



THE ASSOCIATION BETWEEN NEIGHBOURHOOD BLUE SPACE AND HEALTH RESPONSES: A PILOT STUDY OF OLDER ADULTS

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Abstract

The positive impact of the natural environment on human health has been confirmed by related theories and practices. Blue space, as an important part of the natural environment, is often undervalued in nature and health research. This study selected neighbourhood blue spaces, the most likely to be visited frequently, to further explore their impact on the health of adults over 45 years of age. Three neighbourhoods with outdoor blue space in Xi'an, China, were initially identified by the field investigation method. A total of 92 adults who used blue space were investigated by a questionnaire survey. Preliminary findings found that older adults who visit the neighbourhood blue space mainly participate in activities that are indirectly in contact with water bodies, such as chatting, walking, sunbathing, and physical exercise. In addition, residents who frequently (at least once a week) visit blue space are more likely to report good health. Specifically, there was a lower proportion of bad general health outcomes (4.8%) and a higher probability of high wellbeing ($p=0.003$). The results suggested that regular exposure to blue space could positively affect older adults' health and wellbeing. In the context of population aging, actively exploring the beneficial impact of urban blue space on the health of the elderly will provide scientific reference for healthy aging and healthy city construction.

Keywords: Blue Space, Neighborhood, General Health, Older Adults

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INTRODUCTION

Population aging is a major problem facing many countries, especially developing countries. According to the World Health Organization, 22% of people on World will be older than 60 by 2050, and four in five (80%) of the elderly will live in non-high income countries (Chen et al., 2022). In addition, the rapid growth of the urban population, by 2050, which is predicted to comprise approximately two-thirds of the world population (Smith et al., 2021), has given rise to a series of environmental problems such as urban noise, the heat island effect, and air pollution (Britton et al., 2020), and poses great challenges to the health of people living in urban areas, especially the elderly.

With the growing concern for health, it is recognized that contact with the nature can improve human health. Urban green spaces have the potential to positively impact human health by stimulating physical exercise, encouraging social connection, and reducing mental stress. Based on previous evidence, the health benefits of urban blue spaces are anticipated to be similar to those of urban green spaces (McDougall et al., 2022). Water in the natural environment refers to the "blue space," which accurately describes the visible surface water in the human living environment, whether natural or artificial. Blue space has often been an intrinsic part of green space in previous studies, while the health-promoting potential of blue space has received less attention in natural health studies (Smith et al., 2021).

The natural environment of a neighbourhood can influence the health and social behaviour of older people in the short and long term (Ellen et al., 2001). As the most accessible and frequently used urban blue space for the elderly, the health effects of neighbourhood blue space on older people needs to be further discussed. Understanding the health impact of neighbourhood blue space can facilitate the implementation of healthy aging in urban planning, thus providing space for realizing the benefits of the healthy city.

LITERATURE REVIEW

Blue space

A growing number of scholars pay attention to the ability of blue space to promote human health. Living in a house with a view of the ocean can reduce symptoms of psychological distress and improve mental health (Dempsey et al., 2018). It has been shown that proximity to and contact with blue space is related to reduced antidepressant use (McDougall et al., 2021). Furthermore, residents in areas with higher availability of blue space was more likely to report positive health outcomes (Chen et al., 2022). In general, previous findings suggest that blue spaces could promote human health.

Potential pathways

The beneficial effects of the natural environment on health are well known. Research has shown that nature can stimulate the senses of people and create a sense of detachment from the hustle and bustle of city life, resulting in a general sense of wellbeing (Hermanski et al., 2022). Nature also has the potential to improve physical health by increasing physical activity (Gascon et al., 2017). To date, in the existing literature, blue space has been demonstrated to promote human health through pathways likely similar to those of green space (Table 1), including encouraging physical exercise and social contact, as well as reducing mental stress (Markevych et al., 2017).

Table 1: Potential pathways of blue space and health

Pathways	Health benefits
Harm reduction	Regulate microclimates, reduce noise, and mitigate air pollution
Capacity building	Increase physical activity and social interaction
Capacity restoration	Reduce stress, promote recovery, and improve relaxation

Source: Author's Summary

Health outcomes

The World Health Organization defines health as ‘a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity’ (WHO, 1948), which is the most widely used definition in existing studies. Based on a screening of blue space and health (Table 2), there is growing evidence that blue space, including coastal and freshwater (such as lakes and rivers) blue space, can have a positive impact on human health (Georgiou et al., 2021). Studying the effects of specific types of natural environments on healthy living can alleviate the problem of overburden on public health care systems (McDougall et al., 2022).

Table 2: The effects of blue space on health

Human health	Blue space and health
General health	Self-reported general health (Garrett et al., 2019; Völker et al., 2018)
Physical health	Obesity (Halonen et al., 2014); Mortality rate (Vert et al., 2020); Cardiovascular health (Gascon et al., 2017)
Mental health	Lower psychological distress (Dempsey et al., 2018; Nutsford et al., 2016) Better restoration (Amoly et al., 2014; Pasanen et al., 2019)

Source: Author's Summary

RESEARCH METHODOLOGY

This paper conducted a preliminary survey of 3 neighbourhoods in Xi'an, China, in December 2023 to understand the access of adults over 45 years of age to neighbourhood blue space. The pilot study compared the features of neighbourhood blue space, which including natural and artificial, single and multiple (e.g. pools, fountains, etc.) water forms, and the visits of older residents

to analyse the potential beneficial impact of blue space on the elderly's health. Different features of neighbourhood blue space increase the diversity of outdoor blue space forms.

Furthermore, participants' demographic information was used as a covariate to examine the impact of blue space on health at the individual level (Garrett et al., 2019). The main data for this study were obtained through a field survey and a face-to-face questionnaire survey in the neighbourhood of Xi'an. The association between blue space and health is explored by comparing and analysing the features of blue space and visits to different neighbourhoods. b

RESULTS

According to the results of the field investigation and questionnaire interview, a total of 92 people in the three neighbourhoods participated in the survey. The geographical location and blue space of the selected neighbourhood are shown in the figure (Figure 1 and Figure 2). The design forms of the blue space are diverse, including natural forms and regular forms, and water elements enrich the outdoor landscape of the neighbourhood.



Figure 1: The location of the selected neighbourhoods

Source: Map from Google

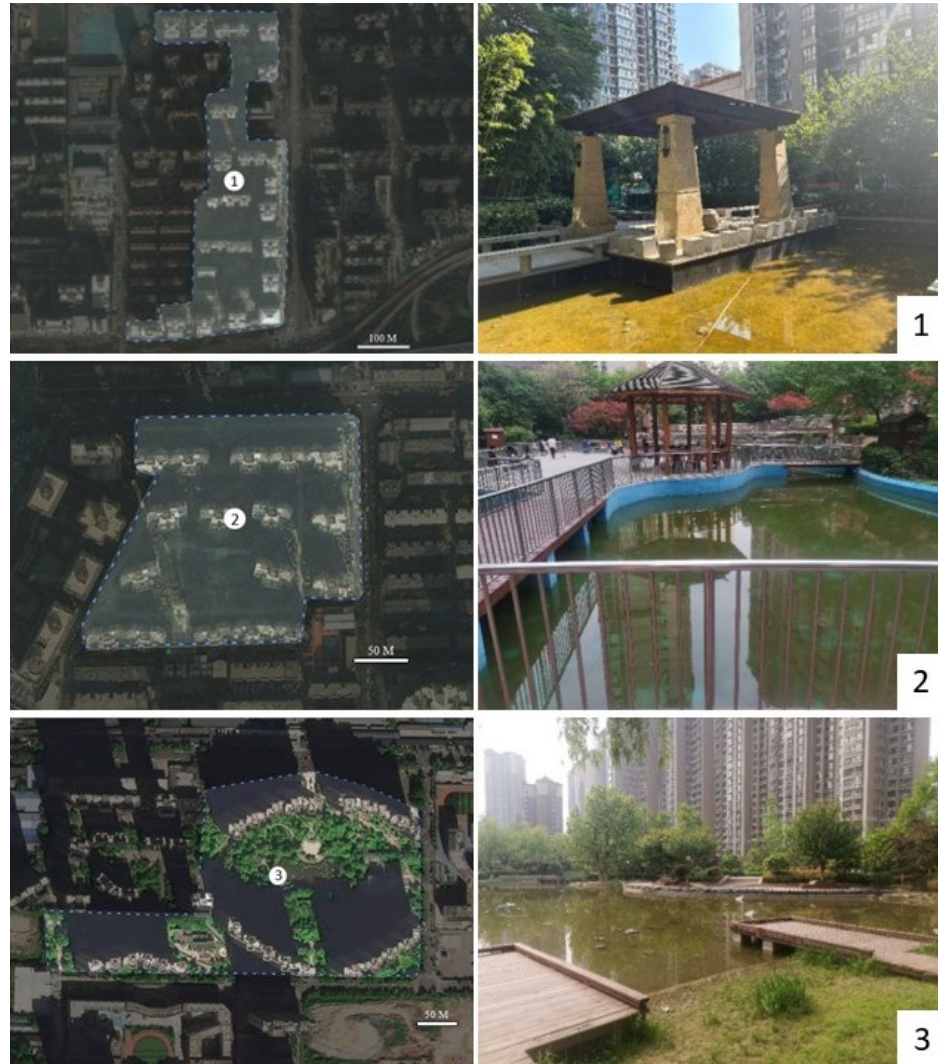


Figure 2: The blue space of the selected neighbourhoods

Source: Map from Baidu map and Photos taken by the author

The results showed that most sample (86%) mainly engaged in chatting, walking, sunbathing, physical exercise and other activities, while a small number of residents engaged in activities directly related to water bodies, such as fishing, splashing, feeding ducks, and enjoying the waterscape. In addition, four-fifths (80%) of the sample reported incidental or intentional visits to neighbourhood blue spaces in daily life, such as initiative visits or commutes through blue spaces.

Further, the results of the study found that the majority of the sample (93.5%) stayed no longer than 2 hours while visiting the blue space. In addition,

respondents who participated in this survey indicated that their overall health was better (Table 3). Residents who visit blue spaces frequently (at least once a week) were more likely to report good health (Tables 4-5).

Table 3: Proportion of people with different general health in each neighbourhood

Neighbourhood. No.	Very bad	Bad	Fair	Good	Very good
1	2.8%	5.6%	30.6%	61.1%	0.0%
2	0.0%	3.2%	54.8%	32.3%	9.7%
3	0.0%	8.0%	56.0%	32.0%	4.0%

Source: Author's Calculation

Table 4: Proportion of general health outcomes at different blue space visits frequencies

Frequency of visit	(Very) Bad	Fair	(Very) Good
Less than once a week	10.3%	37.9%	51.7%
At least once a week	4.8%	49.2%	46.0%

Source: Author's Calculation

Table 5: Probability of high wellbeing at different blue space visits frequencies

Frequency of visit	Probability of high wellbeing	Chi-square	P
Less than once a week	61.9%	8.543	0.003
At least once a week	88.0%		

Source: Author's Calculation

ANALYSIS AND DISCUSSION

According to the survey findings, although the sample evaluated the blue space good overall (mean =3.24), further interviews found that participants suggested that the quality of existing blue spaces should be improved. A small sample (3.3%) did not visit a blue space once in the past month, while more than half of the respondents (54%) said they visited the blue space frequently. The results suggested that neighbourhood blue spaces are likely to become the important place for seniors to participate in outdoor leisure activities. In addition, the majority of participants reported health outcomes as fair (46.7%) or good (40.2%) and further analysis found that the sample with high frequency of contact with blue spaces were more possibly report better health.

Furthermore, respondents are most concerned about the hygiene and safety of neighbourhood blue space. On the one hand, respondents mentioned that there is natural (such as fallen leaves, dead branches) or man-made (such as waste paper, plastic bags) garbage in the water body and its surrounding environment, which influences the visual effect of the water landscape. On the other hand, the respondents are concerned about the safety of the blue space environment. The elderly are willing to carry out recreational and physical activities around the blue

space, but the lack of safety facilities or lighting facilities will affect their willingness to use.

CONCLUSION

This study focuses on the relationship between the neighbourhood blue space and the health of older people, preliminary investigates the use of the neighbourhood blue space, and further analyses the impact on the health of the elderly. The findings confirm that older adults who frequently visit neighbourhood blue spaces are more likely to report good health.

In general, as a natural part of the residential environment, blue space can not only enrich the visual landscape but also improve the quality of the natural environment of the neighbourhood. The neighbourhood's blue space creates a place for residents to communicate outdoors. A good blue space environment can encourage residents to engage in physical activities and participate in social interactions, thus affecting their physical and mental health. In general, the questionnaire used in the pilot study is currently being refined and revised to include additional factors considered important in this study. It is intended that the research findings can provide a scientific guide for healthy aging and healthy city construction.

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ETHICAL STATEMENT

This study obtained informed consent from all participants and was conducted in strict confidence. The authors declare that there are no conflicts of interest and confirm that the study is original, unpublished, and not under consideration elsewhere.

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