



Assessing the Correlation between Neighborhood Green Areas and the Perceived Mental Health of Residents in Metropolitan Areas

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Abstract

Background: Urban parks play a noticeable role in city areas for making connections between nature and the residents of cities, especially from a mental health perspective. This paper investigated how the number and types of urban parks impact city residents' mental health.

Method: This study used the data collected by the Community Health Survey in Seoul, South Korea in 2020 (n=22915). The type and number of local parks were categorized based on each district, and three variables of mental health were selected, including 'subjective health awareness', 'stress awareness' and 'depression rate'. Correlation and interaction analyses were conducted to explore the relationship between variables.

Result: The data indicated that both the quantity and types of the urban parks were associated with mental health of the residents. Positive mental health is likely to be associated with higher density of local parks in a district. It seems that parks characterized by children's activity and have nature-focused design, are more effective in changing the mental health of residents.

Discussion: The research demonstrates a positive relationship between the quantity of urban parks and mental health in the scale of city districts. However, such a correlation can differ based on the type of parks, as well as the quantity of greenery in an area.

Keywords: Urban park; Mental health; Green area; Metropolitan; Seoul

Introduction

Urban parks are increasingly being recognized as a key factor for boosting human health and well-being (1). The availability of parks in local areas has been viewed as a significant part of urban planning in order to improve public health and increase the chance of social interaction for city dwellers (2, 3). In fact, there is a positive relationship between urban green spaces and citizens' perceived general health (4-6). Easy and daily access to green areas encourages the citizens to

have a higher level of physical activity, and it will be beneficial for both general health and mental health (7-9). Interestingly, evidence shows that such benefits are greater in green spaces than in other spaces with less natural resources and greenery (9, 10). Even though it is accepted that urban parks can be beneficial for the mental health of the entire city population, it is not, yet, clear which type of park is more effective (11, 12). Urban Parks can attract people of different



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ages, and people with different interests; also they can be presented as neighborhood parks, natural parks, children's parks, cemetery parks, cultural parks, sports parks, historical parks, and eco-parks.

The availability of nature-based facilities in the urban area is a determinant factor for the quality of life and mental health of citizens. Citizens who were exposed to green areas and natural environments showed fewer stress levels compared to people who were exposed to an urban environment (13). Parks and green spaces contribute to public health by reducing stress (14), mental disorders (15) increasing physical activities (16), quality of life (17), satisfaction and social interaction (3), and mood boosters (18). Visiting parks and access to nature are associated with mental well-being and there is a substantial body of evidence on the relationship between green areas and mental health (15). However, there are a few studies that have specifically focused on the importance of the number of parks in each neighborhood.

Both the quality and quantity of parks and public green space seem to be significant for citizens' health. Francis et al. (12) investigated on the relationship between the quantity and quality of parks for mental health in Western Australia. Their research result showed no significant association between the number of neighborhood parks, but the quality of parks was more likely to have an impact on psychological distress. Notably, this association was not conditional on residents using parks and suggested that having parks and green areas in a neighborhood may have some mental health benefits. This result is similar to previous studies, which have shown that exposure to nature, and green areas is significant for mental health (18-21). Hence, it seems that the availability of parks in a district is positively associated with perceived mental health.

Given these gaps in the existing literature, the aim of this study was to investigate the correlation between the availability of urban parks in different districts and the mental health of residents in each district, in Seoul, the capital city of South Korea. The underlying hypothesis of this

research is that an urban district with a higher amount of parks has a greater influence on the mental health of its residents.

Materials and Methods

Data sources

The data were adopted from reliable data sources provided by the Korean Statistical Information Service (KOSIS) (22), and the Seoul Government data service. (23). Two sets of data were applied including 'health data' and 'parks data'.

In order to get the first data set (health), the Community Health Survey from KOSIS had been conducted from August to October 2020. This governmental survey has been performed annually since 2007 by the Korea Center for Disease Control and Prevention with an approved number, 117075. This survey was conducted in the public center of each district in Seoul by an average of 900 per public health center. The respondents were adults over 19 years old.

For the parks data, we applied Seoul Park Statistics 2020 provided by the Seoul Metropolitan City Parks and Greenery Policy Division as a part of the Seoul Government datasets.

Study Measures

Similar to the previous research on the relationship between green areas and mental health (15,18,24), in this study the variables were adopted from the result of national survey by the Community Health Survey for each district in Seoul, the measures were include the 'subjective health awareness', 'stress awareness' and 'depression experience rate'.

In the survey result, the proportion rate of each measure was calculated by dividing the total number of cases on the total population, and its statistical value was corrected by reflecting the demographic characteristics such as gender, age of the local population (based on the resident registration population at the end of July of the survey year) (22).

A statistics database that provides the statistical overview of all parks across the Seoul metropolitan region for 2020 (23), was applied for the

computation of the number and types of parks in each district. The total number of parks by the 2020 was 2983, which covered 172.317km² urban area in Seoul. Based on definitions stated in the current planning framework of Seoul Metropolitan City Parks (23), parks were classified into eleven functions that include; natural park (national), urban nature park Area, neighborhood park, children's park, small park, cultural park, sport park, historical park, waterside park, eco park, other park. In regards to the parks classification and function, urban nature Park consider an area to protect the natural landscape and improves the health, recreation and emotional life of citizens within the urban planning area.

Analyses

Statistical analysis was performed using SPSS version 20 (IBM Corp., Armonk, NY, USA). The first part of the analyses involved a descriptive analysis of the parks and mental health variables. The variables were compared in each district and

results were reported to show the distribution of the variables for each area, parks and mental health. The second and final part of the analysis dealt with testing the correlation. Correlations analyze were performed to address the research questions. Park variable was examined for its association with positive mental.

Results

First, a set of calculations were performed to clarify the 'number' and 'types' of parks in each district in the Seoul metropolitan (Fig.1). The result shows that the majority types of parks are 'children's parks' and 'neighborhood parks', while the minority types of parks are 'eco parks'. It is very clear that the total number of parks in some area, including Nowon-gu followed by Seocho-gu are highest compared with the other areas. However, Geumcheoun-gu is a district with the lowest rate of number of parks.

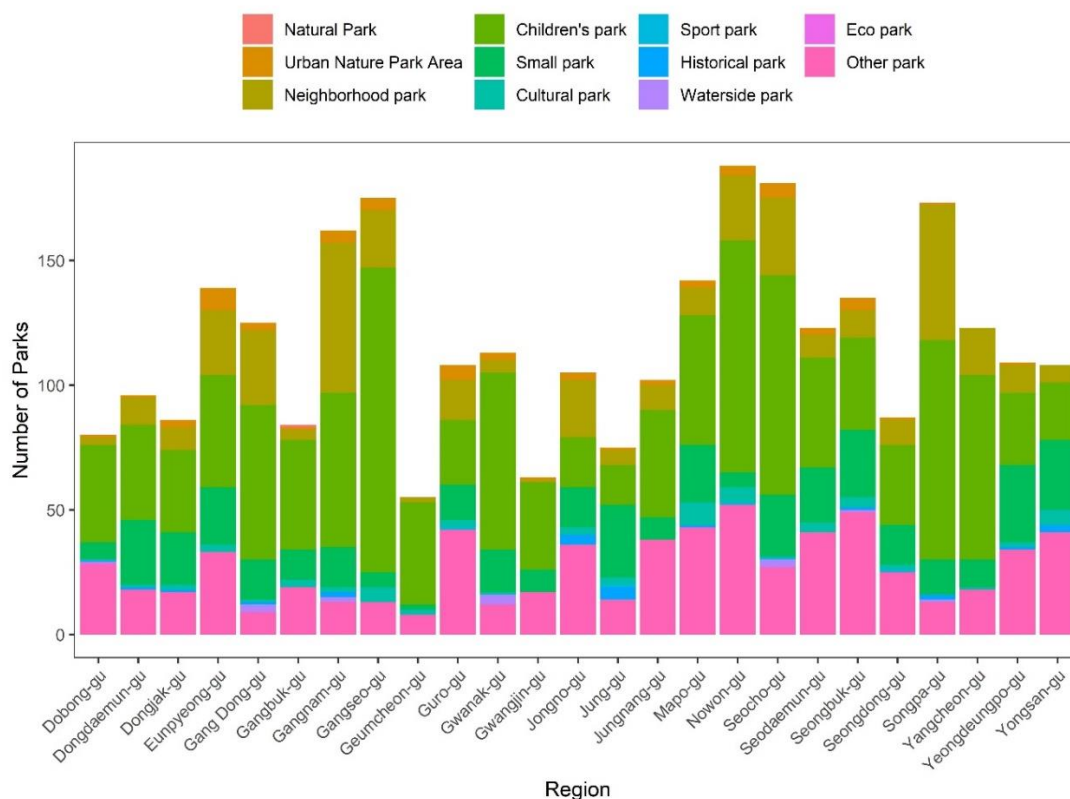


Fig.1: Number on types of parks in each district of Seoul

Fig. 2 provides an overview of the participant's mental health situation in each district of Seoul metropolitan. The results show several differences in the mental health factors for all area (Fig. 2). As shown, the perception of the mental health functions in Seocho-gu and Mapo-gu are

the highest rates compared with the other areas. Accordingly, from the result, it is somehow clear that residents of those districts with a higher number of parks tend to have a better perception of mental health.

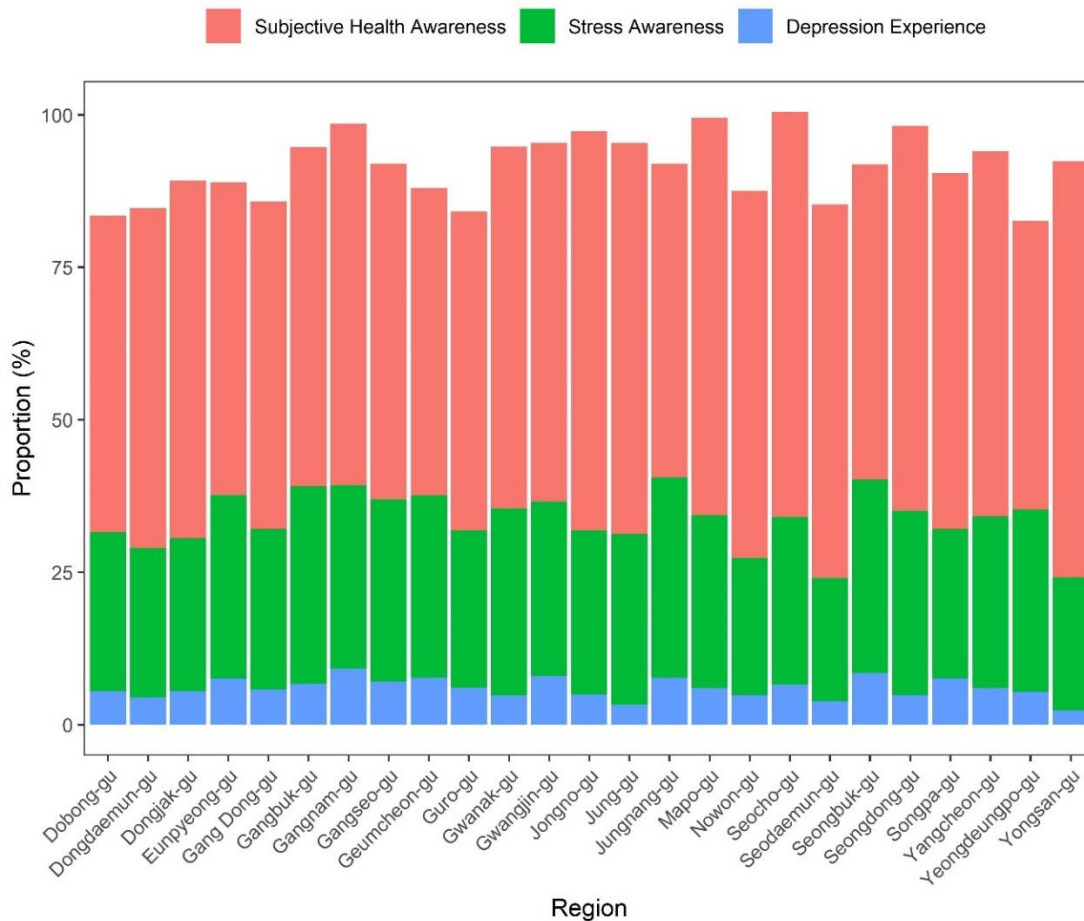


Fig.2: Mental health measures situation in each district of Seoul

Testing the relationship between 'park function' and three measures of mental health, showed a positive correlation between 'health awareness' and all of the 'park types', except for 'urban nature park area' which the correlation was negative. Furthermore, the result indicated that there is a negative correlation between 'stress awareness' and 'park types'. However, there is a positive correlation between 'stress awareness' and 'urban nature park' and 'waterside park'; in terms

of Children's park, there is no relationship with stress awareness.

The final tested variable was 'depression rate' which has a positive relationship with the 'total number of parks', 'urban nature park', 'neighborhood Park', 'children's park', and 'waterside park'. However, negative correlations were found between depression rate and the other types of parks (Table 1).

Table 1: Evaluating the relationships of parks function and mental health measures

<i>Parks</i>	<i>Health Awareness</i>	<i>Stress Awareness</i>	<i>Depression Rate</i>
Total Number of parks	0.18 (0.392)	-0.16 (0.433)	0.22 (0.290)
Urban Nature Park	-0.12 (0.574)	0.11 (0.614)	0.36 (0.078)
Neighborhood park	0.10 (0.638)	-0.09 (0.655)	0.41 (0.044)
Children's park	0.03 (0.876)	0.00 (0.991)	0.30 (0.140)
Small park	0.25 (0.226)	-0.15 (0.475)	-0.39 (0.054)
Cultural park	0.30 (0.150)	-0.19 (0.372)	-0.25 (0.221)
Sport park	0.19 (0.359)	-0.17 (0.405)	-0.28 (0.175)
Historical park	0.45 (0.025)	-0.19 (0.352)	-0.36 (0.076)
Waterside park	0.11 (0.600)	0.14 (0.501)	0.14 (0.501)
Other park	0.08 (0.714)	-0.24 (0.250)	-0.18 (0.378)

Discussion

This research investigated the potential relationship between urban parks and the residents' health. The focus was on the quantity and function of parks in Seoul and their impact on mental health. While the findings showed a positive correlation between the total number of parks and mental health, there was a negative correlation for some 'types of park'. This result indicates that the types of park, beside the quantity of parks in each district can be an effective determinant for the mental health of the residents in that area. The result are consistent with similar studies about the green area exposure and better mood (18, 25, 26).

The results confirmed a positive connection between the number of parks in an area and the better mental health of residents. It was interesting that the residents from the area with more green-oriented parks showed lower depression rates. Notably, the effect size on positive mental health was much greater for the Urban Nature Park ($P=0.36$), Neighborhood park ($P=0.41$), and Children's park ($P=0.30$) compared with the other parks. Part of the results are consistent with research on public "green spaces and positive mental" health (15). They pointed out that the number and total area of public green spaces

were significantly associated with mental health (15). Moreover, they mentioned that positive mental health was not only associated with parks with a natural function, but also with parks characterized by other functions such as sport facilities (15), however, this part is not consistent with the results of this research.

In addition, the perceived benefits from the parks and green areas are also visible in the findings, since we found a positive correlation between health awareness and the number and type of parks. Likewise, similar studies noted better health and mood for the residents who are exposed to a higher amount of green area (24, 27). However, several other factors might contribute to better mental health after green-space exposure as a control variable. For example, the relationship between green space and mental health could differ based on gender, life stage, or type of parks and green space (14,28). Stress awareness had a negative relationship with the number and types of parks, which seems to be a fact that stress awareness has been associated with other factors.

Hence, in terms of Korean citizens, the number and types of the park are associated with the perceived mental health; however, local parks might be related to stress awareness through different mechanisms.

Conclusion

The availability of local parks in each district can be an effective determinant in the level of mental health of urban residents. To be more specific, the number and types of parks might contribute in improving mental health. Therefore, three tested variables, including subjective health awareness, stress awareness and depression rate are attributed to the neighborhood green areas.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of interest

The authors declare that there is no conflict of interest.

References

1. Nilsson K, Åkerlund U, Konijnendijk CC, Alekseev A, Caspersen OH, Guldager S, Kuznetsov E, Mezenko A, Selikhovkin A (2007). Implementing urban greening aid projects—The case of St. Petersburg, Russia. *Urban For Urban Green*, 6(2):93-101.
2. Parr H (2007). Mental health, nature work, and social inclusion. *Environ Plan D*, 25(3):537-61.
3. Maas J, Van Dillen SM, Verheij RA, Groenewegen PP (2009). Social contacts as a possible mechanism behind the relation between green space and health. *Health Place*, 15(2):586-95.
4. Maas J, Verheij RA, Groenewegen PP, De Vries S, Spreeuwenberg P (2006). Green space, urbanity, and health: how strong is the relation?. *J Epidemiol. Community Health*, 60(7):587-92.
5. James P, Hart JE, Banay RF, Laden F (2016). Exposure to greenness and mortality in a nationwide prospective cohort study of women. *Environ. Health Perspect*, 124(9):1344-52.
6. O'Sullivan N, Donnelly A, MacIntyre T, Warrington G (2016). Investigating the Impact of Green Exercise on population health and wellbeing in a small community in Ireland—a novel approach using a natural laboratory ecosystem. *Environ. Health Int*, 18(1):34-40.
7. Annerstedt M, Östergren PO, Björk J, Grahn P, Skärbäck E, Währborg P (2012). Green qualities in the neighbourhood and mental health—results from a longitudinal cohort study in Southern Sweden. *BMC Public Health*, 12(1):1-3.
8. Richardson EA, Pearce J, Mitchell R, Kingham S (2013). Role of physical activity in the relationship between urban green space and health. *Public health*, 127(4):318-24.
9. Vujcic M, Tomicevic-Dubljevic J, Zivojinovic I, Toskovic O (2019). Connection between urban green areas and visitors' physical and mental well-being. *Urban For Urban Green*, 40:299-307.
10. World Health Organization (2016). *Urban green spaces and health*. World Health Organization. Regional Office for Europe.
11. Maller C, Townsend M, Pryor A, Brown P, St Leger L (2006). Healthy nature healthy people: 'contact with nature' as an upstream health promotion intervention for populations. *Health Promot Int*, 21(1):45-54.
12. Francis J, Wood LJ, Knuiman M, Giles-Corti B (2012). Quality or quantity? Exploring the relationship between Public Open Space attributes and mental health in Perth, Western Australia. *Soc Sci Med*, 74(10):1570-7.
13. Brinck A, Engelke C, Neuhäuser H, Molénat G, Rösner H, Langmaack E, Nembach E (1998). Dislocation processes in Fe₃Al investigated by transmission electron, scanning force and optical microscopy. *Mater Sci Eng*, 258(1-2):32-6.
14. Annerstedt M, Östergren PO, Björk J, Grahn P, Skärbäck E, Währborg P (2012). Green qualities in the neighbourhood and mental health—results from a longitudinal cohort study in Southern Sweden. *BMC Public Health*, 12(1):1-3.

15. Wood L, Hooper P, Foster S, Bull F (2017). Public green spaces and positive mental health—investigating the relationship between access, quantity and types of parks and mental wellbeing. *Health Place*, 48:63-71.
16. Mitchell R (2013). Is physical activity in natural environments better for mental health than physical activity in other environments. *Soc Sci Med*, 91:130-4.
17. Heidarzadeh E, Rezaei M, Haghi MR, Shabaniyan H, Lee Y (2021). Assessing the impact of outdoor activities on mental wellbeing; focusing on the walking path in urban area. *Iran J Public Health*, 50(10):2132.
18. Rezaei M, Kim D, Alizadeh A, Rokni L (2021). Evaluating the mental-health positive impacts of agritourism; A case study from South Korea. *Sustainability*, 13(16):8712.
19. Kaplan R (1985). Nature at the doorstep: Residential satisfaction and the nearby environment. *J Archit Plan Res*, 1:115-27.
20. Kaplan S, Kaplan R (1989). The visual environment: Public participation in design and planning. *J Soc Issues*, 45(1):59-86.
21. Cordell HK, Tarrant MA, Bergstrom JC (1998). How the public views wilderness: more results from the USA survey on recreation and the environment. *Int J Wilderness*, 3(3):28-31.
22. KOSIS (2020). Community Health Survey. Available from: https://kosis.kr/statisticsList/statisticsListInd ex.do?parentId=F.1&vwcd=MT_ZTITLE& menu- Id=M_01_01&outLink=Y&entrType=#content-group
23. Seoul Metropolitan Government (2020). Seoul Park Statistics. Available from: <https://data.seoul.go.kr/dataList/10052/S/2 /datasetView.do#>
24. Gascon M, Triguero-Mas M, Martínez D, Davand P, Fornis J, Plasència A, Nieuwenhuijsen MJ (2015). Mental health benefits of long-term exposure to residential green and blue spaces: a systematic review. *Int J Environ Res*, 12(4):4354-79.
25. Bratman GN, Daily GC, Levy BJ, Gross JJ (2015). The benefits of nature experience: Improved affect and cognition. *Landsc Urban Plan*, 138:41-50.
26. Rezaei M, Emmanuel N, Kim J, Kim DH (2021). Analyzing the Impact of Green Roof Functions on the Citizens' Mental Health in Metropolitan Cities. *Iran J Public Health*, 50(5):900.
27. Alcock I, White MP, Wheeler BW, Fleming LE, Depledge MH (2014). Longitudinal effects on mental health of moving to greener and less green urban areas. *Environ Sci Technol*, 48(2):1247-55.
28. Astell-Burt T, Feng X, Kolt GS (2013). Mental health benefits of neighbourhood green space are stronger among physically active adults in middle-to-older age: evidence from 260,061 Australians. *Prev Med*, 57(5):601-6.