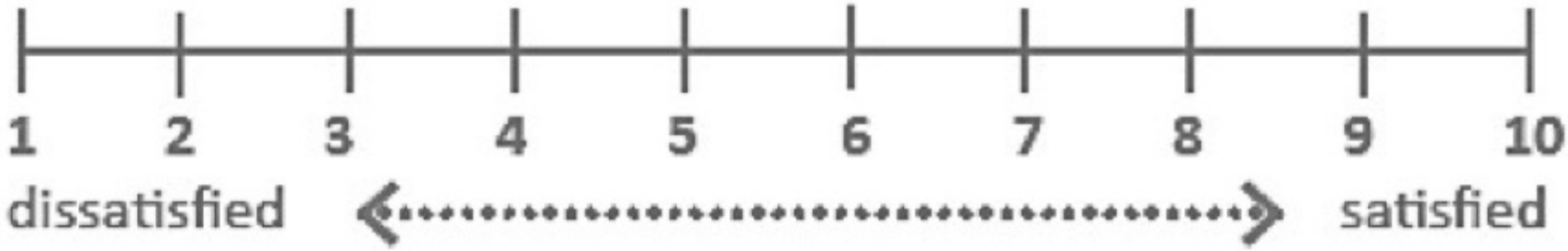
The results show that almost all physical stimuli of urban environment are significantly related to each other ($p<0.05$). Again β shows the type and intensity of this relationship. For example, the index of spatial cohesion and pedestrian-orientedness has a β value of 0.621, which means that there is a strong positive correlation between pedestrian-orientedness and spatial cohesion:

Physical stimuli	Pedestrian-orientedness	Bicycle-orientedness	Environmental elements	Spatial cohesion	Good vegetation	Flexibility	Variety	Legibility	Physical penetrability	Place identity
Pedestrian-orientedness	1									
Bicycle-orientedness	0.360**	1								
Environmental elements	0.638**	0.380**	1							
Spatial cohesion	0.621**	0.347**	0.627**	1						
Good vegetation	0.409**	0.214**	0.152**	0.244**	1					
Flexibility	0.166*	0.067	0.166*	0.189**	0.149**	1				
Variety	0.328**	0.185**	0.457**	0.244**	0.244**	0.181*	1			
Legibility	0.344**	0.288*	0.369**	0.460**	0.402**	0.267**	0.174**	1		
Physical penetrability	0.494**	0.175*	0.673**	0.542**	0.242**	0.170*	0.310**	0.318**	1	
Place identity	0.311**	0.051	0.399**	0.395**	0.177*	0.225**	0.184**	0.356**	0.380**	1

* $p<0.05$ - ** $p<0.01$

Veenhoven analysis

As the director of the international happiness database at Erasmus University of Rotterdam, Ruut Veenhoven has investigated people's life satisfaction over the past few decades. The International Happiness database aims at collecting happiness data from people using this question: "Given all circumstances together, how much do you feel satisfied or unsatisfied with your entire life?" (Moore 2009: 11)



The subjects' selection using this scale is used to measure the level of happiness. Underlying this method of measurement is the fact that the results have been reliable for many years (Diener and Suh 1999). The results obtained from our subjects by means of Veenhoven method show their average level of happiness as 5.90 out of 10.

Analysis of the Results through Field Observation

Informed by both national and international experience, field observations were used to investigate the physical stimuli that have been proposed to improve happiness in the context of the pedestrian areas of central Tehran. Stimuli were analysed comparatively:

Components		very little	little	medium	much	very much
Physical component	Pedestrian-orientedness	25.5	29.5	28	14.5	2.5
	Bicycle-orientedness	15	19.5	25	28.5	12
	Environmental elements	4	21	25	27	13
	Spatial cohesion	43	30	13	11.5	2.5
	Good vegetation	20	35.5	26.5	17	1
	Flexibility	13	28	29	24.5	5.5
	Variety	9	18.5	35	30	7.5
	Legibility	17	20.5	18.5	31	13
	Physical penetrability	11	24.5	18.5	32	14
	Place identity	7.5	14	23	38	17.5

The results indicate a high level of satisfaction with environment quality, such as sense of place and social cohesion. However, physical indexes such as environmental elements or vegetation were mostly negatively evaluated. Therefore, it can be inferred that the physical indexes of happiness in the historical areas of central Tehran need to be improved, the priority being the indexes of bicycle-orientedness, environmental elements, and vegetation.

Results

Our findings suggest that physical indexes have a significant effect on happiness. Based on our findings, the type and intensity of the effect of each index may differ. The conceptual model of research which builds on both the literature and global experiences as well as the experimental application of the model to the urban environment of Tehran confirm the efficiency of the model in evaluating the effect of each physical stimulus on the promotion of happiness among citizens. Other analyses based on this approach can reinforce our results. In investigating the effects of the physical stimuli, SPSS software was used to perform regression test for recognising significant stimuli and Pearson correlation test for evaluating the relationships between stimuli. It should be noted that this model could be modified slightly, based on the urban context in which it is intended to be used. The results show that pedestrian-

orientedness of the area under investigation was the most important physical stimulus in improving happiness. Some of the results are as following:

- The physical stimulus of **pedestrian-orientedness** is the most important factor of happiness among citizens. If the design of a city is orientated towards building many roads and streets, more vehicles will be attracted; and on the other hand, if the design of a city is orientated towards building pedestrian areas and bike paths, more pedestrians will be attracted.

- **Bicycle-orientedness**, **flexibility**, and **green spaces** need to be improved in the area under study. Cycling helps to create a lively urban environment where people can meet each other face to face in urban landscapes instead of getting stuck in traffic jams and having to look at each other from inside their cars. Bike paths are central to sustainable urban development and usually result in a highly dynamic environment by increasing public health and reducing greenhouse gases, as well as noise and air pollution. Research findings suggest that children who regularly ride a bicycle are likely to have higher self-confidence and behave more generously. They may be able to more easily overcome their stress, concentrate better, as well as to protect themselves against different diseases. Therefore, designing safe bike paths, which could connect residential areas with schools, and gradually interconnecting these paths will contribute to the promotion of cycling. According to our observations and interviews, a properly designed bike path may increase happiness in the urban space. Some design criteria include: the bike path being combined with other methods of transportation; it being plausible and justifiable for the public; it being safe and secure; and it being as straight as possible, easy to use, accessible and coherent.

- **Physical flexibility** and **social events** can contribute to people's attendance and increase happiness. Research findings show that economic and social flexibility are necessary for happiness in a city (Montgomery 2013). Devising plans for responsible organisations to hold ritual ceremonies, art exhibitions and competitions for various age groups, and distribution of brochures that inform people about the social events may improve flexibility and happiness among citizens.

- **Green spaces** positively influence happiness and welfare since people's mental health is improved by reducing stress and their physical health is improved by physical activities. Therefore, social interaction and solidarity is likely to increase. A happy city is a green, zero-carbon city that provides a protective atmosphere from pollution. If the network of green spaces and pedestrians is improved by growing trees in the main axes of spatial organisation, the happiness in the city is also likely to increase.

- After pedestrian-orientedness, the next important physical stimulus is **environmental elements**. The most important environmental

elements in the order of significance are: restaurants and cafés, appropriate benches for sitting and talking, illumination, works of art, fountains, and access to lavatories. (Figure 8)

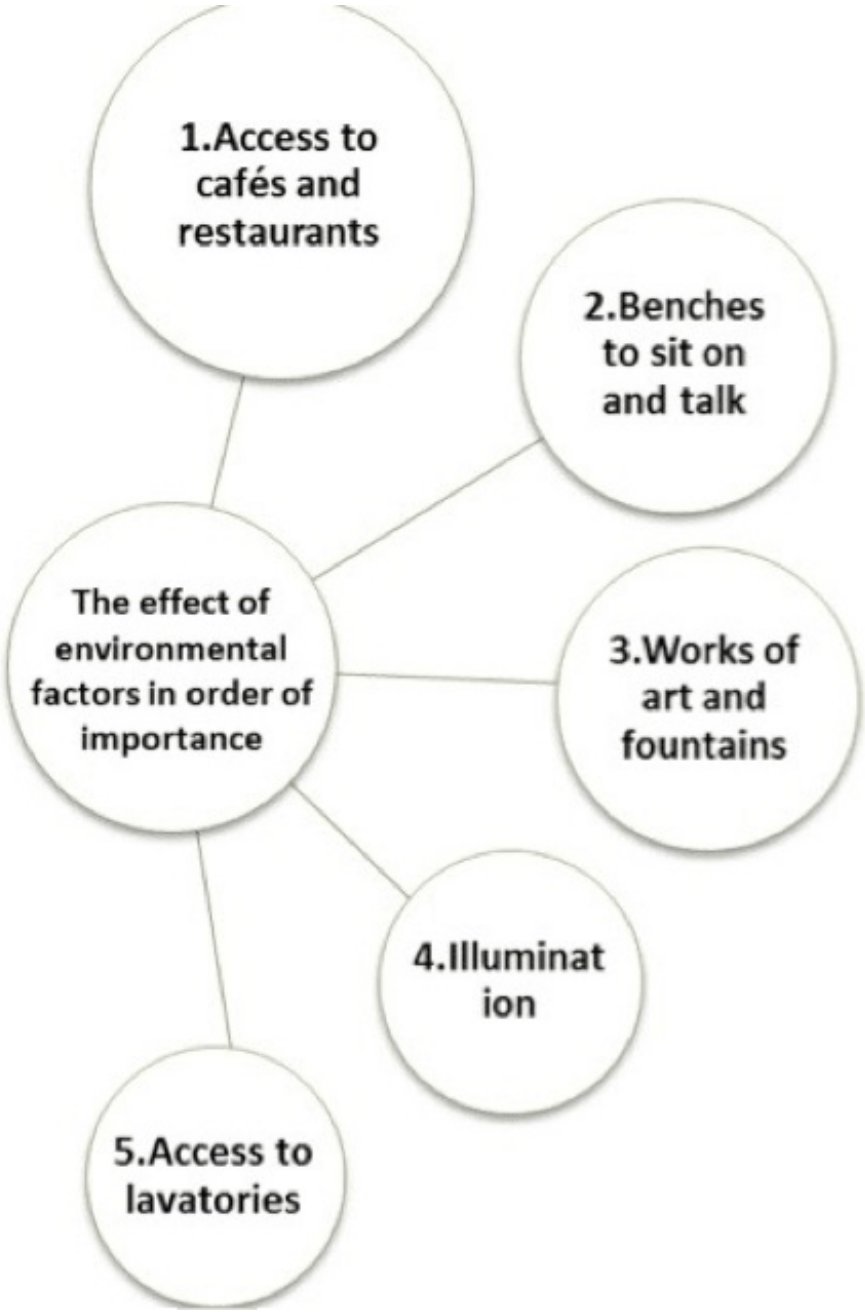


Fig 8: The impact of environmental factors on happiness in order of importance

- Evaluating the correlation between physical stimuli shows that almost all of them are significantly related to each other. Increase in pedestrian-orientedness in the historical part of Tehran has led to improvement in spatial cohesion, variety, legibility, flexibility, penetrability, environmental elements, and vegetation. These factors together contribute to the improvement of urban environment and the mental health of citizens.

- With regard to citizens' satisfaction with the indicators of the conceptual model, the findings suggest that place identity, pedestrian-orientedness, penetrability, and cohesion are indicators from which the subjects took greatest satisfaction.

- The subjects of the study stated that bicycle-orientedness, environmental elements, and appropriate vegetation were the least satisfying factors. Therefore, urban planners and policy-makers should urgently address and improve these factors if they want to increase happiness and improve citizens' mental health.

Discussion

These results describe how physical stimuli influence happiness in an urban environment and identify opportunities for improving the quality of pedestrian areas in Tehran in order to promote happiness. Pedestrian-orientedness, environmental elements, and spatial cohesion seem to be the most important physical stimuli that contribute to promotion of happiness in the pedestrian area of central Tehran. These findings seem, on the one hand, to provide the necessary framework for a scientific study of happiness in the urban environment and, on the other hand, to pave the way for future actions regarding the improvement of physical indexes of happiness in cities.

Most mental health experts recognise happiness as a fundamental aspect of mental health in a society. In the past decade, the question of happiness has been widely discussed by urban experts, whilst cities like Copenhagen and Bogota have been using their experiences to produce the literature in this field. It is clear that the physical environment of the city affects happiness and, thus, the level of happiness in urban environments is partly a manifestation of physical stimuli. The review of literature and the study of the experiences of Copenhagen, Bogota, and Bhutan, along with the results from this study, could indicate that the notion of the'happy city' is based on the development, organisation, and recreation opportunities in urban spaces as well as special plans for urban management. This is corroborated by the fact that Montgomery's "happy city" philosophy seems to have been essentially developed

as a result of his visit to Bogota and close inspection of Enrique Peñalosa's plans and actions for improving urban spaces (Montgomery 2013). The macro-level effects of national structures, however, should not be neglected. A comparison between our findings and other findings would be indicative of shared strategies and physical stimuli for increasing happiness such as appropriate vegetation and green spaces, pedestrian-orientedness, and variety in urban spaces.

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