Impact of a city's spatial structure on residents' stress levels - lessons learned from the Covid-19 pandemic

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**Session topic**: Geographies of quality of life, deprivation, and inequalities

**Abstract**:

The spatial structure of a city plays a crucial role in its functioning and development. It determines the efficiency of the economic system, the quality of the natural environment, and the accessibility of functional areas. However, it also has a significant impact on the stress levels of urban residents, which can affect their quality of life and public health.

The Covid-19 pandemic has brought the issue of a city’s spatial structure to the forefront. The pandemic was an additional severe source of stress for cities and their residents, highlighting the need to look for new models of internal structure for post-pandemic cities. These models should not only provide residents with a high level of service near where they live (e.g., the 15-minute city model) but also foster improvements in their health situation, including mental health (healthy city). Planning cities that help their residents cope with stress during and after a pandemic should be seen as a priority.

The main objective of the study is to analyze the impact of elements of the city’s spatial structure on the stress level of its residents during the Covid-19 pandemic. The specific objectives include (1) examining the impact of forms of residence on the stress level of residents, (2) identifying elements of the city’s spatial structure that intensify and reduce residents’ stress, (3) ways to reduce stress in the urban environment, and (4) desirable directions for changes in the spatial structure of cities. Conclusions from the research will help develop planning guidelines for shaping healthy, post-pandemic cities, and thus improve the quality of life of their residents.

The analysis will be carried out using a research tool - a geo-survey. The object of interest, however, will be three cities of different sizes and characters. This approach will make it possible to identify guidelines of a universal and more individualized nature.

Preliminary research results indicate that during the pandemic, elements of the city’s structure that are associated with the concentration of the population (city squares, shopping malls, public transport facilities) played a strongly stressful role. Additionally, the reducing role of green areas in terms of the stress of residents, in particular, urban parks, forest areas, or waterfront areas, was observed. Therefore, it is suggested that one of the ways to improve the health situation of urban residents would be to increase their accessibility to nature through appropriate and equitable distribution of green areas in the city.

Keywords: city spatial structure, stress, Covid-19, healthy city, quality of life, sustainable development

References:

Adli, Mazda et al. (2022) : COVID-19 pandemic: Lessons for spatial development, Positionspapier aus der ARL, No. 137, Verlag der ARL - Akademie für Raumentwicklung in der Leibniz-Gemeinschaft, Hannover, [https://nbn-resolving.de/urn:nbn:de:0156-01370](https://nbn-resolving.de/urn%3Anbn%3Ade%3A0156-01370)

Gascon M, Triguero-Mas M, Martínez D, Dadvand P, Forns J, Plasència A, et al. Mental health benefits of long-term exposure to residential green and blue spaces: a systematic review. Int J Env Res Pub He. 2015;12(4):4354–79.

Giles-Corti B, Vernez-Moudon A, Reis R, Turrell G, Dannenberg AL, Badland H, Foster S, Lowe M, Sallis JF, Stevenson M, Owen N. City planning and population health: a global challenge. Lancet. 2016;388(10062):2912–24.

Hagger M.S., Keech J.J., Hamilton K., 2020. Managing Stress During the COVID-19 Pandemic and Beyond: Reappraisal and Mindset Approaches. Stress and Health, 36(3), 396-401.

Hedblom, M., Gunnarsson, B., Iravani, B. et al. 2019. Reduction of physiological stress by urban green space in a multisensory virtual experiment. Sci Rep 9, 10113 (2019). <https://doi.org/10.1038/s41598-019-46099-7>

Kii, M., Tamaki, T., Suzuki, T. et al. Estimating urban spatial structure based on remote sensing data. Sci Rep 13, 8804 (2023). <https://doi.org/10.1038/s41598-023-36082-8>

Li, Ling and Wan, Li, Understanding the Spatial Impact of COVID-19: New Insights from Beijing after One Year into Post-Lockdown Recovery (August 20, 2021). Available at SSRN: http://dx.doi.org/10.2139/ssrn.3908277

Lu Y., Zhao J., Wu X. and Ming Lo, S., 2019. Escaping to nature during a pandemic: A natural experiment in Asian cities during the COVID-19 pandemic with big social media data. Science of the Total Environment, Volume 777, 10 July 2021, 146092.

Maury-Mora M., Gómez-Villarino, M. T. i Varela-Martínez, C. 2022. Urban green spaces and stress during COVID-19 lockdown: A case study for the city of Madrid. Urban Forestry & Urban Greening. Vol. 69, March 2022, 127492. <https://doi.org/10.1016/j.ufug.2022.127492>

Rybnikova, N., Broitman, D. & Czamanski, D. Initial signs of post-covid-19 physical structures of cities in Israel. Lett Spat Resour Sci 16, 25 (2023). <https://doi.org/10.1007/s12076-023-00346-8>

Volenec ZM, Abraham JO, Becker AD, Dobson AP (2021) Public parks and the pandemic: How park usage has been affected by COVID-19 policies. PLoS ONE 16(5): e0251799. <https://doi.org/10.1371/journal.pone.0251799>.

Yang, Y.; Jiang, Z.; Hou, Y.; Wang, H.; Wang, Z. Healthy City Community Space-Oriented Structural Planning and Management Optimization under COVID-19. Int. J. Environ. Res. Public Health 2023, 20, 3863. <https://doi.org/10.3390/ijerph20053863>

Zgórska B., Kamrowska‐Załuska D., Lorens P. 2021. Can the Pandemic Be a Catalyst of Spatial Changes Leading Towards the Smart City? Urban Planning, 6(4): 216–227 <https://doi.org/10.17645/up.v6i4.4485>