A THEMATIC REVIEW OF NEIGHBOURHOOD BUILT ENVIRONMENT FACTORS THAT AFFECT THE SENSE OF COMMUNITY.

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Mohd Azli[1, 2,*] , Jamalunlaili Abdullah[1],Yusfida Ayu Abdullah[1], Mohd Firrdhaus Mohd Sahabuddin[3], Idris Taib[4], Sharyzee Mohmad Shukri[4], Azli Abdullah[5]

[1] Faculty of Architecture, Planning and Survey, University Technology MARA, Malaysia,
[2] Department of Architecture, Faculty of Design and Architecture, Universiti Putra Malaysia,
[3] Department of Architecture, Faculty of Built Environment, University of Malaya, Malaysia,
[4] Faculty of Architecture and Built Environment, Infrastructure University Kuala Lumpur, Malaysia,
[5] Faculty of Architecture and Ekistic, Universiti Malaysia Kelantan, Malaysia

* Email: mohdazli@upm.edu.my,
ORCID: 0000-0001-8112-7967

ABSTRACT

Communities, being vital to human existence, provide members with a sense of identity and purpose. The physical environment of these communities plays a critical role in shaping this sense of belonging, warranting further investigation into this relationship. Despite some research indicating that the built environment influences the local community feeling, the specific aspects and their degree of influence remain largely unknown. This study aims to identify which physical features exert the most impact, and what factors need to be currently addressed. This study conducts a thematic analysis to explore how the built environment of a neighbourhood affects community sentiment, focusing on articles published between 2017 and 2023. The research materials were sourced from the SCOPUS and Web of Science databases based on specific inclusion criteria, with keyword searches yielding 37 peer-reviewed articles. Following a thorough inclusion and exclusion procedure, the final selection of 25 papers was compiled for assessment. Upon conducting a thematic analysis of the 25 selected papers, a total of seventeen physical elements were initially identified. However, so far, only eleven out of these seventeen physical parameters put forth by Kim & Kaplan have been used. These include clubhouses or recreation amenities, population density, the distance between sidewalks and residences, the diversity in types of housing, the overall street layout, lakes, greenways, street trees, landscaping, architectural style, the overall design quality of the residences, and block size. Moreover, it was found that aspects of the neighbourhood are associated with physical activity, satisfaction with the community, a sense of belonging, and the perception of one's position within the neighbourhood. Factors of urban landscape directly impact community contentment, sense of belonging, and perceived quality of life. Physical attributes correlate with levels of physical activity and the sense of community, while aspects of planning and policy are associated with community identity, belonging, and architectural aesthetics

influencing the sense of community. The codes presented in this paper elucidate the relationship between a neighbourhood's-built environment and the sense of community it fosters. The research contributes by examining this category and its variables, pinpointing specific themes within related topics across various publications. This analysis will offer valuable insights for future studies, particularly those focusing on communities within Malaysia.

Keywords: Neighbourhood, Built environment, Sense of community, ATLAS.ti 8, Thematic review, Variables.

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INTRODUCTION

The built environment can greatly affect how individuals perceive their neighbourhoods. Their affinity for their community may increase when it is well-maintained, boasts appealing architecture, and abounds with green spaces. Additionally, community feelings can be nurtured by providing public places like parks and meeting points where people can gather and interact. It's necessary to research further into how the physical characteristics of communities can contribute to individuals' sense of community, given its significant impact. Findings from various studies indicate that the physical attributes of a built environment can shape the sense of community, though the specifics of this relationship remain unclear. Additionally, it's uncertain which specific features have the most persistent influence. While it's acknowledged that a community's sense of togetherness can be linked to different physical elements, it's yet to be determined which of these aspects is most recent and should be prioritized in future studies.

The basic proposition of this study is that the constructed environment in the area could be categorized, offering beneficial physical factors that can potentially impact the community feel. It investigates a thematic evaluation of how the built environment in neighbourhoods influences the sense of community, using a code-to-document examination method with ATLAS.ti 8 to analyse articles published from 2017 to 2023.

Due to changes in the business environment and increases in town population after World War II, several Southeast Asian countries had problems with urbanisation. New towns have developed in response to urbanization's problems. The Garden City in British author E. Howard's late 19th-century novel Garden City served as the model for the new modern area. This idea was popular around the world as a replacement for the urbanization-related poverty that dominates large cities [1]. Kuala Lumpur, the Malaysian capital, expanded because of population increase. The Malaysian government proposed new urban development plans to improve living and urban conditions. To accommodate the growing population of Kuala Lumpur, Petaling Jaya (PJ), Malaysia's first major township, was built beginning in 1953. According to British urban planning requirements, it was created based on a modern dream metropolis [2]. Following Petaling Jaya's growth in the 1950s, various new communities farther from Kuala Lumpur grew rapidly in the 1990s. Bayan Lepas, Minden, and Batu Kawan are in Penang, whereas Subang Jaya, Shah Alam, Bangi, and Klang are all in the Klang Valley. Skudai and Pasir Gudang were developed to the south of Johor Bahru [3].

New Urbanism and Neighbourhood

In the US, "New Urbanism" architecture and urban planning gained popularity at the turn of the century as a response to urban expansion [4]. New urbanism design principles may be advantageous for structures, parcels, blocks, cities, regions, communities, districts, and corridors [5]. The guiding principles demand planning growth into a variety of somewhat mixed-use, pedestrian, and transit-friendly neighbourhoods [6]. The Charter of the New Urbanism [7] lists the 10 essential design components of the New Urbanism, such as transit-oriented development, walkable urbanism, trains, and sustainability.

Sense of Community

People, places, and communities make up society. The communities in which people live and work have an impact on their social lives. By interacting, participating, acting, sharing interests, and resolving issues, people create norms of society and culture within their communities. People live in communities, which are made up of their homes, places of

worship, and places of business. The architectural characteristics of any community may reflect how its citizens see or express themselves, the environment in which they live, the social context in which they interact, and the impact that this has on the environment and communal life. Community psychologists contend that a community is a dynamic system with both structural and functional elements [8]. The [9] sense of community theory, depicted in Figure 1, was examined. This hypothesis included four characteristics of a community: shared emotional links, group membership, mutual influence, and shared ideals. These four elements may help to develop a vibrant community. Residents are more likely to feel secure and at home, engage in local events, and help one another out when they're in need when there are strong community links. It also helps to lessen stress in the community and enhances wellbeing, satisfaction with life, and self-esteem [10].
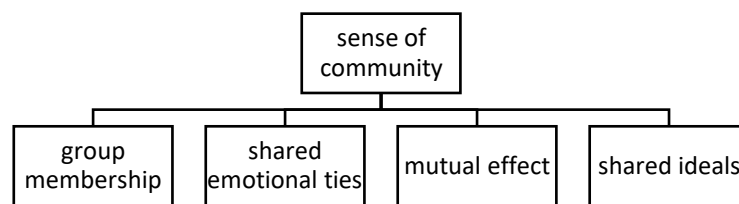

Fig. 1. Four characteristics among community members [9].

A sense of community (SOC), defined by [9], is the belief that each group member is essential to the success of the group and that their demands will be met because of their devotion to one another. Two distinct writers— [11], [12]—define the sense of community. According to [11], it is the attitudes that members of a community have about each other and the neighborhood. It was described by [12] as the sense of community and group identification that was formed via meaningful contacts with others. Only a few of the impacts at the neighborhood level that a vibrant neighbor community has been associated with include a fear of crime, community participation, and greater collective resilience [13].

In today's fast-paced environment, people usually prioritise their own goals and professional objectives over forging bonds with others around them. However, creating a sense of community in a community has several advantages that both a person and the community may enjoy. For instance, studies show that communities with a strong sense of community frequently have fewer crime rates and better security measures. A sense of community may also improve a person's mental and physical health. People who have strong relationships to their community are more likely to vote, recycle, assist others, and give [14] because these connections make them feel at home. Strong social links promote empathy, self-assurance, and fulfilment [15]. According to different research [16], [17] the basic requirements of the complex are satisfied, there is safety and security because of the family's continuing existence, and there are high-quality public and green spaces. By taking part in neighborhood events, volunteering their time to neighborhood organizations, and mingling with their neighbors, individuals may forge links and build a strong feeling of community. By performing something to benefit themselves and those around them, people may contribute to the creation of a comfortable and secure environment. In developing nations like Malaysia, there are now many housing developments being built. Given the importance of the local community's sense of community, which provides numerous benefits, this study is essential to developing a community which is both psychologically and physically healthy.

Neighbourhood built environment (NBE) factor and variables.

To get a response to the question on which aspect is current and requires examination in the most recent research. Next, a thorough analysis of the physical variables affecting SOC will be provided. According to the study, there are a variety of physical elements that influence the Sense of community (SOC). Among the well-known are [18][16], [18], [19] and more researchers. To determine the proper physical components for this study, various theories and physical factors in related theories should be mentioned first, followed by a study of the similarities between all of them. This section discusses the neighbourhood-built environment categorise that impacts the sense of community.

As stated by New Urbanist planning ideas [19], The way streets separate and connect a neighbourhood has an impact on the movements of people and activities inside that area, and one of its primary goals is to improve the sense of community [20]. [19] illustrates these concepts by showing how each of the four areas influences residents' feelings of community. By feeling at home (community attachment), connecting with others (social interaction), feeling a part of the community (community identity), and having access to local exploration (pedestrianism), residents can foster a stronger sense of community and [19] have disclosed that with physical features of the built environment contains both built environment variables (transport, safety and danger, overcrowding and privacy) and physical qualities (danger, crowdedness, privacy, and crowdedness). In their research, [19] looked at the impact of a total of seventeen (17) different physical features on people's feelings of belonging in a community. Residential density, lakes and greens paths, distance between sidewalks and homes are the first three variables. The 4th to the last variable being architectural style, continued with block size, clubhouse/recreational facilities, overall layout, street trees and landscaping the overall size, the arrangement of houses, street width, location of the garage, on-street parking, lot size, mixture of housing types, overall design quality of houses and finally, the street's layout.

[18] used three (3) main factors namely Aesthetics, Streets and services, and Buildings as shown in Fig. 2. Major attractions, aesthetic pleasantness, artists' involvement in building detailing, harmony, architectural style, and regional and distinctive features are some of the physical aspects that fall under the category of aesthetics. Streets and services, the second major factor, also has a few specific components, including a mixed-use neighbourhood, community services, accessibility, public parking, public transportation, walkable streets, activities like street vendors and squares, parks, services, and shops, as well as recreation. Other factors include the duration of residence, the availability of affordable housing, the building line, window sizes and solid-to-void ratios, the building frontage, human scale in high-rise buildings, and lower floors that are visually separated from the upper floors fall under the category of buildings. [21] applied the five (5) physical factors to examine the impact of urban form on community sustainability. Local stores are the most important component, followed by the length of shoreline in each neighbourhood, the prevalence of automobiles, the size of the housing size, and finally, residing in historic structures.
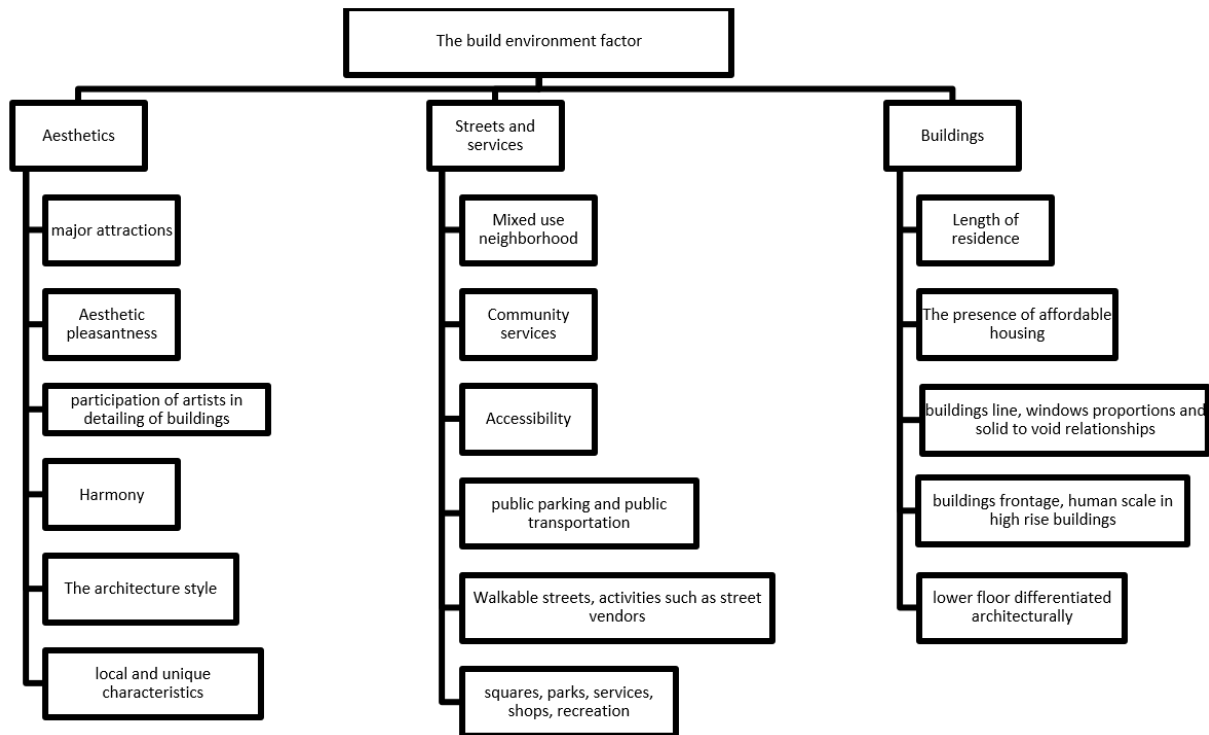
Fig. 2. The build environment factor. Adapted from [18]

There are some similarities among the researchers cited after examining several physical parameters that have an impact on SOC from various experts. To describe the similarity of related physical characteristics, [19] list of the major physical factors are employed. It was also chosen because the study by [19] listed seventeen (17) physical characteristics, the highest number among comparable studies.

Despite the surge in publications on the subject, no study article has addressed the most recent changes in the built environment's impact on community sense. The literature that addresses this issue from 2017 to 2023 will be highlighted in this article due to the significance that the built environment has on a sense of community. It also tries to address the following query:

RQ 1. Which physical aspects have the most influence and how many factors are still important that impact to the sense of community to adapt at this moment?

MATERIALS AND METHODS

The approach of this study utilises a theme analysis procedure in a literature review, leading to the name "thematic review" using ATLAS.ti 8 as the tool, as described by [22]. [23] define thematic analysis as the process of detecting patterns and developing themes and neighbourhood-built environment factors through extensive reading on the issue. The next stage is to determine the pattern and create a category to comprehend the trend of the built environment that influences the development of the sense of community in the country. The research tenets are to assess and interpret the data to recommend further research on the built environment that effects the subject's sense of community. The literature was chosen based on several criteria, including: 1) publication between 2017 and 2023; and 2) include at least one term (s) related to community, neighbourhood, and built environment.

Table 1. Search strings from Scopus and Mendeley

SCOP US	(*"sense of community"* AND *"neighbourhood"* AND *"built environment"*) AND (LIMIT-TO (SUBJAREA , *"SOCI"*) OR LIMIT-TO (SUBJAREA , *"ENVI"*) OR LIMIT-TO (SUBJAREA , *"ENGI"*) OR LIMIT-TO (SUBJAREA , *"ARTS"*) OR LIMIT-TO (SUBJAREA , *"PSYC"*)) AND (LIMIT-TO (PUBYEAR , *2023*) OR LIMIT-TO (PUBYEAR , *2022*) OR LIMIT-TO (PUBYEAR , *2021*) OR LIMIT-TO (PUBYEAR , *2020*) OR LIMIT-TO (PUBYEAR , *2019*) OR LIMIT-TO (PUBYEAR , *2018*) OR LIMIT-TO (PUBYEAR , *2017*))	25 results
WoS	"Sense of community" AND "neighbourhood" AND "built environment" (All Fields) and 2017 or 2018 or 2019 or 2020 or 2021 or 2022 or 2023 (Publication Years)	25 results

The literature search was conducted in the areas of Sense of community" AND "neighbourhood" AND "built environment". 25 items from (SCOPUS) and 25 papers from (Web of Science) surfaced in the initial search. However, 7 articles were omitted because they provided erroneous conclusions and anecdotes, or they failed to address neighbourhood, built environment, and community sense.It was also discovered that several of the articles were overlapped, had broken links, or were either incomplete or unavailable in their entirety. The final paper to be reviewed has been reduced to 25 articles (table 1) due to the incomplete information. The main papers for the articles were uploaded to ATLAS.ti 8, and each paper was then categorised by 1) author; 2) issue number; 3) periodical, 4) publisher, 5) volume and 6) year of publication. By doing this, it will be possible to study the articles according to the year in which they were written and determine how the discussions have changed over time. The quantity of selected articles may be thoroughly analysed in this way using the suggested method. By categorising the study's country, number of yearly studies, word cloud to filter the most frequently used terms, and in-depth analysis of the topic or primary subject area, NBE that affects SOC, there are 25 final documents in ATLAS.ti 8, which represents the total number of articles that were finalised. Refer to Fig. 3.
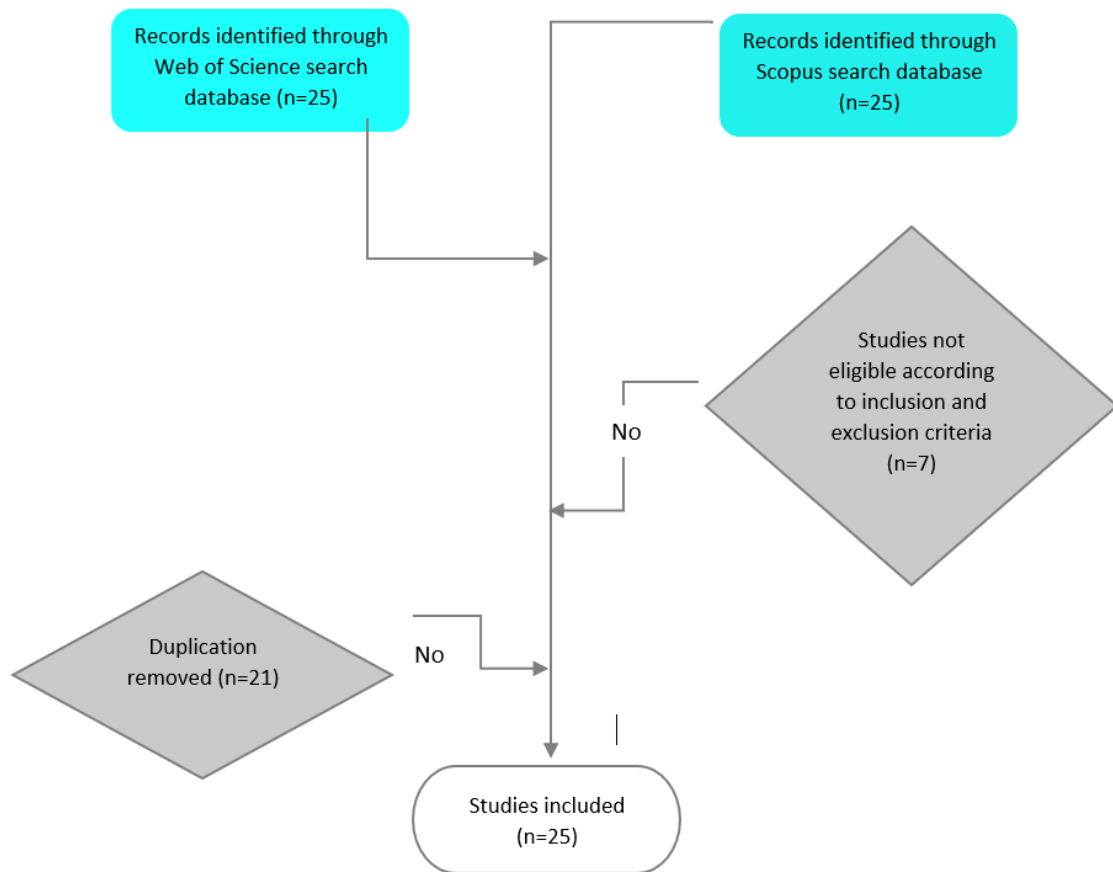
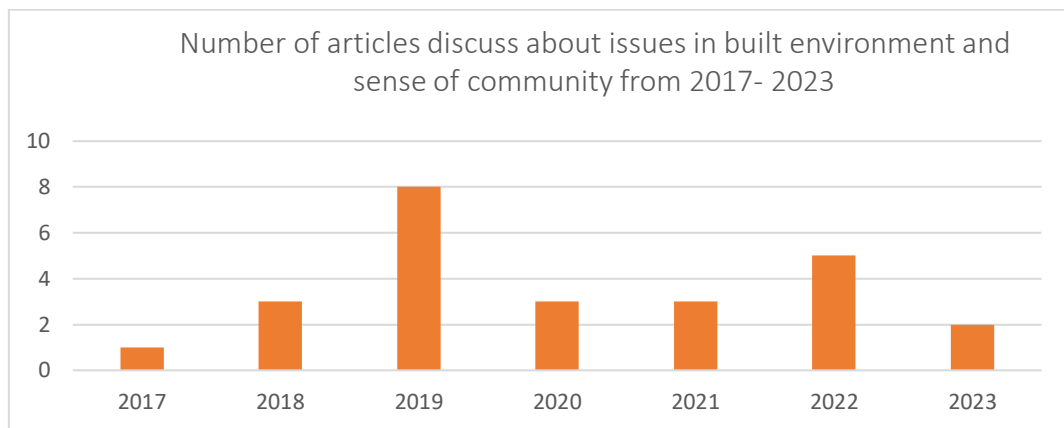**Fig. 3.** Inclusion and Exclusion criteria in the thematic review

Fig. 4. Paper breakdown according to the year of publication.

Fig. 5. Metadata generated in ATLAS.ti 8.

Results and Discussions

There are two categories of results: quantitative and qualitative. Based on a study of 25 documents in the primary document, the quantitative section resulted in the word cloud below. 'Community' and 'social' are words that appear often throughout the article, as shown by the word cloud's biggest word. As was stated in the outset, the focus of this study is the built environment of the area, which influences the sense of community.

Despite the growing tendency, no review study has yet discussed how neighbourhood-built environments affect a sense of community. Data collection, preparation, and interpretation of the findings are outlined in a study protocol that follows a logical flow based on prior research. According to the study of the word cloud, the term "community" is used 2253 times, followed by the word "social" at 1712 times, while cities and health are referenced 1039 times and 872 times, respectively (refer Fig. 6). Over time, trends from publications have increased. Since there were only one papers published in 2017 and three in 2018, there has been a noticeable growth, with 8 articles published in 2019, compared to just 3 articles in 2020 and 2021, 5 articles in 2022, and just 2 articles this year (refer Fig. 7). The primary goal of this study's literature review, which began in 2017, is to concentrate on the most recent articles from the last 5–6 years and to determine the trend for the year 2023. Because of its concentration on search strings, indexes, and exclusion criteria, the author wishes to underline that this study does not appear to be limited or exhaustive. The author, on the other hand, claims that it is based on the research question and represents the literature.
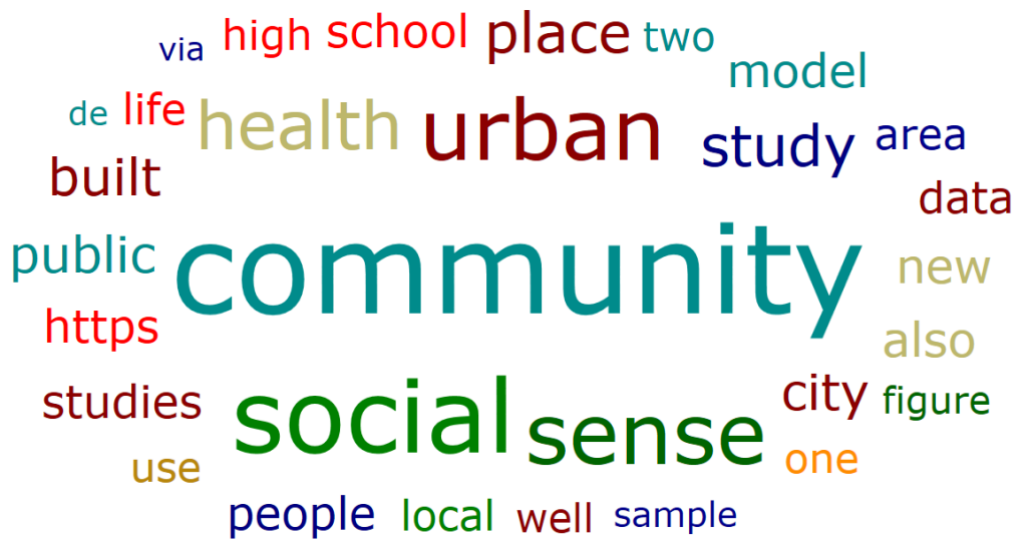
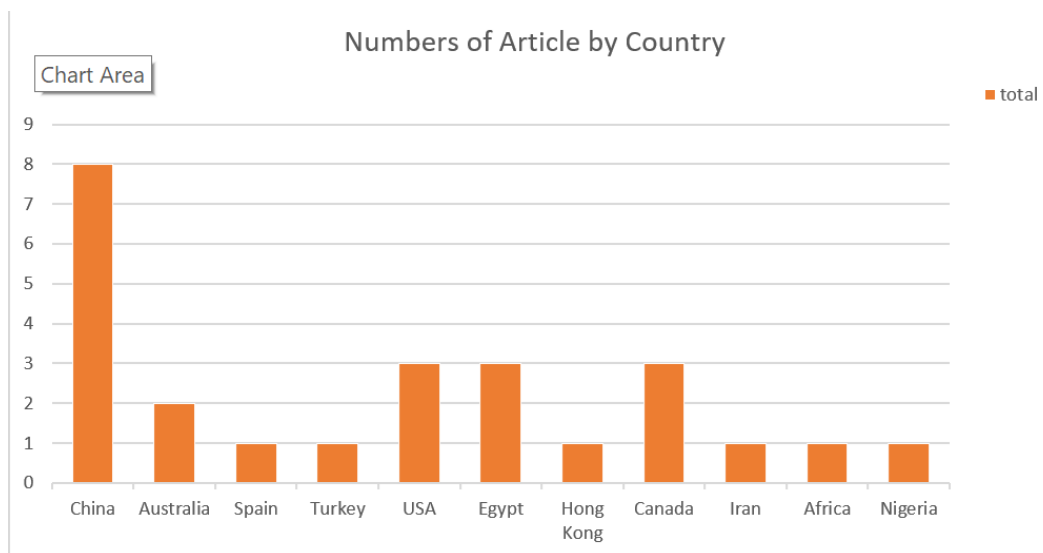**Fig. 6.** Word cloud generated from 25 articles.

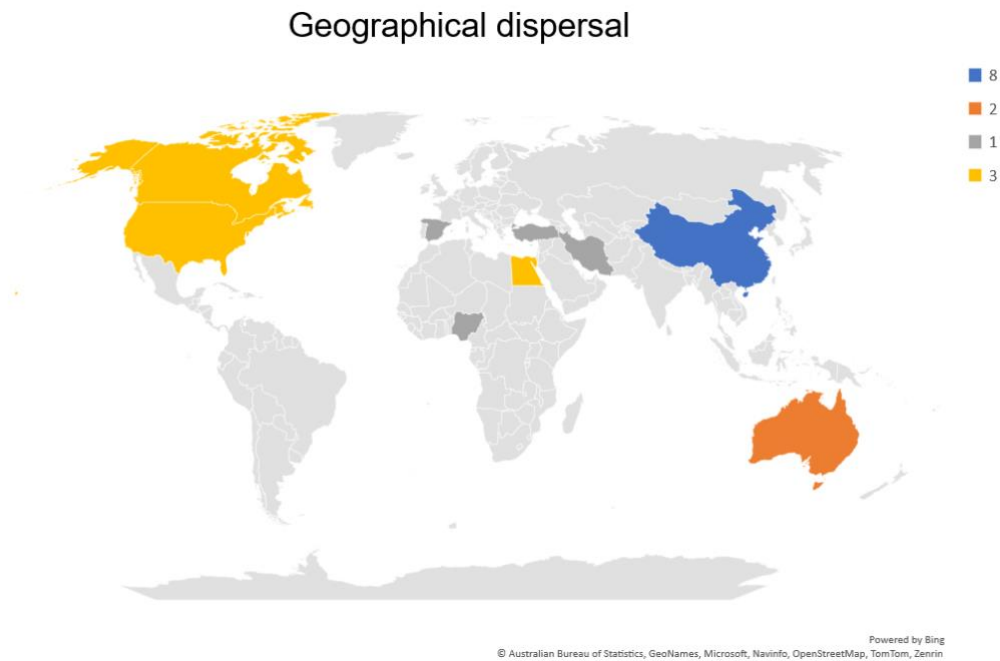**Fig. 7.** Numbers of articles based on country published.

Fig. 8. Location and number of articles based on country published.

a) Quantitative results

The results given below suggest that the built environment, which influences the sense of community, influences a variety of journal choices. As previously indicated, if the only term used in this search is "Neighbourhood Built Environment," the number of articles found will be in the thousands. The findings, however, indicate a considerable and more concentrated decline when narrowing the search phrase to "sense of community" AND "neighbourhood" AND "built environment", demonstrating that the topic is still novel and needs further research. However, the rising attention indicates that the phrases "sense of community," "neighbourhood," and "built environment" have become more popular. The article's development, as shown in the accompanying diagram, may provide evidence of this, see Table 1.

The most recent publications in this field of research are primarily published in China shown in Fig. 7 and Fig. 8. [24] stated that specialists in urban planning and public health, walkable neighbourhoods are a good way to promote active lives, and he investigates the effect of attitudes and perceptions on walking in Beijing's historical area. Although there is little evidence for non-major Chinese cities, the built environment of the neighbourhood may have an impact on residents' recreational activities [25]. The cross-community variances have not yet been thoroughly clarified, according to [26], he pointed out that the current conceptual framework is primarily concerned with investigating the direct effects of personal characteristics on sense of community. In Guangzhou, China, the contentment of home-owners and their willingness to relocate were examined in three different urban areas by [27] while [28] mention that urban policy-makers and planners are becoming more aware of the possibility that urban greenery could improve citizens' quality of life in high-density cities by lessening the consequences of congested settings. [29] concentrated on the perceived environment in the study while also considering mediating influences such as neighbourhood social interaction and location satisfaction.

One of the documents that drew our interest was a study in Egypt. Three related studies— [18]—examine the built environment, social circumstances, and historical context of the places that have an impact on how our society feels, while [30] research focuses on analysing how

citizen empowerment and participatory mapping might improve the planning process and in an effort to establish a link between neighbourhood sense of community and several variables, including the physical surroundings, cultural environment, and socioeconomic elements in three specific regions, [31] undertakes an investigation. Three studies in the USA are more concentrated on neighbourhood design that impacts the physical activity studied by [32][33], while [34] study on urban landscape impacts the sense of community. Three articles from Canada namely [35]–[37] study physical activity that impacts neighbourhood design and becomes the most discussed issue among all the scholars from various countries.

b) Qualitative results

To address the research question in the qualitative parts, this study will investigate current trends pertaining to build environment components that affect a sense of community in great detail. The five main criteria are determined by the article's directions and topic. The themes below were drawn from several publications: neighbourhood (12); urban landscape (6); physical quality (3); Planning Policy (2); and architectural design (2) as shown in Fig. 10. In the next section, it will be discussed about the main physical factors that affect SOC and SOC factors that are affected by NBE in answering the research question on the current trends in the built environment is are that impacts the sense of community.

i) Neighbourhood.

From the study, it can be concluded that five main physical neighbourhood characteristics impact the SOC which are neighbourhood (12); urban landscape (6); physical quality (3); Planning Policy (2); and architectural design (2) as shown in Fig. 10. [38] research focuses on how local market squares in rural South-West Nigeria affect social development principles including the sense of community. The study's physical criteria included economic, social, and aesthetic criteria. The latter included aesthetic elements like beautification and green space as well as social criteria like games, sports, nature, relaxation, and sightseeing. Along with cultural heritage-based values like historical, festival, and ritual events, he also used religious-based activities like prayer areas, convention centres, and retreat programmes. He also made use of areas for community service. Subsequently, [37] examine the effectiveness of a single-item test to measure someone's sense of community connectedness in capturing the complexity of the main idea. He used the density of the population, respondent's type of residence, views of neighbourhood issues and crime, and facilities nearby to measure the Social Capital, Neighbourhood Characteristics, and Rootedness in the studies. Using three different neighbourhood designs, while statistically adjusting for socioeconomic characteristics and neighbourhood decision-making factors, the correlation between levels of weekly transportation and leisure physical activity was examined by [35]. He evaluated factors such as the layout of neighbourhoods (grids, modified grids, and curves), accessibility to highways or major roads, proximity to town centres, places of employment, schools, or other services, recreational facilities, street aesthetic appeal, street cleanliness, the quality of leisure infrastructure, green spaces, and tracks, as well as a variety of housing options. [32] mention a straightforward but overlooked measure, that shows how the built environment of the neighbourhood is connected to an emotional experience of community, is kids playing.

On the other hand, [30] research focuses on analysing how citizen empowerment and participatory mapping might improve the planning process. Consequently, it is an effort to assess the social and spatial experiences of the neighbourhood to look at the relationship between those activities, their perception of the built environment, and their sense of community. In this study, [31] make an effort to establish a link between a neighbourhood's sense of community and a number of criteria, including the geographical surrounds, cultural

context, and socioeconomic elements in three particular places. Research from [39] examined the connection between parents' motivations for picking a neighbourhood to reside in and their teens' physical activity and [29] concentrated on the perceived environment in the study while also considering mediating influences such neighbourhood social interaction and location satisfaction.

Up to twelve researchers address the topic or primary physical component that is a study connected to NBE that impacts the SOC in this neighbourhood as a reference to Fig. 10. It is the study's most tangible aspect. It also demonstrates that this element has recently taken centre stage in study, and that further, deep research is needed.
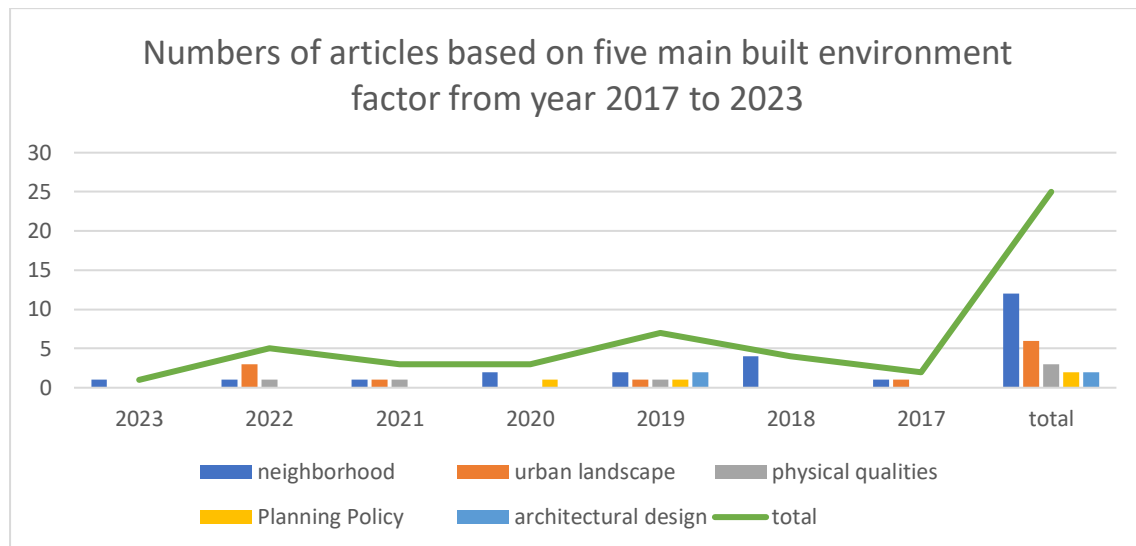

Fig. 9. The number of articles is based on five main build environment factors that impact the sense of community from the year 2017 to 2023.
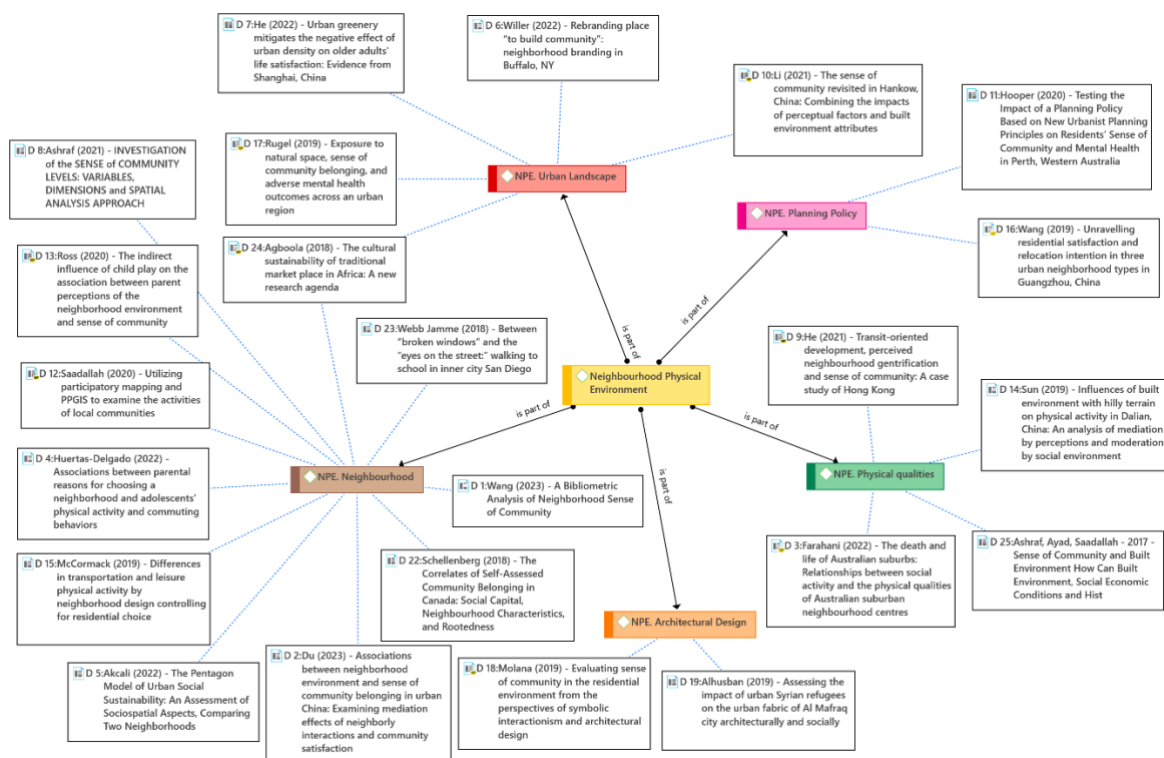
Fig. 10. The overall thematic review formulation on the neighbourhood-built environment that impact the SOC.
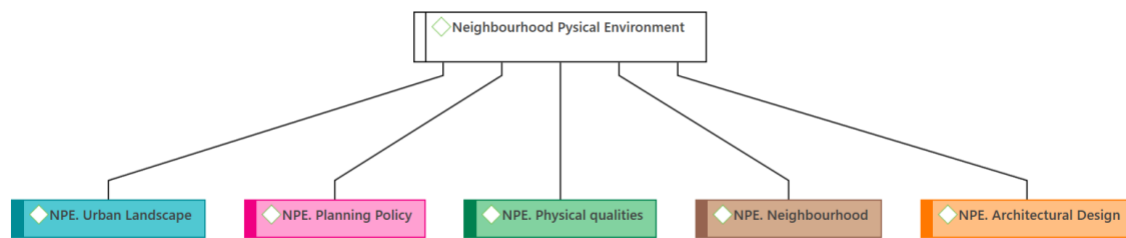

Fig. 11. Neighbourhood Built environment factor theme based on the study.

ii) Urban Landscape.

Six out of the twenty-five articles in this study, or the urban landscape, represent the second-largest physical element as shown in Fig. 9. Adolescents' sense of community is linked to positive experiences in public open spaces such as playgrounds and general peer social well-being [40] while natural greenery, such as street trees and parks, and blue areas, such as oceans and rivers, are characteristics of urban design that assist in alleviating these demands and building social capital, according to [36]. According to [26], the present conceptual framework is primarily concerned with investigating the immediate effects of personal characteristics on the sense of community. He measured a variety of physical aspects in this study, such as municipal amenities, food, shopping, and daily services, as well as sports and leisure facilities. While [28] state that urban policymakers and planners are becoming more aware that urban greenery may help residents of high-density cities enjoy an imrpoved quality of life by mitigating the negative consequences of congested settings. [34] investigates the suburban community's decline. It specifically examines how toponym changes affect the urban landscape and sense of community. Finally Through the identification of five dimensions which are person, place, people, perception, and process for the research Accessibility, social infrastructure, open spaces, and places for routine operations are some of the physical metrics taken into account in the place factor, according to Akcali and Cahantimur's pentagon model for urban social sustainability published in 2022 [41] also taking into consideration the factor of urban design, building type, density, mixed land use, and centre quality. Most of the studies indicate that people who place a high value on their green or open spaces report greater social networks, better social interactions, and increased safety and security.

iii) Physical Qualities

For the third element, physical attributes, [25], [42]–[44] are the primary factors for researchers as shown in Fig. 10. [18] used three (3) main factors namely Aesthetics, Streets and services, and Buildings. Major attractions, aesthetic pleasantness, artists' involvement in building detailing, harmony, architectural style, and regional and distinctive features are some of the physical aspects that fall under the category of aesthetics. Housing density, land use mix, street link, and accessibility are the physical variables employed in [45] study as metrics. [42] investigate whether transit-oriented development strengthens or lowers its sense of community. Based on public opinions, [42] examined the ties between the existence of an urban train system, the thought of neighbourhood gentrification, and the sense of community while [46] study 2022 focused to ascertain how social activities in a quickly expanding suburban neighbourhood centre relate to the built environment's physical properties. Observations of behaviour, a range of building typologies and uses, mobility and accessibility, perceptions of safety and security, population density, and physical spatial quality were all measured

(particularly landscape, size, and café culture). Although this topic of physical attributes has been chosen, it also encompasses all existing high-quality built settings, such as urban landscape, neighbourhood, and architectural design. In general, the neighbourhood's physical condition can be beneficial to encouraging interactions with others and group activities.

iv) Planning Policies.

The physical design and layout of cities and neighbourhoods, according to conventional town planning theories, may promote social interactions, neighbourhood links, and a sense of community. Buildings, lots, blocks, cities, regions, neighbourhoods, districts, and corridors may benefit from new urbanism design concepts [5]. [47] stated that there is growing concern that the constructed form created by typical suburban architecture may be detrimental to its residents' psychological health, sense of community, and social well-being.This study investigates the assertion that suburban neighbourhood development in Perth, Western Australia, was designed using New Urbanist-inspired planning concepts. The indicators used include Community Design, Movement Networks, Lot Layout, and Public Parkland. [27] work seeks to fill this gap by offering an updated and comprehensive analysis of inner-city relocation and by revealing the complex relationships and processes between residential satisfaction and resettlement against a backdrop of overall residential inequality. In summary, implementing neo-traditional neighbourhood design principles or wise planning helps a neighbourhood promote a strong feeling of community and mental wellness. Fig. 10 showed the author discussing Planning Policy in their studies.

v) Architectural design

Designing buildings in a way that encourages occupants to leave their homes and into public places promotes social interaction [48]. People are more likely to be satisfied with their area and have a stronger feeling of community when they see outstanding accessibility, walkable street quality, beautiful architecture, and tranquil surroundings [29]. Two researchers focus on architectural design as a built environment factor for their studies which is [17], [49][17], [49]. The built environment, which includes urban planning, built environment, and architecture and their surroundings, affects how people act and interact with one another [17] and a physical component was used in the study to measure design elements like the use of colour, weights, signs and street art, balcony areas, decoration of windows and displays, architecture, size, and repair standards, as well as other decorative situations that deviate from standard practises [49]. Finally, merging the research domains of urban sociologists, community psychologists, and architects through symbolic interactionist ideas may be an advantageous method for looking at the aspects influencing the feeling of community and larger urban dynamics.

A proposed conceptual framework for the neighbourhood-built environment that impacts the sense of community.

To continue the field's information development, the theme review generates recommendations for new research. These propositions are demonstrated by reading, analysing, and defining research in accordance with the conceptual framework in Fig. 12. Using neighbourhood-built environment main variables as a measure that impacts the sense of community.

1) Neighbourhood factors are associated with physical activity, community satisfaction, sense of community, perceptual factors, and community belonging.
2) Community satisfaction, a sense of community, and perceptual factor are all correlated with urban landscape features.

3) Physical quality factors are connected to physical activity and a sense of community.
4) A sense of community and a sense of belonging to the community are related to planning policy factors.
5) Architectural Design factors are associated with community belonging.
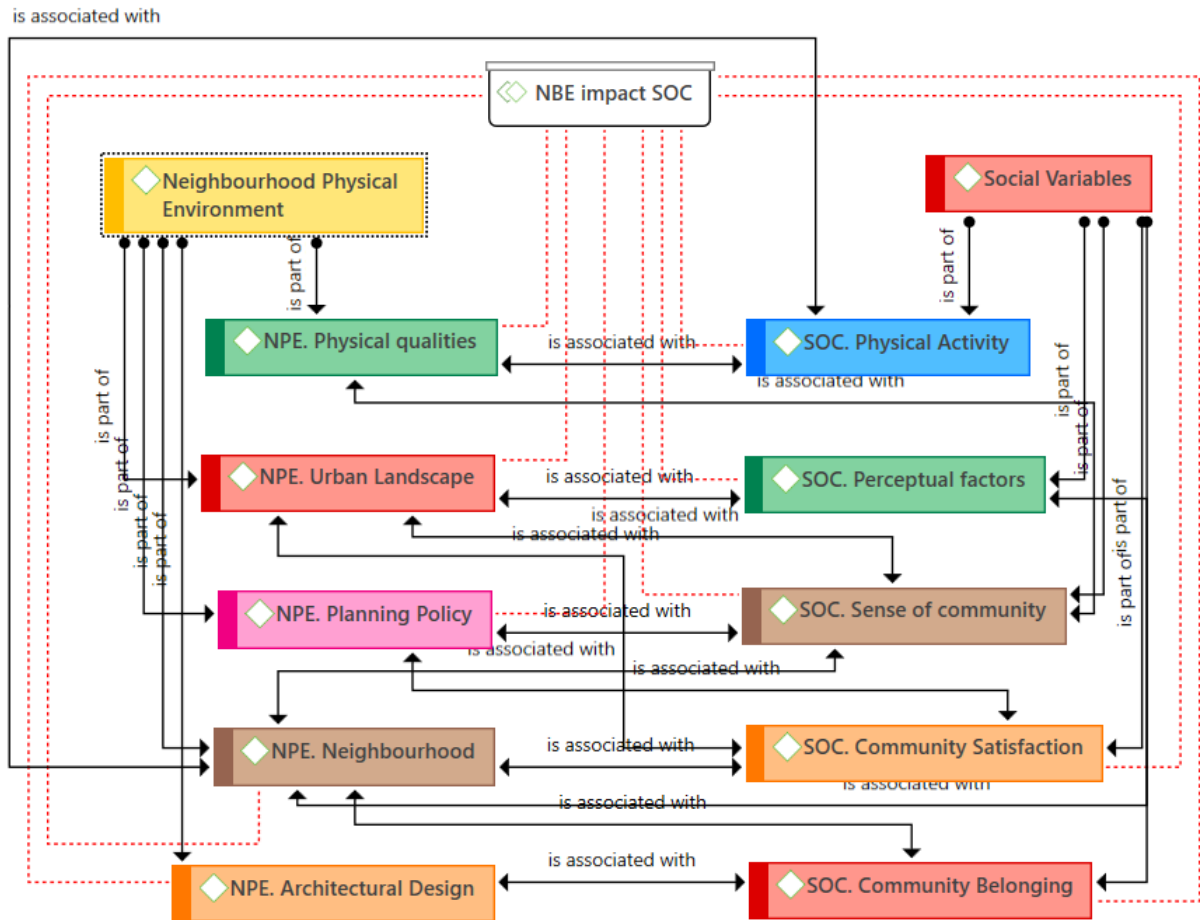
Fig. 12. Proposed conceptual framework of the neighbourhood-built environment that impacts the sense of community.

A description of the author, the physical aspects of the neighbourhood-built environment, and the influence on social and SoC are translated into a table based on the whole study mentioned above as per Table 2.

Table 2. Comparison and compilation from various Author on Physical Environment elements that impact SOC that are similar according to Kim and Kaplan (2004) 17 physical factors.

No	Source	Neighborhood Built Environment factor	activity	Sense of Community (SoC)

1	Ashraf, Ayad, & Saadallah (2017)	Built environment	Overall SoC	sense of community
2	Agboola et al. (2017)	public open spaces	adolescents' sense of community	SoC
3	Agboola et al. (2018)	market squares	Community attachment	social development
4	Schellenberg et al. (2018)	density of the population, respondent's type of residence	Social Capital, Neighbourhood Characteristics, and Rootedness	SoC
5	McCormack et al. (2019)	town centres, workplaces, schools, shops, or services, recreational facilities, street aesthetic appeal, street a clean environment, housing, and the leisurely infrastructure, green spaces, and tracks	leisure physical activity	SoC
6	Rugel et al. (2019)	natural greenery	boost social capital	SoC
7	Sun et al. (2019)	Housing density, land use mix, street link, and accessibility	Physical activity	SoC
8	Wang et al. (2019)	resettlement	residential satisfaction	SoC
9	Alhusban et al. (2019)	urban planning, built environment, and architecture and their surroundings	people act and interact with one another	SoC
10	Molana & Adams (2019)	use of colour, weights, signs and street art, balcony areas, decoration of windows and displays, architecture, size, and repair standards, as well as other decorative	Community identity	SoC
11	[50] [51]	diverse architecture, and green spaces	higher levels of social cohesion and	SoC

			community participation	
12	Ross et al. (2020)	built environment of the neighbourhood	emotional experience of community, is kids playing	SoC
13	Saadallah's (2020)	built environment	sense of community	SoC
14	Hooper et al. (2020)	traditional suburban architecture	social well-being, sense of community, and psychological wellness	SoC
15	Ashraf et al. (2021)	physical surroundings, cultural setting, and socioeconomic features	neighbourhood sense of community	SoC
16	He et al. (2021)	transit-oriented development	Community attachment	SoC
17	D. He et al. (2022)	urban greenery	higher quality of life	SoC
18	Willer (2022)	urban landscape	Community attachment	SoC
19	Akcali & Cahantimur (2022)	social infrastructure, open spaces, and locations	social networks, better social interactions, and increased safety and security	SoC
20	Farahani et al. (2022)	building typology, perceptions of safety and security, population density, and physical spatial quality	social activities	SoC
21	(Du et al., 2023)	view excellent accessibility, walkable street quality, beautiful architecture, and calm surroundings	Community attachment, Community identity, social interaction, Pedestrianism	stronger sense of community

Table 3. Chart show the total number of physical environment elements used by different studies from different authors and years based on Physical environment that impact the SOC.

source / Kim & Kaplan (2004)	Farahani & Lozanovska, 2014 (2014)	(French et al., 2014) (2014)	Ashraf et al., 2017 (2017)	Agboola (2018)	Webb Jamme (2018)	Schellenberg (2018)	Kujawski (2019)	Alhusban (2019)	Molana (2019)	Rugel (2019)	McCormack (2019)	Sun (2019)	Ross (2020)	Saadallah (2020)	Hooper (2020)	Li (2021)	Ashraf (2021)	He (2022)	Akcali (2022)	Huertas-Delgado (2022)	Farahani (2022)	Du (2023)	total	Ranking
Neighbourhood places																								
club house/ recreational facilities	1		1	1		1			1		1		1	1		1	1		1	1		1	13	1
Planning Strategies																								
residential density	1	1				1					1						1	1		1	1		8	5
distance between sidewalk and home	1	1	1					1										1		1			6	6
mix of housing types	1	1	1												1								4	7
overall layout		1				1			1										1		1		5	6
street layout	1	1	1			1					1	1						1	1		1	1	10	4
overall size									1														1	
on-street parking																							0	
lot size																							0	
arrangement of houses																							0	
Urban Landscape																								
lakes, greens paths	1		1	1					1		1		1			1		1		1	1		10	3
street trees, landscaping	1	1		1					1	1						1		1				1	8	9
street width	1																						1	
Architectural design and physical quality																								
architectural style		1	1	1				1	1			1					1		1	1	1		10	2
																							0	
overall design quality of houses		1	1					1															3	10
block size		1																			1		2	11
garage location																							0	
	8	7	9	4	0	4	0	2	6	2	3	2	3	1	1	3	2	5	5	4	5	5		

Based on the Table 2 and

Table 3, the physical features that were most found to contribute to a sense of community were club house or recreational facilities, architectural style, residential density, street layout, lakes and green paths, overall layout, mix of housing types, distance between sidewalk and home, street trees, and landscaping. On the other hand, overall size, on-street parking, lot size, arrangement of houses, garage location, and street width were the physical features that were least commonly found to contribute to a sense of community.

The total number of physical features identified was 81, with 22 unique sources across a range of years 2014 to 2023. The physical features were identified from a variety of sources, including academic articles, planning documents, and design standards.

In conclusion, these findings suggest that the physical design of a community can have a significant impact on the sense of community felt by its residents. By prioritizing the physical features that are most strongly associated with a sense of community, designers and planners can create more vibrant and cohesive communities.

Variables from the study.

We discovered that there are numerous formulations as follows based on the 17 physical factors from Kim & Kaplan 2004 and utilised as a reference for research from other sources that also employ physical factors that impact SOC.

We discover some physical characteristics that are the most to the least important from various studies in the table above. The most physical aspect recreational facilities factor which has a total of thirteen (13) as per used by [17], [30]–[32], [35], [37], [38], [41], [44], [52][19], [53]. The second most physical factor is architecture style similarly, which is used by 10 researchers [17], [31], [32], [38], [41], [43], [44], [49], [54][19] Similarly used from the third to furth physical criteria 10 times each, roadway design, and lake and garden paths. Eight researchers

utilised this study, and street and landscape trees were the sixth most frequently used while residential density is ranked as the fifth significant physical factor affecting SOC by eight (8) scholars. Six researchers utilised the distance from the house to the pavement for this study, placing it in seventh position. Overall layout, mixed of housing type, overall design quality of house and block size are ranked from eight to eleven.

Residents' sense of community has been proven to be affected by the establishment and upkeep of recreational amenities in neighbourhoods. According to research, an individual's engagement with the local community is positively connected with the physical closeness to community resources, especially recreational facilities [55].

Additionally, the availability of green spaces and recreational amenities has been highlighted as key components in creating a feeling of identity and belonging within communities [56]. According to research, providing community amenities encourages individuals to walk more [57].

Gardens, lakes, and parks in public places have a huge influence on the sense of community in a neighbourhood or city. They serve as a gathering place for people to socialise, relax, and participate in leisure activities. Those who use public green areas daily get several health benefits. Exposure to nature has been found in studies to reduce stress and anxiety, increase mood, and stimulate physical activity. Time spent in green places can also help to decrease blood pressure, enhance cardiovascular health, and increase the immune system [58]. Opportunities for social contact and community development are provided by public green areas. They serve as a gathering place for individuals of all backgrounds to interact and take part in leisure activities. People can meet one other, become acquaintances, and develop connections in green settings [59]. Individuals and communities gain greatly from public green places such as gardens, lakes, and parks. They help physical and mental health, the environment, and can be economically beneficial. Furthermore, they contribute to the development of a sense of community by facilitating social contact, developing a sense of belonging, and encouraging civic involvement. Investing in public green areas is thus not only an investment in the environment, but also in the community.

The use of technology-mediated communication may also have an influence on people's feeling of community. Studies have shown, for instance, that while social media and other online platforms can help people in geographically dispersed communities connect and communicate, they may also cause a decline in face-to-face interaction, which is essential for creating and maintaining strong communal ties [60]. Hence, while planning infrastructure, public places, and communication platforms, it is crucial to take the density of a community into account and how it affects people's feeling of community.

The degree of social connectedness people feel inside a given group or community is referred to as a person's sense of community. People's feeling of community can be significantly impacted by a neighbourhood's density. According to research [61], high-density communities, such as those seen in urban regions, may cause a decline in social contact and lower levels of community cohesiveness. This is explained by elements like constrained physical space, greater competition for resources, and a lack of places for collective meeting. In contrast, low-density communities, such as rural areas or small towns, may promote higher levels of social interaction and a stronger sense of community because of things like larger physical space, greater accessibility to communal gathering spaces and resources, and a smaller population of people with whom to interact.

While one of the primary elements cited by research addressing the physical influence on SOC is the overall layout or planning of an area. The sense of community within a neighbourhood or development may be significantly impacted by developing a community-oriented layout design. A sense of community may be fostered among residents by incorporating features like

common spaces, pedestrian-friendly paths, and plenty of lounging spots. A sense of ownership over the place may be fostered and an atmosphere that really represents their wants and wishes can be created by incorporating community members in the planning and design process. Planning a neighbourhood layout is an important part of developing a cohesive and supportive community. Neighbourhoods may build a deeper sense of community by prioritising the needs and preferences of community members in layout design, eventually promoting better social cohesiveness and resilience over time. Additionally, while creating a neighbourhood layout, it is critical to consider elements such as accessibility and inclusion. These might involve including wheelchair ramps, accessible parking areas, and seats with backrests to accommodate those with impairments. The overall layout or planning of a community has a considerable influence on the residents' sense of community.

According to several academics, the most important component is a diversity of housing types. A mix of housing types can have a variety of effects on the sense of community. For example, it may foster a more varied community comprised of people from various backgrounds, socioeconomic levels, and ages. Because people have diverse experiences and viewpoints to offer, this variety may lead to a more active and interesting community.

Second, a variety of housing types can promote greater connection and socialising among community members. People are more likely to meet into each other when walking to and from their homes, or while enjoying shared amenities such as parks or community centres, in a neighbourhood with a mix of single-family homes, townhouses, and apartments. This can lead to more spontaneous encounters and sociability, which can contribute to the development of a stronger sense of community.

Finally, a diverse range of housing types might result in a more equal allocation of resources and services within a community. For example, in a neighbourhood with a variety of housing types, there may be a combination of public and private amenities available to all members of the community, such as parks, community centres, and libraries. This can contribute to the creation of a more balanced and just community in which everyone has access to the resources and services they require to prosper. Overall, a range of housing types may have a substantial influence on an urban area's sense of community by fostering a more diversified, sociable, and equal neighbourhood.

Researchers agreed that the overall design quality of houses constitutes a physical component. This illustrates that quality is a physical factor that affects SOC. The design quality of houses has a considerable impact on a neighbourhood's sense of community. It has an impact on how people view their living environment and interact with one another. Residents benefit from good design because it encourages social interaction and a sense of belonging. Homes with aesthetically appealing facades and well-designed exterior areas that are in tune with their surroundings provide a pleasant impression and a friendly mood. These elements encourage inhabitants to spend more time outside, participate in activities, and socialise with their neighbours. Poorly built houses, on the other hand, might have a negative impact on the sense of community. Homes that are physically unpleasant, have minimal outside space, and are not in harmony with their environment can cause people to feel isolated and disconnected. This might result in a lack of social engagement and a sense of alienation from the community. As a result, it is critical to examine the general architectural quality of houses in a neighbourhood to foster a sense of community. This may be accomplished by urging developers to incorporate communal spaces, green spaces, and outdoor facilities that promote social contact. Moreover, zoning and building laws can be implemented to guarantee that dwellings are created in harmony with their surroundings and contribute positively to the general beauty of the community. Finally, the general architectural quality of houses has a substantial influence on a neighbourhood's sense of community. Well-designed homes encourage social interaction and a sense of belonging, as well as contributing to the general beauty of the neighbourhood. To

stimulate social contact and a strong sense of belonging, it is therefore critical to consider the design quality of houses in any development plan.

Additionally, there is a physical component that Kim & Kaplan initially employed, which comprises overall size, on-street parking, lot size, layout of the home, and garage position. However, it is now used twice as often and is less frequently used until 2023.

Based on this investigation, it was discovered that from year 2014 to 2023, various physical variables were employed less frequently. Of the 17 physical factors used by Kim & Kaplan, only eleven have been applied thus far: club house/recreational facilities, residential density, distance between sidewalk and home, mix of housing types, overall layout, street layout, lakes, green paths, street trees, landscaping, architectural style, overall design quality of houses, and block size. The six additional physical variables which is total size, on-street parking, lot size, home layout, street width, and garage location were less often employed in research conducted between 2014 and 2023. In summary, this study concluded only eleven physical characteristics that are still often employed in current research as per Fig. 13.

Physical Character	Commonly used from 1995-2023	club house/ recreational facilities
		residential density
		distance between sidewalk and home
		mix of housing types
		overall layout
		street layout
		lakes, greens paths
		street trees, landscaping
		architectural style
		overall design quality of houses
		block size
	Less used from 1995-2023	overall size
		on-street parking
		lot size
		arrangement of houses
		street width
		garage location

Fig. 13. Neighbourhood physical character commonly used and less used based on Author study.

CONCLUSION

In this article, two methodologies from the 25-research reviewed in the study were used. The first portion, titled "Quantitative," centred on data that was statistically extrapolated from ATLAS.ti 8. Regardless of growing interest in the subject, there isn't a review paper that considers how the built environment affects a sense of community. According to Kim Kaplan's seventeen known physical factors, which were used to formulate the study's main question, "which physical aspects have the most influence and how many factors are still important that impact to the sense of community to adapt at this moment?" we can categorise the factors into five categories: neighbourhood, urban landscape, physical attributes, planning policy, and architectural design. Only eleven of the seventeen physical parameters proposed by Kim & Kaplan have been employed thus far: clubhouse/recreational amenities, residential density, the distance between the sidewalk and a home, the variety of housing types, the general layout of the street, lakes, greenways, street trees, landscaping, architectural style, the overall design quality of the homes, and block size. Less often used in studies between 2014 and 2023 were

the six additional physical factors total size, on-street parking, lot size, home layout, street width, and garage position.

Even though the nation is still growing there is still a chance to build a neighbourhood that will foster a feeling of community and benefit both the neighbourhood and the nation. Even though several physical components might impact SOC, the study must continue to uncover the most innovative and effective ones. On the qualitative, thematic side, it is additionally emphasised how important it is to describe how the neighborhood's built environment contributes to a sense of community that helps both the local community and society. Numerous articles advocate NBE to support the SOC approach and as a framework for describing how the implementation process works.

This article's primary contribution is a review of the research on how NBE affects SOC. The practical aim is to enhance or add additional NBE elements that influence SOC and benefit the local community. This article presents recent research that is crucial for understanding how NBE impacts SOC theory and how it is applied to the fields of physical planning, built environment, and social aspects. Consequently, it is essential to research the most recent NBE and SOC frameworks. To have a good effect on the neighbourhood, nevertheless, it must make clear how NBE and SOC are related by examining the theoretical framework to reduce its negative impact on neighbourhood social life. Knowing which physical elements most effectively influence SOC holistically is crucial to achieving a better result. It is intended that by applying the physical aspects of NBE to this SOC successfully, it will be possible to use it to develop a neighbourhood suitable for the surrounding region.

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