

The Effects of Changes to the Urban Physical Environment on Mental Disorder: Development of a theoretical framework

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Abstract

This paper examines the way in which the changes of the urban physical environment creates a high level of mental disorder among the urban population. The rapid urbanisation process in a recent year adds urgency to this issue. Drawing on a scoping review of studies of the wider relationship between the urban physical environment and mental disorder, the relevant information from 109 articles published between 1985 to 2019 was synthesised. Through this process, a theoretical framework using urban health indicators that identifies the effects of changes to the urban physical environment on mental disorder was developed. The framework can be beneficial to improve the environmental planning quality towards a healthier urban environment in addressing emerging challenges of urbanisation.

Keywords: Urbanisation; Urban Physical; Environment; Mental Disorder; Framework

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1.0 Introduction

Urbanisation is vital in the urban physical environment, especially to health challenges in the 21st century (World Health Organisation, 2015). The UN-Habitat (2017) predicted that almost 60 per cent of the world's population would live in urban areas by 2030. This rapid urbanisation is exerting pressure on the environment and health of the urban population. As to the year 2019, data in Our World in Data shows the number of people who lives in urban also increased to 82.46 per cent and will keep increasing. Understanding of this increasing urbanisation is critical as the physical form of the urban environment poses massive sustainability challenges, including mental disorder (UN Habitat, 2017).

In fact, the World Health Organization (WHO) (2019) stated that around 450 million people had a mental disorder and causing it to become the leading for health problems and disability worldwide. Most of suicide and self-harm cases reported was due to mental disorder, as United Nations (UN) reported approximately one million commit suicide every year and it also ranked as the third leading cause of death among young people. This figure will keep increasing by the year. As the world's population will move into the urban area, the built environment could play an essential role in the improvement of mental health (Ceñido et al., 2019). According to the United Nations (2018), 75 per cent of the population is living in urban areas. Lau (2016) claimed that mental health problems expected to be the second biggest health problem in Malaysia. As such, it is crucial to understand the effect of the urban physical environment on mental health.

In recent years, the urban physical environment has started to take into account the mental health wellbeing of the urban population. According to Evans (2003) and Beemer et al. (2019), physical urban environments can affect mental health in two significant ways by direct control and indirect control, which are the environmental characteristics, including housing, crowding, noise, indoor air quality, and light. This characteristic also indicates poor urban physical environment caused by rapid urbanisation or urban sprawl, which further will cause many issues in the physical, environmental, and urban areas. It can create an overpopulated area, and thus the demand for housing will increase, and a higher density housing scheme built. It can cause a low quality of housing and inadequate provision of facilities, including green areas. It was point out some time ago by Bonnefoy et al. (2003) that inadequate housing provision may have an impact on the dweller's mental health status as their feeling of privacy and security can be affected. Due to all these factors present in the urban environment, it causes the city population at a higher risk of developing mental disorders (Anakwenze & Zuberi, 2013). However, Garrido-Cumbrera et al. (2018), in his research, does not found significant risk factors between urban sprawl level and mental disorder due to people lives in sprawling areas have lower psychological distress. Thus a literature review is conducted, and a theoretical framework developed to have a better understanding of these associations. This framework will illustrate the components of the urban physical environment and how it will affect mental health and what are the effects of it with detailed explanations of each attribute.

2.0 Urban Physical Environment and Mental Disorder

As the world becomes increasingly urbanized, studies have shown that urban physical environment can affect mental health directly and indirectly through its characteristics. World Health Organisation (WHO) defines health, in general, is not only regarding the absence of disease or infirmity but as a state of complete physical, mental, and social wellbeing. Mental disorder or mental health is a condition that involves changes in thinking, emotion, or behaviour, which results in difficulties in coping with normal life stress and routine. Galderisi et al. (2015) defined mental health as "a dynamic state of internal equilibrium which enables individuals to use their abilities in harmony with universal values of society. Basic cognitive and social skills; ability to recognise, express and modulate one's own emotions, as well as empathise with others; flexibility and ability to cope with adverse life events and function in social roles; and harmonious relationship between body and mind represent important components of mental health contributing, to varying degrees, to the state of internal equilibrium". Moreover, Chu et al., (2004) suggested two sets of factors that can affect mental disorder which is a direct factor, consist of density, environmental pollution, housing quality and, an indirect factor which are personal control, social support, and recovery from fatigue and stress. By determining the effects of changes to urban physical environments on mental health is important to create a better environment and mental health wellbeing.

Barton et al. (2009) define the sphere of direct planning influence towards human settlements is by the urban physical environment, which is the physical form and management of places such as the buildings, spaces, streets, and networks. The urban physical environment is physical factors that comprise settlement area, facilities, utilities, green area, and transportation in the urban area (Guite et al., 2006, Handy et al., 2002 and Chu et al., 2004). Kim and Yoo (2019) found that land use, street environment, transportation infrastructure, green and open spaces, and neighbourhood facilities contribute to mental health problems. Furthermore, Guite et al. (2006) outlined five factors that act independently to predict poor mental disorder and vitality, which is noise annoyance, perceptions of crime, house overcrowding, access to green spaces, and community facilities. In this sense, Gruebner et al. (2012) and Gong et al. (2016) suggested the variable of the urban physical environment associated with mental health which natural environment, green spaces, land use, industrial activity, housing quality, access to basic services, traffic volume, sanitation, housing sufficiency, housing durability, and population density. A higher level of urbanisation increases the risk of a higher number of immigrants, a higher level of air pollution, lack of green provision and lack of social safety as both physical and social environment is found that have significant impacts towards mental health wellbeing (Generaal et al., 2019; Qiu et al., 2019). Some of the previous studies revealed that the effect of the changes in the urban physical environment towards mental disorders by different attributes profoundly. However, some researchers found that the urban physical environment does not affect mental health. For example, Li & Liu (2018) stated living in urban does give effect to stress but not necessarily lead to mental health problems. Thus, it is crucial to understand and find substantial evidence of these associations.

3.0 Scoping a Theoretical Framework for Action

As a first step in developing a theoretical framework, over a hundred scholarly articles and on the relationship between the urban physical environment and mental wellbeing have been identified. This research conducted using a scoping study that consists of five stages methodological framework for data extraction in the literature search (Arksey and O'Malley, 2005 and Hassen, 2016). Scoping studies are a form of knowledge synthesis addressing exploratory research questions aimed at mapping key concepts, types of evidence, and gaps in research. The first stage in the scoping study is to identify the research question, which is 'how does an urban physical environment affect mental health and wellbeing?'. The second stage is to identify the relevant studies and comprehensive searches via different sources that are using electronic databases such as SCOPUS, Web of Science, and PubMed. Then a snowballing is done through the reference lists and hand-searching of key journals using the keywords 'urban physical environment AND urban environment AND mental health/disorder AND wellbeing'. After a database searching is complete, the next stage is study selection, which from a total of 109 references, 47 taken out as not capturing the scopes of the research question. In a total of 62 references are charted by the aims of the study, and essential results extracted. The final stage is collating, summarising, and reporting the results by reviewing the literature, evidence, and findings that answer the research question. Based on the literature review, a theoretical framework developed to summarise the relationship or urban physical environment towards mental disorder and supporting evidence to each of the components.

This research will conduct a case study in the Federal Territory of Kuala Lumpur, Malaysia. The most suitable sampling method proposed is stratified random sampling, whereas it can branch off the entire population into a homogenous group. This method suggested due to this research will consist of a questionnaire survey to the participant who may experience mental health problems or without mental health problems. The questionnaire will adapt from Depression, Anxiety, and Stress Scale (DASS-21) to suit the research question. The site selection will focus on public housing, low-cost housing, and high-density housing. Low-density housing also will be added up for a comparison purpose. The selection of area based on several characteristics, which are types of residential, the distance from the centre of business, the distance to public parks and spaces, facilities provided, and their surrounding land use. The total population in the Federal Territory of Kuala Lumpur is 1,795,200, and a total of 385 samples with confidence intervals of 95 per cent are to carry out.

4.0 Development of a Theoretical Framework

Rapid urbanisation has caused changes in individuals and communities of lifestyle and spatial placement such as green spaces, community centre and other facilities. There is ample evidence documenting the higher prevalence of the psychotic disorder in cities compared to non-cities (Pike et al., 2013). According to Ompad et al. (2007), three distinct features of the urban environment influence health; social environment, the physical environment, and urban resource infrastructure. In this framework, the urban environment

is consisting of three main characteristics in an urban physical environment, which includes a built environment, natural environment, and activities. These three characteristics interlinked with each other, which makes it becomes a complete affinity for health determinants, as shown in Figure 1. These three characteristics will be the base in developing the framework, and each characteristic will be detailed out into more detail components.

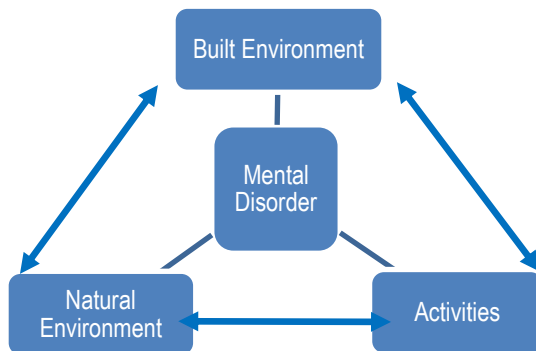


Figure 1: A Cycle of Relationship in Urban Physical Environment

From the characteristics in Figure 1, the theoretical framework (refer Figure 2) derived into more detail components, and each component will explain the relationship between urban physical health for a better understanding of how it can influence mental health. This framework, shown in Figure 2, illustrates the relationship of the urban physical environment with mental health wellbeing. This framework explains the character of the urban physical environment that gives effect directly or indirectly and how it is measured. Scopes divided into three main components, which the built environment, natural environment, and activities. The character underlying in each component has its significance on the effect of health in general and mental disorder problems. A built environment component is usually manmade consist of housing, crowding, park, transportation, services, utilities, and urban design. During this study, the factors and causes of mental disorders will be analysed and understand based on the effects of changes to the urban physical environment. The effects of changes such as high-density housing, green spaces and facilities provision, and the surrounding land use to mental disorder will be studied. From these findings, the relationship between the urban physical environment will be analysed to find the correlation with a mental disorder.

Built Environment	Natural Environment	Activities
Housing	Noise	Living
Crowding	Indoor air quality	Playing
Park/Playground	Light	Learning
Transportation systems	Green spaces	

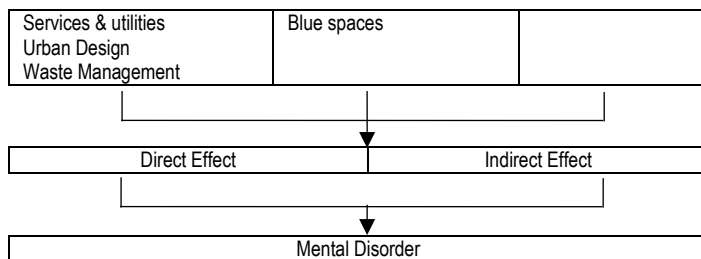


Figure 2: Framework of the effects of changes to the urban physical environment on mental disorder

As shown in Figure 1 and Figure 2 above, the built environment in the urban physical environment can affect mental health directly and indirectly. The built environment is usually is manmade, and made for humans and human use such as housing, park, transportation, utilities, services, and urban design. The built environment and natural environment are related to each other as the built environment will provide access to the natural environment, and the built environment also can cause pollution and affect the natural environment. Both of built and natural environments are supported by activities component, which is people's activities in the built and natural environment. Activities consist of living, playing, and learning where each of these is related directly to the built environment and natural environment. In more recent research, association in these three components highlighted. For example, Wang et al. (2019) stated that the quality of natural, built and social environments are associated with a mental disorder. In previous research by Sarkar et al. (2018), it found that built environment density and the form of urban spaces in a city might affect mental health. According to Melis et al. (2015), urban density and accessibility of public transport can affect depressive symptoms among adults and decrease by the improvements of some features of the urban built environment. It is supported by Ceñido et al. (2019) which found improvement of walkability has positive changes for human behaviours and health outcomes. The built environment is not a stand-alone characteristic which closely related to natural environments such as green spaces, forests, trees, blue spaces, and also activities in which the events happens in both built environments and natural environments. American Psychiatric Association (2016) stated that one area of substantial research is the benefit of a natural environment or green space, which can help people to recover from the mental fatigue of work. Serafini (2014) claimed that space becomes a place the nature, buildings, landscape, and forms in spaces have a meaningful interaction with life. A high level of accessibility to physical activity is critical because good physical health can create a healthy mind. Sturm and Cohen (2014) stated that the distance of residential and parks significantly related to mental health, and Rao et al. (2007) claimed that access to green open spaces could increase physical activity and mental wellbeing. Therefore, neighbourhood or housing quality is one of the essential aspects of built environments as people spend most of their time as home. In contrast, the built environment can become one of the risks for depression for those who live in areas

characterised as poor quality, which linked to housing location and quality of the neighbourhood (Galea et al., 2005 and Friesinger et al., 2019). Hoisington et al. (2019) suggest that improving the condition of the built environment can improve mental health outcomes.

The natural environment is usually related to greenness, which can be open spaces, recreational areas, trees, landscapes, and other natural and other natural features. In a dwelling area, green spaces in very important for the residents to do both active and passive activities. It is also a meeting point of a community. A liveable residential environment represented different elements of physical urban form and role in achieving the quality of living and protecting the natural environment (Skalicky and Cerpes, 2019). Mitchell (2013) stated that the natural environment used for physical activities could lower the risk of mental disorder (Thompson et al., 2019, Barton, 2009) as it mitigates the effects of stress and stress-inducing factors and promotes health wellbeing and speed recovery from illness. In addition, McKenzie et al. (2013) suggest that living in a green environment has positive impacts on mental health because the urban area normally has less green than rural. Zijlema et al. (2018) and Wendelboe-Nelson et al. (2019) found that commuting in natural environments can affect to better mental health due to exposure to the natural environment that can decrease negative affect. Natural environment or green spaces also can promote social cohesion and linked to a higher level of sense of community and associated with improvements in mental disorder (Rugel et al., 2019, Tao et al., 2019). Liao et al. (2019) and Bezold et al. (2018) stated that residential that surrounded with green spaces, especially for people, live in higher density associated with better mental health, and it can reduce the level of traffic-related air pollution. Sefcik et al. (2019) and Wang et al. (2019) found strong evidence on improving and enhancing the quality and quantity of green spaces can improve mental disorders as more greenery correlates with a positive mental disorder. The provision of green spaces and access to the natural environment will promote physical activities, which is vital to reduce poor mental disorders.

Activity is supported components for both built and natural environments. It is any activities that occur or take part in the built and natural environment such as living, playing, and learning. Liu et al. (2019) stated that physical activities, stress reduction, and neighbourhood social cohesion are complete mediation effects for the exposure that has to affect residents' mental health. Akpınar (2016) found that a higher frequency of physical activity and a larger size of greenspaces related to better mental health, and it also supported by research done by Liu et al. (2017) and Harvey et al. (2010), which suggests physical activities and nature interaction in parks improves mental disorder. Neighbourhood walkability and cognitive function is a physical activity which suggests higher walkable neighbourhood provides opportunities to do exercise, which has positives effect on mental health (Guo et al., 2019 and Beale et al., 2012). As people living in a residential, it is essential to provide a place for physical activities to be done. All these three main components in the urban physical environment are related to each other; thus, it will give direct and indirect effects on mental disorder for its insufficiency.

Direct and Indirect Effects

Several urban physical environment characteristics can, directly and indirectly, affect peoples' mental disorders, and due to these factors, the prevalence of mental health problems is increasing. It is at an alarming rate as not only can it cause mental health problems to a person, but it also may affect their surrounding people. Mental disorder attributed to a significant number of deaths around the world by suicide and self-harm. Mental disorder not only causing mortality but also, they have to lives in disability for years. Ferrari et al. (2014) stated that mental disorders associated with an increased risk of suicide. According to the World Health Organization (WHO) reported that ten people per 100,000 died from suicide in 2017 globally, and almost 800,000 persons die from suicide.

Rapid and unplanned urbanisation caused environmental hazards, which has a direct and indirect effect on mental health (Li et al., 2016). An acute effect of air pollution in the urban area has a higher risk of suicide (Min. et al., 2018). Srivasta (2009) stated that mental health is affecting from urbanisation by the increased stressors and factors such as overcrowded, polluted environment, high level of violence, and reduced social support. The population density is causing physical and social problems, and it pressures on mental health (Berry, 2007). Barros et al. (2019) found that people were living in high-rise buildings associated with worse social effects and mental health outcomes due to the poor quality of their semi-public spaces. Xie et al. (2018) found that physical environments such as distribution, proximity, size, and quality of parks and road networks affect with low accessibility of parks will expose to higher health risks. According to research by Xiao et al. (2018) on the effect of housing condition to immigrant and local resident mental health's, it found that housing condition has a direct impact to local resident, meanwhile indirect effect to the migrant's through neighbourhood satisfaction. Yang and Matthews (2010) stated that the imbalance between environment demand and individual coping may lead to a high level of stress and can cause mental disorders. Mental health problems will cause social exclusion as people with mental health will avoid social interaction, which means they will not go to the parks for activities and affecting the quality of life.

In a deprived area, the facilities for the community usually inadequate, causing the residents to tend to stay at home and the community social cohesion lacking. Heekin and Polivka (2015) explain the effect of mental disorder have negative impacts on quality of life and physical health, social relationship strains, reduces labour supply, homelessness, self-harm, and suicide, and also a significant financial burden. People with a mental disorder do not interact with their neighbours because they feel that when there is little interaction with neighbours will make them more downhearted and depressed (Araya et al., 2006). The person with mental disorder will drive them to lower socioeconomic status, and it can influence educational attainment, labour market outcomes, and social mobility restrictions (Anderson, 2017). Besides, urban living can be threatening if a person does not have enough space of their own if the person experiencing insufficient security or living under unstable economic conditions (Brakemeier, 2017). Mental disorders have a profound, life-altering impact on the human experience and afflict individuals regardless of their race, ethnicity, religion, nationality, socioeconomic status, gender, and age (Pike et al., 2013). The framework has shown relationships in how urban physical environments can influence

mental health in particular and changes that done for mental disorder and wellbeing improvement.

5.0 Conclusions

By determining the effects of changes to urban physical environments on mental disorders is important to create a better environment and mental health wellbeing. According to Hoisington et al. (2019), improving the condition of the urban physical environment would likely lead to improved mental health outcomes. Therefore, there is a great need to improve understanding of the effects of the urban physical environment on the occurrence of mental disorders, as well as the factors that promote mental health. Thus, a theoretical framework is illustrated to develop an understanding of how the changes in the urban physical environment can influence mental disorders. This framework highlights the characteristics of the urban environment and how this environment can affect directly and indirectly to mental health and what are the effects of the urban physical environment. This framework could be applied to support the implementation of the New Urban Agenda and in line with Sustainable Development Goals (SDG) to create a healthier urban environment in Malaysia as a central consideration in addressing emerging challenges of urbanisation.

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