Article:
Qi, J. orcid.org/0000-0002-2002-1541, Mazumdar, S. and Vasconcelos, A.C. (2024) Understanding the relationship between urban public space and social cohesion: a systematic review. International Journal of Community Well-Being, 7 (2). pp. 155-212. ISSN 2524-5295

https://doi.org/10.1007/s42413-024-00204-5

International Journal of Community Well-Being
https://doi.org/10.1007/s42413-024-00204-5

OVERVIEW ARTICLE

Understanding the Relationship between Urban Public Space and Social Cohesion: A Systematic Review

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Received: 16 May 2023 / Accepted: 16 January 2024

Abstract

Public space serves as opportunities for everyday engagement including cultural activities and social interactions. The co-presence of diverse groups and activities is seen as an important building block of social cohesion. This review synthesised the empirical evidence to understand the relationship between public space and social cohesion. Databases searched included Scopus, Web of Science, and PubMed with the inclusion of peer reviewed articles published in English, between 2000 and 2023 (till 22nd February 2023). A total of 63 published studies were identified. A variety of physical aspects of different public spaces was found to potentially encourage social interaction and cohesion, i.e., accessibility, mixed land use, presence of street furniture, etc. Furthermore, such impact was found to be affected by a range of sociodemographic factors, for example ethnicity, age, and length of residence, and perceptual factors such as safety perception, visual perceptions, and place attachment. Overall, research exploring the relationship between public space and social cohesion has occurred within disciplinary silos, posing a significant challenge in conceptualising this relationship. The recognition of these findings bridges the research effort in understanding the social mechanism between people and space across research agendas including urban design and planning, sociology, environmental psychology, public health, and human geography. We describe future work in studying the intangible aspects of urban space in the directions of assessing the social performance of public space and devising interventions to promote social interaction and foster social cohesion.

Keywords Public space · Social interaction · Social cohesion · Sense of community · Place attachment · Systematic literature review

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Published online: 13 March 2024

Introduction

"Social cohesion", or "*Interdependence between members of society, shared loyalties and solidarity*", as defined by Durkheim (1893), has been considered as a desirable feature of a well-functioning society and often adopted as an instrument to address the social, physical, and economic challenges our contemporary cities face (Bauloz et al., 2019; Murphy, 2012). It is identified as the key construct that characterises the social environment in terms of interpersonal dynamics and/or collective efforts, which often relate to positive social interactions (Jennings & Bamkole, 2019). Research has substantiated the positive role of social cohesion on preserving strong and functional communities (Forrest & Kearns, 2001), promoting human health and wellbeing (Dash & Thilagam, 2022), the maintenance of a high quality of life (Paramita et al., 2021), and managing urban population growth and sustainability (Lloyd et al., 2016). With the COVID-19 pandemic testing the strength of community resilience across the local, regional, and national levels, social cohesion offers a promising direction towards indicating post-COVID-19 recovery in urban areas (Jewett et al., 2021). This context observed an increasing effort from the national governments in many countries to foster social cohesion, either through turning it into a policy priority (e.g., the EU Cohesion Policy (2021–2027)) or through developing public realm programmes (UNDP, 2022; European Commission, 2022; UN-Habitat, 2022).

There is a shared consensus that social cohesion can be promoted through urban design and planning mechanisms, e.g., new urbanism led neighbourhood design (Kim & Kaplan, 2004), public space design for contemporary urban life (Aelbrecht et al., 2021), and Jacobs' theory on vibrant city and social interaction (Brown & Lombard, 2014). The importance of urban public space in facilitating social cohesion has become even more evident since we continue to advance our understanding of the interplay between the physical and social factors in how they affect social cohesion (Lofland, 1998; Cattell et al., 2008; Mateo-Babiano, 2012). Public space serves as opportunities for everyday engagement including cultural activities and social interactions (Carmona, 2019; Mehta & Bosson, 2021). For example, neighbourhood commercial streets work as the venues for social interactions among residents and community engagement introduces a "feel-good" buzz and increases social capital in terms of improving urban vitality (Modie-Moroka et al., 2020; Lotfata & Ataöv, 2020). The in-between space adjacents to buildings and streets represents the important urban morphologies which affect social interactions occurring in different urban niches (Aelbrecht, 2016). The implication of physical co-presence and conviviality plays a fundamental role in increasing social capital and building community (Zhang & Lawson, 2009; Zordan et al., 2019). Meanwhile, the presence of public open spaces in the residential setting influences people's perceptions of the neighbourhood which in turn nurtures place attachment and their sense of community (Zhu, 2015; Soares et al., 2020).

Given the important role of public space in facilitating social cohesion, previous research has investigated the effects of public space (Cattell et al., 2008) and public space design (Aelbrecht & Stevens, 2019a, b) on specific domains of social

cohesion and how public behaviour evidences social cohesion (Wickes et al., 2019; Francis et al., 2012; Zhang & Lawson, 2009). However, there has been little attempt to link the association among physical characteristics of public space, social interaction in public space and social cohesion. In this systematic review, we aim to bridge this knowledge gap by illustrating the relationship between public space and social cohesion, the outcomes of this review make important contributions to the ongoing research effort in understanding how public space acts as a medium to facilitate social cohesion in response to various spatial and contextual conditions (Aelbrecht & Stevens, 2019a, b).

Specifically, the present systematic literature review aims to address the following research:

- RQ1: What kind of public spaces have been studied in relation to social cohesion?
- RQ2: What are the physical aspects of these spaces that are reported to promote social cohesion?
- RQ3: What conditioning factors affect the relationship between public space and social cohesion?
- RQ4: How has social interaction in public spaces been reported to facilitate social cohesion?

The remainder of this review article is structured as follows. First, we present an introduction to related work on studying the relations between public space and social cohesion (Sect. "Background and related work"). We discuss the methodology of the systematic literature review (Sect. "Methods"), followed by the results of the systematic literature review (SLR) through data extraction and synthesis (Sect. "Data Extraction and Synthesis"). Sect. "Findings and Implications" outlines the key findings and implications. The paper concludes with topical discussion emerged from the findings of our SLR and future work (Sect. "Discussion and Conclusions").

Background and Related Work

Defining Public Space

Most writers on public space choose to focus on what they view as the practice and theory of public space in what they see as the social function of public space, as Carmona (2010) notes: "*Urban public space shapes and is shaped by society*". In the literature, there have been various definitions of public space in relation to ownership, management, and functionality (Mehta, 2014). Table 1 serves to demonstrate the wide range of views around how public space has been discussed.

Many of the urban design scholars define public space by drawing upon the theory of place in which it is considered as the behaviour settings for everyday human activities (Del Aguila et al., 2019).Others consider public space as the focal points of public realm with different degrees of spatial control (Salaza & Wilxoc, 2013).

Table 1 Definitions of public space and their distinguishing emphases

Reference	Definitions of Public Space	Emphasis (as interpreted by reading the paper)
Mitchell and Staeheli (2009)	"*Public space is property open to public use. It can be privately or publicly owned.*"	Ownership
Carr et al. (1993)	"*Public spaces as open, publicly accessible places where people go for group or individual activities.*"	Functionality
Madanipour (1996)	"*Space that allows all the people to have access to it and the activities within it, which is controlled by a public agency, and which is provided and managed in the public interest.*"	Functionality, ownership, and management
Low and Smith (2006)	"*Public space is traditionally differentiated from private space in terms of rules of access, the source and nature of control over entry to a space, individual and collective behaviour sanctioned in specific spaces, and rules of use.*"	Management, ownership
Miller (2007)	"*We tend to think public spaces as having certain essential and obvious characteristics. We believe it is publicly owned, the opposite of private space. We believe it is open and accessible to everyone, where no one can be turned away. We imagine it as the setting for important civic events, where large groups of people come to celebrate, protests, and mourn. We see it as somehow part of democratic life – a place for speaking out and being heard.*"	Ownership and functionality
Parkinson (2013)	"*Spaces and places can have all, some, or just one of the features that we generally label public and yet therefore still be considered 'public space'.*"	Functionality
UN-Habitat (2018)	"*All places publicly owned or of public use, accessible and enjoyable by all for free and without profit motive.*"	Ownership

It is also suggested that the provisions of access to and use of public spaces have traditionally defined public space as places for social gathering (Dines et al., 2006; Carr et al., 1993). Drawing upon these varied definitions, public space is, therefore, understood to be the shared common ground of democracy and the spatial setting of the public sphere that allows for casual exchange and encounters among different race, ethnicity, and between locals and strangers (Madanipour, 2003). For the context of this review, our understanding of public spaces is "*publicly accessible places where people go for group or individual activities*" as defined by Carr (1992).

Emerging Typologies in Public Places

In addition to the traditional public space typologies such as public square, open space and urban street, the changing needs and demands of urban dwellers result in the emerging typologies of public spaces reflecting the contemporary public social life (Oldenberg, 2007; Pittaluga, 2020). Oldenberg (1989) coined the term "third places" to represent a generic destination that is outside of home and work where people go for individual and collective public social activities. The growing social role of "third places" has sparked an increasing interest in researching semi-public space / quasi-public space where private spaces that are conditionally made available to the public including commercial services and local facilities such as cafes, pubs, community centres, etc. (Hickman, 2013; Pratt, 2017; Williams & Hipp, 2019). "Third places" also can be found in the listed public space typologies suggested by the Charter of Public Space and the UN-habitat, namely, public facilities and public commercial spaces (UN-Habitat, 2015). Another prominent emerging typology of public spaces is the "fourth places" which identifies informal public spaces that are characterised with "in-betweenness" and conducive for diverse opportunities of social interactions (Aelbrecht, 2016). Despite Aelbrecht (2016) providing a normative view on the contemporary public settings for informal social interactions, other researchers explored this typology of public spaces using different terminologies such as "in-between spaces" (Can & Heath, 2016) and "transition spaces" (Pittaluga, 2020). The complexity of territory can be seen from informal public settings including buffer zone adjacent to buildings and open spaces, soft edges arounds streets, etc. (Pittaluga, 2020). More importantly, the spontaneous and temporary appropriation of the in-between spaces plays an important role to construct urbanity as well as to promote sense of belonging and social cohesion (Lara-Hernandez et al., 2019; Hajer & Reijndorp, 2001).

Understanding Social Cohesion

Social cohesion is seen as a desirable feature of a social entity but also faces the risk of deteriorating with societies worldwide undergoing rapid social and economic changes, i.e., economic disparities, social polarisation, etc. (Chan et al., 2006; Schiefer & van der Noll, 2017). There is a shared consensus among scholars on the lack of clear and consistent conceptualisation of social cohesion (Schiefer & van der Noll, 2017). However, Schiefer and van der Noll (2017) provided a comprehensive review on the

essentials of social cohesion by defining social cohesion with social relations, identification with the geographical unit, and orientation towards common good.

The meaning of social cohesion varies according to its context (Forrest & Kearns, 2001). This can be seen from recent attempts to characterise the impact of public space on social cohesion in the existing body of literature (Francis et al., 2012; Priest et al., 2014; Khalilin & Fallah, 2018; Liu et al., 2020). For example, for the residents of a multi-ethnic neighbourhood, local public spaces such as the shops, community centres help them build social relations and enhance their sense of community (Cattell et al., 2008). In a city with ethnically diverse population, the social encounters occurred in the public spaces located in city centre (especially in "fourth places" such as threshold spaces) facilitate social integration and community cohesion (Aelbrecht, 2016; Ganji & Rishbeth, 2020). In the context of urban streets located in town centre, the historical continuity of socio-spatial activities strengthens the sense of belonging experienced by its visitors and local communities (Lotfata & Ataöv, 2020). To the minority women user group, a public space that is attentive to women's convenience (including social needs, security requirements, cultural referneces) is crucial in constructing a sense of place and building social relations (Khalilin & Fallah, 2018; Ortiz et al., 2004). Therefore, further empirical research into the opportunities and constraints which reflect the motives and attitudes underlying citizens and communities' experiences in public space is necessary to understand social cohesion, i.e., matching public space provisions to social needs (based on sociodemographic characersitics), percieved safety issues, racial and gender based restrictions (Talen, 2000; Piekut & Valentine, 2017; Aelbrecht et al., 2021).

Previous SLRs on the Relationship between Public Space and Social Cohesion

Despite the hightened interests in the role of public space in achiveing social cohesion, it is claimed that the empirical evidence is still lacking due to the divergent foci among the social scientists, geographers, as well as urban designer theorists and practitioners (Aelbrecht, 2016). This study aims to systematically synthesise the existing literature in terms of offering a holistic understanding on the relationship between public space and social cohesion. We acknowledge three previous SLRs have been conducted (Dash & Thilagam, 2022; Wan et al., 2021; Mazumdar et al., 2018b) but highlight the limitations of these studies. Table 2 provides a summary of the previous SLRs, and their research limitations.

Reflecting the complex relationship between public space and social cohesion, previous SLRs point to a homogenisation in the classification of public space (Carmona, 2010), to the diversed conceptualisations of social cohesion (Schiefer & van der Noll, 2017), and to a positive stance towards the connection between social interaction and the spatial / physical characteristics of the public space (Aelbrecht, 2016). It is also true that much of the literature emanates from a narrow academic perspective, concentrating on specific types of public spaces, while not fully acknowledging the sheer diversity of contemporary urban public life (Aelbrecht et al., 2021). This diversity constitutes the embodied and relational experiences of social cohesion fostered by public spaces.

Table 2 Comparison of previous SLRs related to understanding the relations between public space and social cohesion

Comparison element	Research aim	Years of publication included	Number of primary studies	Research limitation
Dash and Thilagam (2022)	Identify the characteristics of open spaces with their major influential factors for enhancing social cohesion for the well-being of the elderly in an urban residential environment.	2011–2021	57	The research reports on the physical attributes of public spaces and the findings are limited to public open space and the elderly user groups.
Wan et al. (2021)	Identify the different aspects of urban green space that influence social cohesion; uncover the pathways between these aspects and social cohesion.	1997–2018	51	The study focuses on urban green space aspects that influence social cohesion and is limited in considering demographic factors.
Mazumdar et al. (2018b)	Summarise the aspects of built environment that related to social captial at various scales; clarify the relationships between these aspects of the built environment and the various components of social capital.	2003—2015	23	The research focuses on built environment that consists of multiple public spaces, i.e., streets, shops, parks, etc.
Our study	Understand the relationship between public space and social cohesion; identify the conditioning factors affect this relationship and the impacts of social interactions in public spaces on the embodied experiences of social cohesion they facilitate.	2000–2023	63	The review includes a vareity of conceptualisations and operationalisations of social cohesion, various metrics of public space, and different characteristics of social interaction.

Methods

The SLR has been conducted following the guide developed by Okoli (2015). This systematic approach was chosen because it offers a replicable, transparent, and rigourous methodological approach which is well suited to represent the best knolwedge needed for studying interdisciplinary research topics.

Search Strategy

A selection of keywords (Table 3) was included for search queries based on the research questions to identify published empirical research studies including both journal articles and conference papers. We selected peer-reviewed articles that were published during 2000–2023 because social cohesion has been recognised as a concept built around shared social values and varies according to its social context since 2000 (Aelbrecht & Stevens, 2019a, b; Forrest & Kearns, 2001). The search keywords for social cohesion were selected based on the theoretical framework suggested by Aelbrecht et al. (2021). The selection of search keywords for public space was chosen based on the public space typologies adapted by the UN-Habitat for monitoring and reporting SDGs given the report was developed on the account of global partnerships (UN-Habitat, 2015). Table 3 shows the search strings/keywords include different search queries.

Studies were identified by a search of three databases on February 2nd, 2023 and February 22nd, 2023 including Web of Science (WoS), PubMed, and SCOPUS. The choice of databases was motivated by an initial scoping of the literature in the research area (Levy & Ellis, 2006). The search strings were entered for advanced query search building by using field tags including "Topics", "Title", "Abstract", "Author Keywords", and "Keywords". Boolean Operator OR was used for covering the most common synonyms found in the research area. Boolean Operator AND was

Table 3 Search strings/keywords by different search queries

Search query	Strings/keywords
Public spaces	"common space" OR "outdoor space" OR "urban environment" OR "urban spaces" OR "public spaces" OR "public space" OR "city centre" OR "town centre" OR "built environment" OR "urban street" OR "street" OR "neighbourhood environment" OR "open space" OR "markets" OR "communal space" OR "in-between space" OR "neighbourhood space" OR "square" OR "plaza" OR "playground" OR "third places' OR "fourth places" OR "walking environment" OR "social environment" OR "community place" OR "public place"
Social cohesion	"social support" OR "social" OR "sociality" OR "social relationship" OR "social ties" OR "social cohesion" OR "social capital" OR "sense of community" OR "social interactions" OR "sense of place" OR "social value" OR "social integration" OR "community cohesion" OR "place attachment" OR "social inclusion" OR "social network" OR "social interactions" OR "social relations" OR "placemaking" OR "social wellbeing" OR "social sustainability" OR "social benefit" OR "social activities" OR "public life" OR "social life" OR "urban life" OR "life between buildings" OR "placeness" OR "social engagement" OR "collective efficacy" OR "social identity" OR "place identity"

used to link two sets of the search queries. These search terms were used in the same manner to search the three databases.

Study Selection Process

After the initial search with keywords, the study selection process had three further stages (Fig. 1). Firstly, pilot screening steps were carried out on the databases involved by refining the search results to specific fields of study. The research results from the SCOPUS database were refined to subject areas under the categories of *social science, environmental science, behavioural sciences, computer science,* and *multidisciplinary*. In the Web of Science database, the search results were further restricted to Web of Science Categories covering *Public Environmental Occupational Health, Urban Studies, Environmental Studies, Geography, Regional Urban Planning, Environmental Sciences, Sociology,* and *Social Science Interdisciplinary*. The non-human studies from the search result from PubMed were excluded. Second, title screening was conducted based on the inclusion and exclusion criteria

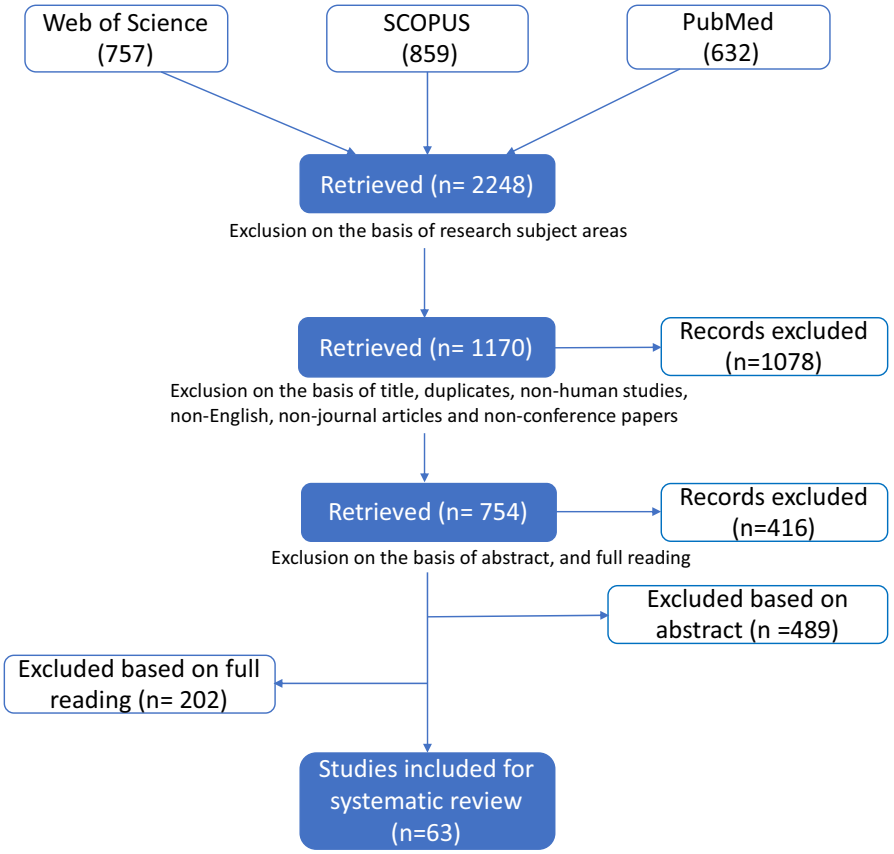

Fig. 1 Study selection process

(Appendix Table 5). This was followed by the third stage, in which the selection process was conducted based on the abstract and the full text reading assessment regarding the inclusion and exclusion criteria. Appendix Table 5 summarises the inclusion and exclusion criteria considered for the present review. The criteria were developed based on the aim of this SLR and to address our research questions.

Data Extraction and Synthesis

For each research study, a selection of descriptive items was extracted to highlight research context, methodology, and assessed outcome of the reviewed publications. This accumulation of evidence is most sufficient to provide an overview of the current state of research on the relationship between public space and social cohesion (Kabisch et al., 2015). Appendix Table 6 shows the table which contains key information of all retrieved publications based on the selection of descriptive items.

An Overview of the Studies

Of the 63 identified primary studies, the highest number of studies had taken place in Asia. Among these, the most common public spaces studied were commercial streets, city centres, urban markets set in China, Malaysia and Indonesia. The second most studied continent for the relations between public space and social cohesion is Europe in which neighbourhood scale public spaces were of interest. Figure 2 indicates the geographical distribution of the reviewed publications. Figure 3 shows

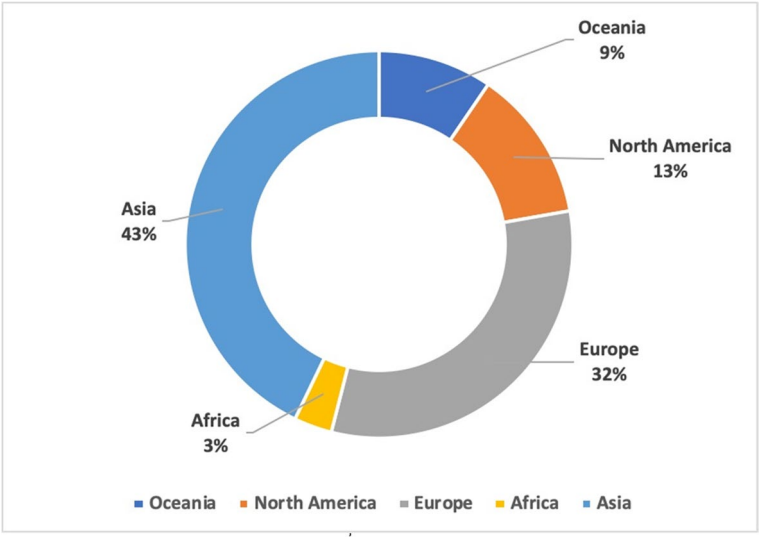

Fig. 2 Geographical distribution of the reviewed primary studies by continent

that there is an increasing interest in studying the relationship between public space and social cohesion since 2019. This is potentially due to the increasing mobilisation of social division influenced by the far-right movements across the Europe and North America in 2018 (Yassim, 2019) and the changes in social cohesion during the COVID-19 pandemic (Borkowska, 2020).

Methods Adopted by Empirical Studies

Analysis was conducted to determine the research methods adopted and the study design of each study. Of the 63 primary studies, 25 adopted qualitative methods and 16 adopted a mixed method approach. The remaining 22 primary studies adopted quantitative methods in which GIS analysis techniques were used for spatial analysis or statistical analytical methods such as structural equation modelling (SEM), multi-level regression, and linear models were utilised for data analysis. The research method and study design adopted for each of the primary study is listed in Table 4.

The data collection techniques adopted by each of primary studies were further analysed. A total of the five data collection techniques was utilised by the primary studies to evaluate the relations between social cohesion and public space. Many studies used a combination of the data collection techniques, so the number listed in Fig. 4 is repeated. Field observation was the most popular technique adopted to gather empirical data in the 34 reviewed studies. Both interview and survey were widely adopted by the primary studies for data gathering. In addition, focus group was incorporated by 4 primary publications whilst 9 of the primary studies adopted questionnaire to collect data.

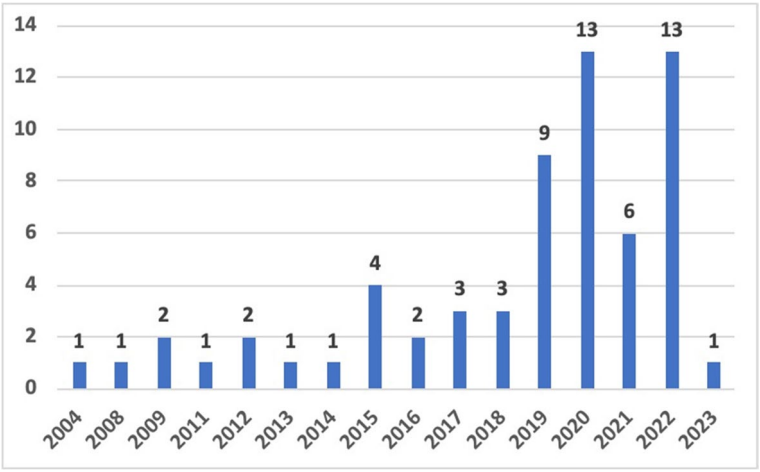

Fig. 3 Number of primary studies reviewed by year

Table 4 Research method adopted and different types of study design

Method	• Study design	Description	Primary studies	Total number of studies
Qualitative ($n=25$)	• Ethnographic study	Studies engaged in ethnographic research process such as field observation to better understand people's presence and social interactions within public spaces (Scott-Jones & Watt, 2010)	P3, P7, P13, P16, P17, P24, P27, P34, P36, P42, P43, P49	12
	• Case study	Case studies identified exclusive information through in-depth analysis of qualitative data collected with field survey or interview	P8, P12, P15, P24, P28, P31, P35, P37, P41, P62	10
	• General empirical study	Studies collected empirical data using qualitative research methods such as interview, focus group	P19, P20, P33	3
Quantitative ($n=22$)	• Cross-sectional study	Cross-sectional that studied examined variables (e.g. sociodemographic variables) at a single point of time, (typically,) they could not establish causality but the association between strength of association between variables (Whalley, 2006)	P2, P29, P32, P39, P40, P44, P45, P50, P51, P52, P53, P54, P55, P57, P59, P61	16
	• Longitudinal (cross-sectional) study	Cross-sectional surveys conducted over an extended period	P9, P25, P56	3
	• General empirical study	Studies conducted empirical analysis on spatial data using GIS analysis or space syntax analysis techniques	P38, P46, P63	3
Mixed Methods ($n=16$)	• Cross-sectional study	Cross-sectional studies supplemented with qualitative data collected with observation and interview	P4, P18, P47	3
	• Case study	Detailed study of a place which involves both qualitative and quantitative data collected using surveys or behavioural mapping techniques	P5, P6, P10, P23, P30, P58, P60	7
	• General Empirical study	Studies collected empirical data empirical data using questionnaire survey	P1, P11, P14, P21, P22, P26	6

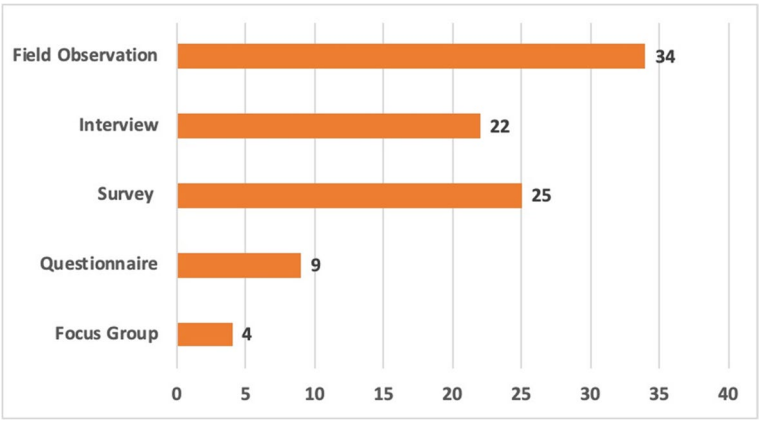

Fig. 4 Data collection techniques employed by reviewed studies

Typologies of Public Space Studied

Figure 5 shows the number of studies reviewed in understanding the relationship between public space and social cohesion based on the typologies of public space. Many of the studies include multiple typologies of public spaces as the social setting, thus, some references in the figure below are repeated. The most studied typology of public space is public open space (47 publications) such as public square (Zordan et al., 2019), outdoor recreation space (Rivera et al., 2022), and public open spaces of city centre (Askari et al., 2015). Public

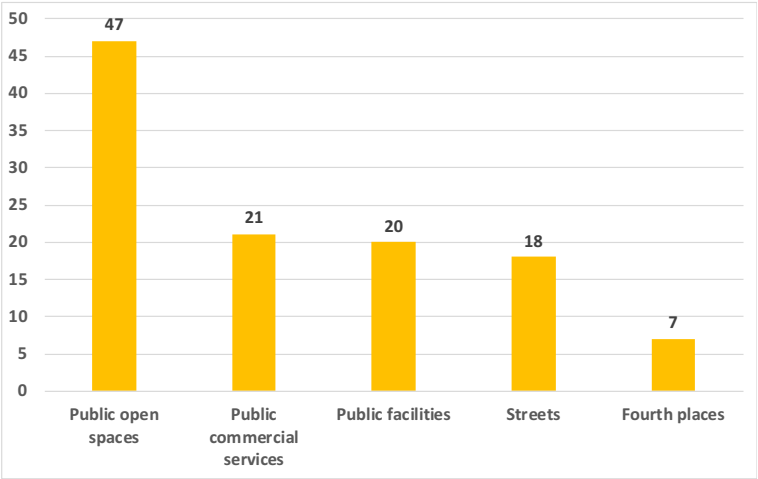

Fig. 5 The typologies of public space studied in relation to social cohesion – public open spaces (e.g., public squares, parks, outdoor creation spaces, etc.), public commercial services (e.g., cafés, shops, etc.), public facilities (e.g., libraries, community centres, etc.), fourth places (e.g., street corners, underground tunnels, informal public spaces, etc.)

commercial service (21 publications) and public facility (20 publications) were the second and third most-studied public space typologies. Furthermore, 18 reviewed studies explored urban streets and 7 empirical studies focused on the fourth places.

Assessed Social Cohesion Outcomes

The outcome of social cohesion can be behavioural and/or perceptual in terms of what it means to and how it is experienced among different communities in various public space settings (Sect. "Understanding Social Cohesion"). The 63 studies assessed a variety of outcomes which allows a multitude of perspectives on understanding how social cohesion is experienced individually and collectively in public space (Aelbrecht et al., 2021). As shown in Fig. 6, 40% of the reviewed primary studies focused on the behavioural outcomes when studying the relations between public space and social cohesion. The remaining primary studies focused on the perceptual outcomes of social cohesion subject to specific local economic, social and cultural contexts (Aelbrecht et al., 2021). Some undertake an umbrella view of social cohesion whilst others focus on one dimension of social cohesion in relation to different study contexts, i.e., social inclusion and integration, social relation, etc. Among these studies, 16% of the reviewed articles whose assessed outcome is 'sense of community' when studying the relationship between public space and social cohesion, and 13% of the reviewed studies focus on the effects of public space

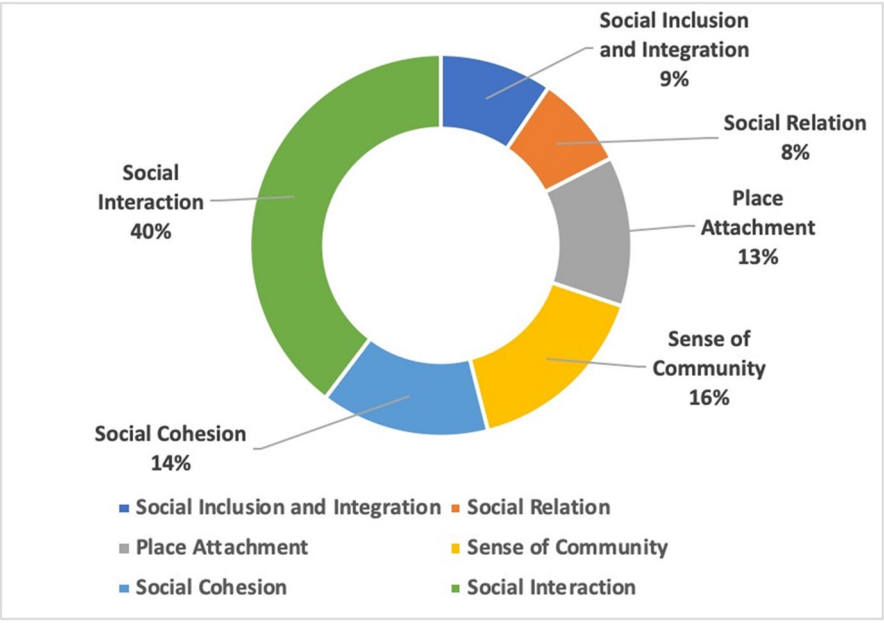

Fig. 6 Assessed social cohesion outcomes

on place attachment. This is expected by the authors—with the differing views on the social role of public space among the new urbanists, built environment researchers, and urban design scholars gaining momentum in recent years, there has been an increasing effort in understanding the interplay between public space, sense of community, and place attachment and identity in recent years (Aelbrecht & Stevens, 2019a, b; Kim & Kaplan, 2004; Talen, 2000).

Findings and Implications

What Kind of Public Spaces have been Studied in Relation to Social Cohesion?

In this section, we answer our research question 1. Figure 7 provides a summary of different kinds of public spaces have been studied in relation to social cohesion. In the city centre setting, the role of public space in establishing social norms, providing social equity, and fostering social inclusion and participation. On the other hand, in the residential neighbourhood setting, public space facilitates the opportunities of fleeting and meaningful encounters in the locality, the strengthening of emotional involvement with everyday places, and the development of shared values connected to place and to identity. However, such positive relationship is under the conditions where the physical attributes of public space maximise place value throughout the lives of citizens across all socio-economic strata (Carmona, 2019).

The Impacts of Public Spaces at City Centre Level on Social Cohesion

The SLR highlighted the association between a range of public spaces located in city centre and social cohesion in terms of their contribution to a city's local identity and public life and culture.

Urban Street The social and physical construct of urban streets in city centre (i.e., the informal, commercial and religious spaces) is suggested to fulfil the needs and desires of users and enrich public social life by manifesting a shared common culture when individuals and groups such as pedestrians, vendors interact (Mateo-Babiano, 2012). In the context of historical urban streets, citizens can develop a shared socio-cultural value and user satisfaction with the continuity of the socio-spatial activities which enhances their sense of belonging (Lotfata & Ataöv, 2020).

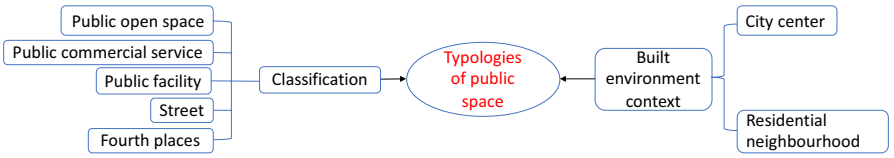

Fig. 7 Typologies of public space based on classification and built environment contexts

Pedestrian Zone Pedestrian zones located in city centre are effective in promoting sense of place, place attachment, and sense of belonging as they lead to increased social interaction by accommodating people's social, physical, and emotional needs (Sattarzadeh, 2018). Similarly, Nguyen (2019) observed a series of informal social norms among "familiar" strangers in public space from their adopted uses of an underpass (an underground passageway). The finding from her study highlights the role of informal public space in the creation of social order in terms of its adaptability of various uses and the social inclusiveness induced by the openness of the space.

Public Open Space The positive effects of public open space located in city centre, i.e., plazas, public square (McClimens et al., 2012), on social cohesion include encouraging social interaction (Latham & Layton, 2019), establishing social norms, and fostering social integration (Aelbrecht, 2016).

They provide the social settings for people from different ethnic groups with cultural diversity (McClimens et al., 2012). Users' experiences are informed by social infrastructures and functions of public open spaces whilst urban life is enriched with different uses of public open spaces.

Public Commercial Service Zordan et al. (2019) found a positive association between the presence of food shops and face-to-face interaction in public open space highlighting the social importance of third places. Through the lens of social media data, Nguyen et al. (2019) found that commercial urban public space plays a dominant role in attracting the public to stay and carry out activities based on the correlation between the geographical locations of commercial public space and the spatial and temporal distribution of social media check-ins reveals. Social cohesion is possible to achieve within public commercial services located in city centres. It is a dynamic process that reveals the historical continuity of the enriched public life, (Mateo-Babiano, 2012), the inclusion and participation of all users (Amin, 2008, 2012).

The Impacts of Public Spaces at Neighbourhood Level on Social Cohesion

The SLR revealed that the various public spaces at neighbourhood level play an important role in local residents' everyday life and considered as the local venue for fostering social cohesion.

Public Commercial Service, Public Facilities, and Public Open Space On the premise of neighbourhood public space and local public life, Trillo (2017) identified the role of public space in reducing social exclusion noting the positive effects of sociocultural activities among minority residents in facilitating social integration. Drawing upon the qualitative evidence gathered from a multi-ethnic residential area in London, Cattell et al. (2008) indicates that it is the social and therapeutic properties of everyday public spaces (i.e., local street market, green space, sports centre, etc.) help people develop a sense of community and build bridges (social ties) from daily

routines (i.e., outdoor recreation activities, social exchanges during a journey to a school or workplace, etc.).

In addition to the qualitative studies, a correlation between the shop and public open space quality and sense of community was found by Francis et al. (2012) using data collected from survey. In contrast, the findings from the recent cross-sectional study by Liu et al. (2020) suggested that social inclusion is more correlated with the actual use of neighbourhood public spaces (including public open space and commercial facilities) than the physical presence of public space and facilities. The large-scale city-wide survey study by Zhu and Fu (2017) identified the impact of the physical attributes of neighbourhood communal space (including streets/sidewalks, clubhouse, consumer sites, and open space) on neighbourhood collective efficacy, social interactions, and neighbourhood attachment. In the construct of their study, neighbourhood public space was regarded as the civic focal point in terms of promoting place-based relations and developing place attachment (Zhu & Fu, 2017). Overall, the conflicting results were found may be due to diverse study context, research focus, and the differences in socio-demographic profiles of respondents. Yet, these studies help us to understand the effects of neighbourhood public space on social cohesion from different viewpoints.

Fourth Places Neighbourhood informal public space/fourth places are reported to be the focal point that are conducive to the co-presence of people, diverse possibility of encounters, and informal social interactions among strangers (Aelbrecht, 2016; Can & Heath, 2016). Such social processes bring about the inclusivity and social comfort that contributes effectively to people's sense of community and is beneficial for social cohesion (Aelbrecht, 2016; Can & Heath, 2016). Indeed, fourth place in residential neighbourhood is reported to be positively correlated with social equity by encouraging inter/intra-generation interactions (Abed & Al-Jokhadar, 2021), increasing social capital via frequent social interactions among neighbours (Zhang & Lawson, 2009), promoting civic engagement that is strengthened by length of residence and home ownership (Gehl, 2007), fostering community stability and place engagement (Zerouati & Bellal, 2019).

What are the Physical Aspects of these Spaces that are Reported to Promote Social Cohesion?

The quality features of public space are recognised with respect to an individual public space or a collective of multiple public spaces at zonal level in terms of identifying the reasons and conditions of people use public space. They have been theoretically (Aelbrecht & Stevens, 2019a, b) and empirically associated with influencing social interaction and fostering social cohesion (Francis et al., 2012). The different physical aspects of public space embody the contrasting and dynamic social experiences of a space reflecting the increasing complex landscape of the contemporary urban built environment. Figure 8 illustrates physical aspects of public space that are studied in relation to promoting social cohesion.

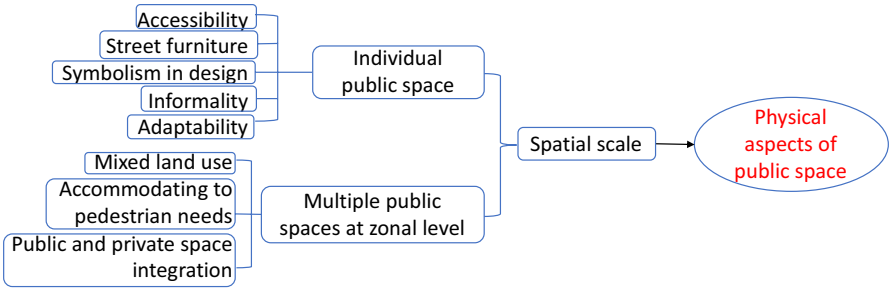

Fig. 8 The physical aspects of public space in addition to different spatial scales

The Effects of Physical Attributes of Individual Public Spaces on Social Cohesion

In exploring the role of public space to promote social cohesion, recent research has advocated to offer evaluation methods for analysing the physical dimensions of public space. A multitude of perspectives on the relation between public space design elements and social cohesion are revealed from the analytical position of social interaction dynamic in public settings. The key themes of this focal area are presented below.

Accessibility The accessibility of public space is regarded as one of the most prominent features which positively correlated to social cohesion since it is the precondition for the co-presence of people, activity and events (Gans, 2002; Khemri et al., 2020; Jenson, 1998). It is critical for social inclusion of people from marginalised groups, for example, people with disabilities (Bredewold et al., 2020), user groups with low socioeconomic status (Trawalter et al., 2021), migrant communities (Nguyen, 2019), and minority groups (Ganji & Rishbeth, 2020), etc.

Presence of Street Furniture Research also indicates the provision of street furniture (e.g., benches, street lamps, fountains, street signs, public sculptures, bus stops, etc.) has significant positive effects on improving the intensity level of social engagement within public space (i.e., lingering, people-watching, conversing) (Ujang, 2012), the pattern of segregation and integration of individuals and crowds (Askarizad & Safari, 2020). From stimulating greater social interactions to creating a sense of place, the provision of street furniture in public space plays a significant part in fostering people's experiences of social integration and conviviality.

Symbolism in Design Urban design literature further emphasises the implications of symbolism in representing the historical and cultural contexts of public space for promoting social cohesion (Mateo-Babiano, 2012; Aelbrecht et al., 2021; Ghahramanpouri et al., 2015). Historical land marks such as public memorials (McMillen et al., 2016) and iconic public spaces that reflect local community culture and traditions (Aelbrecht et al., 2021) can foster strong place identity and help people develop attachments to the place. With the preservation of local characteristics and the integration of

traditional social practices in public space (i.e., street vending (Mateo-Babiano, 2012), baby showering (Modie-Moroka et al., 2020)), the richly-symbolic value of public space not only creates a sense of belonging but also facilitates social cohesion with the accommodation of public participation and the creation of social capital.

Informality and Adaptability According to Aelbrecht and Stevens (2019a, b), public space with informal boundaries and adaptive to social activities (i.e., street vending, gathering, etc.) tend to maximise people's experience of social inclusion and increase the chances of unexpected social interactions in terms of introducing the feeling of comfort with less regulated environment (Amin, 2008). This is particularly the case with fourth places (Aelbrecht, 2016; Zordan et al., 2019). The achievement of freedom to allow novel social experiences in a vibrant public space forms an essential component of contemporary urban public culture (Amin, 2006). Thus, both informality and adaptability are the key physical attributes to ehance the friendliness and openness of public space, and thereby can be benefitial to increase social capital and facilitate place attachment.

The Effects of Physical Attributes of Public Spaces at Zonal Level on Social Cohesion

In comparison with the physical attributes of an individual public space, research that focuses on the physical dimensions of a collection of multiple public spaces at zonal level offers site-specific assessment approaches in relation to strengthening chances of encounters and facilitating social cohesion. The key assessment indicators are discussed below.

Mixed Land Use Public space site consists mixed land use can help initiate and enrich public social life with diverse social and cultural functionalities for public participation and social interactions (Lotfata & Ataöv, 2020; Zordan et al., 2019). A mixture of recreational open spaces, public facilities and public commercial services such as shops, pubs, and cafes can serve a wide range of daily human needs and create affordances for a taxonomy of social and cultural behaviours (Mehta, 2019a, b), i.e., leisure activities, economic activities (trading, vending), and social interactions (conversing, people-watching).

Accommodating to Pedestrian Needs The design characteristics of public space sites that accommodate pedestrian travel (Talen, 2000) with rich ground floor features (i.e., amenity provision, façade articulation, and enclosure) (Zordan et al., 2019) are observed to signify function flexibility, encourage social contacts, and maximise interactions, which are crucial for fostering social integration and building sense of community. Sense of place can simply be stimulated by the liveliness of a busy street (Mehta, 2019a, b; Lara-Hernandez et al., 2019), the familiarity of mundane co-presence (Modie-Moroka et al., 2020), the restorative effects of people-watching (Cattell et al., 2008).

Public and Private Space Integration Public space integration is widely discussed among researchers by drawing upon criteria such as proximity to public space (Liu et al., 2020), spatial configuration of open space (adjacents to buildings or/and streets) (Can & Heath, 2016; Soares et al., 2020), the integration of public facilities (i.e., toilets, carparks) and public commercial services (Worpole & Knox, 2007; Khemri et al., 2020). As with all tempts to allow public spaces serve as a venue of chance encounters and balancing against neighbourhood fragmentation, the notion of public space integration proves to help expand people's social network by creating nodes of overlapping activity / social conduits (Wickes et al., 2019) and foster residents' sense of community by strengthening emotional bounds with the territory.

What Conditioning Factors Affect the Relationship between Public Space and Social Cohesion?

Social needs and perceptions have a defining effect on constructing the motives and attitudes of people's everyday interactions and engagements with public space (Talen, 2000). More importantly, social constraints (i.e., race and gender based restrictions) that may affect the type of social interaction and public behaviour that occurs within public space have been implicated in research seeks to understand the construction of sense of place (Khalilin & Fallah, 2018; Ortiz et al., 2004), place attachment (Purwanto & Harani, 2020), social relations (Rivera et al., 2022; Salimi et al., 2019), and social inclusion (Bredewold et al., 2020) among individuals and user groups. An enhanced understanding of these socially imposed factors and the qualitative characteristics of public space that are subjectively defined (i.e., perceived safety, degradation of public space environment) helps illuminate this line of research (Talen, 2000; Wan et al., 2021), and thereby it should be factored in when attempting to assess the relationship between public space and social cohesion. Figure 9 summarises the conditioning factors. This section will identify the sociodemographic and perceptual factors in relation to their effects on social interaction and cohesion in public space.

Sociodemographic Factors

Sociodemographic characteristics of individuals and communities affect people's interactions in public space and their experiences of social cohesion in a variety of ways.

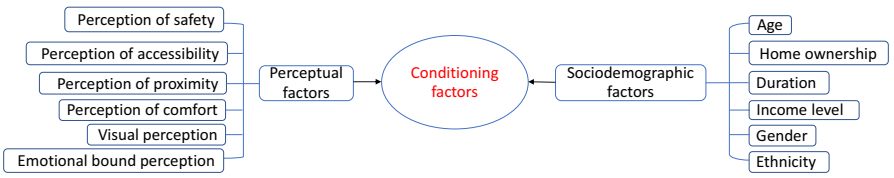

Fig. 9 Conditioning factors affect the relationship between public space and social cohesion

Age Age was found to influence the use of public open space and the experience of social interaction where old people are more concerned with the physical environment when seeking for solidarity while younger age groups are more likely to carry out social interaction and making bridges (Dash & Thilagam, 2022; Holland et al., 2007). Similarly, Askari et al. (2015) reported that the elderly group prioritises environmental conditions such as prsence of natural element (i.e., greenery and water features), quality of street furniture and amenity insfrastructure to carry out social interactions in public spaces. By contrast, younger age groups are more concerned with their proximity to others within public space and having appropriate space to interact for them to develop strong attachment to the territory (Mantey, 2015). This is particularly the case with deprived neighbourhoods (Cattell et al., 2008).

Home Ownership and Duration of Residence In addition to the context of neighbourhood public space, home ownership and length of residence are reported to be positively correlated with neighbourhood participation, community social capital, and sense of community (Francis et al., 2012; Zhu & Fu, 2017). Research also suggests life-stage factors such as the presence or absence of child/children can have a significant impact on people's self-assessment level of the neighbourhood characteristics and the need of social engagements (Frech & Kimbro, 2011; Talen, 2000).

Income Level Income level or economic status of the public space users is found to have profound effects on the relationship between public space and social cohesion in terms of attributing to the degree of publicness and inclusivity in public space (Chan, 2020). For example, streets located in city centre (Ujang et al., 2018) and public commercial facilities such like local cafes (Hickman, 2013) in deprived neighbourhoods are critical for encouraging social interactions, enriching public life, and building social ties. Moreover, the relationship between university campus public space and sense of belonging is reported to be affected by the socioeconomic status (SES) in terms of accessibility and the use of public space (Trawalter et al., 2021).

Gender There has been an increased interest in women's environmental needs, socio-cultural values to fight social exclusion and inequality and the presence of women in urban public space deems to be important to portray (Low et al., 2020). This is evident in studies where females were found to be more socially active than men in terms of public social life from performing daily activities within the neighbourhood (Ortiz et al., 2004), participating practices of community building (i.e., baby shower, gardening) (Modie-Moroka et al., 2020), and ultimately increasing the sense of place with their collective presence (Khalilin & Fallah, 2018).

Ethnicity Given the growing attention to living with migration diversity and cultural and ethnic multiplicity, considerable research has examined its effects on social interaction and social cohesion (Cattell et al., 2008; Ganji & Rishbeth, 2020; Aelbrecht et al., 2021). Empirical findings, though, are inconsistent. One strand of this work has sought to view the co-presence of people from multi-ethnic backgrounds evidences the sufficiency of public space in promoting social cohesion since it generates more

awareness and acceptance of multiculturalism and potentially develops inter-ethnic understanding (Cattell et al., 2008; Peters & de Haan, 2011; Aelbrecht, 2016; Jones et al., 2015). One the other hand, some scholars echo the recent critiques on public space as the locale for inter-ethnic understanding given by Amin (2002), who draws upon the complicity of the causal relationship between opportunities of social interactions and harmonious social relations (Ganji & Rishbeth, 2020; Priest et al., 2014). For example, findings from the ethnographic study by Priest et al. (2014) suggested that majority racial groups are more likely to self-segregate in public spaces than those from minority groups whilst minority groups tend to have no contacts with others nor with other ethnic group members, which can potential lead to social polarization. In the case of public spaces with more frequent inter-ethnic interactions, Peters and de Haan (2011) found that its impacts on social cohesion does not go beyond experiencing positive feelings for diversity in public space or showing appriciation of cultural diversity (i.e., small talk in the store, a more tolorant review of risiding within a multicultural neighbourhood). Liu et al. (2020) further reported the potentials of encountering out-group members can be limited greatly to in-group ties and due to the fact of different public space use habits among the local and migrant groups, and thereby fail to achieve social integration and inclusion.

Perceptual Factors

Much of the research found in urban design, human geography, and environmental psychology has endeavoured to uncover the potential perceptual factors related to our subjective assessment of urban environments for their effects on human behaviours (Jorgensen & Stedman, 2001; Kim & Kaplan, 2004; Klein et al., 2021; Bonnes et al., 2003). Our perceptions on the qualitative characteristics (quality) of public space may potentially motivate or limit social exchange between individual and collective affairs in response to the local environmental contexts.

Perception of Safety Perceived safety is reported to positively correlate to social capital because they lead to an increase in resident interaction and a higher level of close ties (Alipour & Ahmed, 2021; Bjornstrom & Ralston, 2014; Oidjarv, 2018). Similarly, some scholars suggest public spaces that are congested with collective people presence and diversity of pedestrian activities has the natural surveillance availability that increases users' perception of safety and security (Aelbrecht & Stevens, 2019a, b; Khalilin & Fallah, 2018), which in turn improve the quality of public social life and promote feelings of cohesion in places such as marketplace (Watson, 2009), fourth places in inner-city neighbourhoods (Aelbrecht, 2016), common spaces of the apartment buildings (Abed & Al-Jokhadar, 2021).

Perception of Accessibility Accessibility to public space is critical to encourage social interaction and cohesion in terms of physical design. However, perceived accessibility often differs from the actual accessibility measures since the calculation measures based on transportation and spatial data only serves as a proxy for

the subjective determinants of travel behaviours to public space (Pot et al., 2021). A positive relationship between perceived accessibility and social cohesion has long been established in the urban planning and public health research which seeks to explore factors that influence social engagements and physical activities in public space for health wellbeing and building sense of community (Meyer et al., 2021; Guo et al., 2021; Yoo & Lee, 2016).

Perception of Proximity Similarly, perceived proximity to public space and perceived distance to public space are occasionally used for representing the perceptual distance to public space as to the preconditions for social interaction by social scientists (Koohsari et al., 2013; Barlow et al., 2021; Crang & Thrift, 2000). Communities with a higher degree of perceived proximity to public spaces including access to food shopping, social/sport clubs, post office services, etc., were found to develop a higher level of collective efficacy given the increased likelihood of initiating and maintaining social links with community members (Levasseur et al., 2011; Chen et al., 2016). An individual's perception of living close to resources is more likely to enacourage a higher level of social participation and foster a sense of community, particularly among the older adults and the low-income group (Levasseur et al., 2011; Audirac, 1999).

Perception of Comfort Perception of comfort in outdoor public space plays an important role in shaping public social life in terms of effecting one's satisfaction within public space and accommodating diverse social interaction (Peng et al., 2019). Specifically, the effects of the microclimate on people's appreciation and uses of public space are significantly related to the spatial and temporal variation in the thermal environment (Thorsson et al., 2007). It has been shown that an improved level of perceived thermal comfort is positively correlated with an increased level of sense of place and an increase in selective (optional) and social activities (i.e., people-watching, greetings and conversations, leisure activities, etc.) (Smith & Cristián Henríquez, 2019; Zabetian & Kheyroddin, 2019).

Visual Perception In addition, People's visual perception of the public space environment is significantly linked with one's spatial experience in terms of movement itineraries (traffic lines), aesthetic level of the space, and legibility of the environment (Bada, 2012). Subjective visual perception such as polyfunctional, dynamic, associative, homogeneous, authentic spaces with an emphasis on natural elements are the desirable visual effects of public open space which encourage intensive use and contribute to place identity (Perovic & Folic, 2012).

Emotional Bond Perception As Baroni (2003) argued, human behaviour including social interaction can almost entirely be explained on the basis of motivations and emotions, in environmental psychology, that is, the emotional-affective and behavioural components of environmetal schemata.

According to Hashemnezhad et al. (2013), place identity and attachment is one of the subsets of sense of place influencing people's values, meanings, and emotions, and in turn encourage positive social interation tendencies. Previous empirical research also

indicates the positive associations between place attachment, perception of safety, and social capital, aprticularly among adolescents (Dallago et al., 2009). Specifically, this is particulalry the case within the context of neighbourhood public space where place attachment motivates neighbourhood participation (Zhu & Fu, 2017) in addition to constructing the perceptual contetxt which helps residents gain a sense of belonging and experience a sense of community (Kim & Kaplan, 2004). Interestingly, in their empirical study conducted within the public space in the city centre of Kuala, Lumpur, Ujang et al. (2018) further reveals that the relationship between place attachment and social interaction is bi-directional for which they suggest that while place attachment encourages more active engagement with the place but it is also strongly defined by the place dependence which enables the functional bounding between people and place.

How has Social Interaction in Public Spaces been Reported to Facilitate Social Cohesion?

Urban observers agree that the wide range of social interactions and co-presence of people in public space is what makes urban living cohesive and forms the social order and cultural norms (Mehta, 2019a, b). This section reveals the typologies and characteristics of social interactions in public space whilst discussing their impacts on social cohesion. Figure 10 provides an overview of social interactions in public space.

Typologies of Social Interaction in Public Space

Different typologies of social interactions in public space have been explored by empirical studies for their important effects on promoting social cohesion (Can & Heath, 2016; Mehta, 2019a; Cattell et al., 2008).

Social Grouping Social grouping is the classification approach which focuses on the user characteristics in terms of revealing the collective experiences of social cohesion among different user groups through their activity pattern in public space (Hillier, 2002). For example, a recent empirical study conducted by Ganji and Rishbeth (2020) explored the use of outdoor public space by user groups of diverse age, gender, and ethnic backgrounds. The analysis of patterns of social grouping (i.e., couple, family, individual, etc.) and inter-cultural encounters allows for a better

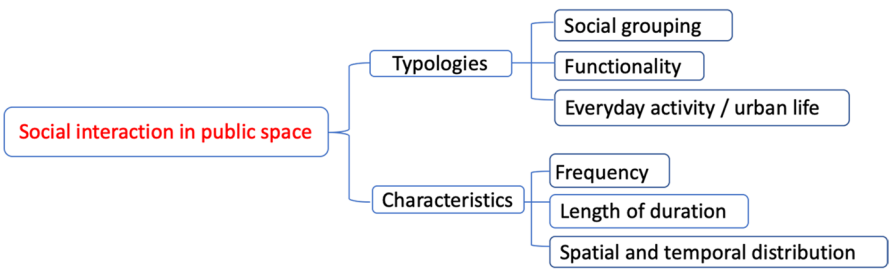

Fig. 10 The classification and characteristics of social interaction in public space

understanding of the spatial and temporal affordance of public space in terms of enabling social integration and achieving public space convivality (Ganji & Rishbeth, 2020). Indeed, different socio-demographic profiles of user groups often enable an explicit narrative to underpin the social relationship dynamics, one of the essential dimensions to social cohesion (Cao & Kang, 2019; Schiefer & van der Noll, 2017).

Functionality In contrast, advocating the notion of environmental determinism (Lang, 1987), the classification approach of social interaction in public space has been suggested to be most effective when linking with the functionality of public space (Khemri et al., 2020; Lara-Hernandez et al., 2019; Mehta, 2019a, b). This is particularly the case when studying the impacts of social interaction occur within a collection of public spaces (at street or neighbourhood level) on people's experiences of social cohesion, i.e., sense of community (Francis et al., 2012), levels of belonging (Salvadó et al., 2020), civility (Mehta, 2019a, b), and social inclusion (Liu et al., 2020).

Everyday Activity/Urban Life Public space theorists have long advocated the socio-spatial aspects of mundane interaction experience that shapes conviviality and cohesion (Gans, 2002; Jacobs, 1961; Lofland, 1998; Whyte, 1980). This underpinning usually takes a mediatory position on the social activities focusing on the characteristics of modern urban life and everyday activity. Using this approach to classify social activities, researchers have been able to reveal the use pattern across a variety of activity spaces with the co-presence of people and activities situated in the urban streets and "fourth places" (Abed & Al-Jokhadar, 2021; Aelbrecht, 2016; Amran & Fuad, 2020). For instance, Zhang and Lawson (2009) categorised outdoor space activity based on the characteristics of daily life occur in the communal space of high-density residential communities, including process activities (i.e., coming back, leaving), transitional activities (i.e., pacing around, standing, sitting), and physical contacts (i.e., talking, playing together). Can and Heath (2016) identified the social interaction occurred in the in-between spaces as movement activity (walking and cycling), stationary activity (sitting and standing), and group contacts (group interactions) in terms of observing the influence of urban form. Additionally, the typology of outdoor space developed by Gehl (1987) with reference to the level of intensity of social interaction, including, necessary activity (i.e., walking to a bus stop), optional activity (i.e., peopl-watching), and social activity (i.e., greetings and conversations) has been widely recognised by scholars in terms of underlining the use and sociability of public space (Mateo-Babiano, 2012; Shirazi, 2019; Zhang & Lawson, 2009). This categorisation of genuine social life occurred in everday public space offers a unique narrative of the dynamic social process to achieving a cohesive society in urban public space, ranging from building social capital and forming networks of relationship to fighting social exclusion and fostering community cohesion.

Characteristics of Social Interaction Pattern in Public Space

It is critical to understand the association between different characteristics of pattern of social interaction in public space and social cohesion. Specifically, analysing

the frequency and length of social interaction, along with their temporal and spatial distribution in public space, allows for an enhanced interpretation of the role social interaction plays in fostering social cohesion.

Frequency of Social Interactions Social cohesion is subject to the frequency of social interactions in public space given the likelihood of building bridges and developing sense of belonging. Routine use of local community space helps building social relationships and increasing social cohesion by maintaining connection among local residents (Abed & Al-Jokhadar, 2021; Cattell et al., 2008). This was particularly true among the older adults and female users of public spaces located in the local residential areas (Yu et al., 2019; Engel et al., 2016; Ortiz et al., 2004). In their empirical study which set out to determine neighbourhood social cohesion, Wickes et al. (2019) developed a typology of social conduits (i.e., anchoring, scheduled, (extra) local exposure) to represent public space catchments that promote activities of routinised or acquaintanceship in terms of building neighbourhood networks and increasing place attachment. However, such studies remain narrow in focus dealing only with rationales that are place-specific and research context dependent. Any type of generalisation regarding use patterns and social activity types should be treated with specific physical and perceptual factors in mind for more robust analysis of public space use patterns (Hillier, 2002; Kim & Kaplan, 2004).

Length of Engagement The length of engagement with public spaces has a direct impact on the vitality and popularity of a place (Watson, 2009). This criterion has been mostly adopted by scholars exploring the social cohesions of public spaces situated in urban streets, i.e., social cohesion, place attachment (Can & Heath, 2015; Mehta & Bosson, 2021). Focusing on people's experience of public space, length of physical contacts/social activities proved useful in terms of encouraging social integration (Priest et al., 2014). The duration of activity like walking has a positive association with people's satisfaction of the public open space and social wellbeing (Askarizad & Safari, 2020; Kim & Yang, 2017).

Spatial and Temporal Distribution The spatial and temporal distribution is most examined for understanding the complexities of social activities when scholars attempted to explore the effects of public spaces in encouraging social interactions via conducting observational studies (Aelbrecht, 2016; Khemri et al., 2020; Can & Heath, 2016; Zordan et al., 2019). The choice of locations to engage in social interactions suggests people's place attachment whilst the spatial distribution of activities reveals the variegated forms of inter-group cohesion and intra group relation (Bwalya & Seethal, 2016). The choice of time of the day and locations to engage in social activities within in-between space (i.e., street corners, building frontages) further explains the space territory for informal social interactions particularly among strangers which are optimal for social fusion and inclusiveness (Amran & Fuad, 2020).

In essence, the classification of social interaction in public space stems from different academic traditions in terms of research focus, i.e., physical environment, social relations, and contemporary urban life. The characteristics of social interaction

in public space further reveal the interplay between the spatial and social aspects of public space whilst revealing how activities and behaviours result in social cohesion.

Discussion and Conclusions

The Lack of Consistency in the Assessed Outcomes

It is well recognised that social cohesion is a multidimensional concept that lacks of consensus regarding the theoretical conceptualisation and standardised measurement of the construct (Schiefer & van der Noll, 2017). In this systematic review, we included a wide range of descriptions which potentially constitute individual and collectives' experiences of social cohesion such as social inclusion, social relation, place attachment, and sense of community. Figure 11 shows the different assessed outcomes representing the dynamic experiences of social cohesion.

Current literature provides a variety of approaches to classify and operationalise social cohesion in public space. However, it is worth noting that many of the reviewed studies do not give clear definitions or standalone measures of the assessed outcomes (Appendix Table 6). The absence of accurate understanding of the assessed outcomes related to social cohesion is problematic in terms of developing assessable indicators to monitor the level and development of social cohesion across time and societies (Schiefer & van der Noll, 2017). For example, Sattarzadeh (2018) used a selection of ambient factors, social factors, and socio-demographic factors to understand place attachment while Karsono et al. (2021) measured the level of place attachment by length of engagement and length of familiarity. Cao and Kang (2019) assessed social relationship by identifying the social distances among people in public space based on the social distance theory by Hall (1992), in comparison with the abstract indication of social relations by Cattell et al. (2008) where they suggest that social interactions in public space provide the sustenance for building sense of community, opportunities of making bridges and bonding, and encouraging tolerance of others. While these are all interesting measures to reveal the multiplicity of people's experiences of social cohesion, they obscure the overall usefulness of the method for assessing social cohesion and understanding the relations between public space and social cohesion. The challenge in the development of indicators of social cohesion will be that different sets of indicators refer to how social cohesion is experienced differently (i.e., place attachment, social inclusion). More importantly, their respective indicators

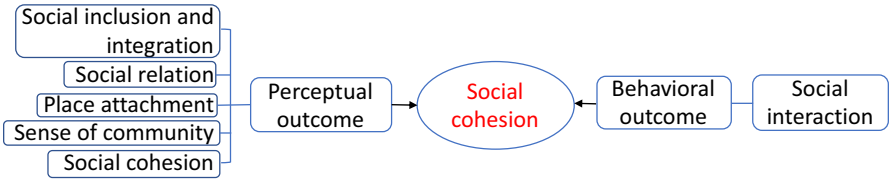

Fig. 11 Assessed outcomes in the reviewed studies representing social cohesion

need to be integrated in a meaningful way since they could be compatible or conflict with each other. For instance, an individual with a more extensive social network may not necessarily be sociable (Dempsey, 2008), one may desire for or identify with a community may not be congruous with other ideals, such as the attainment of social integration or inter-ethnic understanding (Cattell et al., 2008).

The Divergent Research Foci Concerning Public Space and Social Cohesion

Despite the shared goal of understanding the relations between public space and social cohesion, research approach and motivation may differ. This systematic review reveals much of the research has occurred in disciplinary silos and thus the challenge in linking physical aspects and user perceptions of public space, social interactions of diverse communities, individual and collectives' experiences of social cohesion together. This can be reflected by the variety of study design and methodological approaches adopted by the retrieved publications (Appendix Table 6). In terms of prioritisation of research focus, Appendix Table 6 shows that there is less than half of the studies conducted site analysis by using data analysis techniques including behaviour mapping (8 studies), site analysis (7 studies), GIS analysis (6 studies), and visual complexity analysis visual survey (3 studies). There are two potential reasons to justify the lack of consideration of the physical aspects of public space. Urban design and planning scholars, environmental psychologists and public health researchers are more concerned with the impacts of different physical aspects of public space in encouraging social interaction and fostering sense of community. In comparison, researchers from human geography, sociology, and urban studies fall back on the qualitative methods working with people in places (i.e., ethnography and observational methods), and while this can provide useful analysis linking social interaction in public space and social cohesion, it only provides an incomplete picture of the relationship between public space and social cohesion. On the other hand, although field observation and spatial analysis or site analysis provide valuable local knowledge and insights, they require expansive efforts across training, entering and leaving the study groups, length of time in the field, sampling, and data collection techniques (Baker, 2006) such as behavioural mapping, space syntax analysis. The limitation with this methodology is that it is only situated at one place and one point of time, rather than reaching across multiple sites with a large number of observers. Further research to make these approaches scalable would be appropriate, for example, replicate the study with citizen science techniques (Mazumdar et al., 2018a, b) by crowdsourcing the observational task with public participation utilising images and videos containing sites and study targets of research interests.

Conceptualising the Relations between Public Space and Social Cohesion

Research into the relationship between public space and social cohesion has increased given the recent effort made by scholars across a wide range of disciplines

such as urban design, human geography, community psychology and sociology. However, the range of mechanisms or conceptual models aiming at explaining this relationship are not yet sufficiently mature to allow easy application by researchers whose research focus may potentially limit to certain domains of discourse or primarily represent one school of thoughts. For example, the tripartite model of place attachment developed by environmental psychologists Scannell and dan Gifford (2010) has been adopted by a few papers studying the role of person, place, and process on achieving place attachment (Sattarzadeh, 2018; Purwanto & Harani, 2020; Mantey, 2015; Karsono et al., 2021). Many researchers develop socio-ecological frameworks to explain the mechanism by drawing upon the classic model (Francis et al., 2012; Zhu & Fu, 2017) devised by new urbanists Kim and Kaplan (2004). Additionally, in their review paper, Wan et al. (2021) develop a conceptual model incorporates two mechanisms through which urban greenspace can promote social cohesion, namely, perceptions of environment and patterns of use.

While this review provides insights in understanding the social mechanism between people and space, it is important to note the limitations in the research. An obvious one is that few reviewed studies have explored the extent to which the association between public space and social cohesion is influenced by the sociodemographic and perceptual factors. A future study is planned which will explore the moderating effects of these conditioning factors on the strength and direction of the relationship. Another limitation is that given the variety of typologies of public space, research approaches such as observational study, survey questionnaire, and spatial analysis that adapt to specific local contexts are helpful. However, a more standardised study design that incorporates the wide range of typologies ad physical attributes of public spaces drawn from our SLR could complementary ways of understanding the relationship between public space and social cohesion. We will explore this approach as a part of future work. The reviewed studies are predominated by empirical evidence from a cross-sectional study effort that the extent to which public space impacts on social cohesion is still unclear. We would like to undertake a longitudinal approach to investigate citizens and communities' experiences of social cohesion in public space – perhaps spanning multiple years. We would also like to conduct focus groups and interviews with stakeholders such as community groups, decision makers, local authorities to explore how citizens and communities engage with public spaces and their experiences of social cohesion over a long term. This will be a part of the future study and could provide further insights into urban interventions and public spaces that create affordance for social interaction and cohesion.

In conclusion, the potential of urban public spaces in facilitating social cohesion has become even more evident as we continue to advance our understanding of the interplay between the physical and social aspects of public space. With an enhanced understanding of how physical aspects of public space influence social interaction and cohesion can be evaluated, this systematic review is intended to serve as a foundational step in future research exploring the relationship between urban public space and social cohesion.

Appendices

Appendix 1

Table 5 Inclusion and exclusion criteria for conducting the systematic review

Criteria	Principle
Inclusion	• The research must have a spatial setting for investigation, it should be exclusively a form of built environment that has a public space component (e.g., street, open space, marketplace, etc.).
	• The study must investigate features of the urban built environment and should be evaluated for their relationships with/effects on different social cohesion (e.g., social capital, place attachment, sense of community, etc. (Schiefer & van der Noll, 2017)).
	• The study must conduct empirical research, they can evaluate either the behavioural outcomes (e.g., social interaction, use pattern) or the perceptual outcomes (e.g., sense of place, perception of environment) in terms of measuring social cohesion or similar behaviours.
Exclusion	• Studies that focus on the production and management process for public space to enhance social cohesion were excluded as the present study is primarily concerned with the social performance of public spaces.
	• Articles focus on the analysis of public space design projects and design process and its relation to social cohesion were excluded because it requires different data collection and analysis approach to understand how social cohesion is deployed in the design of urban public spaces (Aelbrecht & Stevens, 2019a, b).
	• Studies explicitly focused on urban greenspace and neighbourhood built environment were excluded since previous SLRs have been conducted to explore the possibilities of interrelation between these typologies of spaces and their effects on social cohesion (Wan et al., 2021; Mazumdar et al., 2018b).
	• Non-peer reviewed studies that published before 2000, papers that are less than 3 pages long and not written in English were excluded.

Appendix 2

Table 6 Summary of findings of the primary studies included in the systematic review

Study ID	Author, Year of publication	Location	Data collection methods	Study target, sample size	Public space typology included	Outcomes assessed	Data analysis techniques
P1	Abed and Al-Jokhadar (2021)	Jordan	S, I	Residents, architects, developers; $n=197$ for S, $n=30$ for I	FP, PF	Social sustainability: 6 items adapted from the Housing Associations' Charitable Trust (Abed & Al-Jokhadar, 2021).	Spatial analysis, correlation analysis, qualitative data analysis
P2	Al-Ali et al. (2020)	UAE	S	Residents; $n=145$	POS	Social capital: 6 items adapted from Ross and Searle (2019).	Regression analysis
P3	Amran and Fuad (2020)	Indonesia	O	General population; $n=4$ for O	FP	Social interaction: social interactions between strangers in transit space.	Site analysis
P4	Askari et al. (2015)	Malaysia	S, O	General population (aged 14–50); $n=400$	POS	People's engagement: measured by social needs, environmental needs, and physical needs.	Principle component analysis
P5	Askarizad and Safari (2020)	Iran	O	General population	POS	Behavioural pattern: assessed by activity types, number of people observed with specific activity, temporal and spatial distribution.	Behavioural mapping, GIS analysis
P6	Can and Heath (2016)	Turkey	Q, O	Residents; $n=340$ for Q, $n=3$ for O	FP	Social interaction: measured by activity types, temporal and spatial distribution.	Space syntax analysis, correlation analysis
P7	Cao and Kang (2019)	UK, China	O	General population; $n=1297$	POS	Social relationship: types of social relationship identified by distance following Gehl's (1987) application of Hall's (1992) social distance theory.	Behavioural mapping

Table 6 (continued)

Study ID	Author, Year of publication	Location	Data collection methods	Study target, sample size	Public space typology included	Outcomes assessed	Data analysis techniques
P8	Cattell et al. (2008)	UK	FG, O, I	Residents; $n=42$	POS, PCS	Social relations: social interactions in public spaces provide daily routines and sustenance for people's sense of community, opportunities of making bridges and bonding, encouraging tolerance of others	Qualitative data analysis
P9	Francis et al. (2012)	Australia	S, FG	Residents	POS, PF, PCS	Sense of community: 12 items Sense of community Index (SCI) adapted from McMillan and Chavis (1986)	Linear regression analysis
P10	Ganji and Rishbeth (2020)	UK	I, O	General population: $n=30$	POS, Str	Social integration/conviviality: represents the symbolic value of situated diversity, visibility to lingering, in-betweenness (of the physical environment), playfulness	Behavioural mapping
P11	Ghahramanpouri et al. (2015)	Malaysia	S	General population: $n=227$	Str	Social sustainability: measured by equity, quality of life, pride, sense of place and identity, social inclusion and coherence, democracy/governance	Factor analysis
P12	Hickman (2013)	UK	I	Residents: $n=180$	PCS, PF	Social interaction: the characteristics of residents who interact in third places and the barriers to engagement	Qualitative data analysis

Table 6 (continued)

Study ID	Author, Year of publication	Location	Data collection methods	Study target, sample size	Public space typology included	Outcomes assessed	Data analysis techniques
P13	Jones et al. (2015)	UK	O	General population: $n=3$ for O	PCS	Everyday encounter: embedded engagement with the cafés' publics, practices, uses, atmospheres, and rhythms	Qualitative data analysis
P14	Karsono et al., 2021)	Malaysia	Q, I, O	General population: $n=330$ for Q, $n=26$ for I	POS	Place attachment: length of engagement, length of familiarity	Descriptive data analysis, qualitative data analysis
P15	Khalili and Fallah (2018)	Iran	O, I, SSI, FG	Female residents: $n=28$ for FG, $n=24$ for I	PCS, POS	Public (communal) life: measured by vitality parameters from four commentary perspectives – functional, social, visual, and cultural	Qualitative data analysis
P16	Khemri et al. (2020)	Algeria	O, I	General Population	POS, Str	Social activities: temporal and spatial distribution of different types of activities	Qualitative data analysis
P17	Lara-Hernandez et al., 2019	Mexico	O	General Population	Str	Temporary appropriation: the dynamic process of interaction between the individual and its surrounding.	Visual complexity analysis
P18	Liu et al. (2020)	China	S, O, I	Residents: $n=1280$	POS, PF, PCS	Social inclusion: measured by frequency of using open spaces and commercial facilities, perceived opportunity for neighbourly interaction, perceived diversity of neighbourhood open spaces and commercial facilities; diversity of neighbourhood open spaces and commercial facilities	Logistic regression analysis

Table 6 (continued)

Study ID	Author, Year of publication	Location	Data collection methods	Study target, sample size	Public space typology included	Outcomes assessed	Data analysis techniques
P19	Bredewold et al. (2020)	Netherland	O, I	Residents: $n=78$	POS, PF	Social inclusion: relative to three conditions that are conducive to convivial encounters between with and without disability – a shared purpose, built-in boundaries, freedom to (dis)engage.	Qualitative data analysis
P20	Lotfata and Ataöv (2020)	Turkey	I, O, S	Residents: $n=18$ for FG, $n=20$ for I	Str	Social sustainability: measured by social equity, satisfaction of human needs, wellbeing and happiness, social interaction and social mixing (cohesion and inclusion), sense of place (cultural identity), sense of community, future focus	Fuzzy cognitive mapping, cognitive spatial mapping
P21	Mahdinezhad et al. (2020)	Iran	I	Experts: $n=11$	PCS, POS	Socialization in public space: the process of socialization and the promotion of community life within public spaces, based on the acceptance of different social groups, provides physical and psychological comfort.	Qualitative data analysis, exploratory factor analysis
P22	Mantey (2015)	Poland	S	Residents: $n=149$	POS, PF, PCS	Place attachment: measured by the frequency of use, individual social network, the size and characteristics of public space.	Descriptive data analysis, qualitative data analysis

Table 6 (continued)

Study ID	Author, Year of publication	Location	Data collection methods	Study target, sample size	Public space typology included	Outcomes assessed	Data analysis techniques
P23	Mateo-Babiano (2012)	Thailand	S	General population: $n=140$	Str	Public life: motivated by an ecology-cultural-behaviour paradigm; identified by a set of pedestrian needs criteria – mobility, protection, ease, equity, enjoyment/leisure, identity	Descriptive data analysis
P24	Mehta (2019a, b)	US	S, O	General population: $n=66$	Str	Social life: categorised by a taxonomy consists passive sociability, fleeting sociability, and enduring sociability	Qualitative data analysis, behaviour mapping
P25	Mehta and Bosson (2021)	US	S, O	General population: $n=140$	Str	Social interactions: measured by the liveliness index captures stationary, lingering, and social activities on the street.	Behaviour mapping, regression analysis and factor analysis
P26	Modie-Moroka et al. (2020)	South Africa	O, I	Residents: $n=110$	POS	Social capital: associated with social networks, social norms of mutuality, reciprocity, social support, collective efficacy, informal social control, mutual trust, empathy and reciprocity.	Qualitative data analysis, descriptive data analysis

Table 6 (continued)

Study ID	Author, Year of publication	Location	Data collection methods	Study target, sample size	Public space typology included	Outcomes assessed	Data analysis techniques
P27	Nguyen (2019)	Singapore	O, SSI	General population: $n=18$	POS	Social life: the adaptability and informality of public space creates the opportunity for social mixing in terms of fulfilling the promise of a public space that is inclusive, representative and fluid in its meanings and norms.	Behavioural mapping, qualitative data analysis
P28	Ortiz et al. (2004)	Spain	O, I	Female residents: $n=8$	POS	Sense of place: conditioned by the age, gender, and by the socio-cultural background.	Qualitative data analysis
P29	Piekut and Valentine (2017)	UK, Poland	S	General population: $n=1522$ (in Leeds), $n=1499$ (in Warsaw)	PF, POS, PCS	Inter-ethnic contacts: measured by neighbourhood context, individual characteristics, and space of encounter.	Multilevel regression analysis
P30	Priest et al. (2014)	Australia	O	General population: $n=974$	PF, POS, PCS	Inter-group contact: type of contact is measured against majority/minority group (primary explanatory variables), age, time of day, (public space) setting, length of interaction, quality of interaction.	Logistic regression analysis, multinomial regression analysis

Table 6 (continued)

Study ID	Author, Year of publication	Location	Data collection methods	Study target, sample size	Public space typology included	Outcomes assessed	Data analysis techniques
P31	Purwanto and Harani (2020)	Indonesia	O	General population: $n=120$ (number of observer respondents)	PF, POS, PCS, Str	Place attachment and place identity: identified with three elements of spatial cognition including elements of the everyday environment, the spatial relationship between units of the place, travel plan that represents information related to activities and movements.	Qualitative data analysis
P32	Rivera et al. (2022)	Australia	S	Adolescent: $n=468$ (119 were excluded for incomplete data)	POS, Str	Social connectedness: measured by connectedness, affiliation, companionship.	Multilevel linear regression analysis
P33	Salimi et al. (2019)	Iran	I	Residents: $n=16$	POS	Social cohesion: explained by conditional factors (different expectations, different time of attendance, different residence size), interactional factors (detached behaviour settings, weak vibrancy), consequential factors (lack of social capital).	Qualitative data analysis (Grounded theory), site analysis
P34	Salvadó et al. (2020)	Chile	S, O	Residents: $n=48$	POS, Str	Levels of belonging: identified by physical elements of public space, types of activities, frequency of uses, types of user groups.	Qualitative data analysis, site analysis

Table 6 (continued)

Study ID	Author, Year of publication	Location	Data collection methods	Study target, sample size	Public space typology included	Outcomes assessed	Data analysis techniques
P35	Sattarzadeh (2018)	Iran	Q, O, I	Residents: $n=30$	POS, Str	Place attachment: explained by ambient factors (service quality, accessibility facilities, satisfaction), social factors (feeling of security, social interactions, community relations), socio-demographic factors (personal characteristics, duration of residence in the region).	Correlation analysis
P36	Aelbrecht (2016)	Portugal	O	General population	FP	Informal social interactions among strangers: spatial characteristics of "fourth places", types of informal social interactions, temporal and spatial distribution.	Spatial and behaviour analysis
P37	Aelbrecht et al. (2021)	Denmark, London	O	General population: $n=3$ (for O)	POS	Social cohesion: explained by 4 dimensions – belonging, place attachment and identity; inclusion, social order and control; participation, social networks, and social capital; recognition, common values, and civic cultural.	Urban design analysis
P38	Soares et al. (2020)	Netherland	Q	General population: $n=318$ (university campus users)	POS, PCS, PF	Creative encounters: analysed by spatial affordance of creativity (urban functions, public spaces (open public space, semi-public space), physical features).	GIS analysis

Table 6 (continued)

Study ID	Author, Year of publication	Location	Data collection methods	Study target, sample size	Public space typology included	Outcomes assessed	Data analysis techniques
P39	Nguyen et al. (2019)	Vietnam	SMD	General population	POS, PCS, PF, Str, FP	Public (urban) life: interpreted by different activity category, type of visited public space, temporal and spatial distribution of activity.	Social media data analysis (GIS analysis, correlation analysis)
P40	Trawalter et al. (2021)	US	S	General population: $n=312$ (university students)	POS	Sense of belonging (among students with different socioeconomic status (SES)): analysed by the relations among use of public space and iconic public space, SES, sense of belonging, and public space knowledge; the mediating effects of sense of belonging on the influences of SES in use of public space.	Regression analysis
P41	Trillo (2017)	Italy	S, SSI	Residents: $n=6$ (sites for visual S)	POS, PF, Str	Social integration: supported by public space that encompasses mixed use, connectivity, public facilities, and sociocultural activities.	Qualitative data analysis, visual survey
P42	Ujang et al. (2018)	Malaysia	SSI, O	General population: $n=16$	POS, Str	Place attachment: meaningful social interactions and social mixing (social integration) foster place attachment.	Qualitative data analysis

Table 6 (continued)

Study ID	Author, Year of publication	Location	Data collection methods	Study target, sample size	Public space typology included	Outcomes assessed	Data analysis techniques
P43	Watson (2009)	UK	O, I	General population: $n=8$ (sites for O)	PCS	Social inclusion: represented by different types of sociality – making social connections, 'rubbing along' (minimal level of encounter), inclusive sociality, theatre and performance (presence of people and events in the marketplace), mediating differences.	Qualitative data analysis
P44	Wickes et al. (2019)	Australia	S	Residents: $n=4132$	POS, PCS, PF, Str, FP	Social cohesion: interpreted as neighbourhood networks, social cohesion and trust, place attachment; predicted with 3 multilevel regression analysis with independent variables selected from 4 types of social conduits, social holes, neighbourhood fragmentation index, green space, land use diversity, neighbourhood demographics, individual demographics.	Multilevel regression analysis, spatial analysis
P45	Williams and Hipp (2019)	US	S	Residents: $n=2589$ (number of third places' in LA)	PCS	Social cohesion and neighbourhood interactions: measured by five items adapted from Rhineberger-Dunn and Carlson (2009) and Sampson et al. (1997).	Multilevel random effects regression analysis

Table 6 (continued)

Study ID	Author, Year of publication	Location	Data collection methods	Study target, sample size	Public space typology included	Outcomes assessed	Data analysis techniques
P46	Zordan et al. (2019)	China	O	General population: $n=292$ (number of buildings and adjacent public open space)	POS, PCS, PF, FP, Str	Social (face-to-face) interactions: measured by the temporal and spatial distribution of different types of social (face-to-face) interactions; correlated to land use types, design characteristics of different ground floor features.	GIS analysis, correlation analysis
P47	Zhu & Fu (2017)	China	S, O, I	Residents: $n=1809$	POS, PF, PCS, Str	Neighbourhood participation: influenced by private social capital, community social capital, neighbourhood attachment, use and appraisal of communal space (neighbourhood public space), and socio-demographic characteristics.	Path analysis
P48	Zhang and Lawson (2009)	Australia	O	Residents: $n=3$ (number of public outdoor space for O)	POS, PCS	Social activity: evaluated by spatial distribution of different activity types.	Qualitative data analysis, site analysis
P49	Peters and de Haan (2011)	Netherlands	O, SSI	Residents: $n=40$	POS, Str	Inter-ethnic interaction: interpreted by uses of public space, everyday experiences with multiculturality in urban public space, private bounding, tolerance towards multiculturalism.	Qualitative data analysis

Table 6 (continued)

Study ID	Author, Year of publication	Location	Data collection methods	Study target, sample size	Public space typology included	Outcomes assessed	Data analysis techniques
P50	Dasgupta et al. (2022)	Japan	Q	Residents: $n=2093$	POS	Place attachment: measured by 21 variables across the four-place dimensions, namely, place identity (five variables), place dependence (seven variables), social bonding (five variables), and nature bonding (four variables).	Exploratory factor analysis, multiple linear regression
P51	Mullenbach et al. (2022)	US	S	Residents: $n=521$	POS	Trust: interpreted by park and public space use, social interaction, and confounding variables including social support and income.	Structural equation modelling
P52	Armstrong and Greene (2022)	US	S	Residents: $n=489$	POS	Sense of inclusion: interpreted by social interaction, authenticity, sense of belonging, acceptance, negative valence.	Exploratory factor analysis (EFA)
P53	Powers et al. (2022)	US	Q	Residents: $n=931$	POS	Sense of belonging and interracial contact: measured by new people motivation, social group motivation, welcome and belonging, engagement and representation, programs and events, input in decision making, representation of racial and ethnic diversity, safety, park interracial contact, and quality of contact.	Structure equation modelling

Table 6 (continued)

Study ID	Author, Year of publication	Location	Data collection methods	Study target, sample size	Public space typology included	Outcomes assessed	Data analysis techniques
P54	leBrasseur (2022)	Finland	Q	Residents: $n=1800$	POS	Social wellbeing: the exchange of social interaction enables social ties, sense of community, social cohesion, social identity	Relational analysis
P55	Samsudin et al. (2022)	Singapore	S	Residents: $n=740$	POS	Social capital: measured by networks, trust, solidarity, participation, social cohesion	Correlation Analysis
P56	Zahnow et al. (2022)	Australia	S	Residents: $n=4088$ for 2008, $n=4167$ for 2010, and $n=4132$ for 2012	POS, PF, PCS, Str	Social cohesion and collective efficacy: seven items from the ACCS (Australian Community Capacity Study)	Mixed effects panel models
P57	Chen et al. (2022)	China	Q	General population: $n=501$ (the elderly group aged between 65 and 95)	POS	Social cohesion: related to place identity, place dependence, emotional wellbeing, social wellbeing, and psychological wellbeing	Structure equation model
P58	Ahmed and Haykal (2022)	Iraq	Q, I	General population: $n=239$	Str	Sense of place: measured by physical appearance, street amenities, and street comfortability	Spatial analysis, descriptive analysis
P59	Shen et al. (2022)	China	S	General population: $n=102$	POS	Social benefits: measured by physical element characteristics, perceptual quality, cognitive experience, and activity behaviour	Structural equation model

Table 6 (continued)

Study ID	Author, Year of publication	Location	Data collection methods	Study target, sample size	Public space typology included	Outcomes assessed	Data analysis techniques
P60	Vidal et al. (2022)	Portugal	O	Green space user: $n=979$	POS	Pattern of behaviour: sociodemographic characteristics, behaviour types, physical activity level, and mobility	Descriptive statistical and inferential analyses
P61	Wang and Liu (2022)	China	S	Residents: $n=915$	POS, PF, PCS	Inclusiveness: measured by attitude toward equal citizenship and attitude toward equal entitlement	Structural equation model
P62	Gray and Manning (2022)	UK	FG	Young people: $n=51$	POS	Place identity: interpreted with place appropriation and autobiographical insideness	Collaborative spatial mapping
P63	Loo and Fan (2023)	China	O	General Population	POS	Social interaction: measured by the spatial–temporal distribution of social interaction; the impacts of edge effects and landmarks on social interaction	Binominal model

Data collection methods code: *O* observation; *SSI* semi-structured interview; *I* interview; *SMD* social media data; *S* survey; *Q* questionnaire; *FG* focus group. Public space typology code: *POS* public open space; *Str* street; *PF* public facility; *PCS* public commercial service; *FP* fourth place

Acknowledgements For the purpose of open access, the authors have applied a Creative Commons Attribution (CC BY) licence to any Author Accepted Manuscript version arising.

Funding The authors declare that no funds, grants, or other support were received during the preparation of this manuscript.

Declarations

Competing Interests The authors have no relevant financial or non-financial interests to disclose.

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