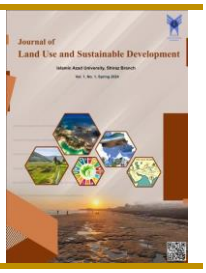
Islamic Azad University
Shiraz Branch

Journal of Land Use and Sustainable Development
Summer 2025. Vol 2. Issue 2

https://sanad.iau.ir/journal/jlusd



Original Research Paper

Analysis of the Components of Physical Quality as the Missing Link of Social Sustainability in Residential Complexes

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ARTICLEINFO

Received: 2025/08/07
Accepted: 2025/08/29
PP: 43-58

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Keywords: *Social, Sustainable Development, Identity, Physical desirability, Housing*

Abstract

In recent decades, the design and construction of residential complexes in many cities have prioritized quantity over quality. This disregard for physical quality has reduced housing to a purely quantitative and market-driven commodity. This approach has, in turn, led to inefficiency in achieving social sustainability and has created a significant gap between the spatial structure and the real, diverse behavioral needs of residents. recent studies in the field of social sustainability in residential complexes have led to the identification of a key indicator called "physical desirability." This indicator, acting as the missing link between the physical and social dimensions of housing, can create a synergistic relationship between the quality of space and the collective behavior of residents. The current research aims to investigate and identify the components of physical desirability, with a focus on systematically analyzing previous studies. the research method for this study is descriptive-analytical, and data were collected through library and documentary sources. the findings show that three fundamental components legibility, flexibility, and identity—can interact to create a foundation for sustainable housing. Legibility enhances the intelligibility and usability of a space, flexibility allows the environment to adapt to the changing needs of residents, and identity strengthens the emotional and cultural bond between people and their living environment. the results of the research indicate that physical desirability, through these components, acts as an active mediator between the spatial structure and social actions. It directly impacts the strengthening of collective security, the increase of social cohesion, and the sustainability of neighborhood interactions. Ultimately, enhancing physical desirability not only improves the quality of life for residents but can also become an effective strategy for the sustainable regeneration of contemporary residential fabrics.

Citation: Doaee, M., Sotoudeh, H., & Sazandeh, M. (2025). **Analysis of the Components of Physical Quality as the Missing Link of Social Sustainability in Residential Complexes** . *Journal of Land Use and Sustainable Development*, 2(2), 43-58. https://doi.org/10.82173/juep.2025.1214211

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Introduction

Today, as a result of the increasing population growth in metropolises and the expansion of apartment living, attention to sustainability and its dimensions, such as social sustainability, has declined in residential complexes. This has led to a lack of quality in these complexes and, consequently, residents' dissatisfaction with their living spaces. Social sustainability is a process that works toward creating a stable and successful place. Given people's fundamental need for a place to live, focusing on social sustainability can enhance their satisfaction and well-being. Social sustainability in housing addresses basic needs such as recreational and cultural programs, spaces for social activities, security, participation, identity, and more. Therefore, it seems that until the indicators of social sustainability in residential complexes are identified and improved, social sustainability will not be achieved. Housing is a fundamental human need and one of the most important urban elements (Alaei et al., 2020), which reflects a person's social status, quality of life, standing within their home, health, well-being, security, and social connections. As such, housing must be able to meet an individual's needs in a way that is appropriate to the local environment and resolve any related issues. In fact, in addition to protecting people from climatic conditions, housing must have various other functions, such as fostering connections among residents and establishing social interactions (Dixon, 2019).

In general, social sustainability in residential complexes is a state where residents are satisfied with their home and community life and enjoy being neighbors with other residents. In this situation, the overall living conditions are such that social interactions increase over time, and the majority of residents develop a sense of attachment and belonging to their place of residence (Rahima et al., 2022). Therefore, social sustainability in residential complexes implicitly protects the health of residents and fosters their participation and coordination in maintaining and improving their current conditions, which in turn increases the useful life and productivity of sustainable residential complexes (Hosseinpour et al., 2020).

The main indicators of social sustainability in housing are social trust, social participation, neighborly relations, compatibility, social security, public and environmental services, physical comfort inside the home, playability, and social identity (Sarhani et al., 2019). Now, given that physical desirability—a component of social sustainability in residential complexes—is an aspect that has been severely neglected and lacks sufficient attention in modern architecture and construction, the aim of the current research is to identify the components of physical desirability as the missing link of social sustainability in residential complexes by exploring existing research. The research question is as follows:

- Based on what micro-components is physical desirability formed as the missing link of social sustainability in residential complexes?

Literature Review

Social sustainability

Social sustainability is one of the dimensions of sustainable development (Shrivastava, 2019), which gained attention in the late 90s and was introduced in 2000 by the European Union in Lisbon as an inseparable part of the sustainable development process (Kordi et al., 2021). Social sustainability is a dimension that aligns with the evolution of civil society, creating an environment that is beneficial for the coexistence of different social and cultural groups, while simultaneously promoting social unity by improving the quality of life for all segments of society (Fatourehchi & Zarghami, 2020). Therefore, it means reaching a state where all members of a society can achieve their needs and desires, such as attaining peace in their community and living environment, and even enjoying equal opportunities (Akbari Shark & Kamelnia, 2023).

Consequently, social sustainability refers to people's desire to live in a specific place and emphasizes the ability to continue this trend in both the present and the future (Rezaei *et al.*, 2023). It combines social principles with issues related to participation, happiness, well-being, and the quality of life of individuals in a place based on physical elements. Thus, social sustainability in a location requires a physical-social network (Ohene, 2022). through which stability and continuity are measured and evaluated. This network provides better living conditions for individuals, characterized by balance, harmony, desirability, and fair equality (or the necessary conditions for a life with health, security, peace, vitality, creativity, and beauty) (Ghaforian *et al.*, 2017).

In relation to social sustainability, theorists have provided various definitions, first offering general theories and then moving on to more specific ones. Long (2003) defines social sustainability as people's desire to live in a place, and in this definition, the continuity, establishment of people in a specific location, and having the right to choose a place to live are prerequisites. Shrivastava & Singh (2019) state that social sustainability is a process that increases people's well-being and their share and role in society. Finally, Kosa et al. (2023) refer to the way individuals and communities live with each other and achieve the goals of sustainable development models specific to each society, also considering physical boundaries. In a more detailed category of theories on social sustainability that refer to factors and criteria, Bramley et al. (2000), in a study of fifteen areas in an English city, identified the indicators of social sustainability as a sense of belonging, security, social interactions, residential stability, environmental qualities, and participation in social groups. Thin et al. (2002) state that social sustainability includes four main criteria: social justice, social cohesion, social integration, participation, and security. Williams (2004) generally states that in social sustainability, factors such as access to facilities, green spaces, job opportunities, public transport, opportunities for walking and cycling, public health and sanitation, less social segregation, raising job opportunities for low-skilled individuals, and affordable housing are important. Gates & Lee (2005) also, in their explanation of social sustainability, emphasize attention to basic needs like income and individual capacities such as diverse job opportunities and suitable recreational, cultural, and leisure programs at a minimum cost. They also highlight social capacities, such as identity, participation, and the existence of places for artistic and social activities to develop social organizations and strengthen the balance among them. To make individual and collective capacities effective, they also introduce the principles of equality and social justice, social cohesion, social balance, security, and social trus.

Colantonio (2008) in his definition of social sustainability states that social sustainability considers a combination of traditional social principles, such as primary and basic needs (housing and health), employment and education, equality and social justice, social trust, and new concepts like identity, sense of place, happiness, well-being, and quality of life, which are less measurable. Wingets & Moberg (2011) consider social sustainability to be a set of indicators including access to services, social capital, health and well-being, social cohesion, fair distribution of employment and income, local participation, cultural heritage, identity, education, housing and community stability, communication and mobility, social trust, social justice, social integration, and sense of place. Murphy (2012) in his definition of social sustainability refers to four main pillars: justice, participation, awareness for sustainability, and social solidarity. Furthermore, Ope (2016) considers the dimensions and indicators of social sustainability to be four dimensions: primary human needs, equal access and opportunities, quality and health of the living environment, and the community's living values. Janssens & Verbeeck (2017) expressed the dimensions and indicators of social sustainability as including: identity and identification, social interactions, social trust, security, health and comfort, accessibility and attractiveness. Abdel-Raheem & Ramsbottom (2016) also listed the indicators of social sustainability as respect for the community, a change in attitudes and perspectives, minimal use of non-renewable resources, social cohesion, a sense of place, promotion of quality of life, awareness of social sustainability and its principles, and accountability. In Figure 2-3, the presented theories are offered from general to specific (Fig. 1).

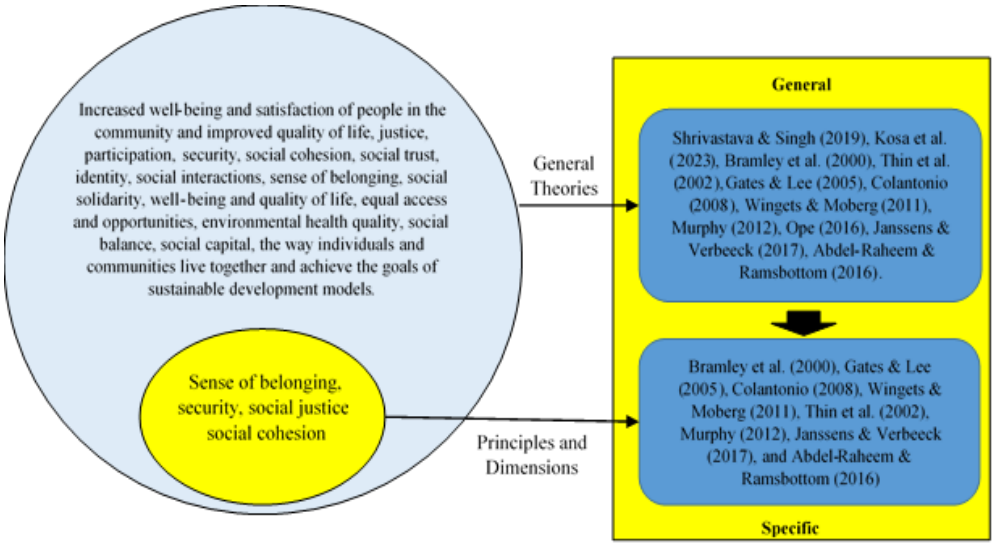

Fig 1. Theories on social sustainability, from general to specific

Social Sustainability in Housing

Today, in metropolises, due to planning, design, and especially stereotypical mass-production, people are placed next to each other as a mass. Instead of forming purposeful social groups, this results in crowds of individuals whose coexistence leads only to congestion, chaos, and disorder (Akbari Shark & Kamelnia, 2023). In such conditions, "family members escape the crowd to find a minimum of security and peace, taking refuge in the corner of their homes. Social compensation and deprivation begin here; therefore, a suitable and dignified home for social cohesion, personal well-being, and individual independence is a basic need" (Rezaei *et al.*, 2023). If home construction is not a sustainable process, no society will be able to achieve sustainable social development; hence, this highlights the importance of social sustainability in contemporary housing (Yaghoubi & Razakhani, 2021).

This is because social sustainability in housing must focus on both people and the environment, rather than just one of the two options. Social sustainability in housing is seen as the quality of communities and the nature of social relations, which in a way represents the internal relations of society (Ghaforian *et al.*, 2017). Given that social sustainability in residential complexes is a space for growth (Woodcraft, 2012), in the field of architecture and housing, it discusses space. Architectural space, or housing, due to its significant role in shaping human behavior, acts as a socializing institution and a source that, by studying the needs and behaviors of users, plays an effective role in preserving the dynamism and non-physical sustainability of the space (Kordi *et al.*, 2021). If a space has a semantic load, it will be transformed into a special state intertwined with human norms and values, and it is called a "place" (Ohene, 2022). Therefore, the qualitative indicators that represent social sustainability and are effective in improving the quality of a space are recognized as indicators of social sustainability in housing if they are attributed to the conceptual domain of "place." They promote an individual's personal growth through the quality of the living environment and the creation of a sense of individuality and belonging to a place. Furthermore, through the opportunities that architecture, from the perspective of social sustainability, provides for personalizing space and user participation by offering spatial diversity, it promotes a person's sensory, intellectual, and perceptual motivations and enhances their cognitive needs (Kosa *et al.*, 2023).

From an architectural perspective, social sustainability in housing means that a social system can remain stable by meeting human needs and maximizing the productivity of residential complexes. It aims to "create a situation where residents develop better social interactions and a stronger sense of belonging to their complex and to other residents over time" (Yaghoubi & Razakhani, 2021). In addition to the mentioned aspects, social sustainability in housing can also bring about other cultural, identity-related, social, and even individual functions and events for its residents. Chiu (2004) stated that social sustainability in

housing must focus on both people and the environment, instead of just one of the two options. Woodcraft (2012) sees social sustainability in housing as a process that leads to the production of sustainable housing and, by responding to the user's desire for a successful space that fulfills their living and activity needs, results in their satisfaction and health. This includes principles such as sense of place, identity, social capital and participation, social justice, and satisfaction with housing based on the cultural, social, and environmental components of social sustainability. Kordi et al. (2021), discussing social sustainability in housing, referred to the level of resident satisfaction with life in their housing, noting that this satisfaction must be at an acceptable level. Furthermore, they assert that social sustainability in housing has five main dimensions: security, activity, identity, people-centeredness, and physical integrity, which encourage residents to care for and maintain their place of residence. Mohammadzadeh Neilagh & Ghafourian (2018), in relation to social sustainability in housing, referred to the physical component as integrated social cohesion and positive and negative social and physical indicators, as well as placemaking (sense of place and identity to strengthen the place and space) for socio-cultural sustainability.

Physical desirability in social sustainability of housing means the physical design and organization of residential spaces that not only meet basic living needs but also help strengthen social interactions, mental health, a sense of belonging, and spatial justice among residents. This concept is defined based on principles such as structural safety, access to infrastructure, spatial flexibility, culturally appropriate aesthetics, and the creation of communal spaces. Research shows that physical desirability is realized through components like "inclusive design" (meeting the needs of different age groups and abilities), "pedestrian-friendliness," "spatial diversity," and "the use of natural light and proper ventilation" (Alaei *et al.*, 2020). For example, designing semi-private spaces like shared courtyards or wide corridors strikes a balance between personal privacy and social interactions, helping to increase the vitality of the housing. In this regard, there are shared theoretical perspectives on physical desirability, physical integrity, and the physical body. For instance, Amr et al. (2022) referred to the components of identity and legibility in physical sustainability; Kordi et al. (2021) pointed to physical integrity through identity; Mohammadzadeh Neilagh & Ghafourian (2018) also referred to identity in relation to physical integrity. This same aspect is seen in the theory of Shieh et al. (2014), who considered the components of identity, flexibility, and legibility to be important in physical integrity. Finally, Alaei et al. (2020) considered the micro-components of legibility and flexibility to be significant in physical desirability.

Methodology

The present study was formed with the aim of specifying the scope of theoretical studies on social sustainability in housing and physical desirability. This is a descriptive-analytical study that examines research on social sustainability in housing and physical desirability. The current research evaluates and compares previous studies, and the data collection method is a literature and documentary review. In the first step of the research, a systematic review of selected texts and articles from reputable scientific websites was conducted based on keywords and abstracts. Accordingly, the English and Persian scientific articles published in the databases Magiran, Springer, Google Scholar, Wiley, Science Direct, Sid, and Taylor & Francis, which were written on the topic of social sustainability, social sustainability in housing, and physical factors or physical desirability, were included. These articles were published between 2006 and 2025, because the topic of physical desirability from the perspective of social sustainability does not exist in the years prior to 2006 (Fig. 2). In the next stage, the sources were reviewed and filtered. The inclusion criteria were descriptive research studies on social sustainability in housing, the physical body, physical desirability, or the meaningful physical body. In the initial evaluation, article titles and abstracts were extracted and assessed by the researchers. For the analysis, qualitative thematic analysis was used to extract concepts and themes. In this regard, after extracting the research components and variables and categorizing them, the main and sub-themes related to social sustainability in housing and physical desirability were extracted. Overall, in the

present study, according to the studies performed in Table 1, the variables for measurement and search were limited to an examination of the variables of physical factors (physical desirability) and social sustainability in housing. Therefore, a total of 164 articles were initially extracted, which were reviewed using the method of acquiring articles (by studying the components and variables along with an examination of the abstracts and research results). Eighty-five articles were reviewed for content. It is worth noting that from these 85 articles, some that were in the field of social sustainability but did not include housing were removed, and 52 final articles were reviewed, which are included in Table 1. Figure 1 shows the process of searching and selecting articles for this research.

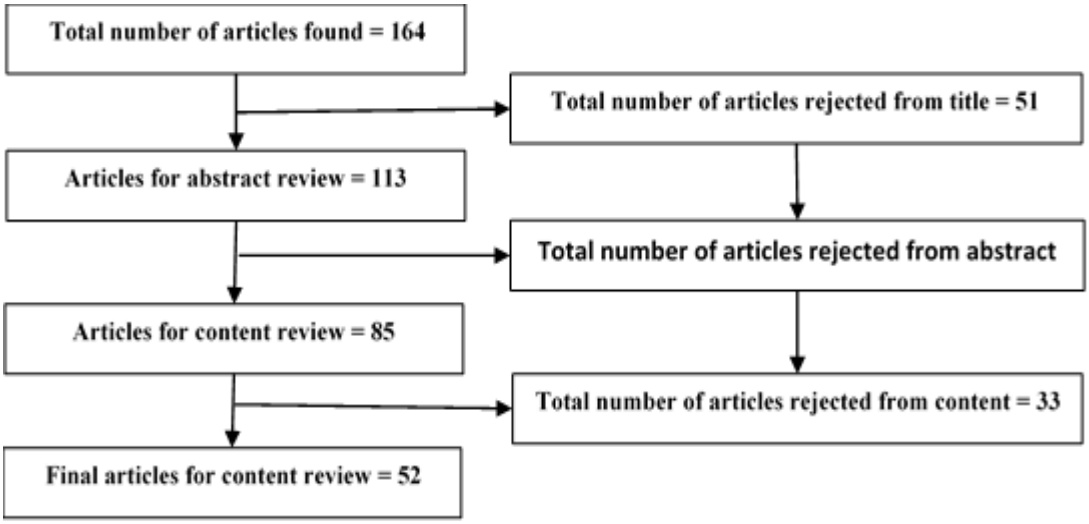

Fig 2. The process of searching for and selecting research articles

Results and discussion

The first research on social sustainability in housing was conducted in the early 2000s. Also, the first documented research registered in databases is related to Chiu (2003). Figure 2 shows the temporal analysis of the reviewed sources in the field of social sustainability in housing and the physical body. After the temporal analysis of the conducted research, the components were categorized into two areas: social sustainability in housing and physical desirability (Figure 3), and the frequency of the main and sub-components of the studies was extracted (Fig. 3).

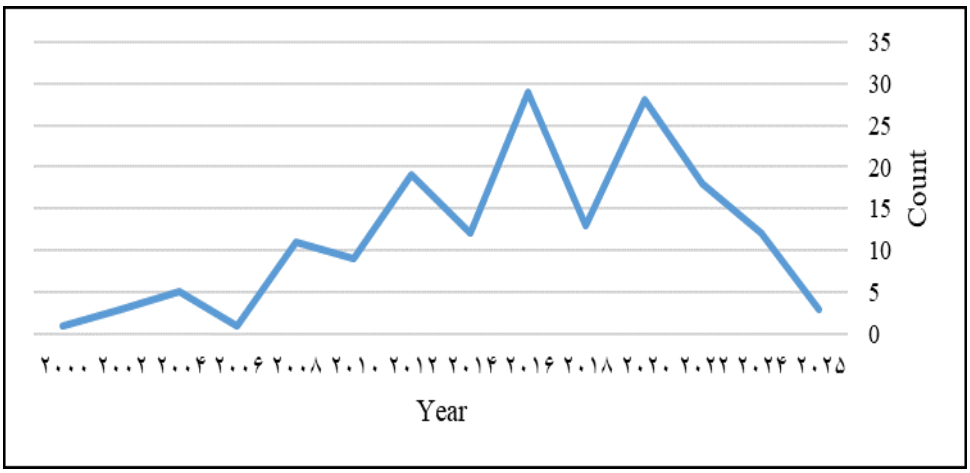

Fig 3. Timeline of research studies reviewed in the literature

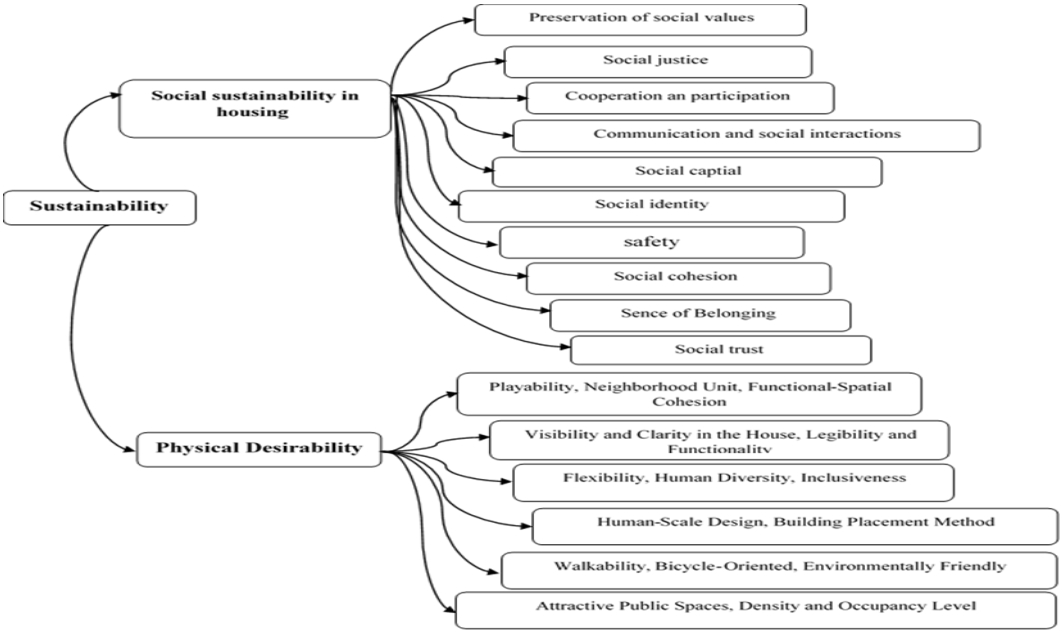

Fig 4. Classification of the components of social sustainability in housing and physical desirability in the research literature

Given that social sustainability has two main components—the social sustainability of housing with sub-themes (preservation of social values, participation and cooperation, social justice, social communications and interactions, social capital, social identity, social cohesion, social trust, physical desirability, security, and a sense of belonging) and physical desirability with sub-themes (legibility, flexibility, playability, neighborhood units, inclusivity, physical-spatial cohesion, indoor comfort, visual permeability, identity, observance of human scale, building placement style, pedestrian/bicycle-centricity, landscaping, attractive public domain, density and site coverage, diversity and efficiency, and desirable facade design)—the frequency of the main and sub-components in the studies on social sustainability in housing and physical desirability is presented in Table 1.

Table 1. Frequency of the main and sub-components in the studies on social sustainability in housing and physical desirability

Sub-themes	Frequency	Source	Main Themes	Total Frequency
Preservation of Social Values	17	(Fatourehchi & Zarghami, 2020), (Woodcraft, 2012), (Shrivastava, 2019)	Social Sustainability in Housing	150
Participation and Cooperation	15	(Kosa et al., 2023), (Chuba et al., 2024)		
Social Justice	17	(Kosa et al., 2023), (Bramley et al., 2006), (Dixon, 2019)		
Social Communications and Interactions	17	(Kosa et al., 2023), (Rezaei et al., 2023), (Yaghoubi & Razakhani, 2021), (Bramley et al., 2006), (Dixon, 2019)		
Social Capital	15	(Kosa et al., 2023)		
Social Identity	9	(Kosa et al., 2023), (Kordi et al., 2021), (Mohammadzadeh Neilagh & Ghafourian, 2018)		
Social Cohesion	17	(Kosa et al., 2023), (Mohammadzadeh Neilagh & Ghafourian, 2018)		
Social Trust	17	(Kosa et al., 2023), (Chuba et al., 2024)		
Physical Desirability	8	(Ohene, 2022), (Kosa et al., 2023), (Kordi et al., 2021), (Mohammadzadeh Neilagh & Ghafourian, 2018)		
Security	9	(Yaghoubi & Razakhani, 2021), (Chuba et al., 2024), (Babaei Eliasi et al., 2024), (Kosa et al., 2023), (Karji et al., 2017)		
Sense of Belonging	9	(Ohene, 2022), (Yaghoubi & Razakhani, 2021), (Rezaei et al., 2023),		

Sub-themes	Frequency	Source	Main Themes	Total Frequency
		(Mohammadzadeh Neilagh & Ghafourian, 2018), (Bramley et al., 2006), (Dixon, 2019)		
Legibility	11	(Amr, 2022), (Woodcraft, 2012), (Alaei et al., 2020), (Zarghami, 2010), (Caistor-Arendar et al., 2024), (Paidakaki & Lang, 2021)	Physical Desirability	156
Flexibility	17	(Kordi et al., 2021), (Woodcraft, 2012), (Alaei et al., 2020), (Zarghami, 2010), (Caistor-Arendar et al., 2024), (Karaji et al., 2019), (Paidakaki & Lang, 2021)		
Playability	6	(Alaei et al., 2020)		
Neighborhood Unit	6	(Alaei et al., 2020), (Feisal Rajab Rivai, 2022)		
Inclusivity	9	(Alaei et al., 2020), (Karji et al., 2017)		
Physical-Spatial Cohesion	9	(Alaei et al., 2020), (Karji et al., 2017)		
Indoor Comfort	7	(Alaei et al., 2020), (Zarghami, 2010)		
Visual Permeability	9	(Alaei et al., 2020)		
Identity	11	(Mohammadzadeh Neilagh & Ghafourian, 2018), (Caistor-Arendar et al., 2024), (Kordi et al., 2021), (Amr, 2022), (Alaei et al., 2020), (Woodcraft, 2012), (Feisal Rajab Rivai, 2022), (Karaji et al., 2019), (Karji et al., 2017)		
Observance of Human Scale	9	(Alaei et al., 2020)		
Building Placement Style	9	(Alaei et al., 2020)		
Pedestrian/Bicycle-centricity	9	(Alaei et al., 2020), (Feisal Rajab Rivai, 2022), (Karji et al., 2017)		
Landscaping	9	(Woodcraft, 2012), (Alaei et al., 2020)		
Attractive Public Domain	9	(Alaei et al., 2020)		
Density and Site Coverage	9	(Alaei et al., 2020)		
Diversity and Efficiency	9	(Alaei et al., 2020), (Paidakaki & Lang, 2021)		
Desirable Facade Design	8	(Alaei et al., 2020)		

In the review of factors for physical desirability in social sustainability in housing, 8 studies have addressed the micro-components of identity, flexibility, pedestrian/bicycle-centricity, observance of human scale, inclusivity, landscaping, attractive public domains, legibility, density and site coverage, design of a desirable facade, diversity and efficiency, playability, neighborhood unit, indoor comfort, physical-spatial cohesion, visual permeability, and building placement style. Specifically, 9 studies have addressed sense of belonging, 11 studies have addressed legibility, 9 have addressed security, 17 have addressed flexibility, 6 have addressed playability, 6 have addressed neighborhood units, 9 have addressed inclusivity, 9 have addressed physical-spatial cohesion, 7 have addressed indoor comfort, 9 have addressed visual permeability, 11 have addressed identity, 9 have addressed observance of human scale, 9 have addressed building placement style, 9 have addressed landscaping, 9 have addressed pedestrian/bicycle-centricity, 9 have addressed attractive public domains, 9 have addressed density and site coverage, 9 have addressed diversity and efficiency, and 8 have addressed the design of a desirable facade as indicators of physical desirability from the perspective of social sustainability. Therefore, according to Figure 4, which shows the frequency percentage of the micro-components of physical desirability in the research, it can be stated that in most of the reviews on physical desirability in social sustainability, up to 90% have addressed flexibility, and 85% have addressed legibility and identity. In contrast, other micro-components of physical desirability have been generally studied in only 5% to 48% of cases (Fig. 5).

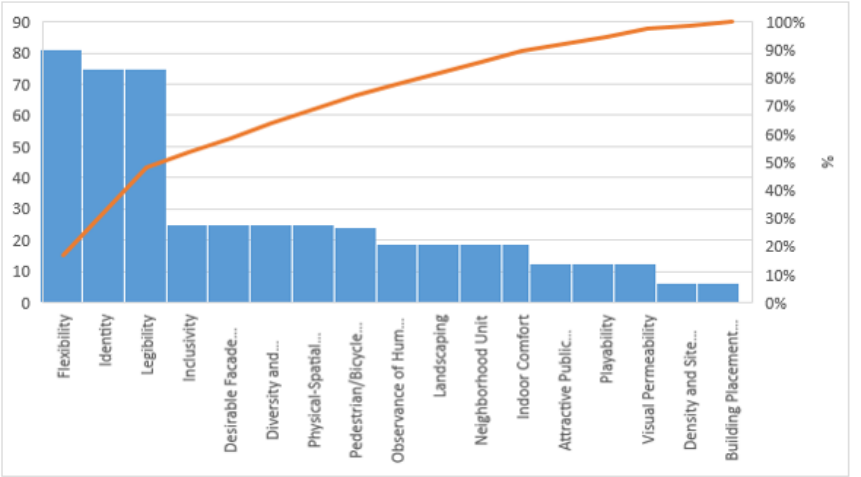

Fig 5. Percentage Frequency of Micro-components of Physical Desirability

Based on the research conducted, the five main components of social sustainability in housing are as follows: 1. Physical Desirability: Includes flexible design, legibility, identity, playability, natural light, use of local materials, access, pedestrian-centricity, permeability, etc. (Alaei et al., 2020). 2. Social and Cultural Life: Strengthening social interactions (Bojago, 2023, Abdulrazaq Zamil Menshid & Hoshyar Qadir Rasul, 2024, Golić et al., 2023, Lang, 2019, Abdel-Raheem & Ramsbottom, 2016). 3. Access to Infrastructure: Including public transportation, health centers, and educational spaces. 4. Participatory Management: Resident participation in the decision-making process and space maintenance (Feisal Rajab et al., 2022, Paidakaki & Lang, 2021, Sierra et al., 2023, Janssens & Verbeeck, 2017, Abdel-Raheem & Ramsbottom, 2016). 5. Economic Justice: Reducing inequalities through fair financial policies.

In line with expressing physical desirability from the perspective of social sustainability in housing, it can be stated that physical desirability is one of the components of social sustainability in housing, alongside functional and infrastructural, environmental, economic, and socio-cultural factors. It includes the micro-components of physical-social cohesion, legibility, flexibility, building placement style, observance of human scale, landscaping, playability, neighborhood units, desirable facade design, diversity and efficiency, attractive public domains, inclusivity, bicycle-centricity, visual permeability, density, and site coverage (Alaei et al., 2020, Azan et al., 2020). In general, physical desirability, as a micro-component of social sustainability, in addition to the components mentioned, also includes the quality of access hierarchy, compatibility, clarity of view, diversity and variety (Kiassi & Karimi Azari, 2023, Moztarzadeh & Nikounam Nezami, 2022), appropriate density, compactness, physical continuity, hierarchy, flexibility, and legibility (Shieh et al., 2014) and identity (Ahouei et al., 2021, Kordi et al., 2021, Mohammadzadeh Neilagh & Ghafourian, 2018). Therefore, it can be stated that the final model of physical desirability for social sustainability in housing includes physical and social outcomes. In the physical dimension, the micro-components of legibility, flexibility, and identity are important, and in the social dimension, length of residency, number of households, ownership, history and culture, daily interactions and activities, religious beliefs and identity, collective memories, collective behaviors and interactions, social control and supervision, and a low fear of crime, security, and order are significant socio-cultural outcomes in this process (Amr et al., 2022). Overall, physical desirability, as one of the fundamental components of social sustainability in housing, refers to the physical and structural quality of residential spaces that directly affects residents' well-being, health, and social interactions. This concept goes beyond the technical aspects of buildings and includes elements that strengthen daily life, a sense of belonging, and social dynamism. Physical desirability is not limited to physical factors inside the house; physical attributes such as legibility, flexibility, and identity have a greater impact on the social sustainability of housing (Fig. 6).

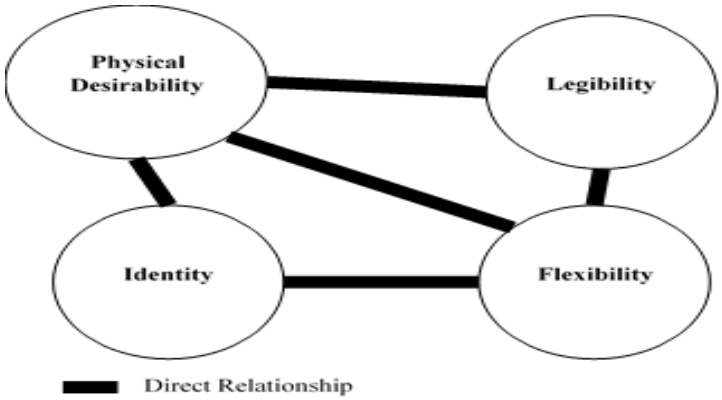

Fig 6. A model of the relationship between the most frequent components of physical desirability in the social sustainability of housing.

In terms of impact, physical quality plays a fundamental role in shaping social capital and reducing inequalities. Overall, housing with suitable physical quality strengthens a sense of security and collective identity, increases resident participation in neighborhood management, and helps reduce unwanted migration. Additionally, approaches such as using eco-friendly materials and flexible design not only reduce energy consumption but also improve residents' mental health by reducing noise and visual pollution. In general, physical quality acts as a bridge between individual and collective needs, ensuring social sustainability by creating a stable, just, and responsive environment for future developments.

Discussion

In general, the social sustainability of housing is not limited to economic or environmental aspects; rather, the quality of human interactions and residents' sense of belonging to their living environment are also fundamental pillars. Physical factors act as an intermediary between space and social behavior. Components such as neighborhood units, physical-spatial cohesion, and attractive public spaces provide a setting for the formation of stable relationships, the strengthening of social solidarity, and the creation of a collective sense of security. However, architects' neglect of these principles and a sole focus on aesthetic or profit-driven aspects gradually weakens the social core of residential areas. The fading of factors such as playability and the centrality of walking and cycling leads to a reduction in opportunities for informal interaction among residents. For example, the absence of safe play areas deprives children of the experience of collective growth, and the design of streets without sidewalks eliminates the possibility of neighborly conversations. This neglect turns the community into a group of passive individuals living in spatial and social isolation, lacking an emotional connection to their living environment.

The uniform and soulless architecture of today's residential complexes is a result of a disregard for identity-making components and human scale. High-rise buildings with repetitive and emotionless facades not only reduce the legibility of the environment but also destroy the residents' sense of belonging to the place. This lack of identity, especially in multicultural communities, creates a distance between collective memories and the living space, leaving residents with a feeling of alienation from their surroundings. It is important to note here that focusing solely on increasing density and site coverage, without attention to internal comfort and permeability, has turned modern life into a stressful experience. Excessive density, along with a lack of privacy and public spaces, leads to an increase in neighborhood conflicts and a decrease in quality of life. On the other hand, neglecting efficiency and flexibility in the design of residential units limits the ability of the space to adapt to the changing needs of families and traps residents in an

unresponsive environment. Therefore, to compensate for these damages, redefining the relationship between physical form and the social sustainability of housing is essential. Architects must focus on identity, legibility, and flexibility as aspects of housing's physical desirability to create spaces that not only meet functional needs but also respond to the human desire for meaning and connection. This requires resident participation in the design process, the formulation of standards based on social sustainability, and the integration of sociological knowledge with architectural principles. Only in this way can housing be transformed from a mere physical shelter into a living and sustainable ecosystem.

The social sustainability of housing, and particularly its physical desirability, not only affects the individual well-being of residents but also enhances the foundations of housing cohesion and social, cultural, and economic resilience. This topic has received significant attention, especially in areas of housing architecture that address environmental and climatic issues, such as thermal energy, lighting, and costs. Findings from a documentary study indicate that physical desirability in the social sustainability of housing refers to the design of residential spaces that, by combining physical and social dimensions, not only meet basic needs like shelter and security but also strengthen social interactions, mental health, and residents' sense of belonging by creating an inclusive and responsive environment. This concept is built on components such as safety, social trust, social capital, participation, social communication and interactions, security, a sense of belonging, equitable access to urban services, spatial flexibility, and aesthetics consistent with local culture to prevent social isolation and physical inequalities. The design of semi-private spaces like shared courtyards and public spaces like neighborhood parks provides a setting for face-to-face interactions and, by creating a balance between personal privacy and collective life, strengthens social solidarity. Also, the use of natural light, proper ventilation, and eco-friendly materials helps improve residents' physical and mental health and reduces visual and noise pollution. Ultimately, by strengthening social capital and providing opportunities for residents to participate in the management of spaces, physical desirability is increased and social sustainability is achieved through the creation of an environment that is just, stable, and adapted to future needs (Fig. 7).

Fig 7. The Result of Physical Desirability in Social Sustainability

Conclusion

Social sustainability in housing, with a focus on physical desirability in the design of today's residential complexes, refers to the design of residential spaces that, in addition to meeting physical needs, also respond to social interactions, a sense of belonging, and flexibility in the face of change. This concept is based on more detailed components such as legibility, flexibility, and identity, each of which plays a key role in improving the quality of life, the quality of the residential environment, and residents' mental health. Among these micro-components of physical desirability, legibility means creating spaces in which residents can easily navigate and connect

with their environment. Important details such as spatial hierarchy (separating public, semi-private, and private spaces), visual cues (such as prominent architectural elements), and connection to the urban fabric (matching local patterns) help strengthen the sense of security and reduce confusion. Furthermore, the legibility and visual clarity in residential complexes, through natural surveillance from windows overlooking alleys and semi-public spaces, cause residents to unconsciously act as social guardians. This phenomenon leads to a reduced fear of crime and a strengthening of social capital. Also, spatial design using elements such as contrasting colors at entrances, rhythmic canopies, and marked sidewalks helps individuals with limited mental abilities or the elderly maintain their independence of movement without needing a guide. Ultimately, this spatial clarity, by turning residential complexes into an interpretable urban text, sets the stage for collective participation in the maintenance of spaces and the formation of a shared sense of place.

Another purposeful component of physical desirability is flexibility, which emphasizes the ability of residential spaces to adapt to the changing needs of households. Micro-components such as open plans (the possibility of dividing or combining spaces), the use of lightweight and movable materials, and multi-purpose equipment (such as movable partitions) allow residents to redefine the space according to their lifestyle. This feature, especially in low-income housing, helps strengthen socio-economic sustainability by reducing renovation costs. The third and influential component among the components of physical desirability in social sustainability in housing is identity, which refers to creating a sense of belonging and memory for residents through physical design. Small details such as the use of indigenous architectural patterns (including local materials, colors, and forms), symbolic collective spaces (such as a central courtyard and fountains), and resident participation in the design process (such as selecting the facade or neighborhood green space) help strengthen social cohesion and reduce visual monotony. Housing that portrays a local identity can also lead to a reduction in unwanted migration and marginalization.

Given these points, it can be stated that the interaction between legibility, flexibility, and identity can lead to the creation of sustainable housing. For example, a residential complex with an understandable design (easy access to facilities), the ability to change the use of spaces (such as turning rooms into home offices during a pandemic), and a facade inspired by local culture, simultaneously provides efficiency, spatial justice, and a sense of belonging. This synergy leads to the integration of the physical body of the housing and the creation of an adaptable, just, and sustainable environment, which ensures sustainability (Table 2).

Table 2. Explanation of Findings

<table>
<tr><td rowspan="6">Physical desirability, the missing link in social sustainability in residential complexes</td><td>Social Sustainability</td><td>Physical Desirability</td><td rowspan="6"></td><td>Face-to-face interactions</td><td rowspan="6">It creates an adaptable, just, and sustainable environment that enhances the social sustainability of housing</td></tr>
<tr><td colspan="2">Improving quality of life for residents and housing sustainability for future generations.</td><td>Strengthening of social capital</td></tr>
<tr><td>Improving quality of life</td><td>Social sustainability in housing</td><td>Physical and mental health of residents</td></tr>
<tr><td colspan="2">Architects' attention to the components of legibility, flexibility, and identity as indicators of physical desirability</td></tr>
<tr><td colspan="2">Physical desirability from the perspective of social sustainability prevents social isolation and physical inequalities in housing and for residents.</td><td>A continuous relationship of mutual interactions between housing and social and physical factors</td></tr>
</table>

The cycle of social sustainability in housing, which depends on the micro-components of social sustainability and physical desirability, if considered by architects and designers in the design and execution of any housing, and if the components of physical desirability are implemented and realized in housing, leads to quality improvement through architectural methods and the use of physical desirability indicators, as well as resolving the problems of existing housing and architectural backgrounds. This ultimately results in a sustainable, social, and influential home in the behavior, psychology, and health of its residents (Fig. 8).

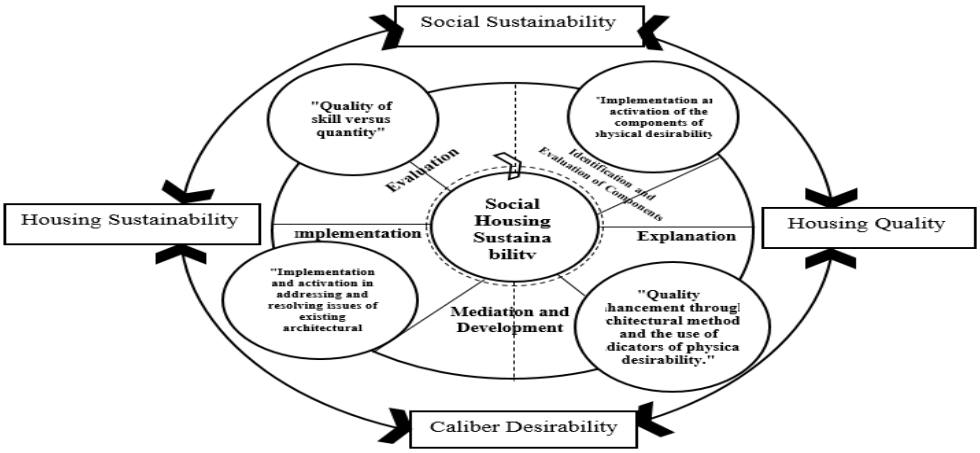

Figure 8. A Model of Social Sustainability in Housing

Promoting social sustainability in housing with a focus on physical desirability in residential complexes:

1. The creation of small neighborhood units (with a population of 20 to 50 households) requires design based on the principles of human scale and physical-spatial cohesion, and must focus on spatial hierarchy and informal interactions. A central courtyard, as a nucleus for social interactions, plays the role of a semi-public space by combining elements such as communal gazebos and smart benches. This space acts both as a place for multipurpose gatherings and as a platform for strengthening collective identity.
2. Designing residential complexes with attention to human scale and dividing large blocks into smaller volumes provides the possibility of creating visual diversity and a sense of cohesion in spaces.
3. Designing open plans using movable walls and multi-purpose spaces provides the possibility of dynamic adaptation to the changing needs of families and helps maintain residential continuity. This type of flexibility, by strengthening population stability in residential complexes, provides the necessary ground for the formation of stable collective memories in the environment and the physical body of the open space.
4. Legibility and visual clarity in the design of residential complexes, by creating a clear spatial hierarchy and environmental readability, act as a foundation for strengthening a sense of belonging and purposeful social interactions. Designing based on continuous sightlines and clear cues allows residents to create an accurate mental map of the space. This not only increases the perceived sense of security but also, by facilitating urban mobility, provides opportunities for informal encounters and the formation of networks of trust.

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