Reflections on New Urbanism at the COVID-19 Pandemic Background—Urban Health Research

Junyu Hu and Xinyi Hu

Abstract

The theory of New Urbanism, which promotes high-density, mixed zoning, and high walkable communities, has had a profound influence on the design of many cities globally and played a certain positive role in urban health. However, under the current COVID-19 pandemic, this theory faces new challenges. This paper aims to analyze the influence of New Urbanism on urban health from different spacial scales and reflect on whether these design methods still apply to the post-pandemic era. A series of recommendations for urban systems at different levels are proposed for further improving health of cities and residents. A real-world scenario-based design case is used to demonstrate ideas for optimizing public spaces in the districts. This paper is expected to provide ideas for future urban development and renewal design leading to a healthier and more sustainable city.

Keywords

New urbanism • COVID-19 • Urban health • Public open space

1 Introduction

The New Urbanism is the urban renewal theory that emerged in the late 1980s, reflecting deeply on the rapid expansion mode of Suburbia. To some extent, it represents the development direction of modern urban design theory. After World War II, under the influence of industrial cities, architects and planners, led by Le Corbusier, proposed the idea of fleeing the city and expanding into the rural areas to realize the "American Dream", setting off a suburbanization movement (Clements, 2017). This trend temporarily allowed city dwellers to escape the congestion of the metropolis. However, with the disorderly expansion into rural areas, large amounts of land were changed into low-density blocks termed "leapfrog pattern" (Frumkin, 2002). Different land functions are far from each other, forming an automobile-dominated commuting system, which led to city center deterioration, environmental pollution, frequent traffic accidents, and health problems, making people reflect on this development pattern. In 1994, the Charter of the New Urbanism was agreed and signed on the fourth Congress for the New Urbanism. It advocates creating a high-density, walkable, and vibrant community and has profoundly influenced the development of many cities, towns, and suburbs (Congress for the New Urbanism, 1996; Trudeau, 2013). The previous literature mainly focused on design methods and public policies about the community and local urban space under the guidance of the New Urbanism principle, including multi-functional mixed zoning (Lucchesi et al., 2020) and multi-level street system (Iravani & Rao, 2020), in order to improve the walkability and vitality of the community and increase the physical activity of the residents. There is not much research on the impact of New Urbanism on urban health from different spatial scales.

The COVID-19 pandemic has threatened public health and swept the whole world since last winter, directly or indirectly affecting everybody, which has aroused people's great concern about urban health. During this period, many countries adopted different degrees of restrictions to control the pandemic. Residents' outings were restricted to some extent (Zaremba et al., 2020). Because of the lack of outdoor sports, other physical health problems such as obesity have also become a "pandemic" (Chua, 2020). Simultaneously, insomnia, anxiety disorders, depression, and other mental

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H. Altan et al. (eds.), *Advances in Architecture, Engineering and Technology*,
Advances in Science, Technology & Innovation, https://doi.org/10.1007/978-3-031-11232-4_21

health problems increased with home isolation (Wang et al., 2020). However, the spread of COVID-19 will not disappear in the near future but is a long-term challenge (Pak et al., 2020). Whether the principles of New Urbanism can still have a positive impact on urban health requires further research.

In the following lines, the influence of New Urbanism on urban health will be studied from different spatial scales. Then the reflection on the New Urbanism will be conducted about whether it is still applicable in the background of the post-pandemic era and whether any improvements are required to reduce the risk of epidemic re-emergence and increase the speed of emergency response in the future. Based on the reflection results at the district level, a design will be illustrated to state a specific design idea, which embodies the understanding of New Urbanism and urban health.

2 The Influence of New Urbanism on Urban Health

This section analyzes the influence of New Urbanism on urban health from the three different spatial scales: the overall urban planning, the districts, the public open space, and buildings inside the districts.

2.1 Overall Urban Planning

One of the main concerns of New Urbanism is the urban transportation system. With the allocation of land resources, the compact city pattern is promoted, where the transportation mode is changing from private automobiles to non-motor (walking or cycling) and public transportation systems. This trend also has a positive impact on urban health.

The former suburbia advocated an idealized artificial system in which widening car roads and compressed sidewalks were becoming the external manifestations of the modern traffic system. “Becoming a Showcase: Virginia Beach Boulevard-Phase I celebrated its completion…” (Duany et al., 2001) People in the city center were proud to achieve a concrete life vision: an 11-lane highway and plenty of parking area. This city was the practice result of modern engineering and regulation and the microcosm of a modern city. However, the increasing number of private cars led to a higher incidence of road congestion and traffic accidents. Therefore, old roads were widened, and more new ones were built, further promoting private automobiles and making the city's non-proliferation situation more severe and finally falling into a vicious circle. Although this kind of transportation system was first built on human demand, ultimately, it became the system for transporting cars instead of people. In this automobile-dominated city, people worried about parking spaces every day and had little time to exercise. People's health needs were neglected. The city eventually became one space designed for cars.

The use frequency of private automobiles is closely related to the users’ health. A study of Atlanta-area showed that residents were 3% more likely to be obese with every five-minute increase in daily driving time (Speak, 2013). The impact of daily commuting on residents’ mental health is also significant. It is reported that increasing commuting time spent on congested roads eventually raises car drivers’ mental health problems, such as road rage (Frumkin, 2002). On the contrary, the non-motorized commuting model and the “public transport first” principle encouraged by New Urbanism can help weaken the adverse effects of private automobile commuting on residents’ physical and mental health. Walking and cycling increase the amount and time of people's exercise to some extent. Public transport vehicles consume energy more centrally and efficiently than private cars, reducing carbon emissions and external transportation costs (Wu, 2006).

2.2 Districts

Many factors affect residents’ healthy lives, including social factors, external and internal motivations, indoor and outdoor environments. It is reported that except for keeping pets, good urban design is also one of the main motivations for a healthy life (Katapally et al., 2018). The New Urbanism aims to explore how to build vibrant and walkable communities to guide people to travel more frequently on foot or by bike (Clements, 2017).

In terms of land function, New Urbanism advocates the land zoned with multiple uses to increase diversity. In urban design, living and public space diversity play a crucial role in residents’ healthy living. As illustrated in Fig. 2, the left plan follows the typical Euclidean Zoning pattern used during suburban sprawl with wide roadways and large single-use zones. The right one is the layout with traditional small-scale blocks, where the building mass is smaller than the left one, and the multiple functions are mixed in each zone. The dotted circles in two images cover areas of the same size. In traditional layouts, the mixed zoning development enhances the close connection between functions with reduced travel distances. The demand for private cars is minimized, and people prefer walking or cycling. It is easy to understand that in mixed-use communities, daily-life facilities are scattered around the residential areas. When people travel with utilitarian purposes, if the distance between the starting point and the destination is relatively close, it will give people the reason to increase the

possibility of walking or cycling (Rodríguez et al., 2006). The research conducted in 13 cities of the Atlanta region metropolitan area also confirms this argument. It is investigated that there is a direct linkage between the diversity of land function and the obesity rate of residents. The mixer the land use is, the more social activities can be completed by walking or public transport over short distances, and the lower obesity rate will be observed (Frank et al., 2004).

The mixed-use zoning also reduces commuting distances, and the time saved can be supplemented by sleep and physical activity, thereby reducing the incidence of chronic diseases and further enhancing public health. As the commuting distance reducing, people prefer taking public vehicles or riding bicycles, or even walking, and air quality can be improved with a gradual process that will eventually create a virtuous circle.

In terms of block connections, New Urbanism advocates roadway networks with improved interconnectivity and walkability. In the left image of Fig. 1, the block is bigger, and roads are wider than the right one, leading to the poor connecting road network. While the road layout in the right image is the one people prefer to walk. Because the smaller block scale and higher dense road network represent more intersections and more robust connectivity, which provide more route options, people can choose to take different routes between the starting point and the endpoint, improving the interest in walking. This road network will enhance people's willingness to walk and facilitate the number of their physical activities (Iravani & Rao, 2020). Due to the smaller blocks in the right image and compact layout, the streets are narrower, reducing the speed of automobiles. It means that the likelihood of a car accident can be decreased to ensure the safety of pedestrians.

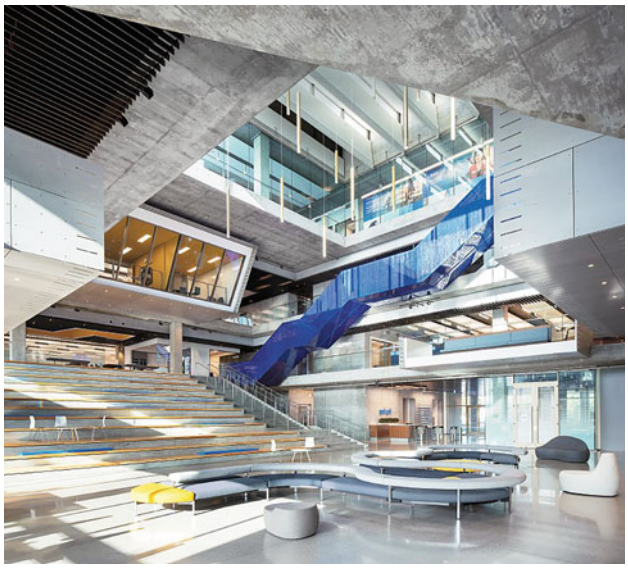

Fig. 2 Open stairs in an office building (Cohen, 2018)

2.3 The Public Open Space and Buildings in Districts

The New Urbanism also pays attention to public open space design such as squares and green spaces in blocks. Their relationship with surrounding areas should be organized well to ensure their accessibility and openness. In the previous automobile-dominated traffic mode, it was easy to form apathetic, low-dense urban space that transcended the scale of human nature. The lack of opportunities to communicate in public open spaces resulted in weak links between residents. While in a compact city, favorable design of the open space can attract residents, promote mutual acquaintance,

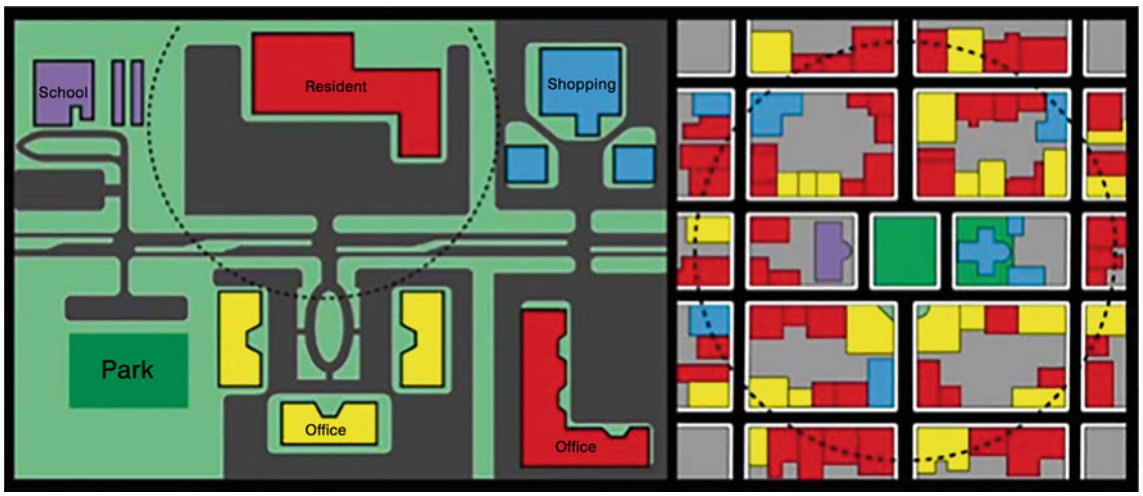

Fig. 1 Comparison of typical euclidean zoning and traditional small-scale zoning (Clements, 2017)

and communication between the residents, which can enhance the harmony and cohesion of the community and contribute to the mental health of the residents. In addition to being a social setting, public open space can encourage public health in two other ways. The green space environment is suitable for residents to conduct physical activities. In addition, it can be crossed by people to reach other destinations or be part of the walking or running route (Koohsari et al., 2015). Similarly, attention should also be paid to the design of the traffic space inside the buildings, such as good flow organization and staircase design, to increase people's physical activities in the building and reduce the dependence on elevators. For example, the open stairs in Fig. 2 are set in a public space without sight obstacles, which is more attractive than a traditional closed staircase.

The New Urbanism proposes design suggestions from macro to micro aspects of the city, which not only save the whole city from automobiles and free the residents, but also has a positive impact on the urban health.

3 Reflection on the New Urbanism Under the COVID-19 Pandemic

Since the COVID-19 outbreak, it has rapidly risen to a global pandemic prevention incident. People have experienced many changes, from the initial panic consumption causing insufficient supply and the spread of false news to the substantial blow to the global financial market and various industries (Ibn-Mohammed et al., 2021). The pandemic has destroyed the harmonious and modern society, and the flourishing market economy that we worked hard to create. In urban planning, the design trends about interactions that promote communication have become less critical or even excluded. However, the COVID-19 pandemic is impossible to end suddenly in a short time. Instead, this is likely to be a long-term challenge. Then, we cannot help thinking whether the New Urbanism principles are still appropriate in this context? In terms of contributing to urban health, what adjustments or improvements should New Urbanism make?

3.1 Urban Transportation System During Pandemic

The urban transportation system plays a crucial role in the virus spread process. Roads are like the bloodlines, connecting the economic and cultural lifeblood of the entire city. The primary and secondary roads guide the tertiary streets and then toward different blocks. This relationship can be analogized as the aorta, the secondary artery, and the capillaries in a human body. Oxygen and nutrients in the blood are transported through blood vessels throughout the body, penetrating capillaries into every tiny tissue, eventually feeding each cell. The vascular system that the human body has evolved over hundreds of millions of years can be used as a philosophical explanation for the segmentation of the transportation system and the city walkability in New Urbanism.

The way people travel has changed accordingly. The accessibility to medical facilities has become even more important for people in need of medical assistance. However, to avoid face-to-face interaction for the healthy ones, they would abandon taking public vehicles and prefer to travel by walking or cycling (Seidlein et al., 2020). Under the instructions of multi-functional mixed zoning by New Urbanism, people's daily needs can be met in the vicinity of residential areas, which could greatly reduce the travel distance and increase the frequency of people choosing to walk or ride, thus reducing the possibility of widespread of the virus across regions and facilitating the pandemic control.

3.2 Public Open Space During Pandemic

In addition to directly serving medical facilities, public open space can also benefit residents' mental health. During the pandemic, face-to-face interaction has been greatly reduced due to the block-down policy and public fear of the virus spread. However, the need for the accessibility of public open space is always there, especially for green space (Zhu & Xu, 2020). Prolonged home isolation not only affects residents' mental health but also may result in serious mental problems such as anxiety disorders. In the vicinity of urban residential areas, ensuring enough walkable green spaces for outdoor activities can reduce the risk of anxiety disorders. It is reported that as the distance between available green space and small settlements decreases, or the affection of green space in large residential areas increases, the number of treatments for anxiety disorders required per capita decreases (Nutsford et al., 2013). Therefore, the requirement to going outside should not be prohibited or ignored. It is expected that the reasonable designs of public open space could help people not only exercise the right to enjoy the fresh air and sunshine, the beautiful scenery, and communicate with others, but also protect them from the virus invasion.

During the block-down, Italian residents held concerts on their balconies, playing instruments on their own and cooperating with neighbors on different balconies, while others listened quietly. Then people would applaud and cheer for the performers across the balconies or the streets (Grigoriadou, 2020). The emergence of this phenomenon is the embodiment of people's social needs and the functional transformation case of the building as well. As a part of many families, the balcony is usually used for sunbathing,

potted plants, and other leisure activities. The balcony is an open space that people can enjoy in their own homes. It is not comparable to the squares or parks with larger areas and richer plants. However, due to people's desire for outdoor activities and the boredom of home isolation, a functional transformation of the balcony is naturally achieved, making it change from a family leisure space to a social platform and satisfy the requirement of a safe distance. Such a transformation pattern can be considered to be applied under the circumstance of public open space, allowing residents to have more options in the post-pandemic era rather than just staying at home.

3.3 Architectural Design During Pandemic

Looking back at the story of the balcony concert in Italy during the outbreak, it is not difficult to recall the microscopic part of the New Urbanism, namely what can we do about the architectural design during the pandemic?

In buildings, especially residential buildings, the central spot of the interaction is the traffic space. Stairs and elevators are one of the significant parts of the virus's spreading path. When people operate the elevator, they make direct contact with the buttons, and then when the next person operates the elevator, an indirect contact occurs (Hasanreisoglu & Hasanreisoglu, 2020). The air quality in the confined elevator spaces is hard to ensure due to lack of ventilation, providing opportunities for the virus to spread. We can only find another way to replace it for this inevitable contact in a confined space.

Staircase, during the pandemic, is a better travel space because of its good lighting and ventilation. However, due to the height and physical power constraints, people prefer elevators. In order to reduce the frequency of elevator use and reduce the probability of infection in the elevator, it can be stipulated that the elderly and other people under particular circumstances can take priority elevator; other residents are not recommended to use elevators. The protection measures should be increased, and the number of people should be limited in the elevator. For new buildings in the future, it is recommended to create a more comfortable staircase environment and provide the staircase with richer functions. For example, a rest platform or common area can be set up in the staircase to carry certain indoor functions like reading, discussion, and planting to attract more people to take the stairs and increase their physical activities.

4 Design Case

Based on the reflection mentioned above on New Urbanism during the pandemic, a landscape architectural design is proposed as an example. The protection requirements are taken as the design precondition. This design is determined to provide residents with appropriate public areas for activities and communication, both physically and psychologically, to promote healthy lives. The main issues that people may encounter when isolated at home during the pandemic are analyzed in Fig. 3, and they are also considered the primary motivation of this design. As shown in Fig. 4, they are further subdivided into six specific functions.

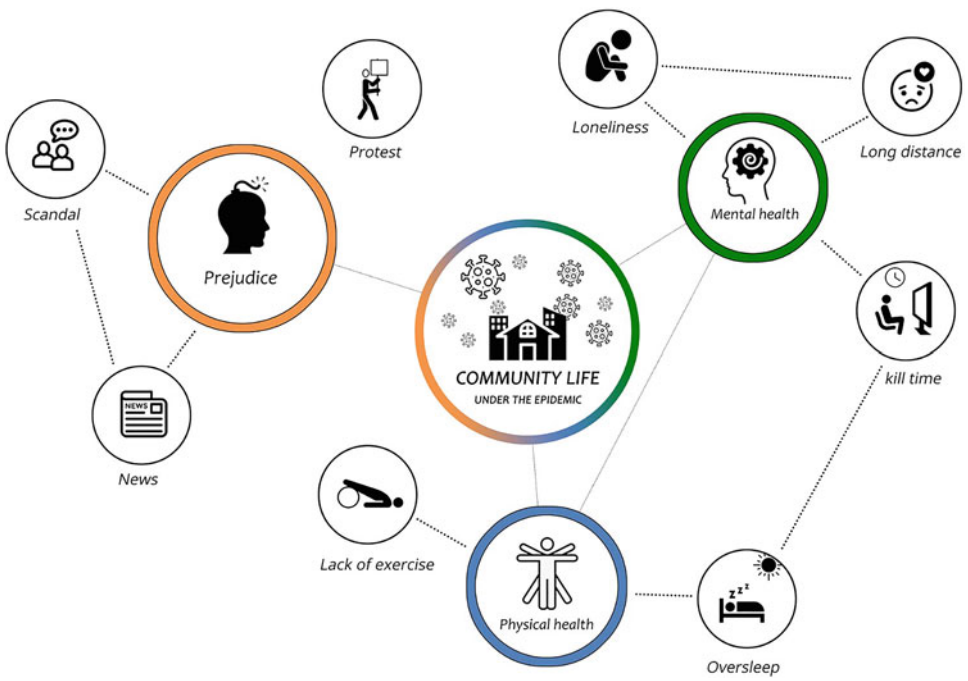

Fig. 3 Main problems that may arise from home quarantine during pandemic

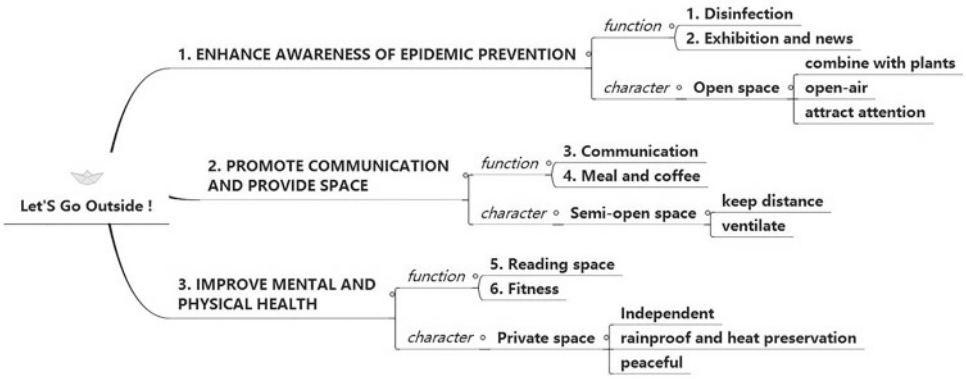

Fig. 4 Primary design motivations and main functions of the pavilions

4.1 The Pavilion as the Information Platform

As shown in Fig. 5, the function of this pavilion mainly contains information display and art expression. The first is to update the pandemic information, pass it on to the residents, and provide related protection recommendations. The information is spread through the network media and monitors. The key information, such as the number of daily new patients, can be illustrated with a separate digital board for warning function. This pavilion is recommended where people pass by every day, such as the street corner or the parking lot. The other function of this pavilion is to convey people's emotions about the pandemic through art methods. The mental problems that arise during the pandemic, such as fear of the virus and distrust of human interaction can be expressed more artistically. It is essential to provide a platform for the display of our ideas and emotions.

This pavilion does not take up much public space and is set like a small module in the city to complement the missing features. After the pandemic, it can be transformed into other functions, such as a small shop, advertising location, or art exhibition space.

4.2 The Pavilion as Public Communication Space Meeting the Protection Requirements

This pavilion presented in Fig. 6 is the same size as the previous one, but their difference is in the internal function and spatial form. In this case, a more private space is created for two people (friends or strangers) to communicate. Due to the fixed seats and narrow tables in this pavilion, two people can only sit opposite each other and are separated by 1.6 m (1.5 m is the minimum safe distance) with a small window in front of them. If they want to initiate a conversation, they can open the door panel and chat face-to-face. They can also remain relatively independent if they want to do something for themselves. Each side is equipped with a disinfectant

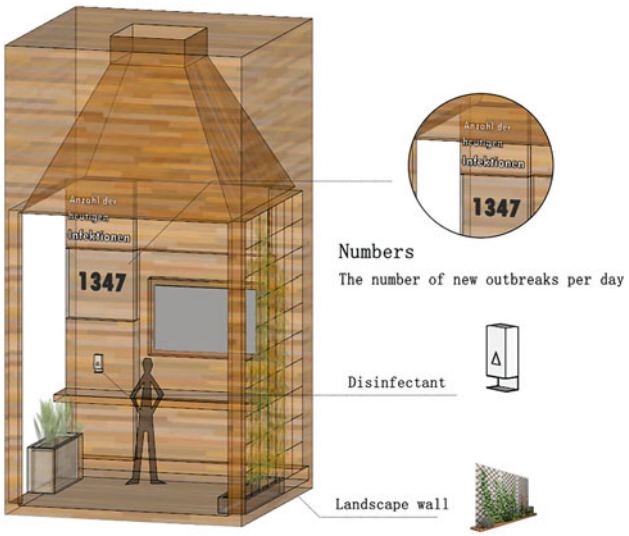

Fig. 5 Pavilion as the information platform

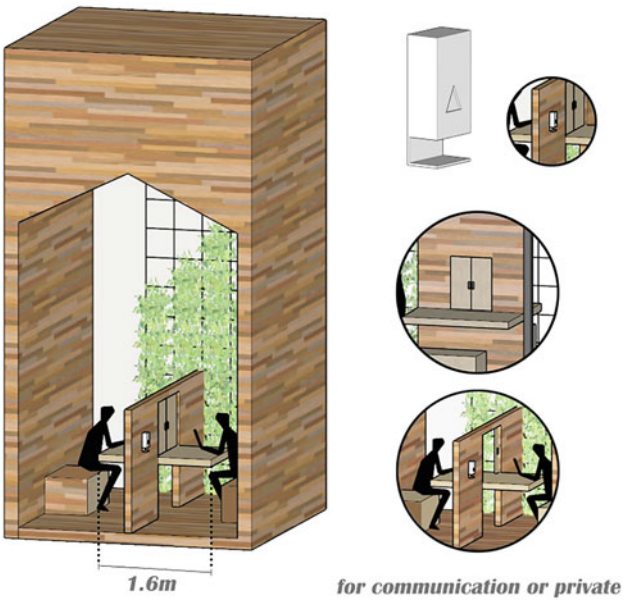

Fig. 6 Pavilion as public communication space

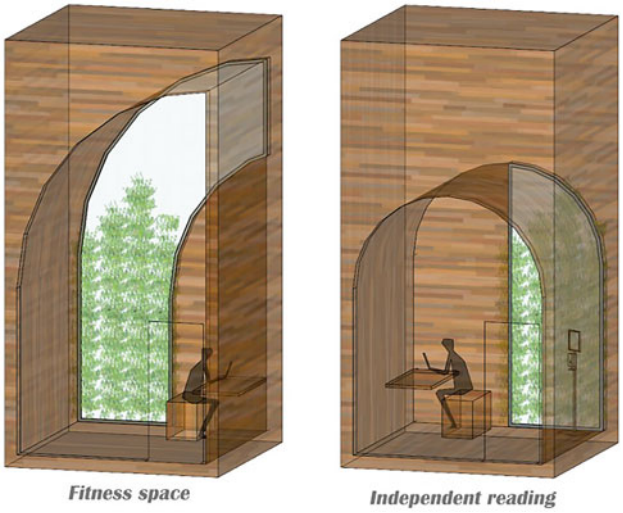

Fig. 7 Pavilion used for independent reading and exercising

hand sanitizer to keep the furniture clean during use and prevent the virus spread caused by indirect contact.

4.3 The Pavilion Used for Independent Reading and Exercising

As illustrated in Fig. 7, the arched element is introduced into this pavilion's interior space to create a bright and welcoming indoor environment (niche). Arches have beautiful continuous curves, which often play a role in regulating emotions in architectural elements. This relatively independent space can be used for residents to read or exercise. A confined space, in principle, can only serve one person at present. However, when combined with the two types of pavilions mentioned above, small groups can be created in cities to achieve various public needs.

The above three kinds of pavilions can be combined to meet residents' psychological and physiological spatial needs to some extent, strengthening people's understanding of the pandemic simultaneously. Following the principles of New Urbanism, appropriate public space within walking distance should be selected to add these pavilions. It was mentioned earlier that the conversion capacity of public open space between streets and groups should be enhanced, leaving room for the additions during the pandemic and space for structures similar to these pavilions.

5 Conclusion

This study set out to study the influence of New Urbanism on urban health from different spatial scales (from the urban transportation system to district level and architectural design). In light of the current pandemic, it is considered systematically whether the New Urbanism principles are still a boost to urban health or areas that need improvements. Finally, through an experimental architectural design case, one of the ideas to improve the residents' physical and mental health is proposed at the district level.

After studying the theory of New Urbanism at different spatial levels, it is concluded that these principles still have a promoting effect on urban health. They are also conducive to the overall framework for pandemic control by increasing community density and functional diversity, encouraging residents to travel on foot or by bike, and encouraging people to use open stairs rather than closed elevators. However, there are still areas that need to be reconsidered and redesigned. The public vehicles and buildings need to increase facilities to meet the pandemic's prevention and control requirements. Public open space should be thoughtfully redesigned to meet the residents' spiritual needs of green space and social interactions, as well as the physiological needs of outdoor activities, to ensure people's healthy life.

In the urban development during the post-pandemic era, some of the New Urbanism principles are worthy of references, such as public space walkability and multi-functional mixed zoning of districts. The pandemic will be a long-term battle, not only now, but something similar will happen again in the future. The learning, reference, and reflection of the previous design thoughts will guide us to a more sustainable and healthy city.

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