

Social sustainability of residential squares: Evidence from Narmak neighborhood, Tehran

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ABSTRACT

Local squares function as open spaces where people can conduct many activities and where many social events take place. While squares in Iran have had a historical role in urban life, in recent years they have lost their place as social nodes of neighborhoods. They are losing their sustainability due to diminishing social roles in residential neighborhoods. The primary aim of this research was to investigate social sustainability dimensions in the squares of Narmak neighborhood located in the east of the metropolitan city of Tehran. The research method was descriptive, and 140 questions in seven dimensions were asked from 378 respondents aged 12+, who were selected randomly in 2018. The results showed that social sustainability variables differ in all five types of squares, particularly in terms of sense of place. However, equality was ranked on average as low in all types of squares. This study concluded that social sustainability in residential squares is very sensitive to a rapid urbanization process that has imposed mass apartment blocks, traffic flow, and lack of place identity. As a result, the process has led to social unsafety, low urban security, and weak maintenance of squares, particularly larger squares, as well as the transformation of their role as residential squares to mostly traffic squares and parking spaces. Additionally, this study concluded that small squares are socially more sustainable than larger ones because respondents felt that small squares were safer, more secure, and full of a sense of place. Urban policy-makers can use the results of the present study to evaluate the effects of their executive strategies on urban livability, social sustainability, and the satisfaction of residents.

1. Introduction

Public squares in the Iranian cities, which date back to pre-Islamic times, are enormous squares positioned near the city gates or in the city center (Sharifi & Murayama, 2013). Historically speaking, in many places, a big plaza serves as the main market's entrance and is connected to the mosque (Pazhuhan, 2021). Public spaces offer areas for rest and greenery, both of which are essential to human health (Wolch et al.,

2014).

According to Sharifi et al. (2021), public squares may also serve as gathering places for major political, religious, or social events. In this context, Oldenburg (1997) coined the phrase "third spaces" which serves as a public counterbalance to the rising commercialization of family life. Third places are just informal public meeting spaces. The term "third places" comes from the idea that people's houses and their workplace are their "first" and "second" places in life, respectively. In

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contrast to the relative instability of the bipod, “third places” denote the stability of the tripod.

At the same time, public squares left behind new urban needs as the new phase of unbridled urban growth occurred due to dramatic urban population growth (Estoque et al., 2021). On the other hand, social sustainability, as one of the important pillars of sustainable development (Larimian & Sadeghi, 2019), has been investigated by many scholars as an aspect of sustainable development which deserves more attention, particularly in terms of urban public spaces such as public squares (Javadi, 2016; Mehan, 2016a, 2016b; Mehan & Soflaei, 2017). Moreover, public squares are one of the main pillars in social life and have impacts on the quality of city public space (Javadi, 2016; Mehan, 2016b). Although social sustainability has generally been vaguely defined, the role of public squares in forming and sustaining social sustainability is undeniable (Lamond & Everett, 2019; Faye & Le Fur, 2012; Lenzholzer, 2012; Zakariya et al., 2014; Harun et al., 2014; Mehan, 2016a; Mehan, 2016b). As Mehan (2016a) concluded through the lens of social sustainability, public squares are one of the major sources in social life, thus influencing the social aspect of sustainability in city spaces and improving the level of social cohesion of citizens (Mehan, 2016a). Nevertheless, the role of the local squares in the social sustainability of neighborhoods has been overlooked in the literature. As San Juan et al. (2017) asserted “even when the urban spaces are studied, attention is focused on the open and green spaces within the city” (e.g., urban parks, forests, and even public squares).

In the Iranian cities, local squares have always been the focal point of neighborhoods and have maintained their centrality not only as the physical heart of neighborhoods, but also in the social life of inhabitants (Ali & Kaur, 2021; Sandström & Elander, 2021). Nonetheless, under the unfettered processes of urbanization due to huge demands for living in Tehran, countless local squares have lost their physical and social roles in the old neighborhoods of the city (Azad & Partovi, 2013).

The Narmak neighborhood in Tehran, which was established fifty years ago, is one of the earliest residential developments in Tehran's eastern region and was planned ahead of time. The increased demographic and building densities have somewhat affected all the desirable aspects of this neighborhood, including safety and security, facilities, livability, and physical comfort for the users (Pakzad et al., 2019). This process has had the most adverse effects on the role and function of these squares such that demographic and building densities exceeded the carrying capacity of the neighborhood (Pakzad et al., 2019; Pazhuhan, 2021; Azizi, 2006). Simultaneously, reviewing current studies in social sustainability of public spaces, particularly in ancient cities of the Middle East, reveals that previous research has put more emphasis on macro-scale factors such as urban wide issues (e.g., Mehan and Soflaei (2017) in the field of overall satisfaction, Kyttä et al. (2016), Pazhuhan et al. (2020), and Mehan and Soflaei (2017) in terms of urban quality of life in urban spaces, and Dempsey et al. (2011), Guthey et al. (2014), Chapin and Knapp (2015), and Tan et al. (2018) in terms of sense of place and sense of community). Furthermore, a few studies have focused on medium-scale factors like neighborhood in cities (e.g., Harris (2020), Moulay and Ujang (2017), and Yoo and Lee (2016)). As a result, there is a dearth of authoritative studies on the social sustainability of local squares in the existing literature, necessitating additional study (Mehan & Soflaei, 2017).

In order to fill this gap in the literature and advance our understanding of the socially sustainable qualities of the local squares in traditional urban spaces of Tehran, this study makes a contribution by developing and empirically investigating the social sustainability of micro-scale urban spaces and local squares from the perspective of the residents of the Narmak neighborhood. In doing so, this study aims to assess social sustainability variables through a questionnaire-based survey in the Narmak neighborhood. By detecting differences in terms of social sustainability variables in various squares sizes, this study presents how inhabitants evaluate the variables based on their own life experiences. This study follows attempts to answer two main questions:

Firstly, to what extent are various types of squares in Narmak socially sustainable? Secondly, is there any relationship between the size of the squares and their social sustainability?

2. Theoretical background

Due to its prominent role in the establishment of the UN SDGs (11 out of 17 objectives are connected to social sustainability), social sustainability has received notable recognition as a fundamental component of sustainability in recent years (Afshari et al., 2022; Schroeder et al., 2019). However, a concise review of related literature shows that the definitions of social sustainability are quite complex (Du & Zhang, 2020; Mehan & Soflaei, 2017). Larimian and Sadeghi (2019) claimed that “social sustainability has always been the least defined and the vaguest pillar since the introduction of the three-pillar sustainable development rhetoric in the 1980s.”

Kandachar (2015) links this conceptual ambiguity to distinct and more severe obstacles in defining and operationalizing social sustainability since there is no universally acknowledged scientific foundation for analysis and measurement, unlike the capacity to argue population ecology or acceptable concentrations of green-house gases with the environment component of sustainability, nor is there a standard unit of measure such as monetary units with the economic dimension of sustainability. According to Boström (2012), the idea of social sustainability is separated into two categories: substantive elements (i.e., what aims to attain) and procedural aspects (i.e., how to achieve). The goals of social sustainability include meeting fundamental requirements such as food, shelter, as well as employment, security, health issues, and quality of life. Proactive stakeholder communication, empowerment, participation in issue conceptualization, social monitoring of policy, and accountable governance are procedures to achieve those aims (Boström, 2012).

Even more difficult to define than the idea of social sustainability is its indications. Social sustainability indicators have not previously received much attention in the literature, according to Afshari et al. (2022), and they still need to be studied more thoroughly in order to be used in the design and implementation of sustainability programs. Additionally, there is no consensus on how to define social sustainability indicators, how to evaluate them, or what data are needed to quantify them (Afshari et al., 2022; Popovic et al., 2017).

According to Mehan (2016a), “the chronological analysis reveals how conventional themes, such as equity, reducing poverty, and livelihood, have been increasingly supplemented or replaced by more ethereal and immeasurable concepts, such as identity, the sense of place, society, stability, and security” (Mehan, 2016b). Due to the multidisciplinary nature of social sustainability, there are also several (sometimes competing) interpretations of the notion that include a wide variety of practical, political, and philosophical challenges (Kyttä et al., 2016). In recent years, analyzing urban and social sustainability at the neighborhood level has increased significantly (Lamond & Everett, 2019). While previous research has focused mostly on the macro levels (i.e., region and city) (e.g., Harun et al. (2014), San Juan et al. (2017), and Mehan and Soflaei (2017)), recent studies have chiefly concentrated on the micro levels (i.e., community and neighborhood) (e.g., Javadi (2016), Larimian and Sadeghi (2019), Shrivastava and Singh (2019), Dempsey et al. (2012), and Dempsey et al. (2011)). According to Javadi (2016), among other micro urban spaces, squares have had a vital role throughout the history of urban life since they have served an outstanding role in the socio-economic life of inhabitants. What makes squares the center of city events and social nodes are their openness and robustness (Zakariya et al., 2014). According to Faye and Le Fur (2012), “public squares are becoming the targets of regeneration programs in many cities because of their key role in city structure and social life.” Nevertheless, public squares, as interactive places and behavioral settings, have now shifted to places in the urban environment for citizens. As Naz and Ashraf (2016) concluded, “since the invention of the

motorized traffic, squares have kept turning into vehicular crossings for facilitating safe and effective movement.” Therefore, because of vast urbanization processes in many modern cities, the public squares cannot endure the burden of the increasing social demands and expectations and are not able to enhance social life effectively (Mehan, 2016b).

Meanwhile, at the neighborhood scale, local squares play a crucial role in enhancing inhabitants’ social life and are, as a result, an important fixture of community life (Mehan, 2016a). What is more, as Goosen and Cilliers argue “regarding changing nature of social needs, as new generations emerge, open public spaces, particularly local squares, are fighting against other land consumptions to settle the mounting urban pressures” (Goosen & Cilliers, 2020). Accordingly, social sustainability is going to be a vital criterion within the urban context, searching for equilibrium between socio-economic developments, environmental problems, and the needs and locational preferences of modern societies (Palacky et al., 2015, pp. 13–16). Fig. 1 shows the conceptual framework of the current study which is followed as a basis to develop the main approach used.

2.1. Measuring social sustainability

Reviewing the social sustainability literature, it is evident that there is no consensus on definitions of its indicators. Thus explained, various researchers have adopted different frameworks to assess social sustainability based on contextual circumstances. However, according to the existing literature, some indicators to assess local squares’ social sustainability can be identifiable. We justified these prevalent indicators via various works of scholars who have deployed them in local and urban squares and then contextualized the indicators to the squares’ circumstances in Narmak. Consequently, seven variables were identified to assess the social sustainability of the study area, including overall satisfaction, physical quality and livability, social interaction, sense of place, equality, flexibility in activities, and safety and security. Each variable was defined via chosen variables, where each variable was linked with a question in the individual questionnaire (Table 1).

Table 1

Social sustainability dimensions for urban public squares.

Variable	Explanation	References
Overall Satisfaction	It evaluates the inhabitants’ overall satisfaction with the quality of their built environment.	Zagroba et al., 2020; Ghahramanpouri et al., 2015; Larimian, 2015; Larimian & Sadeghi, 2019;
Physical Quality and Livability	This variable is connected with the livability of the square. If squares provide physical, visual, and mental comfort for their users, then they are livable.	Choguill, 2008; Javadi, 2016; Marinkovic et al., 2012
Social Interaction	This variable is described as the adhesive that leads to prosperity of the society.	Larimian & Sadeghi, 2019; Pierson, 2016; Choguill, 2008; Dempsey et al., 2011; Colantonio, 2009; Shirazi & Keivani, 2019
Sense of Place	This variable describes our relationship with places, expressed in different aspects of human life.	Carmona, 2010; Larimian & Sadeghi, 2019; Shirazi & Keivani, 2019; Marinkovic et al., 2012
Equality	From equality perspective, urban squares must be designed inclusively so that they consider all people from different age groups and various demands.	Larimian & Sadeghi, 2019; Javadi, 2016; Dempsey et al., 2011; Colantonio & Dixon, 2011; Shirazi & Keivani, 2019
Flexibility in Activities	This variable examines the variety of activities and abilities of urban squares to engage inhabitants in different pastimes.	Javadi, 2016; Carmona, 2010; Marinkovic et al., 2012
Safety and Security	The vital precondition for all urban activities and dwellers’ presence in the neighborhood is security and safety.	Eizenberg & Jabareen, 2017; Javadi, 2016; Colantonio & Dixon, 2011;

3. Materials and methods

3.1. Study area

One of the first planned residential constructions in the eastern

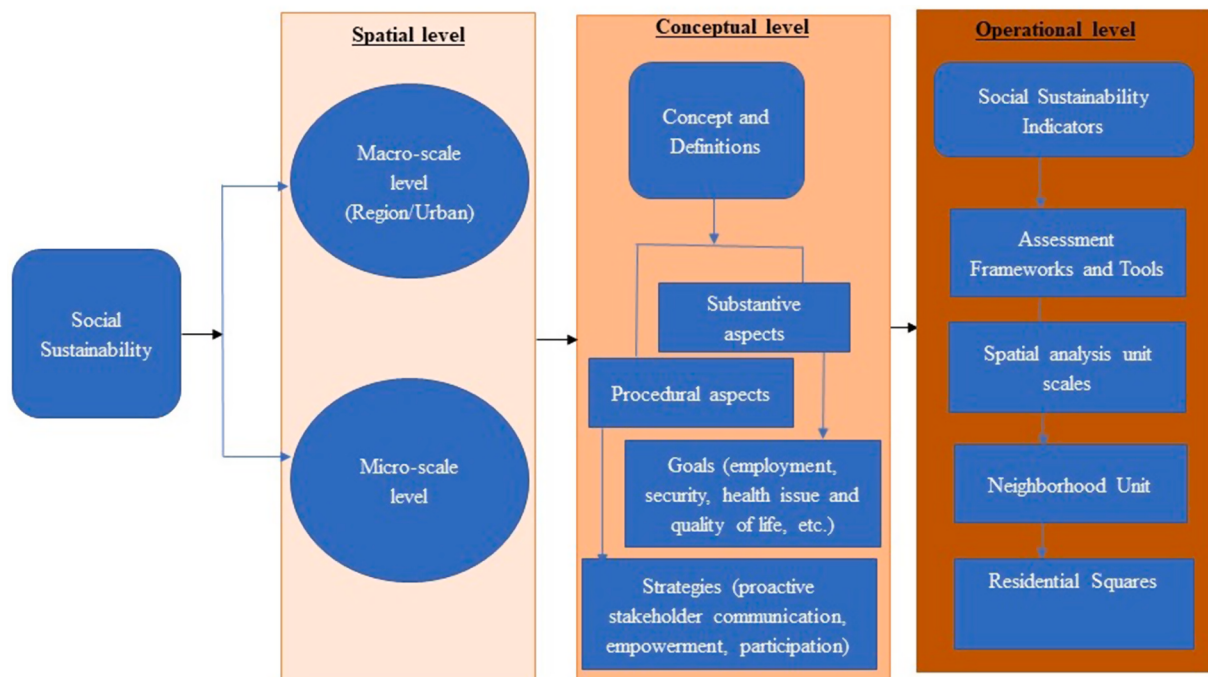


Fig. 1. Conceptual framework of the study.

section of Tehran is the Narmak neighborhood which was created fifty years ago. According to the original design, Narmak is made up of 108 tiny squares that are shared by neighboring homes as “semi-public areas” and are arranged in a grid street arrangement with small blocks (Fig. 2) (Pazhuhan, 2021). Pakzad et al. (2019) assert that this specific layout has turned Narmak into a sustainable neighborhood in terms of livability, accessibility, and safety from crime and traffic in Tehran’s car-oriented metropolis. These characteristics make Narmak a suitable subject for this research since the city’s primarily orthogonal grid street plan makes distance for different routes connecting an origin and a destination nearly invariable (Pakzad et al., 2019). 78% of Narmak’s population have lived there for more than 10 years, according to the Iran Statistical Centre (2017), and as a result, they are adequately familiar with the area. Narmak is one of the historical neighborhoods of Tehran. The construction of the core of Narmak, which is one of the first experiences of Iranian modern urbanism, began in 1959 and ended in 1966. The main and the largest square is the Nabovat square (Haft-Hoz) which plays the central role in the neighborhood. All squares have local roles based on the idea of neighborhood units, with each surrounded by blind alleys offering a quiet, green, vital, and calm place for life.

3.2. Data collection and analysis

Measuring social sustainability using field surveys is a prevalent method to gather data on people’s evaluation of their living environments in urban contexts (Larimian & Sadeghi, 2019). More specifically, social sustainability was evaluated by asking the respondents to weigh different dimensions (i.e., variables) of their daily life categorized into particular domains. Responses measured their own satisfaction in every single social sustainability dimension using a Likert scale (Pazhuhan et al., 2020). “An individual Likert item is a special instance of a fully anchored rating scale in which the anchors reflect different levels of agreement or disagreement on a given dimension,” writes Harpe (Harpe, 2015). The scale was divided into five score components in the current investigation, ranging from 1 (total dissent) to 5. (Total consent). In-person interviews were conducted in 2018, when Narmak’s population was 27,000 people. Using the Cochran sample approach, 378 neighborhood inhabitants aged 12 and above (51.2% females and 48.8% males) were chosen for an interview. The response rate was 96% (363 answer sheets were prepared for analyzing, and 15 answer sheets were rejected due to irrelevant or incomplete answers). The age group between 25 and 55 years was the most prevalent (70%) in the sample, followed by age classes of 56–70 years (25%), 12–18 years (4%), and 70+ years (1%). The interview consisted of a broad range of questions matching up with the 140 questionnaires, reported in Table 1 categorized in seven aspects. Every single questionnaire element was assessed before the final delivery. The randomly selected respondents were selected to be asked 30 questions in order to test the reliability of the questionnaire. Critical questions were identified, and the irrelevant ones were corrected or removed, thereby increasing the reliability and validity of the questionnaire.

Spreadsheets were used for analyzing data gathered via questionnaires. The reliability of each question was assessed using the Cronbach’s alpha scores, and the level of each question’s reliability was fixed to alpha >0.8. Then, the graphic charts were drawn so as to visually present and analyze the result. Each of the seven aspects of social sustainability of the squares was compared both with its own variables and with other aspects for five types of squares.

To quantify and measure the inhabitants’ opinions on social sustainability dimensions and indicator, we used descriptive statistics to compute all Likert scores given by the respondents to various questions. The descriptive statistical analysis is a prevalent and popular approach in social studies used for various social sustainability assessments by many scholars (e.g., Dey et al., 2018; Montalbán-Domingo et al., 2019). Using this approach, we took three steps to quantify the questionnaires’ results as follows;

- First, we multiplied all Likert scores given to each question by the number of people who gave those scores. For instance, 113 (respondents) *5(score)+100*4 + 61*3 + 59*2 + 30*1 = 1296 (total score of the question).
- Then, we multiplied each question score by 100 and then divided it by the total number of respondents (1296) to calculate its response distribution percentage.
- Finally, we repeated the same formula for all questions in seven dimensions based on five categories of the Likert scale (Annex 1).

4. Results

4.1. Squares’ classification

Given the size and number of the squares (108) and the differences between the squares, first, we classified them into five groups of very small, small, medium, large, and very large. This classification is based on the method of the municipal services to the squares, as the municipality’s Department of Environment and Urban Services gives them various services based on their five types of size. Table 2 shows this division and the number of squares in each category.

4.2. Assessing social sustainability of the squares

Table 3 shows the results of response distribution (%) of the assessment variables (seven domains) in one type of the squares¹ (very small squares). Each domain consists of a number of questions by which the respondents evaluated the variable.

4.3. Overall satisfaction

Overall satisfaction, according to Ghahramanpouri et al. (2015), is concentrated on the gap between residents’ desired and actual quality of their urban settings. Overall satisfaction may be synonymous with subjective well-being, quality of life, a pleasant life, and life satisfaction (e.g., Larimian (2015) and Sedaghatnia et al. (2013)).

More than 89% of the respondents mentioned that they have a good feeling of living near very small squares. Furthermore, the majority of them (90.9%) showed high satisfaction with the overall function of the squares, while only 2.4% were dissatisfied. In the fields of maintenance of open and green spaces and quality of urban furniture, the respondents showed high satisfaction (85% and 82.7%, respectively). Only 1.7% and 3.2% of the respondents had a very low satisfaction of maintenance and quality of urban furniture and proper lighting, respectively. As regards the small squares, 15.4% of the respondents expressed neutral feelings about being a neighbor of small squares. By contrast, 69.4% declared high satisfaction with living near squares. Although 17.3% of the respondents were neutral and 17.2% ranked the overall function of the squares as low and very low, 65.5% ranked it as very high and high. A total of 79.2% of the respondents were satisfied with the quality of urban furniture and proper lighting.

A total of 65.5% of the respondents articulated that they are highly satisfied with the overall function of the medium squares, and 62.4% stated that they feel good about living close to the squares. However, 15.4% and 15.5%, respectively, were neutral to the maintenance and the quality of urban furniture and proper lighting of the squares. 73.2% of the respondents were highly satisfied with the quality of urban furniture, and 68% were highly satisfied with the maintenance of open and green spaces.

A total of 22% of the respondents articulated a moderate feeling about living near large squares, and 60.2% declared high satisfaction

¹ Due to the large number of tables, we have brought just one type (very small) of squares results in this section, and the other four types have been mentioned in a table in the annex 1.



Fig. 2. The location of the Narmak neighborhood and squares in Tehran in the district 8 and 4 of Tehran municipality.

Table 2

Categories of squares.

Categorizing squares from the physical point of view	Squares number
1000 m > very small squares	1-2-3-6-13-14-24-15-25-28-29-30-34-35-37-38-39-50-52-61-63-64-65-66-67-75-83-91-96-97-98-t1-t2-t8-Ettihad-Endollah-Golestan-Ebadi-Mosavi
2000 m > small squares > 1000 m	4-5-12-19-26-27-31-33-36-40-41-42-47-49-56-58-59-60-62-66-68-70-71-72-74-76-77-78-79-80-81-82-84-87-88-89-93-94-95
3000 m > medium squares > 2000 m	10-18-20-22-23-32-43-44-45-46-51-53-54-55-85-86-90
5000 m > large squares > 3000 m	7-8-9-11-21-48-57-69-92
very large squares > 5000 m	16-17-73-100

with being in proximity of squares. However, approximately one-fifth (17.7%) showed low and very low feelings. Furthermore, while 29.5% of the respondents were neutral to the maintenance of open and green spaces, 10% rated it as low. In terms of quality of urban furniture and proper lighting, tremendous satisfaction (73.2%) can be seen (Annex 1). Nevertheless, 15.5% remained neutral on this variable.

As regards the very large squares, only 37% of the respondents stated that they are satisfied with this type of squares, and 10.7% were neutral. The same pattern applies to the neighborliness and maintenance of open and green spaces in a way that only 40.2% and 38.9%, respectively, declared high satisfaction. On the contrary, nearly 49.1% expressed low and very low satisfaction with living next to squares (Annex 1).

4.4. Physical quality and livability

According to Table 3, 82.6% of the respondents stated that extremely small squares may be used to promote mental and bodily relaxation, while 7.2% were ambivalent. 65.5% were completely happy with the form and shape of these squares, while 29.5% evaluated it as poor or extremely low. In the field of physical quality, a considerable number of the respondents (47.3%) rated it low and very low, while 2% were neutral.

As for the small squares, 78.8% of the respondents thought that squares are useable, and 8% were neutral. However, slightly less than half of respondents (48.5%) were satisfied with the quality and location of furniture, and 43.5% rated this variable as low and very low. 73.5% were satisfied with the form and shape of the squares, while more than one fifth (21.5%) were dissatisfied with it. The physical quality of the squares gained 65.2% of the respondents' attention, while 28.6% of them rated this variable as low and very low.

According to the survey results, 26.6% of the respondents' derived dissatisfaction from the usability of the squares, and 68.4% were highly satisfied. However, the overwhelming majority of them (82.9%) were in favor of the form and shape of the squares. More than half (55.3%) were satisfied with quality and location of furniture, with near one-tenth (9.4%) being neutral. A total of 26.6% of the respondents had low and

very low satisfaction with the usability of the medium squares, and 68.4% proved highly satisfied with it. Furthermore, the satisfaction with the form and shape of the squares was considerably high (82.9%). However, 13% rated the form and shape of the squares as low and very low. Nearly one-fourth of the respondents (74.7%) proved satisfied with physical quality of the squares, whereas 20.8% of them were dissatisfied. In terms of quality and location of furniture, nearly one-third of the respondents (73%) showed high satisfaction, while 8% were neutral. A total of 15% of the respondents displayed a neutral judgment of the form and shape of the square. A total of 26.1% were totally dissatisfied, and 8.5% were moderately dissatisfied with the usability of the squares. An overwhelming majority of the respondents (93.7%) were satisfied with the physical quality of the large squares. 80.7% agreed with the quality and location of furniture in very large squares, while 12.3% were dissatisfied (Annex 1).

4.5. Social interaction

Social interaction plays a critical role in holding society together (Horayangkura, 2012) and acts as a "social support system" (Pierson, 2016). A total of 94.2% of the respondents showed strong agreement with the appropriateness of the squares for social interaction, and only 1.4% were dissatisfied with very small squares. Additionally, a vast majority of the respondents (84.2%) stated that they often see and chat with their neighbors. As regards physical facilities, 3.2% were impartial, and 93.3% were highly satisfied with the facilities for social life (Table 3).

More than 94.8% of the respondents expressed that small squares are suitable for social life, and 92.9% mentioned chatting with their own neighbors on a daily basis. Furthermore, 83.5% expressed their high satisfaction with the physical facilities of squares for socio-cultural ceremonies. Slightly more than one-tenth of the respondents (10.6%) were disinterested in the suitability of the medium squares, and still a majority of them (82%) were satisfied. At the same time, 7.8% expressed their deep dissatisfaction with the facilities of the squares for socio-cultural ceremonies, while 7.2% were neutral. Nevertheless, 85% were highly satisfied with the facilities. A total of 12.5% of the respondents were neutral to the suitability of large squares for social interaction, and 8% expressed their strong disagreement. However, 79.8% were highly satisfied with this feature. As for the very large squares, nearly one-third of the respondents (31.6%) proved highly dissatisfied with the suitability of the squares for social interaction, and 18.1% were disinterested. Less than half of the respondents (48.3%) were satisfied with the physical facilities of this type of squares, 15.2% were unbiased, and more than one-third (36.5%) stated their complete dissatisfaction with the facilities (Annex 1).

4.6. Sense of place

According to Javadi, "sense of place is characterized as an amalgam of shared emotional relationships via a sense of membership and place attachment, as well as sentiments of having a right to belong" (Javadi,

Table 3

Response distribution (%) of assessment variables in very small squares (Likert scale from 1 (total dissent) to 5 (total consent)).

Overall Satisfaction (OS)					
Question	5	4	3	2	1
OS1. Does presence of the squares by your home make you feel better?	60.8	27.2	8.3	2.5	1.2
OS2. Are you satisfied with the overall function of the squares in the neighborhood?	65.2	25.7	6.7	1.8	0.6
OS3. Are you satisfied with the maintenance of open and green spaces in the squares?	62.7	22.3	10.5	2.8	1.7
OS4. Are you satisfied with the quality of urban furniture and proper lighting in the squares?	58.5	24.2	7.1	7	3.2
Physical Quality and Livability (PQ)					
PQ1. How much are these squares useable and provide mental and physical comfort for you?	73.2	9.4	7.2	7	3.2
PQ2. How much are you satisfied with the form and shape of the square?	55	10.5	5	20	9.5
PQ3. Are you satisfied with the physical quality of the squares (material, facilities, etc.)?	45.2	5.5	2	33	14.3
PQ4. Are you satisfied with the quality and location of furniture (trash bins, signage, etc.)?	30.4	7.5	6	35	21.1
Social Interaction (SI)					
SI1. Do you think that the squares provide suitable atmosphere for social interaction (seeing and chatting with neighbors, making friends, etc.)?	80.2	14	4.4	1.2	0.2
SI2. Do you often run into your neighbors in the squares and greet each other on a daily basis?	85	9.2	3.1	1.5	1.2
SI3. Are you satisfied with the facilities these squares provide for socio-cultural ceremonies (urban furniture, green and open spaces, and canopies)?	86.1	7.2	3.2	2.5	1
Sense of Place (SP)					
SP1. How strong is your sense of belonging to the squares?	80.1	12.1	4.3	2.1	1.4
SP2. Do you often spend your spare time in the squares?	85	10	3.2	1.4	0.4
SP3. Are you proud of having these squares?	83.5	10	4.2	1.2	1.1
SP4. Do you want to live at your current neighborhood for a long time?	90	8.3	0.9	0.5	0.3
SP5. Do you think that you participate in the square revitalization process if it is needed?	88.7	8.2	1.1	1.5	0.5
Equality(E)					
E1. Do you feel that these squares are designed for you and your other family members (your children, parents, siblings, and people with disabilities)?	50.4	15.8	13.5	12.3	8
E2. Are you satisfied with the facilities of the squares (sport, leisure, etc.)?	52	11.3	15.8	14.4	6.5
E3. Do you think that there are various facilities for all kinds of people in these squares?	48	8.2	12.3	20	11.5
E4. Are you satisfied with the convenience of using pedestrian paths in the squares?	53	15	5.5	16	10.5
E5. To what extent are you satisfied with the availability of playgrounds for children and their recreation amenities in these squares?	71.4	14.7	6.6	5.3	2
Flexibility in Activities (FA)					
FA1. Do you participate in common socio-cultural activities in these squares?	84.5	10.6	3.2	1.4	0.3
FA2. Do you think that these squares have enough facilities for holding various socio-cultural activities?	35.5	4.1	9.4	22	29
FA3. Do you think that being involved in various activities in these squares is important?	85.6	9.2	2.8	1.5	0.9

Table 3 (continued)

Overall Satisfaction (OS)					
Question	5	4	3	2	1
FA4. How prepared are these squares for holding different social, cultural, environmental, and leisure time activities?	26	16	8.4	33.4	16.2
Safety and Security (SS)					
SS1. Are women/children safe going out in these squares during the night?	85.5	10.1	3.8	0.5	0.1
SS2. Do you feel safe and comfortable being in these squares?	87.6	7.8	3	1.2	0.4
SS3. Do you think that facilities in these squares are secure to use (playgrounds, sport means, etc.)?	42.1	5.4	15	24.5	13

2016). As can be seen in Table 3, a total of 95% of the respondents asserted that they spend their spare time in very small squares. The same tendency applies to the proudness of having such squares near home such that 93.5% were proud of it. 95% showed their deep sense of belonging to squares. Ironically, an overwhelming majority of the respondents (98.3%) articulated that they would continue to live in the current neighborhood for a long time, and 96.9% were ready to engage in a revitalization process.

A total of 84.6% of the respondents had a strong feeling of place attachment to small squares, while 10.1% were disinterested. As regards the motivation for living in the current place, 14.6% were neutral, and 1.4% were deeply keen on moving out. However, 83% demonstrated a strong preference for staying for a long time. Three-quarters (75.4%) stated their strong willingness to participate in revitalization plans, and 12% were indifferent. In the medium squares, even though 13.8% did not have a strong sense of belonging to the squares, 79% did. A total of 69.5% of the respondents rated tendency of living by the squares for a long time as completely agree, and 11.2% did not seem to care. Based on the empirical findings, around one-third of the respondents (33.9%) had no sense of belonging to large squares, with 9% of them being disinterested. However, 57.1% described a strong feeling of place attachment. Surprisingly, only one-fourth (25%) of the respondents were proud of the squares, and while 14.3% were disinterested, 60.7% did not have any sense of pride. A total of 74.3% of the respondents were neutral to the sense of belonging to very large squares, and near one-fourth (24.5%) had no sense. As regards the motivation for living for a long time, more than half of the respondents (55%) did not care, and just 16.4% wanted to live for a long time in the neighborhood. Surprisingly, only 15.5% asserted that they would participate in a revitalization process of the squares, and 37.7% were not interested at all (Annex 1).

4.7. Equality

Equality, as a variable showing the level of social coherency, draws attentions to the positive advantages of urban squares (Erem & Gür Şener, 2008; Harun et al., 2014). As regards very small squares, more than half of the respondents (66.2%) showed strong feelings of inclusive design of the squares, whereas 13.5% were neutral, and 20.3% deemed these squares undesirable for all people in terms of design quality. Although around one-fifth of the respondents (20.9%) were not satisfied with the facilities of the square, 63.3% were fully satisfied with them (Table 3).

A total of 66.4% of the respondents showed strong feelings of inclusivity of small squares, and 23.4% had a clear perception of poor design. 58.7% and 27% of the respondents rated the facilities of the squares as fully satisfied and satisfied, respectively. However, fewer than half of the sample (48%) believed that there are a diverse range of amenities for individuals from all walks of life. More than one-third of the respondents (34.3%) were dissatisfied with the state of pedestrian routes. At the same time, the vast majority of the responders (90.2%)

were pleased with the availability of playgrounds and leisure facilities for children. According to our study's empirical findings, 10.8% of the respondents had a neutral opinion of the squares' inclusion. A total of 58.5% of the respondents were totally satisfied, and 30.7% were fully dissatisfied with the design quality of the squares for all. The respondents also rated various facilities for all kinds of people as very high and high (60.5%). More than 7% of the respondents felt dissatisfied with the quality of the facilities. At the same time, 84.4% of the respondents declared high satisfaction with the facilities. As regards the availability of playgrounds for children, the vast majority of the respondents (85.5%) showed high agreement, and 6.8% were neutral.

A total of 41% of the respondents declared being dissatisfied with the inclusivity of very large squares. More than 43.7% of the respondents were highly satisfied with the present inclusivity of squares. The vast majority of the respondents (94% and 70.6%, respectively) were highly satisfied with the facilities and various facilities of these squares for all kinds of people. The same pattern goes for the qualities of pedestrian paths, where 83.6% were highly satisfied with the quality. Regarding the availability of playgrounds, 31% of the respondents showed their dissatisfaction, while 7.5% were neutral (Annex 1).

4.8. Flexibility in activities

A total of 95.1% of the respondents proved eager to participate in various common socio-cultural activities, and only 1.7% were not keen on being involved in such activities in very small squares. The efficiency of facilities to hold various socio-cultural activities was another dimension, which 9.4% of the respondents evaluated in a neutral way, and 40% were satisfied with. Approximately half of the respondents (49.6%) expressed disappointment with the preparedness of very small squares for holding different social, cultural, environmental, and leisure activities (Table 3).

As far as the small squares are concerned, 72% of the respondents displayed a marked tendency for participation in common socio-cultural activities, and only 14% were not keen to do so. More than half of the respondents (57%) were dissatisfied with enough facilities for holding various socio-cultural activities. Regarding being involved in various activities, 92.1% of the respondents acknowledged that being involved in various activities in these squares mattered to them. However, only 30% expressed very strong agreement with the preparedness of these squares for holding different ceremonies, and the majority of them (67.3%) disagreed. A considerable number of the respondents in the area of medium squares (75.2%) showed strong feelings about participation in common socio-cultural activities. The same pattern is true for their opinion about having enough facilities for holding various socio-cultural activities (88.5%). As regards the large squares, around half of the respondents (49.2%) paid little and very little attention to participating in common activities, and 10.5% were neutral. Simultaneously, less than half of the respondents thought that the large squares have enough facilities for holding various socio-cultural activities. More than half of the respondents (51%) showed little and very little attention to participating in common activities, while 26.5% were ready to participate, and 22.5% were neutral. The same status is true for being involved in various activities, as this element was not important for 62.1% of the respondents. Surprisingly, only one-fourth (25.8%) thought that very large squares are prepared for holding different ceremonies, and the majority of the respondents (65%) did not see squares well prepared for ceremonies (Annex 1).

4.9. Safety and security

Safety and security are vital preconditions for all the beneficial social activities occurring in a neighborhood (Eizenberg & Jabareen, 2017). According to Table 3, a total of 95.6% of the respondents stated that women and children are safe going out in very small squares during the night, and 3.8% were neutral. Approximately 95.4% declared that they

feel very safe and comfortable in very small squares. Regarding the security of facilities, less than half of the respondents (47.5%) thought that they are safe, and more than one-third (37.5%) expressed their strong objection. Only 7.7% of the respondents expressed dissatisfaction with unsafety of women and children going out in these squares during the night, and 5.2% were indifferent. However, 88.2% believed that women and children are safe in small squares during the night. In the area of squares' facilities, slightly more than half of the respondents (51.5%) thought that these facilities are safe to use.

As regards the safety of women and children, 67.2% of the respondents stated that they are safe. Nonetheless, around one-fourth (25.8%) did not have the same idea, and 7% were disinterested. 71% were satisfied with the security of facilities, and 16.3% were totally dissatisfied. Furthermore, a total of 78% of the respondents stated that the facilities of large squares are highly safe, and 12.9% were extremely dissatisfied. Regarding very large squares, less than half of the respondents (49.4%) deemed these squares as safe places for women and children during the night. On the contrary, nearly half of them (45.4%) declared their strong disagreement. Nevertheless, 75.2% felt safe and comfortable being in these types of squares (Annex 1).

4.10. Summary analysis

The graphical interpretation of the overall satisfaction analysis demonstrates that most of the respondents were highly satisfied with very small squares, as the blue polygon (5 in the Likert scale, corresponding to very high) spreads all over the chart, especially for the OS1, OS2, OS3, and OS4 variables which belong to very small squares. With a considerable distance, the orange color (4 in the Likert scale, corresponding to high) concentrated around the inner circles of the chart. Finally, the smallest share belongs to dark blue (1 in the Likert scale, corresponding to very low) which is located at the inner circle, and SO18 and SO19 (very large squares) were ranked as highly dissatisfied by the respondents. Therefore, overall satisfaction in very small squares is at the highest level (Fig. 3).

In terms of physical quality and livability of the squares, as can be seen in Fig. 4, the blue polygon (5 which means fully agreement) has some fluctuations between 40% and 80%, meaning that most of the respondents rated the physical quality and livability variables as high and very high, respectively. However, in some other variables such as PQ3 (physical quality) and PQ4 (quality and location of furniture), the respondents were deeply dissatisfied, as the blue polygon in this section of chart overlaps with the inner circles. Satisfaction with the form and shape (PQ18) and physical quality of the very large squares (PQ19) were at the highest level. The dark blue polygon in the smallest circle of the

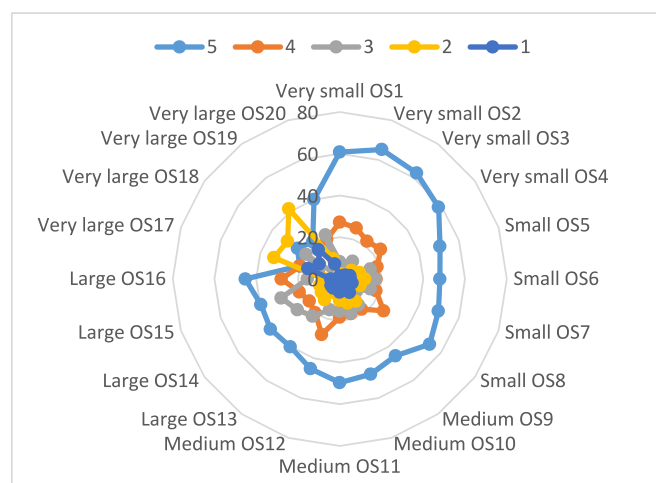


Fig. 3. Graphical interpretation of overall satisfaction with the squares.

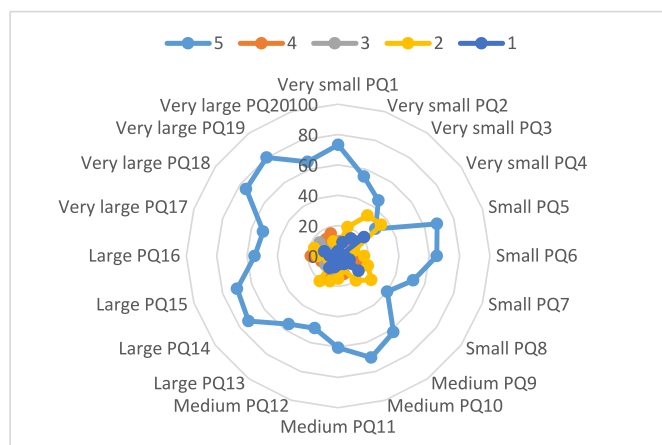


Fig. 4. Graphical interpretation of physical quality and livability of the squares.

chart articulates dissatisfaction in almost all variables of physical quality and livability in all five types of squares (Fig. 4).

As for the social interaction, the blue line (the highest agreement) surrounds most parts of the chart and covers more than 70% of the circle for the variables SI1 to SI9. In other words, the satisfaction rate of the social interaction variables for the first three types of squares is very small, small, and medium, respectively. By contrast, high satisfaction of the respondents with the social interaction variables in the very large squares is under 50% (Fig. 5).

In the field of sense of place, the blue line (highest satisfaction) exceeds 70% for SP1 to SP14 (very small, small, and somehow medium squares). However, it decreases dramatically for the very large squares (SP21 to SP25). Instead, the neutral respondents (i.e., the gray line) are considerable for this type of square, as it exceeds 35% for the variables SP21 to SP25. The dissatisfaction rates (i.e., orange and dark blue lines for SP16 to SP18 and SP22 and SP25) are noticeable, which means that the respondents did not have a sense of belonging to large and very large squares (Fig. 6).

In terms of equality, the highest satisfaction (i.e., the blue line) has an obvious fluctuation throughout the chart between 30% and 70%, which means that it is too volatile to give a specific pattern. Interestingly, E14, E16, and E21 are rated as very low satisfaction by 20% of the respondents (Fig. 7).

As regards the flexibility in activities variables, it can be seen from

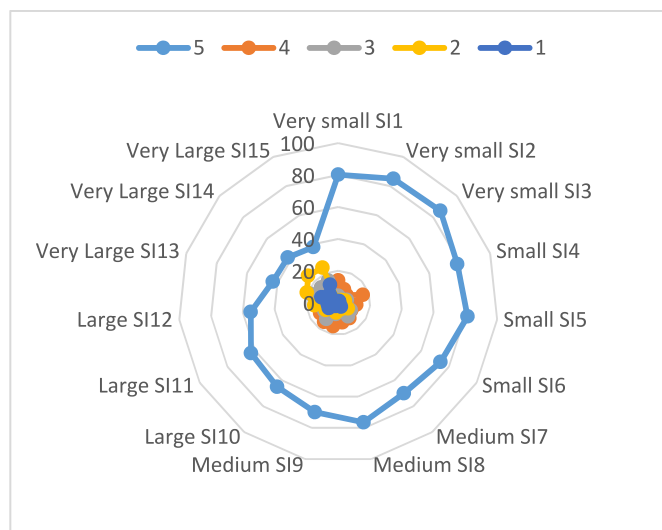


Fig. 5. Graphical interpretation of social interaction in the squares.

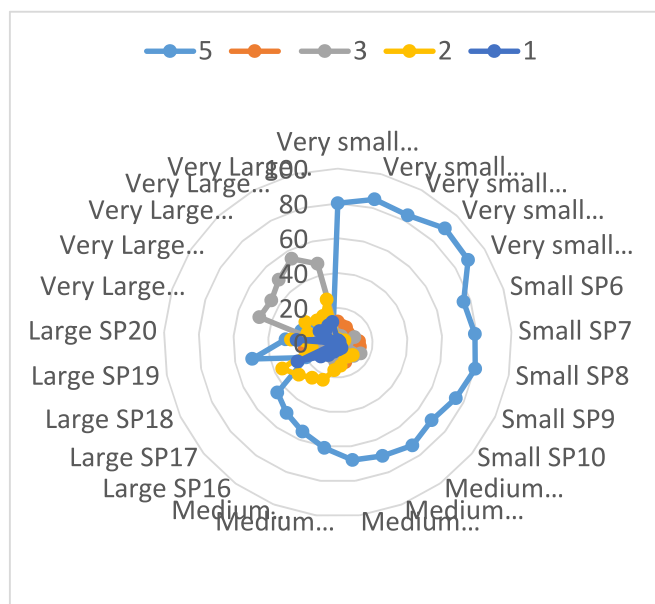


Fig. 6. Graphical interpretation of sense of place in the squares.

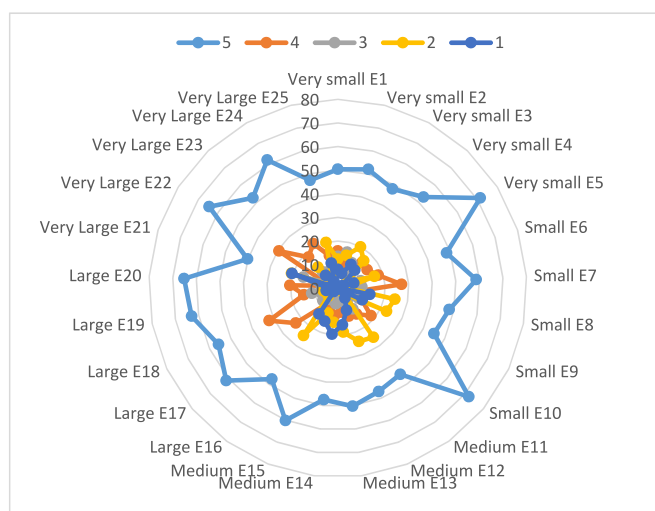


Fig. 7. Graphical interpretation of the equality in the squares.

the chart that the blue line (highest satisfaction) is oscillating between 20% and 80% all around the chart for all types of squares. The distance between all ranks of the Likert scale is very close, indicating that the overall satisfaction with the flexibility in activities is below the average. The overall tendency of all colors, or all ranks, concentrates on the inner circle of the chart (Fig. 8).

The graphical interpretation of the safety and security variables shows that the respondents felt extremely safe and comfortable in very small and very big squares, while they rated the security of facilities as low (blue line). Accordingly, SS3, SS6, security in facilities, SS13, and safety of women and children are ranked as low (Fig. 9).

5. Discussion

From the theoretical point of view, our findings show that there are some gaps in the current literature in terms of the role of local squares in social sustainability since the literature has overlooked the micro scale of these social hotspots in the neighborhoods and has focused on larger ones such as main squares, parks, and plazas instead.

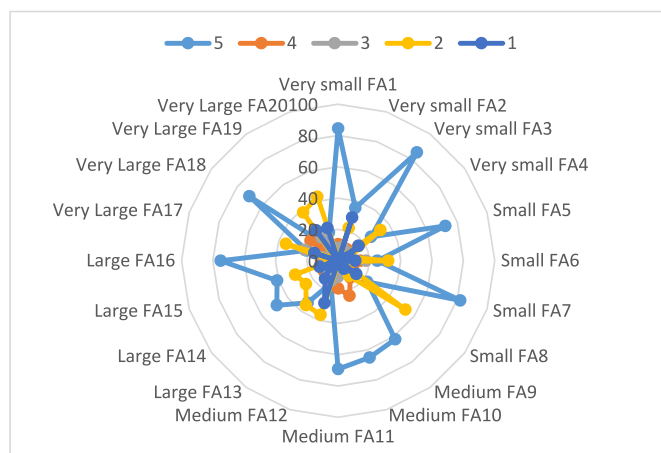


Fig. 8. Graphical interpretation of flexibility in activities in the squares.

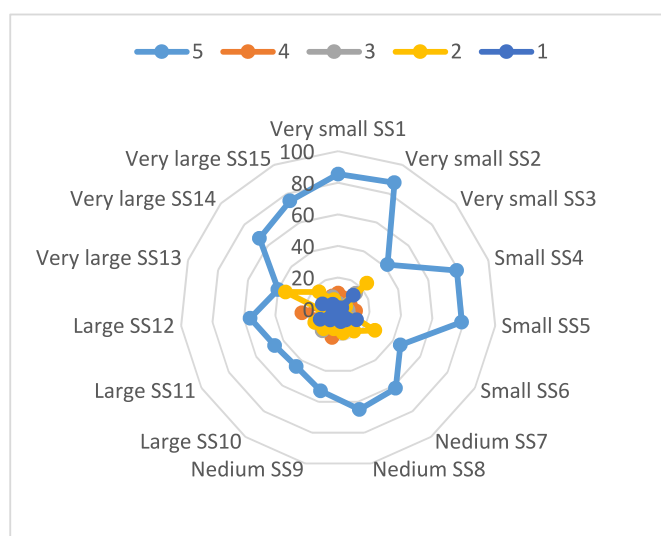


Fig. 9. Graphical interpretation of the safety and security in the squares.

Javadi (2016), Mehan and Soflaei (2017), and Mehan (2016b) are among those researchers who have discussed social sustainability of public squares theoretically. Although their studies have tried to develop social indicators of sustainable development in terms of public squares, local squares in residential neighborhoods have been overlooked in their studies. On the other hand, most scholars who have investigated public squares in Iran (Azad & Partovi, 2013; Haghi et al., 2016; Pakzad et al., 2019) and overseas (Lenzholzer, 2012; Tan et al., 2018) have evaluated one square as a case study solely, while our study evaluates social sustainability of a total of 108 squares in a neighborhood context. The other conspicuous distinction of our study is a comparative approach by which all five types of squares were compared in terms of social sustainability indicators. Based on the findings of this study, the overall satisfaction in all types of squares was medium in a way that only around 60% of the respondents were fully satisfied with very small squares, while it decreased to 50% for the small squares. Surprisingly, the overall satisfaction dropped to only one-fourth (26.8%) for very large squares which have been affected by unbridled urbanization, and nearly three-fourths of the respondents were neutral or deeply dissatisfied. Accordingly, it seems that very small and small squares support social sustainable indicators for their residents more than the other three types. This result supports the results of Zagroba et al. (2020) in Warmia, Poland, where they concluded that those local squares which were under unbridled urbanization and flanked by mass

apartment blocks without urban services have been ranked as low by inhabitant's satisfaction. As regards very small and small types of squares, they showed high performance in supporting almost all social sustainability indicators, particularly soft ones such as safety and security, social interactions, and place identity. However, two other square types (i.e., large and very large) have gained inhabitants' attentions in the proper providing of some social sustainability indicators, particularly in terms of physical quality of the squares (material, facilities, etc.) and square furniture and facilities. Therefore, while very small and small squares mainly support soft social sustainability indicators and lack physical facilities due to their size, large and very large squares provide more physical quality and environmental amenities for their users, thereby chiefly supporting physical aspects of social sustainability.

In addition, this study concluded that almost all squares in Narmak, particularly the large and very large squares, are subject to heavy traffic flows and have been transformed from residential squares to parking spaces. This supports the findings of Marinkovic et al. (2012) who concluded that the squares in three European cities of Helsinki in Finland, Galliate in Italy, and Gallen in Switzerland have been very important points in the city and nowadays are used as parking spaces. Their findings also support our finding in terms of losing the attractiveness and place identity of very large squares due to lacking enough spaces for various socio-cultural activities (Marinkovic et al., 2012). However, the results of our study contradict the findings of Harun and her colleagues in Ipoh city, Malaysia, as they concluded that engaging in the green infrastructure in Dataran Bandaraya square affords the residents' physical, cognitive, and social well-being (Harun et al., 2014). Instead, although people came to the squares and occasionally participated in some activities in very large squares in Narmak, they did not feel place attachment to the squares and were not satisfied with living near them.

6. Conclusion

The present study analyzed the social sustainability status of the residential squares of Narmak using their inhabitants' opinions. We investigated social sustainability variables in all five types of squares and revealed that there are some concerns due to unbridled urbanization and its impact on the loss of social identity among the residential squares of Narmak. However, this function was not similar in all types of squares, as the respondents' satisfactions with the social sustainability variables increase as the size of the squares decreases. Therefore, there was an inverse relationship between the degree of satisfaction with the social sustainability indicators and the size of the square. The same pattern goes for all seven variables in a way that most of the social sustainability variables achieve lower scores from inhabitants' point of view as the squares achieve bigger ones. Consequently, the urbanization pressures have had bigger negative effects on the large squares of the study area due to their transformation from social places to traffic squares, where the socio-historical relationships between people and large squares have been disconnected. However, the inhabitants were more satisfied with the physical qualities—amenities, facilities, and form—of large and very large squares.

Despite this, we find that the respondents found very small and small squares more sociable, safe, and secure with good physical quality and full of sense of place, compared with large and very large ones. Therefore, these squares appear to be socially more sustainable than the other three types of squares since they support most of the social sustainability dimensions for residents living around them.

The first point of contention in this study is that social sustainability is given the least weight in discussions of sustainability. Due to the fact that the phrase "social sustainability" in city management is context-dependent, many frameworks have been offered to develop social sustainability indicators as precondition, measures, future emphasis, and process framework. The recommended components of social sustainability include equality, basic necessities, and social cohesiveness. Since

social fairness, participation by the public, safety, and relationships are some of its essential parts, “social capital” is a well-known indication of social sustainability.

Social justice, interactions, public engagement, and safety might be listed in that sequence of declining effect on social sustainability. Despite the fact that scholars disagree on how to define social sustainability, this study identified some essential characteristics that have been central to the discussion of social sustainability, including cultural value, relationships, social affiliation, and well-being. The results imply that because the idea of social sustainability is dynamic, it varies over time and in different contexts. Most pertinent research is done in developed countries. However, because the rising concerns and context in developing nations are distinct, it is necessary to investigate social sustainability in developing countries as well. Additionally, we proposed that in order to achieve sustainable development goals, local assessment processes should be developed. This approach fosters broad public participation in government, which increases civic engagement and social cohesion.

6.1. Policy implications

Regarding the results, some policy implications are followed:

- Despite having more amenities, as evidenced by the findings, very big squares lack a feeling of place. Therefore, there should be some methods to enhance place identity. Therefore, using common cultural signs or holding some socio-cultural festivals could be helpful so as to promote a sense of place as well as place attachment.
- People in large and very large squares socialize less with one another, and they use sports facilities or other facilities instead. The reason behind this is that some facilities for easing social interactions, such as round benches and spaces that make people gather together easily when they want to rest for a while.
- From the equality perspective, the average of ranks was moderate (54.2%) for all types of squares. Therefore, the squares should be equipped with various facilities for various social groups ranging from children, women, and elderly people to people with disabilities.

However, more detailed research needs to be done. First, for each type of square, sustainable design prerequisites should be investigated since they suffer from lack of proper physical conditions due to urbanization pressures on the carrying capacity of all squares. Secondly, there is a vital need to conduct robust research on reasons behind identity loss in neighborhoods, especially in large and very large squares.

Credit author statement

Mousa Pazhuhan (Panahandeh Khah) performed the study and developed the main text. Hossein Azadi provided instructions, comments for the research design and approaches and enriched the paper. David Lopez-Carr, Jelena Barbir, Irum Shahzadi and Christine Fürst reviewed and edited the final version.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Annex 1. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.habitatint.2023.102811>.

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