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Abstract

Recognizing the importance of population aging and urbanisation research in achieving healthy ageing in cities, the United Nations (UN) conducts continuing initiatives to ensure healthy lives and promote well-being for people of all ages. Malaysia's population ageing has concentrated on the elderly and all areas of their well-being as the country aspires to become a developed nation by 2040. In the planning and design of urban environments, there is a critical requirement for adoptive social comfort among the elderly. User-centered design for the elderly is more complex than for other user groups. Researchers must be aware of the behaviors, sensory and cognitive abilities, and attitudes of the elderly when conducting the study. To address this issue, this study's objective is to explore and analyse the existing methods and tools used in urban park study among the elderly. To meet the study's goals, the researcher should employ practical approaches. This study employed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method published in 2009. The authors used Science Direct and an archival Scopus database to manage the search results and systematically reviewed existing literature on the elderly in the urban park. Keywords related to "elderly and urban parks design" were examined in articles published between 2016 and 2021. Resulting in 31 relevant papers, the methods used have been analysed, and the effective way to be used in handling research in urban park design for the elderly in Kuala Lumpur. This article was to combine field observation and interviews with users and experts.

Keywords: Social well-being, Urban Parks, Senior Users, Park Design.

Introduction

Urban green spaces can help improve air quality while also reducing stress levels among urban residents, which positively impacts mental health and human well-being (Nath et al., 2018). Nath et al (2018) specify urban green spaces in the form of parks, gardens, urban forests, and open spaces. An urban public park is a built-environment gathering place that offers opportunities for physical activity, appreciation of nature, and social interaction with old and new acquaintances (Finlay et al., 2015; Aleksandra, 2013). The main objective of urban planning and design is to create urban spaces that are more livable for people. There is

increasing evidence that there can be a strong connection between green spaces and healthy aging, especially in densely populated areas (Xie et al., 2018; Enslee & Kabisch, 2020). In a rapidly urbanizing world, finding evidence-based interventions to support healthy ageing is essential.

Landscape aesthetics and other human requirements are the focus of empirical investigations on the elderly's preferences. According to Wen, Albert, and Von (2018), relevant studies on the needs of older adults concerning green spaces can be divided into five categories: (1) Green spaces and open spaces that can promote older adults' walking and other physical activities (Joseph & Zimring, 2007; Kaczynski et al., 2010; Popa, 2020); (2) Parks that can promote participation (Kemperman & Timmermans, 2006); (3) Green spaces that can support social contacts and well-being (Kemperman & Timmermans, 2014; Yung et al., 2017); (4) Therapeutic gardens and space (Milligan et al., 2004); and (5) Aesthetic and attractive open green spaces (Alves et al., 2008; Aspinall et al., 2010).

As a result, identifying the elements of a public park that can satisfy and meet urban ageing needs for a healthy lifestyle is critical. Because of the increasing number of elderly worldwide, studies on their preferences and accessibility to urban green spaces are popular (Guo, Liu, Tian & Xu, 2020; Pratiwi & Furuya, 2018; Guo et al., 2019; Arnberger et al., 2017). Accessibility, safety, aesthetics, amenities, maintenance, comfort, and proximity are all crucial factors in increasing park use, according to several studies (Kou, Hunter & Cleland, 2021; Lau, Yung & Tan, 2021; Blaszyk, 2020; Williams et al., 2020; Zhang & Tan, 2019).

Interacting with elderly individuals, on the other hand, requires care and a significant amount of effort and attention (Roberta, 2000; Cusack & O'Toole, 2013). Due to time and cost constraints, this is not always achievable. On-site surveys or interviews revealed how people acquired the equipment in their environment, how they learned to use it, and who helped them and reported both joyful and unpleasant experiences. According to several studies, such a massive amount of data could only have been collected in a controlled environment. Collaboration between professionals or experts in the landscape and ageing field with elderly individuals is a systematic technique for highlighting concerns and creating a better urban park design context for elderly users in specific locations (Zhu et al., 2017; Yung et al., 2017). Participation of the elderly in the research is critical in gaining a better knowledge of how to design facilities that promote social interaction and well-being.

This study utilised the Systematic Literature Review (SLR) method to address the research questions: What are the existing methods and tools used in urban park and design study among the elderly? Thus, this SLR aims to explore the methods and tools used in urban park design among the elderly. Therefore, the findings will assist in suitable strategies for handling the research in urban park design for the elderly in Kuala Lumpur.

Methodology

The SLR methodology was developed to analyse the case studies. PRISMA 2009 was used to find, evaluate, and assess the publications' eligibility as well as to describe the sources. The following part will provide a full explanation of the methodology. PRISMA 2009 directs the SLR investigation by specifying the precise research topic, creating inclusion and exclusion criteria, and evaluating a significant number of pertinent scientific papers (Liberati et al., 2009;

Rethlefsen et al., 2021). Information on papers that were screened, evaluated for eligibility, and either included in or excluded from the review is provided by the PRISMA 2009 flowchart (Pati and Lorusso, 2018). This approach thus constitutes a creditability and transparent process. This paper reviews various journals regarding urban park design in contact with the elderly. In finding the published paper to review, Science Direct and Scopus databases were used as a search platform, and specific keywords were used. The reason for employing those indexing databases is that it maintains the higher value of journals in terms of authenticity, quality, novelty, and academic and professional relevance.

The literature search was carried out on 8/11/2021. The authors found a bunch of 8287 journals in the Science Direct database from the keywords “elderly and urban park design,” and 93 journals were found in the Scopus database from the same keyword. The Science Direct and Scopus database was queried using the following search string: TITLE-ABS-KEY (elderly AND urban AND park AND design) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016)) AND (LIMIT-TO (DOCTYPE , "ar")). The search was limited to research articles in journals only and more specific recent papers between the years 2016 to 2021. About 93 journals from Science Direct and 20 from Scopus have been downloaded and reviewed after filtering due to relevant articles, double counting, and full article accessed. Thirty-one journals have been chosen to be reviewed because of their focus on the methodological aspect. From the review journal, Table 3.1 were developed and analysed to differentiate all the methods conducted in the study about the elderly in the park and urban green spaces.

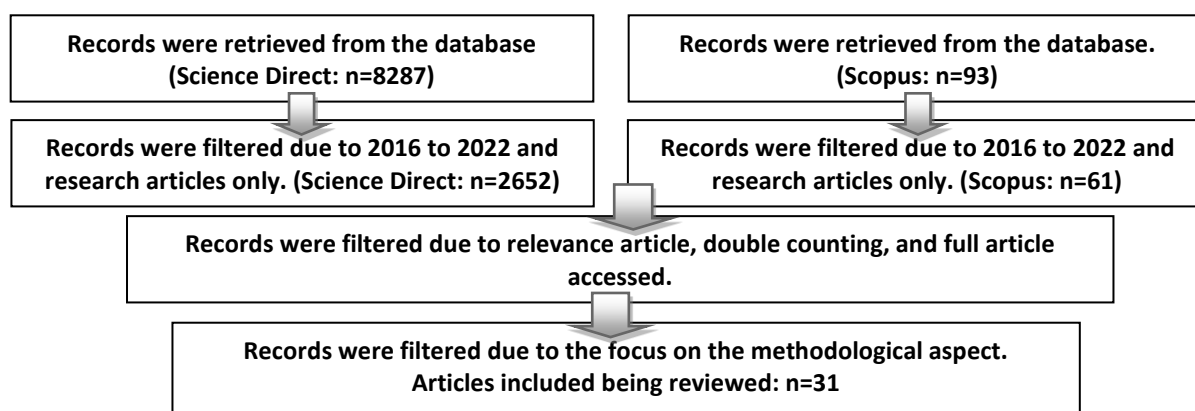


Figure 1. The diagram shows the process for selecting the relevant paper using the PRISMA method

Methods in Elderly Study

The researchers in the selected papers used several methods to understand several contexts between the elderly and the urban parks design study. *Table 2.1* below explores previous ways of measuring elderly participation in green spaces research.

Table 2.1

Analysis of methods used to study urban green spaces for the elderly.

No	Authors	Year	Country	Topic	Methods & elements
J1	Lau et al	2021	Hong Kong, China	Usage and perception of urban green space of older adults in the high-density city of Hong Kong.	At 16 urban green spaces in different districts, trained students performed on-site questionnaire surveys on 269 older people aged 60 and up. The first component of the questionnaire collects data on how people use urban green space and how they perceive it Urban Green Space (UGS). The second portion of the 5-point Likert scale (with a neutral choice in the middle) about their perceptions of nine UGS attributes, including spaciousness, shading, proximity, aesthetics, maintenance, air quality, acoustics, cleanliness, and overall perception of the UGS that they regularly visit. Finally, utilising a short Form-12 version 2 Health survey, self-report health issues are discussed (SF12v2).
J2	Kabisch et al	2021	Leipzig, Germany	Physiological and psychological effects of visits to different urban green and street environments in older people: A field experiment in a dense inner-city area.	In the inner city of Leipzig, Germany, 33 older men and women with an average age of 63.5 were exposed to a long-standing urban park with numerous ancient trees, a newly created park with different use opportunities, and a busy street environment. The heart rate variability, blood pressure, mood, and perceived restoration outcomes were assessed using continuous ECG monitoring, psychological questionnaires, and perceived restoration outcomes.
J3	Vich et al	2021	Barcelona Metropolitan Region, Spain	Contribution of park visits to daily physical activity levels among older adults: Evidence using GPS and accelerometry data.	To find potential participants, 39 public and private centres in urban regions with varying levels of walkability were contacted. Snowball sampling was used to reach out to other senior citizens who did not visit senior centres. Participants were instructed to wear an accelerometer on their wrist and a GPS logger (Qstarz BT-Q1000X; Qstarz International Co., Ltd., Taiwan, R.O.C.) for seven days to record their daily visited places and physical activity patterns. A questionnaire about anthropometry, socio-demographic factors, daily mobility, and physical activity habits was also given to participants. A total of 181 people were accepted from a sample of 269 interested people.
J4	Lin & Wu	2021	Beijing, China	Green and blue space availability and self-rated health among seniors in China: Evidence from a national survey.	The Chinese Sociological Survey (CSS) employed a national-level social survey to investigate older citizens' self-rated health (SRH). There were 1773 observations of people above the age of 60. The researchers employed a 4-point scale with "3" denoting good health, "2" denoting fair health, "1" representing lousy health, and "0" denoting no health (cannot take care of myself).
J5	Ma et al	2021	Xi'an, China	How to design comfortable open spaces for the elderly? Implications of their thermal perceptions in an urban park.	In a Xi'an urban park, field research was done. The researchers calculated the percentage of landscape features within a 10-meter radius of site centres (314m ²). To establish the sky view factor, fisheye pictures of the four sites were obtained (SVF). Respondents over 60 who engaged in free activities in measured locations were chosen for questionnaire surveys during the trials. Because some seniors have cognitive deficits, a field interview was included to help the elderly understand the questionnaire and improve response accuracy. There were 1417 "effective" questionnaires gathered, with 471 in the winter and 946 in the summer. The number of responses was computed for each place, day, and season.
J6	Kou et al	2021	Belfast, United Kingdom	Physical environmental factors influencing older adults' park use: A qualitative study.	Interviews were conducted by the researchers. In Belfast, UK, 20 older persons (aged 60 and above) were recruited through purposeful convenience sampling. Fifteen people walked to their nearby park for semi-structured walking interviews (defined as parks intersected with the 500 m residential radial buffers). They employed a Go-Pro camera on their chest to record visual and audio data. The remaining participants were questioned at their homes (sedentary interviews) with just audio recordings. The interviews were transcribed verbatim and analysed thematically inductively. The verbatim transcriptions were loaded into Atlas ti. 8.
J7	Guo et al	2020	Jiangxi Province, China.	Elderly Suitability of Park Recreational Space Layout Based on Visual Landscape Evaluation.	A field investigation determined each ground element's name and category. The case park's geospatial data included roads, buildings, lakes, landscapes, pavilions, benches, and other amenities. Using Python Scripting for ArcGIS, the authors calculated the terrain viewability quantitatively. The goal of a

					questionnaire study of some senior individuals in five local parks was to learn more about the needs of the elderly in the park visual landscape and the factors that influence the park visual landscape for the elderly. Ninety questionnaires were distributed, and 74 were found to be valid.
J8	Shan et al	2020	Shen Yang, Liaoning, China	Creating a Healthy Environment for Elderly People in Urban Public Activity Space.	The following methods were used: literature review, field investigation, questionnaire, and physical survey (sound level meters). The authors categorised eight different characteristic spaces based on the variables of dynamic or static space, size of the area, surrounding structure, and plant density in seven example parks with extensive music activities. This study included general linear regression and multiple regression analyses utilising SPSS (Statistical Product and Service Solutions) and a layout plan for each activity space. The association between activity population and several geographical characteristics in the three chosen parks was investigated. For the questionnaire survey, 250 people aged 40 to 100 provided valid data.
J9	Popa	2020	Bucharest (Romania)	Too Old for Recreation? How Friendly Are Urban Parks for Elderly People?	Four case study parks were observed in the field. The study's goal was to evaluate spatial planning and urban park design. A total of 5752 participants completed a questionnaire survey, with 16 percent being senior. General information (limits, alleys, entrances, lakes), endowments (playgrounds, fitness areas, chess tables, sports areas, fountains, dog-walking areas, bicycle lanes, etc.), facilities (toilets, guard posts, first aid points, drinking fountains), and problems (areas with slopes greater than 10%), noise, odours, waste, dogs, homeless people, etc.) encountered in urban parks are all included in this database. The ESRI application Collector for ArcGIS was used to populate the database in the field.
J10	Enssle & Kabisch	2020	Berlin, Germany	Urban green spaces for the social interaction, health and well-being of older people- An integrated view of urban ecosystem services and socio-environmental justice.	A quantitative questionnaire survey was conducted among adults aged 50 and above. There were 566 questionnaires in all (318 online and 188 papers). Use information from a quantitative survey conducted in Berlin in 2018. Questionnaires were delivered in social and cultural gathering spots, counselling centres, and community organisations. The researchers contacted the institutions that had been identified during the qualitative phase of the study. Provide an online version of the questionnaire that was mailed out.
J11	Yu et al	2020	Taipei City, Taiwan.	Restorative effects of virtual natural settings on middle-aged and elderly adults.	The social networking platforms were used to recruit 34 participants at least 45 years old. The study orientation took 15 minutes in total. The SART (Sustained Attention to Response Test) was used. Participants were asked to complete the Profile of Mood States (POMS) questionnaire after completing the SART. The researchers then measured their physiological markers (HR, SBP, DBP, and HRV). They were then subjected to their allocated VR state, either natural or urban. After the VR sessions, participants were interviewed in semi-structured interviews to assess their experiences. The physiological signs of the subjects were then measured again. After a week in either a natural or urban context, participants were invited to complete follow-up POMS, RCS, interview, and SART assessments.
J12	Lak et al	2020	Tehran, Iran	A Framework for Elder-Friendly Public Open Spaces from the Iranian Older Adults' perspectives: A Mixed-Method Study.	This study used an exploratory mixed-method approach, combining qualitative and quantitative methodologies. This study was split into two parts. Grounded Theory (GT) is used first, with 64 semi-structured interviews conducted in Public Open Spaces (POS) and data analysed to extract key themes. Second, 420 older people were surveyed by a self-administered questionnaire. Partly least squares-Structural Equation Modelling (PLS-SEM) was used for data analysis and model development.
J13	Gagliardi et al	2020	Ancona, Italy	Benefits for Older People Engaged in Environmental Volunteering and Socializing Activities in City Parks: Preliminary Results of a Program in Italy.	A questionnaire and a Focus Group Discussion were used to collect data. The Physical Activity Scale for the Elderly (PASE), Positive and Negative Affect Schedule (PANAS), Life Satisfaction, and Lubben Social Network Scale were all used to assess variation in the variables (LSNS). Trained research assistants oversaw the protocol administration, which took around 20 minutes per participant, and offered assistance to those who had trouble completing the questionnaire independently. Two focus groups were held to get information from the participants on why they wanted to volunteer for the environmental project.

J14	Leng et al	2020	Harbin, China	Planning for supportive green spaces in the winter city of China: Linking exercise of elderly residents and exercise prescription for cardiovascular health.	The formal questionnaire survey, interview survey, and field observation were all undertaken as part of this study. Mixed survey methods were utilised, including interviews with doctors, distribution of a questionnaire to older participants, interviews with elderly participants with cardiovascular disease, and field observation in green spaces to learn about the exercise habits of elderly inhabitants. According to an interview survey with doctors, green spaces are needed to support exercise for cardiovascular health.
J15	Okuyama et al	2019	Shimane, Japan	Hilly neighborhoods are associated with increased risk of weight gain among older adults in rural Japan: a 3-years follow-up study.	Our Shimane CoHRE study in 2012 collected longitudinal data from older persons (65 years) who were followed up in 2015. This study investigates rural individuals' living habits and any chronic diseases they may have had to identify potential causes of healthy ageing. There were 2147 participants in total, with 1630 (65 years) taking part in the baseline study and 926 taking part in the follow-up survey in 2015. Self-reported questionnaires and face-to-face interviews were used to gather all of this data.
J16	Wang & Rodiek	2019	Nanjing, China	Older adults' preference for landscape features along urban park walkways in Nanjing, China.	A questionnaire with photos. This study used photographic comparison methods with 283 older persons (mean age 71 years) in Nanjing, China, and was completed using printed booklets. This research looked at various well-known landscape and hardscape characteristics to see which park users over 60 favoured. With each aspect represented by four alternative paired photographs, this photo comparison study hypothesised that older persons would select particular elements of urban park paths (28 pairs in all). Except for the specific feature being examined in that comparison, where the image was digitally manipulated to show the hypothesised component, both were identical within each photo pair.
J17	Li et al	2019	China	Subtypes of park use and self-reported psychological benefits among older adults: A multilevel latent class analysis approach.	Questionnaire for the survey (pre-visit & post-visit) 200 senior citizens from 15 different Shanghai parks. When visiting a park, use GPS gadgets. While visiting the park, the participants completed pre-and post-visit surveys and wore a GPS and pedometer. A multilevel latent class analysis (LCA) identified three types of park users: active park lingerers, active walkers, and passive scanners.
J18	Guo et al	2019	Beijing, China.	Accessibility to urban parks for elderly residents: Perspectives from mobile phone data.	The Two-Step Floating Catchment Area (2SFCA) approach, which performed floating catchment searches from both supply and demand points, was used to determine the accessibility of urban parks. Statistical analyses were used to see how park accessibility for senior citizens was related to environmental factors and socioeconomic and demographic factors. Only customers with local phone numbers were included in the data taken in Beijing on December 6, 2015. The data for the urban parks were collected by manually vectorizing the park boundaries from Google Earth and georeferencing them with ArcGIS Desktop 10.2 software. At 86 parks, visitors were identified. The Gini index and the Lorenz curve data were used to depict the spatial unfairness of park accessibility among older inhabitants.
J19	Yu et al	2019	Shanghai, China	Sustainable Development Research on the Spatial Differences in the Elderly Suitability of Shanghai Urban Parks.	The Two-Step Floating Catchment Area (2SFCA) approach, which performed floating catchment searches from both supply and demand points, was used to determine the accessibility of urban parks. Statistical analyses were used to see how park accessibility for senior citizens was related to environmental factors and socioeconomic and demographic factors. Only customers with local phone numbers were included in the data taken in Beijing on December 6, 2015. The data for the urban parks were collected by manually vectorizing the park boundaries from Google Earth and georeferencing them with ArcGIS Desktop 10.2 software. At 86 parks, visitors were identified. The Gini index and the Lorenz curve data were used to depict the spatial unfairness of park accessibility among older inhabitants.
J20	Yung et al	2019	Hong Kong, China	Thermal perceptions of the elderly, use patterns and satisfaction with open space.	A questionnaire survey was conducted to obtain older perspectives on the thermal climate and levels of outdoor exercise in open places. People aged 65 and up were the focus of the poll. There are 235 in the winter and 219 in the summer.

J21	Duan et al	2018	China, Germany	Physical activity areas in urban parks and their use by the elderly from two cities in China and Germany.	A questionnaire, field observation. Both cities conducted a face-to-face questionnaire study (317 Hong Kong, 311 Germany). From the outside, an observational approach was employed to investigate park-based Physical Activity (PA), PA regions, and urban environments. Trails were the most often used physical activity locations by the old, with the elderly walking.
J22	Xie et al	2018	China	Healthy aging with parks: Association between park accessibility and the health status of older adults in urban China.	Between the 10th and 16th of September 2016, a questionnaire survey of 700 older persons was conducted utilising a cross-sectional study. According to logistic regression analysis, older persons with the most access to parks have significantly reduced probabilities of cardiovascular disease, joint disease, and endocrine illness than those with the least access to parks. This research emphasises the need for more comprehensive economic planning methods in transitional cities to improve park accessibility and promote healthy ageing.
J23	De Lira et al	2018	Brazil	Engagement in a Community Physical Activity Program and Its Effects Upon the Health-Related Quality of Life of Elderly People: A Cross-Sectional Study.	Questionnaire research. The study included one hundred older men and women (aged > 60) who were either inactive (sedentary group; n = 50, 30 males) or physically active and participated in a community physical exercise programme (physical activity group; n = 50, 30 men). The poll had 36 subscales for participants to rate their quality of life. All of the subjects were approached directly by the researchers. The survey - 36, translated and validated for Brazilian Portuguese, was used to assess health-related quality of life.
J24	Subramanian & Jana	2018	India	Assessing urban recreational open spaces for the elderly: A case of three Indian cities.	An empirical study of the physical aspects as well as user and behaviour. The aesthetic value of the design and amenities. The quantitative portion of user data and patterns of usage. Field observation to determine the current state of open spaces. The empirical study included 51 Recreational Open Spaces (ROS), comprising 19 from Mumbai, 17 from Bengaluru, and 15 from Chennai. With help from recreation landscape design books and studies, a thorough questionnaire was created to identify and evaluate the relevant ROS amenities and Urban Design characteristics. For ROS factors, a scoring system was developed with a scale of one to ten for evaluating their design, focusing on age appropriateness for the elderly and maintenance quality.
J25	Artmann et al	2017	Europe cities	The role of urban green spaces in care facilities for elderly people across European cities.	A standardised questionnaire is used in quantitative approaches. The questionnaire consists primarily of closed questions with an open response option for additional information. The survey was completed entirely online. Administrators of 458 facilities received email invites with a link to the survey and instructions to share the survey with personnel involved in urban Green Spaces (UGS) initiatives. A total of 126 surveys were completed by facility managers in Austria, Germany, Romania, Slovenia, Poland, and Norway.
J26	Zhai & Baran	2017	Beijing, China	Urban Park pathway design characteristics and senior walking behavior.	The research was carried out in two Beijing neighbourhood parks: Rendinghu Park (9.6 ha) and Yuetan Park (9.6 ha) (8.12 ha). Data on senior walking behaviour (dependent variable) and pathway design parameters were collected by on-site observations (independent variable). The number of seniors observed in all observations was computed to indicate the usage of each pathway segment. Senior users' preferences and dislikes for pathway design were investigated through interviews. Forty-six face-to-face interviews with senior park users to learn about their favourite and least favourite walking path design features. Each interview lasted between 15 and 20 minutes.
J27	Zhu et al	2017	China Harbin Institute of Technology (HIT) open space	Public Open Space Development for Elderly People by Using the DANP-V Model to Establish Continuous Improvement Strategies towards a Sustainable and Healthy Aging Society.	Forty surveys were sent out online to 40 professional landscape planners and designers. A total of 205 questionnaires were distributed and collected from older persons who were relaxing, reading literature, or exercising in public open places, with 59 invalids. Eight experts with experience in developing a healthy ageing place were interviewed, and five professional academics work at the design institution. The authors clarified any uncertainty regarding the questions by administering the questionnaires as structured interviews.
J28	Arnberger et al	2017	Vienna, Austria	Elderly resident's uses of and preferences for urban green spaces during heat periods.	Green-space preferences of the elderly on hot days were studied using a questionnaire based on Discrete Choice Experiments (DCE). A DCE looked at the elderly's preferences for green spaces on hot days. Face-to-face interviews were conducted in the homes of 200 randomly selected residents aged 65 and above. Most of the interviews lasted between 20 and 30 minutes. The

					visual green area and access possibilities were created in Adobe Photoshop.
J29	Yung et al	2017	Hong Kong, China	Elderly satisfaction with planning and design of public parks in high density old districts: An ordered logit model.	Interviews with 12 specialists to get their criteria feedback to validate better and modify them to meet the local circumstances. The panel of experts comprises 12 specialists with backgrounds in urban design, architecture, urban planning, and aged services. In a face-to-face survey (365 persons), we used a stratified random sample strategy to approach adults in their fifties in three public parks.
J30	Zhang & Zhang	2017	China	Perceived residential environment of neighborhood and subjective well-being among the elderly in China: A mediating role of sense of community.	A reliable sample of 720 questionnaires was collected from 50 to 90. There were 261 men, 456 women, and three participants who did not disclose their gender. Over the age of 80 or with a low level of education. Investigators conducted interviews in the comfort of their homes, reading each item out to the individuals. This study used four typical variables to describe subjective well-being: (1) life satisfaction, (2) meaning in life, (3) positive affect, and (4) negative affect.
J31	Yung et al	2016	Hong Kong, China	Social needs of the elderly and active aging in public open spaces in urban renewal.	A qualitative study that included a thorough literature review and focused on group interviews. To elicit the social demands of the elderly in utilising public open space, focus groups were held in two urban renewal districts in Hong Kong (Sham Shui Po and Kwun Tong districts). Eight focus groups were held between July and August 2013 and October 2013. In each district, four focus groups were held in elderly centres. There were 77 participants in the focus groups, including 34 and 43 from Sham Shui Po and Kwun Tong, respectively. Because 5 participants from Sham Shui Po and 6 from Kwun Tong were unable to discuss their views with the focus group moderators, only 66 responses were examined. The qualitative data analysis with NVivo 10 was used.

Table 2.2
Matrix of objectives and methods in elderly study.

No	Objectives												Methods			
	Preference	Perception	Physiological	Psychological	Physical/Social Activity	Thermal	UGS Environment/Soft/hardscape	Health Status / Weight	UGS Use	UGS Usage/UGS visit	Space design planning	Accessibility	Questionnaire (Quantitative)	Interview (Qualitative)	Field Observation/Field trip	Other tools
J1	√									√			√			
J2			√	√			√						√			√ (GIS)/ ECG monitor
J3					√								√			√ GPS/ accelerometer
J4							√	√					√		√	
J5		√				√							√	√	√	
J6							√		√					√		√ (Go-Pro camera)
J7			√	√									√		√	√ (GIS)
J8							√						√		√	
J9							√		√				√		√	√ (GIS)
J10									√				√			
J11							√						√	√		√ ECG monitor
J12	√								√				√	√		
J13					√		√						√	√ (FGD)		
J14					√								√	√		
J15							√	√(weight)					√	√		
J16	√						√						√			
J17				√						√			√			√ (GPS)
J18											√					√ (GIS)
J19										√			√	√		√ (GIS)
J20		√				√							√			
J21					√		√						√		√	
J22								√				√	√			
J23					√			√					√			
J24											√	√	√	√	√	
J25									√				√			
J26										√			√	√	√	
J27											√		√	√		
J28						√								√ (face-to-face interview)		
J29										√			√	√		
J30					√		√						√	√		
J31					√				√		√		√	√ (FGD)		
Total													26	15	8	9

Discussion

Based on Table 2.2 above, several methods were used in the study related to the elderly in urban green spaces.

In addition, attributes of the same type of public open space may affect socio-demographic groups differently (Abdul Aziz et al., 2018; Kaczynski et al., 2013). The study of the elderly in the urban green areas shows the commonly used of questionnaire surveys, interviews, and field observations to gain the information and data collection to be measured. Only one study uses other methods to detect the user's location by phone number. Twenty-six of the studies in the table show that they conducted the questionnaire survey, and fifteen conducted interviews with different groups: the elderly, the expert, and professionals. Eight of the study conducted a field observation or field trip; on the other hand, eleven used mixed methods research, combining questionnaires and interviews. Nine selected studies used a new technology software and items to support their data collection.

A questionnaire survey is a common method since the output can be clearly understood because it plays with the number and interesting to be measured. The high number of this method used in the study above shows that this method is preferable and easy to understand. This method has been used to identify variables reliably associated with pro-environmental behaviour and quantitatively determine these relationships' strengths. Therefore, much research uses the quantitative meta-analysis approach for research synthesis (Bamberg & Moser 2007). Besides that, several studies explain because the other approaches are too costly and have too many logistical issues, the questionnaire is the chosen method that can be used in major epidemiological studies (Roberta, 2000). The total for the respondent needed in this method was high regarding the several inadequate responses from the respondent to gain a valid number. It would be challenging to achieve those numbers for the respondents among the elderly especially. Besides that, three of the questionnaire methods in the study above employed the face-to-face questionnaire regarding the limited mobility and elderly understanding in reading the questionnaire (J5, J15, and J30). This shows the disadvantage of using questionnaire methods for the elderly group study. As a recommendation of the psychological research, the elderly group needs to give support and attention to gain perfect responses (Yu et al., 2019). The average response time for the questionnaire compilation needs to be shortened to approximately 15 to 30 minutes only and suitable for the ability of the elderly to understand the question and respond to it (Fornara et al., 2019).

Qualitative research is the second most used method for ageing research. These procedures entailed conducting an interview and analysing the data using qualitative data analysis tools such as Nvivo or Atlas ti. In two stages, the interviews were transcribed entirely and analysed. Theme coding comes first (Flick, 2014), then objective hermeneutics study of interview sections (Reichertz, 2004). According to Welsh (2002), computer-assisted analysis can provide more accurate results.

The most effective approach for genuinely knowing the status of the elderly suitability for parks is to conduct an on-site interview. The wealth of information could have been obtained in a laboratory situation, and better accuracy and transparency were gained (Veitch et al., 2020; Qiu et al., 2021). Furthermore, qualitative methods are better adapted to grasping complicated processes, such as the growing relationship between place usage and spatial

agency, and investigating difficult-to-reach and vulnerable groups, such as those living in disadvantaged residential areas. Case studies are distinguished by the fact that the examples have boundaries and are approached holistically to provide an in-depth picture of the situations (Creswell 1998). Research for J5 in Table 2.2 mentioned they must include field interviews to help the elderly with cognitive deficits understand the questionnaire clearly and enhance response accuracy. However, these methods need a long-time frame to manage the interview session since setting the time with all the respondents (Elo et al., 2014).

Other than that, field observations are other methods used in the study regarding the elderly. Several studies that conducted field observation or field trips aimed to investigate the activity status of the older population on the specific study sites and their preferences (Qiu et al., 2021). In addition, some of it was about understanding the spatial design character of the parks. In this context, observation must be conceptualized as extending beyond a simple visual perceptible. Observation can be described as a process that involves the use of all elements of sensory perception. The smelling, seeing, hearing, and touching of social behaviors are all entangled with sensory perceptions in social and analytic interpretation processes (Schmidt & Volbers, 2011). From the journal chosen above, field observation can be conducted in many ways and is done systematically. There is a field trip, behavioral mapping, field observation, and one using an application GIS that helps inform the areas the elderly use while visiting the park. Proximity to public open space is typically computed using geographic information systems software. There are several issues associated with calculating proximity measures using geographic information systems, which are highlighted below. This approach is conventional for the elderly with mobility issues while visiting the parks. However, new technology in collecting data for the elderly group needs more time to explain and teach them to use it correctly. Besides that, the site visit is used to determine how people or groups accommodate their behavior in each situation at a specific time and place (Satwikasari, 2017). Through this method, a designer could properly know the elderly's needs and decide which design elements in parks should be considered in designing the spaces for the elderly. Since the study also aimed to make a design framework for the elderly in a park, it is very suitable and easy to understand while reporting the data. Context and activity logs can assess behaviour-specific physical activity (e.g., Kaczynski et al., 2009), combining physical activity sensors (e.g., pedometers, accelerometers) with global positioning system technologies (e.g., Vich et al., 2021; Li et al., 2019; Finlay et al., 2015) or wearable cameras such as Sense Cam (e.g., Kou et al., 2021). Exploring physical activity related to public open space will help strengthen the evidence about the variety of ways public open space influences specific types of physical activity, thereby enabling urban designers and landscape architects to design public open spaces that target specific physical activity behaviours.

To summarize, suitable methods for studying the elderly in urban green spaces should be conducted using field observation. While understanding the elderly park use to the parks, a semi-structured interview is suitable since it is suited to grasp complex processes and gain more input.

Conclusion

In summary, the analyses of approaches for understanding older park use in urban parks will influence the best outcome and respond to numerous study objectives. Finally, various methods should be effectively used according to the study's objectives. The elderly are facing

limited mobility and understanding rather than other groups, and suitable methods should be applied appropriately. The researcher should consider the current situation of Covid-19 and limit the connection with the elderly since they are a group with a high risk in their health.

Field observations should be conducted to understand the site areas and investigate the behavior of the elderly while using the parks so that the factors that make the elderly use the park can be achieved. Interview sessions are a relaxing approach for the elderly, and the interviewer can gather enough information to validate the data from the session.

The findings of this study could be used to raise public awareness, particularly in the field of research or in any event involving elderly people. There were variations in methodology and study design, showing that researchers were dubious about which approach was best for their research to meet its goals. Our research aimed to find the best method for studying design characteristics in parks for the elderly. The application of our methodology conclusions is significant from the perspective of public policy and urban planning concerns for elderly well-being in an urban setting.

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Conflict of Interest

The authors declare no conflict of interest.

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