Urban planning and quality of life: A review of pathways linking the built environment to subjective well-being

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ABSTRACT

In light of the rapid global urbanization, providing a better quality of life in cities is becoming an increasingly critical issue for urban planning. However, the links between the built environment and subjective well-being are not sufficiently understood. This paper reviews the evidence on the range of pathways linking the built environment to subjective well-being. Seven potential pathways are identified and reviewed: (1) travel, (2) leisure, (3) work, (4) social relationships, (5) residential well-being, (6) emotional responses, and (7) health. Based on this knowledge, the paper presents an overview of strategies for improving subjective well-being through urban planning. Among others, proposed strategies are to: enhance conditions for active travel; improve public transport while restricting cars; provide easy access to facilities and services; develop or steer technology and emerging mobility options to improve inclusiveness and quality of life for different groups; integrate various forms of urban nature as much as possible; provide accessible, inclusive public spaces and communal spaces; maintain upkeep and order in urban space, vegetation, and transport systems; implement noise reduction strategies; develop aesthetically pleasing buildings and public spaces based on residents' needs and preferences; and reduce socio-spatial inequalities while providing support for housing and transport for vulnerable groups.

1. Introduction

Improving quality of life in cities is becoming an increasingly critical issue for urban planning. The rise of urban populations worldwide, caused by rapid population growth and urbanization processes, makes urban quality of life relevant to more and more people. At the same time, the physical characteristics of cities change to accommodate new residents. The Coronavirus disease (COVID-19) pandemic has also exerted a fundamental influence on the quality of life of almost every resident in every city around the world. A deeper knowledge on the relationship between the built environment and quality of life in cities can play a catalytic role in shaping present and future urban development.

Knowledge on the ways in which the built environment can influence quality of life is growing rapidly. Several researchers have attempted to synthesize knowledge on how to improve quality of life via urban planning. Marans and Stimson (2011) provided an overview of how to measure and analyze the relationships between urban environments and quality of life. Kent and Thompson (2014) synthesized literature and suggested that the built environment can contribute to health and well-being via three pathways: physical exercise, community social cohesion, and equitable access to healthy food. Pfeiffer and Cloutier (2016)

provided an overview of the main drivers of happiness in neighborhoods including, among others, open, natural, and green spaces, and urban design that fosters social interaction and safety. Wang and Wang (2016) provided an overview of theories and empirical evidence on how the geographical context may shape subjective well-being (SWB). Mouratidis (2018c) provided a conceptual framework explaining how the neighborhood-scale built environment may influence SWB through four pathways: social relationships, leisure, health, and affective experience. Shekhar et al. (2019) suggested that well-being in human settlements is shaped by four drivers: participation and engagement, access, identity, and safety. More recently, Tonne et al. (2021) reviewed evidence on urbanization and health and suggested a set of actions to promote health through sustainable urban development: integrated planning, evidence-based policy-making, and monitoring the implementation of policies.

Nevertheless, the whole range of ways through which the built environment may contribute to SWB – the personal evaluation of quality of life (Diener, Oishi, & Tay, 2018) – is still not sufficiently understood. There is a lack of a holistic conceptualization that includes all the major pathways between the built environment and SWB. Previous studies have proposed conceptualizations that do not completely capture the range of relevant pathways. Some pathways included in one study are

not captured by another, and vice versa (see e.g. Kent & Thompson, 2014; Mouratidis, 2018c; Pfeiffer & Cloutier, 2016), and some possible pathways have been ignored. Moreover, as new evidence on the built environment and SWB is constantly being produced, there is a need for an updated synthesis of empirical evidence.

The paper attempts to address these gaps by presenting a new organization of the pathways linking the built environment to SWB and by providing an overview of the state of knowledge. The objectives of the paper are: (1) to present a conceptual model that organizes the pathways linking the built environment to SWB, (2) to provide an overview of the empirical evidence on these pathways, and (3) based on the knowledge from the overview, to present potential strategies on how to improve SWB through urban planning. The outcomes of this paper may provide updates and refinement to existing literature and conceptual models on the built environment and SWB and can be used as theoretical and methodological guidance for further empirical research. Besides its scientific contribution, this paper provides suggestions on urban planning strategies that could guide practitioners, policy makers, and decision makers who work on urban planning issues. It aims to shed further light on practical ways to improve quality of life in cities by improving the most relevant life domains through the built environment.

The review presented in the paper is based on a qualitative interpretation of research evidence. Due to the broad scope of the topic and the large number of relevant studies, the review is a synthesis of literature that presents an overview of the state of knowledge. It is not an exhaustive review of each pathway included in the conceptual model. The review assessed around 150 relevant studies. The focus was mostly on peer-reviewed articles published in international journals. This ensured that the literature covered in the review is more manageable. On some occasions, a few books, book chapters, and reports were also included to complement peer-reviewed evidence. The literature search was based on identifying relevant literature review papers and highly relevant empirical papers and performing backward snowballing. This was supplemented by a search in scientific databases. Several relevant papers had to be excluded to keep the literature manageable. The review is however expected to cover the main trends found in the existing empirical evidence.

The paper is structured as follows. Section 2 presents the conceptual model of the review, displaying the pathways linking the built environment to SWB. Section 3 presents a review of the empirical evidence on the pathways linking the built environment to SWB. Section 4 presents potential strategies on how to improve SWB through urban planning. Section 5 summarizes and discusses the findings and provides concluding remarks.

2. Conceptual model

The proposed model on pathways linking the built environment to SWB is presented in Fig. 1. The model was developed analytically, by synthesizing earlier conceptual frameworks (Marans, 2003; Mouratidis, 2018c) and recent empirical findings (Mouratidis, 2020a). In this section, the model is described briefly in general terms. In the following sections below, the model is employed to structure the literature review and to develop recommendations for urban planning strategies.

SWB comprises life satisfaction (i.e. contentment with life overall), emotional well-being (also called affect or hedonic well-being), and eudaimonia (i.e. self-actualization and meaning in life) (OECD, 2013; Sirgy, 2012). By encompassing measures of overall life evaluation as well as emotions at specific time points, SWB is a reliable, scientific way to measure trends in quality of life and has become a public policy goal worldwide (Diener, Oishi, & Tay, 2018; OECD, 2013; Veenhoven, 2012). The *built environment* refers to the physical human-made environment where human activity occurs. Its components can be organized in several ways. The distinction used here is: land use, transport systems, urban design, and housing.

The built environment can influence SWB through pathways that mostly correspond to life domains (Marans, 2003; Mouratidis, 2018c). Life domains all contribute to SWB (Diener, Oishi, & Tay, 2018; Sirgy, 2012). SWB can also contribute to life domains, but this reverse relationship is not examined in the model. Life domains may also influence each other, having what is called "spill-over effects" (Sirgy, 2012). Pathways in Fig. 1 are therefore all interlinked. These interconnections are explained in the sections below but are not shown in the model to reduce complexity.

The pathways linking the built environment to SWB are organized in the conceptual model in seven domains. The organization of these seven pathways is novel, but is also inspired by previous conceptual frameworks (Marans, 2003; Mouratidis, 2018c). The seven pathways linking the built environment to SWB are: travel, leisure, work, social relationships, residential well-being, emotional responses, and health. These are considered major life domains based on several different conceptualizations (Diener, 2009; Sirgy, 2012). There are certain life domains not included in or not captured by the conceptual model such as civic duties and rights, spirituality, and religion. The potential links
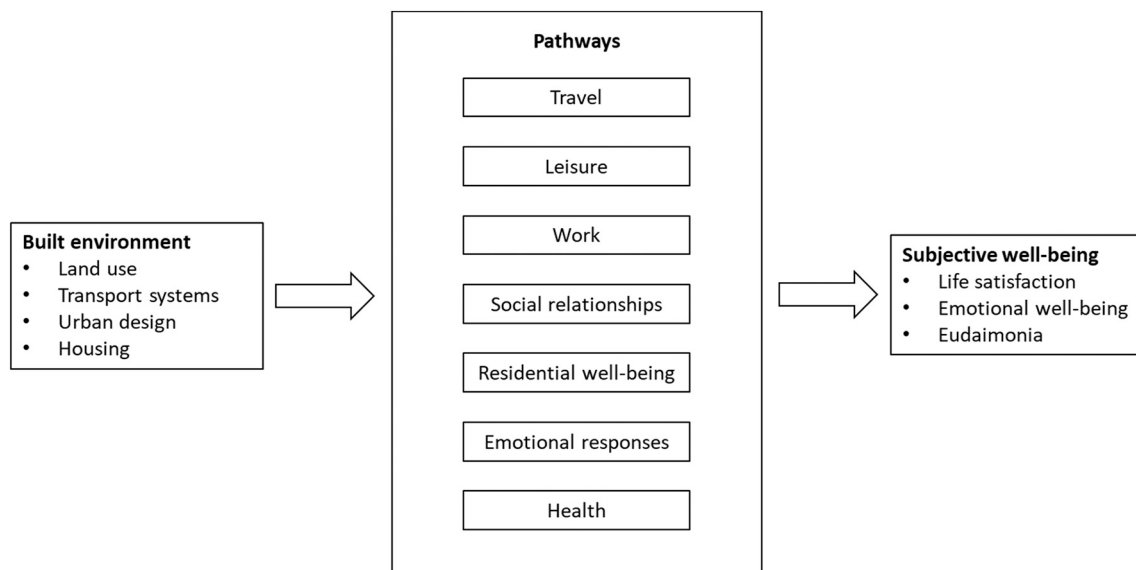

Fig. 1. Model of the pathways linking the built environment to subjective well-being (SWB).

from the built environment to such life domains are not clear and not backed up by adequate empirical evidence so they were excluded from this review. Other aspects that may influence SWB include sociodemographic characteristics, personality traits, and human values (Diener, 2009; Diener, Oishi, & Tay, 2018). These are, nevertheless, moderators of the link between the built environment and SWB, and not mediating pathways (Ballas & Tranmer, 2012; Jokela et al., 2015; Morrison & Weckroth, 2017). The seven pathways identified in this review represent life domains that are all influenced by the built environment in distinct – and to some extent overlapping – ways, as explained below.

3. Pathways between built environment and subjective well-being: an overview

3.1. Travel

Travel can influence all SWB components – life satisfaction, emotional well-being, and eudaimonia (De Vos et al., 2013; De Vos & Witlox, 2017). A way to, at least partially, assess the influence of travel on SWB is to measure the level of satisfaction with travel (travel satisfaction). Travel satisfaction has been measured with unidimensional or multidimensional scales, cognitive and/or affective items, and momentary and/or general assessments (Friman et al., 2013; Olsson et al., 2013; Susilo & Cats, 2014). Travel satisfaction mainly depends on travel time and travel mode, but also on a wide range of factors such as safety, comfort, and cleanliness (Chatterjee et al., 2020; Ettema et al., 2016). Short travel times and active travel modes are associated with increased travel satisfaction (Ettema et al., 2016; Morris & Guerra, 2015; Mouratidis et al., 2019). Compact urban form is conducive to increased travel satisfaction, as it may reduce travel times and promote walking and cycling (Mouratidis et al., 2019). Information and communications technology and new mobility options can change travel and travel experience in cities and could potentially provide opportunities to improve inclusiveness and quality of life (Lyons et al., 2018).

Travel to the main occupation and travel for other purposes are linked to SWB in a variety of ways (Chatterjee et al., 2020; Clark et al., 2019; Ettema et al., 2010; Friman et al., 2017) that may not be completely captured by "travel satisfaction" measurements. (1) Travel enables people to access places, facilities, and services, and thereby participate in activities and cover their needs. (2) It generates emotional responses – for example, stressful or pleasant trips – and therefore influences emotional well-being. (3) It may enable or constrain physical activity – for example, active travel such as walking and cycling versus sedentary travel – and thereby may influence health outcomes which in turn contribute to SWB. (4) It has spill-over effects on other domains such as leisure, work, health, and residential well-being.

3.1.1. Participation in activities and needs fulfillment

Travel allows people to meet other people, access their workplace, visit shops, and access healthcare, educational, recreational, sport, and cultural facilities and services. These access options contribute to needs satisfaction and enable people to fulfill their potential and achieve eudaimonia. Needs satisfaction and eudaimonia may in turn also contribute to emotional well-being. Built environments that facilitate travel to places, facilities, and services are conducive to increased SWB (Leyden et al., 2011). Land use, transport systems, and urban design may act synergistically to facilitate travel (Næss et al., 2019). Studies have shown that the higher the accessibility to facilities, to public transport, and to green space, the more satisfying the daily travel (Dong et al., 2016; Feng et al., 2017). Transport disadvantage, on the other hand, that restricts access to all these options may hinder SWB (Delbosc & Currie, 2011). Information and communications technology now offers plenty of options for multi-tasking during travel (Kenyon & Lyons, 2007). People are thus able to perform more than two activities at the same time; for example, travel and telework, travel and socialize online, travel and perform educational or recreational activities. Travel and in-person

participation in activities have been hampered during the COVID-19 pandemic. This triggered a strong boost in online remote activities such telework, teleconferencing, online shopping, telehealth, online learning, teleleisure, and video calls (e.g. Marcucci et al., 2021; Pierce et al., 2020). The widespread adoption of these online activities leads to changes in cities and in the way people travel (Mouratidis et al., 2021) and may have implications for SWB in the post-COVID-19 period.

3.1.2. Emotional response to travel

Travel not only serves the purpose of allowing participation in activities, but also may also directly influence emotional well-being by generating positive or negative emotions. Active travel such as walking and cycling is the most pleasant way of travel (Mouratidis et al., 2019; Smith, 2017; Wild & Woodward, 2019), while car driving is found to be the least pleasant and the most stressful travel mode, at least in certain cases (Legrain et al., 2015; Mouratidis et al., 2019). Higher neighborhood densities, proximity to city center, local amenities, mixed land uses, walkability, public transport density, and a high variety of transport systems have all been found to promote active travel such as walking and cycling (de Nazelle et al., 2011; Durand et al., 2011; Næss et al., 2019; Sallis et al., 2016). Increased travel times, especially for commuting, are found to induce negative affective reactions and increase stress (Chatterjee et al., 2020; Morris & Guerra, 2015). Compact urban forms that enable shorter distances to destinations are associated with reduced travel times, especially when they are accompanied by increased walkability, efficient public transport, and restrictions in car travel (Mouratidis et al., 2019).

3.1.3. Physical activity (or lack of) during travel

By enabling the use of certain travel modes, the built environment can also influence physical activity during travel. Built environments that promote walking and cycling may have a positive impact on physical activity and physical health. Especially walking-inclined individuals are enabled to walk more in walkable environments (Frank et al., 2007). Compact environments characterized by higher densities, mixed-uses, proximity to destinations, and focus on active travel and public transport instead of car use are associated with increased walking and cycling (e.g. Ewing & Cervero, 2010; Mouratidis, 2019a; Saelens & Handy, 2008; Stefansdottir et al., 2019; Stevenson et al., 2016). Increased access to public transport can also by itself contribute to increased walking to and from public transport stops and thereby help promote and maintain active lifestyles (Besser & Dannenberg, 2005; Freeland et al., 2013; Sallis et al., 2016). On the other hand, car-oriented, low-density environments are linked to more car travel and longer driving distances (Næss, 2012; Newman & Kenworthy, 1989). Urban design qualities related to street design, pedestrian environment, safety features, and adjacent land uses may influence walking conditions and perceptions of walking, potentially contributing to walking activity (Adkins et al., 2012; Ewing & Handy, 2009).

3.1.4. Spill-over effects on other life domains

Travel may relate to SWB indirectly via other life domains and domain satisfactions since travel allows people to participate in activities and achieve their goals (Ettema et al., 2010). Domain satisfactions that are substantially influenced by travel are neighborhood satisfaction, leisure satisfaction, and job satisfaction (De Vos, 2019; Mouratidis, 2020a). The location and internal characteristics of a neighborhood can influence how people travel and how satisfied they are with their travel (Mouratidis et al., 2019). This consideration could in turn influence their evaluation of neighborhood satisfaction. Thereby, the evaluation of travel may contribute to neighborhood satisfaction (De Vos & Witlox, 2017; Mouratidis, 2020a). Long commutes contribute to less leisure time, and are linked to lower levels of physical activity, lower job satisfaction, and lower leisure satisfaction (Clark et al., 2019; Mouratidis, 2019a). The mood during travel to a leisure activity as well as the evaluation of the trip can contribute to the satisfaction with a leisure

activity (De Vos et al., 2017). Again, built environments that reduce commute time and promote active travel contribute to positive spill-over effects of travel on other life domains (Clark et al., 2019).

3.2. Leisure

Leisure is an independent life domain with an important contribution to SWB (Hribernik & Mussap, 2010; Liu, 2014; Lloyd & Auld, 2002; Mouratidis, 2020a; Sirgy, 2012; Spiers & Walker, 2008). Leisure satisfaction can be defined as the level of content with the leisure activities one participates in (Beard & Ragheb, 1980; Francken & van Raaij, 1981). Leisure activities and leisure satisfaction are positively associated with physical and mental health outcomes (Caldwell, 2005; Mausbach et al., 2012). Prioritizing time for leisure activities instead of focusing on gaining more money has been linked to higher levels of happiness (Hershfield et al., 2016).

To understand how the built environment may influence leisure and leisure satisfaction, we can first look at how leisure satisfaction is shaped. Leisure satisfaction is shaped by the participation in social activities and physical activities (Brown & Frankel, 1993; Crandall, 1979; Mouratidis, 2019a) and in preferred leisure activities in general (Lloyd & Auld, 2002). Leisure satisfaction may also be affected by various possible constraints that could pose restrictions on participation in certain activities (Crawford et al., 1991). Time available for leisure activities is positively linked to leisure satisfaction (Crandall, 1979), while longer commute duration may result in reduced physical leisure activities (Hilbrecht et al., 2014), reduced leisure activity duration (Cao & Chai, 2007), and lower leisure satisfaction (Mouratidis, 2019a; Stutzer & Frey, 2008).

Studies that directly focus on how the built environment contributes to leisure satisfaction are scarce. A recent study developed and tested a relevant model examining pathways between the built environment and leisure satisfaction (Mouratidis, 2019a). The study showed that built environment characteristics are significantly associated with participation in leisure activities and leisure satisfaction. Urban greenness and local amenities were found to be positively linked to leisure satisfaction. High neighborhood density and proximity to city center were also found to relate to leisure satisfaction via indirect pathways. Compact urban forms of high neighborhood density and proximity to city center were negatively related to leisure satisfaction via reduced urban green space, and positively related to leisure satisfaction via higher access to local amenities, shorter commutes, and increased social interaction. During COVID-19, green spaces were considered to be especially important as they provided space for performing leisure activities with a lower risk of infection (Ugolini et al., 2020; Xie et al., 2020).

3.3. Work

Work is one of the most important life domains and job satisfaction substantially contributes to SWB (Mouratidis, 2020a; Sirgy, 2012). Cities provide opportunities for work and education and thereby they can influence SWB. The level of diversity of and accessibility to opportunities for work and education may in turn contribute to SWB (Glaeser, 2011). According to some studies (Glaeser, 2011; Glaeser et al., 2001), denser, vibrant cities increase access to goods and services, facilitate daily interaction, attract talent, facilitate entrepreneurship, and enable social and economic mobility. However, it has been argued that under neoliberal political-economic and spatial organization, cities can also be arenas of inequality, injustice, and exploitation (Brenner et al., 2009).

As described in Section 2, an indirect way that the built environment may influence work is through travel's spill-over effect on job satisfaction. Long commutes allow less time for leisure, and are associated not only with lower leisure satisfaction but also lower job satisfaction (Clark et al., 2019; Sun et al., 2020). Commute satisfaction is found to indirectly contribute to SWB via job satisfaction (among other pathways) (Mouratidis, 2020a). One way to reduce the negative impacts of long

commutes on SWB is teleworking (or telecommuting). Telework enables people to work remotely by increasing virtual accessibility, flexibility and reducing geographical restrictions (Moriset, 2003). This however might in turn encourage urban expansion and decentralization (Yousefi & Dadashpoor, 2019).

3.4. Social relationships

The domain of social relationships is probably the most important life domain in SWB (Diener, Seligman, et al., 2018; Mouratidis, 2020a; Vaillant, 2012). Having a partner or being married, having many close relationships, meeting friends and relatives frequently, receiving support from close relationships, and enjoying opportunities for social contact all contribute to higher SWB (Diener, Oishi, & Tay, 2018; Lucas & Dyrenforth, 2006; Sirgy, 2012). There are studies suggesting that cities and societies where social relationships are strong and supportive are associated with the highest levels of happiness (Diener, Seligman, et al., 2018).

The built environment has been shown to play a role in the development and maintenance of social ties among residents (Boessen et al., 2018). The built environment may shape the formation of social ties through mechanisms including spatial propinquity, spatial composition, and spatial configuration (Small & Adler, 2019). Researchers have examined the role of the built environment in the formation of two types of social ties: local social relationships (community, neighborhood social ties, neighborhood social cohesion and social capital) and overall social relationships (relationships between friends, family, and partners).

3.4.1. Local social relationships

Urban researchers have been traditionally investigating how the built environment may influence social relationships on a smaller scale than that of a city, by focusing on relationships in the community or in the neighborhood. Although nowadays these local social ties seem to be less vital for highly- mobile, specialized, and educated individuals (Popenoe, 2005), they are still valuable for residential well-being (Kawachi & Subramanian, 2007) – especially for more vulnerable groups including older adults and people who live in poverty (Cramm et al., 2012; Miao et al., 2019).

Built environment characteristics have been consistently linked to neighborhood social ties (Mazumdar et al., 2018). Easy access to destinations and good walking conditions are associated with increased social cohesion at a neighborhood level (Kwon et al., 2017; Leyden, 2003; Mazumdar et al., 2018; Rogers & Sukolratanametee, 2009; Talen & Koschinsky, 2014; Wood et al., 2010). Green communal spaces are linked to stronger neighborhood social ties and sense of community (Kweon et al., 1998). Community initiatives in outdoor spaces may improve neighborhood social cohesion (Anderson et al., 2017). Several studies have found that neighborhood density is associated with lower levels of neighborhood social cohesion and this association persists even after controlling for the time living in the dwelling (Brueckner & Largey, 2008; French et al., 2014; Mouratidis & Poortinga, 2020; Skjaeveland & Garling, 1997). Numerous local amenities are also found to be associated with lower neighborhood social cohesion (Mouratidis & Poortinga, 2020).

Residents of dense, mixed-use neighborhoods appear to form more impersonal neighbor ties resulting in lower neighborhood social cohesion. Daily interactions between neighbors in such urban forms tend to be more superficial, as also suggested by early urban sociologists (Simmel, 1903; Tönnies, 2002). There are several factors that explain this phenomenon (Mouratidis & Poortinga, 2020). (a) Detached houses, duplexes, and row houses found in low-density areas might be conducive to more frequent and more meaningful social interaction between neighbors compared to apartment blocks found in denser areas. (b) Lower density may provide residents with greater control over whom they meet and socialize with regularly (Baum & Valins, 1977). Due to the lower concentration of residents, they are more likely to frequently

meet a limited number of neighbors. This helps create the trust needed for developing social ties. (c) Residents of dense, inner-city neighborhoods are enabled to create and maintain bonds with residents of other neighborhoods more easily due to geographical centrality and higher accessibility (Mouratidis, 2018a). Therefore, they might have a decreased need for socializing with neighbors and might be less interested in forming local social connections.

3.4.2. Overall social relationships

Although denser urban form results in more impersonal social interaction between neighbors and weaker neighbor ties, it enables residents to socialize more frequently overall with friends and family and facilitates the development and maintenance of larger overall social networks since it increases proximity among a larger number of people and provides greater access to "third places" (Alexander, 1965; Balducci & Checchi, 2009; Gehl, 2013; Jacobs, 1961; Mouratidis, 2018a). Lower density, on the other hand, brings people further apart and may decrease overall social activity (Putnam, 2001). Compact-city residents, although they may not even know their neighbors, tend to have a greater number of close relationships, to socialize more often, to receive stronger social support, and to have better chances of making a new friend or meeting a new partner compared to residents of low-density suburbs (Melis et al., 2015; Mouratidis, 2018a). For all these reasons, they were found to be happier with their personal relationships (Mouratidis, 2018a).

3.5. Residential well-being

Residential well-being has been conceptualized as "residents' attitude toward their living space", "feelings of gratification from living in a specific space", "residents' perceptions of quality of life of their community" (Sirgy, 2012, p. 303). Based on these definitions, the most relevant scales for evaluations of residential well-being are the dwelling, the neighborhood, and the city (or metropolitan area) one lives in. These evaluations could be operationalized by measuring satisfaction with the dwelling (housing satisfaction), satisfaction with the neighborhood (neighborhood satisfaction), and satisfaction with the city (city satisfaction).

3.5.1. Housing satisfaction

Housing satisfaction is the level of content with the dwelling one lives in and provides indications on the influence of dwelling characteristics on SWB. Housing satisfaction is positively associated with life satisfaction, happiness, and eudaimonia (Davis & Fine-Davis, 1991; Mouratidis, 2020a; Sirgy & Cornwell, 2002). Empirical studies have examined aspects of housing satisfaction that are conducive to higher SWB (Clapham et al., 2018; Foye, 2017; Tsai et al., 2012). Dwelling characteristics that are linked to housing satisfaction are the dwelling's: plan, design, size, adequacy of interior space, construction quality, amenities, and price (Aigbavboa & Thwala, 2016; Davis & Fine-Davis, 1991; Galster, 1987; Nguyen et al., 2018; Wang & Wang, 2019). Housing ownership also contributes to housing satisfaction, with owners being more satisfied with their dwelling than tenants (Elsinga & Hoekstra, 2005). Communal spaces attached to housing may provide increased privacy and social interaction between neighbors, may offer a safe place for children to play, and could thereby improve housing satisfaction and well-being (Anderson, 2015; Kweon et al., 1998). Dwelling characteristics have played an important role in well-being during COVID-19. Living in a larger dwelling may have facilitated daily life activities and improved well-being and mental health (Amerio et al., 2020).

3.5.2. Neighborhood satisfaction

Neighborhood satisfaction measures the level of content with one's neighborhood or how well the neighborhood covers individual or household needs. It aims to provide indications on the influence of neighborhood characteristics on SWB (Marans, 2003). Neighborhood satisfaction is found to be associated with life satisfaction, happiness, and eudaimonia (Cao, 2016; Cummins, 1996; Mouratidis, 2020a; Rojas, 2006). Objective and perceived environmental characteristics shape neighborhood satisfaction, and in turn contribute to SWB (Campbell et al., 1976; Cao, 2016; Lee et al., 2017). Objective environmental correlates of neighborhood satisfaction are the location of the neighborhood within the city; the presence of and accessibility to local amenities; and the availability of accessible and usable green spaces (Lovejoy et al., 2010; Mouratidis, 2018b; Yang, 2008; Zhang et al., 2017). Equitable access to healthy food in terms of food stores, markets, and restaurants may improve both residential well-being and health outcomes (Kent & Thompson, 2014). Easy access to diverse local facilities has been even more crucial during COVID-19 by enabling participation in certain activities and facilitating healthcare provision. Perceived environmental characteristics correlate more strongly with neighborhood satisfaction but are of course shaped by objective ones (Cao et al., 2018; Lee et al., 2017; Permentier et al., 2011). Perceived environmental correlates of neighborhood satisfaction are neighborhood attachment, perceptions of accessibility, neighborhood social cohesion, perceived safety and fear of crime, perceptions of public space quality, perceptions of aesthetic quality, and perceived quietness (Buys & Miller, 2012; Davis & Fine-Davis, 1991; Grogan-Kaylor et al., 2006; Hur & Morrow-Jones, 2008; Hur & Nasar, 2014; Lee et al., 2017; Mouratidis, 2018b; Parkes et al., 2002). Social inequalities manifested in neighborhood deprivation may also contribute to lower perceived neighborhood quality, less positive emotional responses to the neighborhood, and lower neighborhood satisfaction (Mouratidis, 2020b). When common urban problems (noise, inequalities, crime, lack of green space) are relatively limited, and when planned to integrate all its essential characteristics (density, land use mix, public transport, walkability), a compact built environment of short distances can be conducive to higher neighborhood satisfaction than urban sprawl (Mouratidis, 2018b; Yang, 2008).

3.5.3. City satisfaction

Besides the dwelling and the neighborhood, it is also the city as a whole (or the metropolitan area) that can shape the levels of SWB since residents use several areas and functions in the city and not only their dwelling or neighborhood. Moreover, the characteristics of the city, the characteristics of the neighborhood, and the characteristics of the dwelling may be interlinked to some extent. Satisfactions with the city, the neighborhood, and the dwelling are also interlinked. Objective built environment characteristics in a city that can improve SWB are open, natural, and green spaces and urban spaces that facilitate social interaction and improve safety (Pfeiffer & Cloutier, 2016). Evaluations of contentment with built environment characteristics contribute to city satisfaction. According to a study of European cities (Węziak-Białowolska, 2016, p. 87), "dissatisfaction with public transport, cultural facilities, availability of retail outlets, green space, air quality, trustworthiness of people, public administration and administrational efficiency, contributed significantly to dissatisfaction with life in a city", while safety positively contributed to city satisfaction. Similar findings were observed in a study of ten major cities worldwide (Leyden et al., 2011). Housing satisfaction and neighborhood satisfaction also seem to be conducive to city satisfaction (Węziak-Białowolska, 2016). Residents of cities with lower social inequalities tend to have higher quality of life (Ballas, 2013).

3.6. Emotional responses

The built environment may trigger emotional responses (affective reactions) that may, in turn, contribute to emotional well-being as well as to other predictors or dimensions of SWB (e.g. neighborhood satisfaction, life satisfaction). Well-maintained vegetation, upkeep and order, and openness of space are qualities that have been found to trigger positive emotional responses (Johansson et al., 2016; Tang & Long, 2019; Zhang & Lin, 2011). Green space, vegetation, and urban tree

cover provide several benefits for emotional well-being as they are linked to reduced stress, reduced mental fatigue, attention recovery, improved feelings of safety, and greater happiness (Markevych et al., 2017; Mouratidis, 2019c; White et al., 2013).

The built environment may trigger emotional reactions via its influence on perceptions of safety. Empirical studies on the "Broken Windows Theory" (Wilson & Kelling, 1982), suggest that physical environmental disorder does not only influence actual social disorder and criminal behavior, but also increases perceptions of social disorder (Hinkle & Yang, 2014), therefore contributing to lower perceived safety and negative emotions. Routine Activity Theory (Cohen & Felson, 1979) has been applied and extended by Jiang et al. (2018) who found positive links between increased routine activities and perceived safety, suggesting that a careful environmental design can increase routine activities and lead to higher perceived safety.

Public space design and building architecture may also contribute to emotional responses. Aesthetically pleasing public spaces and architecture are linked to greater momentary happiness (Seresinhe et al., 2019). Contemporary architecture – inspired by characterized by asymmetry, lack of ornamentation, and industrial appearance – has been found to score lower in environmental perception than traditional architecture (Mouratidis & Hassan, 2020) and could thereby trigger negative emotional responses since environmental perception may contribute to affective appraisal (Zhang & Lin, 2011).

As explained above (Section 3.1.2. *Emotional response to travel*), travel may also trigger emotional responses in several ways but perhaps most importantly through travel time and travel mode (Chatterjee et al., 2020). Therefore compact, walkable, cyclable environments that enable short travel times and active travel modes may contribute to a positive emotional state (Ettema et al., 2016; Morris & Guerra, 2015; Mouratidis et al., 2019).

Finally, some studies found that people tend to experience lower momentary happiness in cities than in natural or rural environments (MacKerron & Mourato, 2013) and people who grow up in cities may develop more stress later in life (Lederbogen et al., 2011). Suburban neighborhoods have been associated with more positive emotional responses compared to denser, inner-city neighborhoods (Mouratidis, 2019b). These findings altogether may suggest a negative link between dense, vibrant urban surroundings and emotional well-being, possibly due to stressful intense life rhythms, noise, overcrowding, impersonal social interactions in public spaces, fear of crime, and loss of connection with nature.

3.7. Health

Health is bidirectionally linked to SWB. Good health contributes to higher SWB, but also high SWB contributes to good health and longevity (Diener, Oishi, & Tay, 2018; Kushlev et al., 2020). Therefore, health could be obviously considered as a final outcome in conceptual models (Northridge et al., 2003). In this paper, since the focus is on SWB, health will be examined for its contribution to SWB. Health is also bidirectionally linked to most life domains (pathways) presented in the paper above. For example, physically active travel and positive emotional responses may contribute to health outcomes, while, at the same time, health problems may cause discomfort during travel, restrict travel and access to destinations, or contribute to negative emotional responses.

The built environment may influence physical and mental health outcomes via the mediating role of the pathways examined above: (1) travel (e.g. physically active travel, emotions during travel, access to healthcare, participation in activities, contribution to other life domains), (2) leisure (e.g. participation in health-promoting activities such as physical activities, activities in nature, fulfilling leisure activities), (3) work (e.g. stressful working conditions, emotionally satisfying job, job providing income for healthcare), (4) social relationships (e.g. low or high social well-being contributing to health outcomes), (5) residential

well-being (e.g. healthy versus unhealthy living conditions, proximity to healthcare and healthy food), (6) emotional responses (e.g. feelings of safety or unsafety, pleasant versus unpleasant public spaces and architecture, positive emotional responses to green spaces, negative emotional responses to noise or overcrowding). These pathways may contribute to health outcomes directly or indirectly via SWB since SWB and health are interlinked (Northridge et al., 2003).

The built environment may also influence health outcomes in other ways that are not directly captured by the other pathways linking the built environment to SWB. One example is air pollution. The built environment may contribute to air pollution which may in turn negatively affect health and even reduce life expectancy (Khomenko et al., 2020; WHO, 2020). Air pollution tends to be higher in cities. A study from China showed that compact urban form is associated with higher PM2.5 concentration (Tao et al., 2020).

Measures to increase active travel and public transport usage while reducing car travel can improve air quality in cities but also provide several other health and SWB benefits rising from increased physical activity, more positive travel experience, reduced noise, and freed up public space. More specific transport-related measures could be to improve conditions and infrastructure for walking and cycling; employ efficient, accessible, and frequent multimodal public transport systems; and restrict car travel and car parking to the extent possible. Pedestrianization may also contribute to improved air quality and provide several other health and SWB benefits (Soni & Soni, 2016).

Urban nature provides multiple physical and mental health benefits. As explained above (Section 3.6. *Emotional responses*), urban nature reduces stress, restores attention, and improves emotional state. Urban green space also provides health benefits by reducing noise (Margaritis & Kang, 2017), reducing local air pollution (Nowak et al., 2006), and mitigating human heat stress (Lee et al., 2016). According to the World Health Organization (WHO), urban green space is beneficial for health by improving mental health and reducing the risk of cardiovascular disease, obesity, and type 2 diabetes (WHO, 2016). When people live in greener urban areas, they experience higher life satisfaction and lower mental distress, according to panel data (White et al., 2013). Green space during childhood is associated with better mental health (Engemann et al., 2019). Green space in cities is positively related to attention, mood, physical activity, and mental health, while it is negatively related to mortality, heart rate, and violence (Gascon et al., 2015; Kondo et al., 2018; van den Berg et al., 2015). Green space has been particularly important during COVID-19 for mitigating the negative implications for health and well-being in urban regions (Douglas et al., 2020).

Urbanity is associated with certain mental health problems including increased risk of schizophrenia (Gruebner et al., 2017), stress, and anxiety (Lederbogen et al., 2011; Mouratidis, 2019b). The increased risk for mental health problems could be due to poverty and inequality in cities (Gruebner et al., 2017). A recent study in Oslo found that residents living close to the city center reported higher anxiety, even after controlling for neighborhood deprivation and individual characteristics (Mouratidis, 2020b). Possible factors behind certain mental health risks in cities are the loss of connection with nature, intense life rhythms, overcrowding, and noise. Noise exposure tends to be higher in dense, vibrant areas (Mouratidis, 2018b), and this may compromise mental health outcomes (Aletta et al., 2018; Lan et al., 2020). Noise reduction strategies are however possible such as restricting noisy vehicles, reducing traffic speeds, restricting noisy activities, and improving building insulation (Litman, 2020).

On the other hand, urbanity is also linked to positive mental health outcomes. Dense urban form and high public transport accessibility could be conducive to a reduced risk of depression, especially for women and older adults, by increasing mobility and social interaction (Melis et al., 2015). A review on cites and mental health concluded (Litman, 2020, p. 3): "Credible research suggests that urban residency can increase psychosis and mood disorder risks, addiction to some drugs, and some people's unhappiness, but reduces dementia, some types of

substance abuse and suicide rates, and increases many people's happiness, particularly those who are poor or alienated. Urban living also tends to improve mental health by increasing economic and social opportunities, fitness and health, and access to mental health services, and higher mental illness rates reported in cities may partly reflect better reporting." A recent overview of systematic reviews concluded that there is still insufficient evidence on causal links between the built environment and mental health (Núñez-González et al., 2020).

Overall, urban residents have better health and live longer on average than rural residents (Cosby et al., 2019; Dye, 2008), although this better health might be enjoyed only by more privileged urban residents (Dye, 2008). Compact development is associated with higher life expectancy than sprawled development in the United States (Hamidi et al., 2018). Similarly, recent studies from Oslo, Norway found that, even after controlling for individual socioeconomic characteristics, residents of the inner city reported higher overall health than suburbanites (Ihlebæk et al., 2020; Mouratidis, 2019b). Possible mechanisms explaining better health in compact urban areas could be the increased walking and cycling enabled by compactness (Stevenson et al., 2016), improved overall social well-being (Mouratidis, 2018a), better access to healthcare, or differences in lifestyle and other health-related behaviors. However, even in compact, livable cities, policies ensuring equitable access to public transport and green space and strategies for the reduction of noise and air pollution are needed to protect poorer residents from facing health problems and lower life expectancy (Khomenko et al., 2020).

4. Strategies for improving subjective well-being through urban planning

The review of the seven pathways above sheds light on potential strategies to improve SWB by applying urban policies and changing the built environment. In addition to policies and changes in the built environment, it is also urban planning as a process that can influence SWB in urban regions. Urban policies, plans, planning laws, and regulations should be developed and adjusted considering, among other aspects, evidence-based knowledge on the links between cities and quality of life (see also Tonne et al., 2021). Policies, plans, planning laws, and regulations should protect residents' interests. Otherwise, profit-seeking can compromise quality. Planning tools should also allow planners and practitioners to intervene and improve quality of life on different spatial scales. Planners, practitioners, and decision makers would need to have evidence-based knowledge on the multiple ways through which land use, transport systems, urban design, and housing may contribute to SWB, as explained in the review presented here. They are asked to shape quality places but may often lack systematic knowledge on this. Better knowledge transfer and more interaction between planners and public health coordinators are also important for improving health and well-being in urban regions (Hofstad, 2011). Moreover, measurement and benchmarking of urban planning outcomes can be a beneficial strategy for evaluating whether plans and policies manage to provide livable cities and urban spaces (Carmona & Sieh, 2004). Several types of indicators can be used for this purpose including objectively and subjectively measured indicators as well as quantitative and qualitative indicators on different spatial scales within urban regions (Cloutier et al., 2018; Diener, Oishi, & Tay, 2018; Marans & Stimson, 2011; Shach-Pinsly, 2019; Shach-Pinsly & Ganor, 2021). Lastly, yet importantly, empowerment strategies, public participation, and the inclusion of vulnerable groups in the planning process can provide well-being benefits by reducing inequities and exclusion and strengthening social cohesion (Baba et al., 2017; Wallerstein, 2006). Attention should be paid not to use public participation blindly. In certain cases, there is a risk of self-interests being prioritized over the greater good. Also, urgent or

complex, technical matters may not be suitable for participatory processes.

Based on the evidence provided in the review of pathways and the discussion of urban planning processes, some strategies can be suggested for improving SWB through urban planning. The strategies and their benefits for SWB are summarized in Table 1. These strategies can guide practitioners, policy makers, and decision makers who work on urban planning issues, but also researchers and students.

It should be acknowledged that the list in Table 1 is far from complete. The strategies presented here can be further elaborated with more detailed actions. Additional strategies could also be helpful. It should be also noted that the possible influence of the built environment on SWB may largely depend on individual characteristics, personal and household needs, as well as the geographical, social, cultural, economic, and political context. Therefore, the potential benefits of urban planning strategies would differ for different individuals and different contexts.

5. Conclusions

This paper has provided a framework in which the potential pathways linking the built environment to SWB are organized into seven domains: travel, leisure, work, social relationships, residential well-being, emotional responses, and health. An overview of the state of knowledge on each of these pathways has been presented. The new organization of pathways between the built environment and SWB and the literature review presented in the paper have extended and refined knowledge from previous relevant conceptual frameworks and reviews (e.g. Kent & Thompson, 2014; Marans & Stimson, 2011; Mouratidis, 2018c; Pfeiffer & Cloutier, 2016; Shekhar et al., 2019; Wang & Wang, 2016).

The paper's conceptual model and literature review can offer theoretical and methodological guidance for future empirical research. Although the literature review presented links from the built environment to SWB during the COVID-19 period, future research should further explore such links when the evidence is more mature. The relationship between the built environment and SWB is also likely to change in post-pandemic times and should be re-evaluated.

The paper has also attempted to contribute to urban planning education and practice. It has provided evidence-based suggestions on urban planning strategies that could guide current and future practitioners, policy makers, and decision makers working on urban planning issues. These strategies represent practical ways to improve SWB in cities by improving the most relevant life domains through the built environment. Strategies related to urban planning processes have also been discussed. All these strategies are more relevant for economically developed countries, since less developed countries may lack crucial infrastructure and provisions that should be prioritized. They could however guide, to some degree, urban planning in developing contexts as well. The strategies presented here have integrated and extended previous relevant recommendations (e.g. Carmona & Sieh, 2004; Hofstad, 2011; Tonne et al., 2021).

Based on the overview presented in the paper, potential strategies for improving SWB through urban planning could be to: enhance conditions for active travel and public transport while restricting cars when possible; provide easy, equitable access to facilities and services; develop or steer technology and new mobility options to improve inclusiveness and quality of life for different groups; integrate various forms of urban nature as much as possible; provide accessible and inclusive public spaces as well as communal spaces; maintain upkeep and order in urban space, vegetation, and transport systems; implement noise reduction strategies; develop aesthetically pleasing buildings and public spaces based on residents' needs and preferences; reduce socio-spatial inequalities while providing support for housing and transport

Table 1
Urban planning strategies for improving subjective well-being (SWB) in cities.

Theme	Strategy	Benefits for SWB
Urban nature	Integrate urban nature in various forms (private or semi-private gardens, community gardens, parks, street trees, climbing plants, green roofs, balconies, easy access to nearby nature including rivers, lakes, forests, and sea)	Reduced stressors (noise, pollution, heat); stress-reducing benefits; attention recovery; improved perceived safety; improved emotional state; opportunities for activities; improved leisure satisfaction; improved residential well-being
Public spaces	Provide easily accessible, socially inclusive public spaces	Opportunities for social interaction; participation in activities and needs fulfillment; improved residential well-being
Communal spaces	Provide high-quality communal spaces for residential complexes (e.g. common courtyard, backyard, terrace, playground)	Social interaction between neighbors; stronger neighborhood social cohesion; increased privacy; provision of safe places for children to play; improved residential well-being
Facilities and services	Provide easy, equitable access to a diversity of facilities and services including education, healthcare, family, culture, shopping, and physical exercise	Participation in activities and needs fulfillment; improved residential well-being; increased walking and cycling to access facilities and services; improved leisure satisfaction
Active travel and public transport	Improve public transport, walkability, and cyclability; implement pedestrianization; restrict car travel and car parking to the extent possible	Increased walking and cycling which are the most pleasant travel modes; increased physical activity; improved travel satisfaction; reduced air pollution and noise from cars; freed up public space
Technology and emerging mobility	Develop and steer information and communications technology and new mobility options to improve inclusiveness and quality of life for different groups	Improved accessibility and mobility based on different needs; participation in activities and needs fulfillment
Upkeep and order	Keep well-maintained and tidy urban spaces, urban vegetation, and transport systems	Improved sense of social order; improved feelings of safety; improved emotional state; improved residential well-being
Noise reduction	Restrict noisy vehicles; reduce traffic speeds; restrict noisy activities; improve building insulation	Improved emotional state; improved residential well-being; improved mental health
Aesthetic quality	Develop aesthetically pleasing buildings and public spaces based on residents' needs and preferences	Improved emotional state; improved residential well-being
Socio-spatial equity	Reduce socio-spatial inequalities; provide support for housing and transport for vulnerable groups	Improved residential well-being; participation in activities and needs fulfillment; improved travel satisfaction; and improved life chances for vulnerable groups
Urban planning processes	Urban policies, plans, laws, and regulations should consider evidence-based knowledge; knowledge transfer and interaction between planners and public health coordinators; measurement and benchmarking of urban planning outcomes on different spatial scales; empowerment strategies, public participation, and inclusion of vulnerable groups in the planning process	Knowledge transfer from research to practice; monitoring and improvement of outcomes relevant to well-being in urban regions; improved well-being for vulnerable groups

for vulnerable groups; ensure that urban policies, plans, laws, and regulations consider evidence-based knowledge; improve the knowledge transfer and interaction between planners and public health coordinators; apply measurement and benchmarking of urban planning outcomes; and employ empowerment strategies and encourage public participation and the inclusion of vulnerable groups in the planning process.

CRediT authorship contribution statement

Kostas Mouratidis: Conceptualization, Methodology, Formal analysis, Investigation, Visualization, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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