


## Article

# Mental Well-Being and the Influence of Place: Conceptual Approaches for the Built Environment for Planning Healthy and Walkable Cities

Antonio Zumelzu <sup>1,\*</sup>  and Marie Geraldine Herrmann-Lunecke <sup>2</sup>

<sup>1</sup> Instituto de Arquitectura y Urbanismo, Núcleo de Investigación en Riesgos Naturales y Antropogénicos, Universidad Austral de Chile, Valdivia 5091000, Chile

<sup>2</sup> Departamento de Urbanismo, Facultad de Arquitectura y Urbanismo, Universidad de Chile, Santiago 8331051, Chile; mherrmann@uchile.cl

\* Correspondence: antonio.zumelzu@uach.cl

**Abstract:** Promotion of healthy cities has prompted urban planners and designers to build new conceptual frameworks to improve the design of public spaces, in which mental well-being emerges as a fundamental concept. Mental well-being is related to spatial design, with increasing attention being paid to the built environment as an important predictor of mental well-being. The objective of this article is to advance and contribute new knowledge about the characteristics of the built environment and its potential benefits for mental well-being. A meta-analysis is carried out on various empirical and theoretical approaches from the literature. Using a WOS database as a case study, a methodology based on a bibliometric analysis is proposed to examine which elements of the built environment impact mental well-being in research between 1975 and 2020, using the HistCites and VOSviewer tools. The results show that there are six thematic axes related to the built environment that would favor greater mental well-being in public spaces: walkability, density, spatial design, environmental noise, green areas and social interaction. The six thematic axes are critically analyzed and integrated into a conceptual framework to address the impacts of the built environment on mental well-being in the planning of cities. It concludes with a discussion on the implications of these concepts for urban public policy and the promotion of healthier and more sustainable and walkable environments in Latin American cities.

**Keywords:** urban sustainability; mental well-being; built environment; urban planning; walkability



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## 1. Introduction

One of the most important challenges faced by modern cities is to maintain and improve quality of life for citizens. This quest has inspired planners and urban designers to construct new conceptual markers for redesign of the urban space [1–6] where well-being and happiness emerge as fundamental concepts when rethinking the development of cities [7–11]. These concepts are also gaining growing attention in Latin America. In Chile, the social demands that have emerged since October 2019 framed these concepts as rights, as well as the need for habitations with greater equality, dignity and environmental balance [12,13]. On the other hand, the appearance of the COVID-19 pandemic and its impact on cities has generated adverse events for society, offering a glimpse into the precariousness and vulnerability of a built environment in which mental well-being conditions are rapidly and significantly deteriorating. Mental well-being is a right demanded by every society, which is promoted in most nations, within various political slogans and regulatory bodies for urban development and sustainability [14–17]. Promotion of mental well-being seems to be an increasingly important challenge today, considering not only the consequences of increasing urbanization in cities, but also the implications of new forms of urban regeneration and its effects on health and mental well-being of its inhabitants.

In Chile at present, there is concerning data regarding the welfare of citizens. According to the Organization for Economic Cooperation and Development (OECD), Chile ranks 33rd out of a total of 36 countries evaluated based on a series of indicators such as satisfaction with life (22), physical and mental health care (25) and especially the quality of the environment or environment in which one lives (which occupies the last place), among others [18]. In turn, the 2016–2017 National Health Survey reports that depression (21.3%) and suicide attempts (0.7%) present the highest rates within the countries of the Americas, with Chile ranking 42nd out of a total of 47 [19,20]. These rising figures have been modestly considered and, therefore, have had little impact on the design of urban public policies. In this context, several authors have argued that a large part of the causes lie in the accelerated processes of urbanization and excessive building densification, with negative spatial effects such as loss of privacy and quality of public space, lack of trees and vegetation, increase in blind walls, increase in chronic noise and destruction of sidewalks [17,21–23].

Particularly in intermediate cities, effects of the urban landscape have caused traditional “street life” to radically diminish, with a strong negative impact on pedestrian mobility and the use of public space. According to the latest mobility survey in Chilean cities [24], data show that although intermediate cities register high modal quotas for walking, these have decreased in cities in southern Chile such as Valdivia (from 33.5% to 23.1% between 2002 and 2013), showing similar values in Osorno (20.1%), Temuco (24.5%) and Puerto Montt (18.5%) [25]. On the other hand, the decrease in pedestrian accessibility, together with the deterioration of the urban landscape that is reflected in environments of low spatial quality, excessive building densification, lack of vegetation, poor sidewalk maintenance, low porosity on facades and presence of blind walls in streets and passages, have forced the inhabitants to redefine their social relationships and connection with the built environment [26–29]. A surging body of evidence supports that these changes have a negative influence on the mental well-being of inhabitants. Problems such as stress and anxiety, general mood and life satisfaction are some aspects of mental well-being influenced by the physical quality of the built environment [30–32].

In Latin America, scarce research has analyzed which factors of the built environment promote greater or lesser mental well-being. To date, the majority of these investigations come from “unbuilt” environmental disciplines: generally public health, epidemiology, and psychology, which means that part of the research does not explore the physical characteristics of neighborhood environments and their potential benefits for mental well-being. The need to analyze mental well-being in cities, from the point of view of the built environment, constitutes an imperative opportunity to promote the development of new public policies and neighborhood design that points toward greater equity in inhabiting urban space, as a crucial axis to direct the positive transformation of these cities towards a more sustainable future [33–35]. Considering the aforementioned, this article formulates the following research question: What elements of the built environment affect mental well-being according to international literature?

This article aims to contribute to knowledge through a bibliometric approach on various empirical and theoretical approaches to emerging concepts of the built environment and its potential benefits for the mental well-being of people in areas such as planning and urban design. The article begins with a theoretical review about the dimensions of mental well-being related to the built environment. Subsequently, using the WOS database as a case study, a bibliometric review methodology is proposed, carrying out a meta-analysis on various empirical and theoretical approaches to emerging concepts from the literature. For this, the HistCites and VOSviewer tools are used for data processing and analysis: total number of citations per year, journals and regions with the highest scientific production, and finally, analysis of the co-occurrences of keywords and institutions with the highest production, which allows for analyzing where research on mental well-being and the built environment is concentrated, and which are the main themes and concepts approached from the scientific literature. The review developed in this research demonstrates not only the importance and contextual nature of the advances in research associated with the built

environment and mental well-being, but also highlights the most relevant thematic axes from the international evidence, which are green areas, density, walkability, environmental noise, spatial design and social interaction. Finally, the article concludes that in Latin America, studies on the impact of the built environment on mental well-being are still very scarce, and it discusses its implications for urban public policy and the promotion of healthier and more sustainable and walkable environments in Latin American cities.

### *1.1. Mental Well-Being and the Built Environment*

According to the latest report from the United Nations, an estimated 68% of the global population is expected to live in cities by the year 2050, especially in developing countries [36]. Particularly in Chile, these processes have not been indifferent, which stands out with nearly 90% of the population living in cities [37,38]. In turn, the number of megacities is increasing and many small cities are growing and transforming rapidly, not to mention recent migratory flows that alter the sociocultural composition of urban areas. All of these changes highlight the need to focus on how cities will adapt to the environmental, social and spatial challenges to come and their effects on the quality of life of their residents [39].

The 2030 Agenda of the United Nations for Sustainable Development, in which Chile is participating, states in its third objective that health and well-being includes “guaranteeing a healthy life and promoting the well-being of all at all ages in cities” [15]. Similarly, the New Urban Agenda adopted at Habitat III in 2016 recognizes not only fundamental links between health, well-being and sustainable urban development, but also reflects the importance of how the environments and physical form of cities can influence people’s well-being positively [40,41]. In the same line, the Commission for Social Determinants Health [42] prioritizes improvements in daily living conditions: healthy places, healthy people. Meanwhile, another report from the WHO called “Health 2020” [43] aligns the creation of environments that support health, including equity in health and well-being, with the need for communities resistant to climate change. Bettering health politics is not only a question for health professionals, but rather for the various sectors and professions that affect the social, economic and environmental determinants of health. The focus of “health in all policies” recognizes the importance of strategies that integrate diverse sectors—health, urban planning, transport and economy, among others—to foster healthy cities and neighborhoods [44]. In this context, urban planning and design have the responsibility of promoting healthy settlements at the different territorial scales that comprise it.

The built environment has been widely recognized as a determinant of human health [9,45]. In this area, more and more attention is being paid to the concept of mental or subjective well-being [46–48]. Mental well-being is a complex concept and there is extensive debate regarding its definition. According to the Encyclopedia in Research on Quality of Life and Well-being, well-being is a complex and multifaceted construction that can be defined as “the human experience and optimal psychological functioning, which involve subjective experiences and objective conditions indicative of a physical type, mental-psychological and social” [49] (p. 2004). According to the World Health Organization (WHO), health is defined as “a complex state of physical, mental and social well-being, and not only the absence of conditions or diseases” [50]. In the literature, there exists consensus that mental well-being consists of “a state of health, happiness and prosperity, comprising two dimensions, that is, how we feel and how we function” [51] (p. 2). From an emotional point of view, authors Vidal and Toro-Huerta [52] remark that mental well-being is associated with individual experiences and reflects a combination of positive emotions and general satisfaction with life [53,54]. From a functional point of view, it is more complex since it implies optimal psychological functioning, which is why mental well-being is considered a dimension of mental health, but it acts independently of mental illness [55]. Mental health is a concept that is used in a medical sense and that implies the presence or absence of specific symptoms of mental illnesses or disorders. In contrast, the concept of mental well-being does not consider medical symptoms, but life circumstances

and events that happen to individuals, mentally healthy or not, and that would lead them to increase or decrease their levels of mental well-being. In this sense, mental health can overlook factors that lead to the deterioration of the life circumstances of healthy people. For example, the effects of neighborhood characteristics on mental health may be different from the effects on mental well-being [56].

Mental health and well-being are related to all facets of spatial design, with increasing attention being paid to the built environment as an important predictor of measures of mental well-being [30,57–59]. The environmental conditions that people may experience, such as the stress of travel, noise, the perception of danger or insecurity in the street, the lack of natural light or little contact with nature and the lack of physical activity, affect moods and emotions in general [9,60,61]. The first to attempt a comprehensive evidence-based review on this topic was David Halpern in his book “Mental Health and the Built Environment” [62]. Halpern (1995) made the distinction between direct influences (noise levels, the aesthetics of streets and building facades, access to nature) and indirect (levels of social support, income and the perception of a sense of belonging) from the built environment. In relation to indirect influences, mental well-being is linked to the concepts of community, cohesion and social capital, which have a long history in sociological and planning thought, especially with the idea of neighborhoods and “neighborhoods”. However, in relation to direct influences, Halpern states that mental well-being is supported by: (1) fostering contact with nature through trees in the streets, private gardens and front gardens, pedestrian-accessible green areas that allow you to experience natural sounds and feel part of nature; (2) reducing the prevalence of unpleasant noise and odors through land use zoning and/or design measures along with reducing traffic noise; (3) creating opportunities for recreational physical activity for all ages, including streets and safe spaces for children’s play; (4) ensuring multiple opportunities and stimuli for social interaction in public spaces [62] (p. 209).

Later, Hugh Barton and Marcus Grant [63] deepen this relationship through a conceptual framework of health and well-being in neighborhoods, in which human health and well-being represent the central purpose of public policy in general. The conceptual framework proposes a series of dimensions in which all the social, economic and environmental elements of a human settlement are established within the global context. The built environment corresponds to dimension number six, in which architects, planners and spatial decision makers have a direct impact, as well as an indirect influence on the other dimensions, such as citizen and resident organizations in the participation and planning of built environments. The built environment includes not only buildings and the physical infrastructure of the city, but also Green areas and spaces in general, in which human activity is understood as an important part of nature. Direct health and well-being factors include the quality of housing, the quality of street and public space design, access to nature, trees and green spaces, among others. Places can also be important to people for their cultural and historical associations, familiarity and beauty, which helps to give a sense of identity and belonging [58]. The urban form at local levels affects the viability of service provision and the pedestrian accessibility of residents, with repercussions on lifestyles, social networks and employment prospects [64].

Understanding the role of the built environment on mental well-being can provide important information to urban design and urban planning debates about the synergies and conflicts between sustainability, land use regulation and the built form in public spaces, neighborhoods and cities. Most of the existing studies, however, have been carried out in more developed countries, and the evidence from countries in the Global South is very scarce [47,65]. In this sense, the role of the built environment to address determinants of mental well-being is beginning to be accepted not only by governments, but also by various international institutions and organizations, and is becoming an emerging research potential for Latin America and the Caribbean [9,41,66,67].



### 1.2. Dimensions of Mental Well-Being in Relation to the Built Environment

The built environment is an important predictor of subjective measures of well-being [68–71]. In the literature, some researchers use the concept of mental well-being as a synonym for “happiness” and “satisfaction with life” [5,52,72,73]. However, the concept of mental well-being is generally defined as a subjective state of well-being that includes both happiness and satisfaction with life [65,74,75]. From psychology, the concept of quality of life is evaluated from an objective dimension, related to material well-being and from a mental or subjective dimension [52]. Mental well-being is a subjective indicator to evaluate life conditions, which comprise three components according to Diener & Suh [76]: the judgment of knowledge of satisfaction with life overall, positive affect and negative effect (hedonic) and eudaimonia.

Some researchers recognize that mental well-being can be conceptualized as a momentary (for example, affective episodes) and long-term state of well-being [77]. Various studies have shown that public space can influence people’s mental well-being, through satisfaction with life, which is a construction of long-term well-being. In addition, the level of attractiveness of a space and its quality for living also depends on the temporal subjective experiences of individuals, such as the long-term individual well-being of the individual (for example, satisfaction with life) [78,79]. In relation to the built environment, empirical investigations of mental well-being distinguish three types of dimensions or measures as established by [76], which are classified as: satisfaction with life, eudaimonia, and hedonic well-being (emotional or affective). These three dimensions are established by the recent OECD guidelines [80] and the European Social Survey [81], which are the most recommended in international literature by various scholars on issues of the built environment and mental well-being [31,48,59,82,83]. These dimensions have clear differences and are measured in different ways.

Hedonic well-being, also understood as hedonic happiness, affects a person’s emotions in reference to a particular point in time [31]. Hedonic well-being consists of positive or negative emotions derived from immediate experiences [84,85]. The hedonic view of happiness was conceptualized by Aristippus (4th century BC), who equated happiness with pleasure and inner tranquility, stating that only what is pleasant or has pleasant consequences is intrinsically good [86]. Hedonic measures of well-being are related to evaluations of positive and negative effect (emotions and mood) and with reactions to certain stimuli. These reactions occur without cognition-thought and awareness-and are expressed with positive and negative emotions from the experience of a place.

Eudaimonia, also understood as eudemonic happiness, is linked to the performance of altruistic activities and the achievement of long-term goals or symbolic rewards [49]. Unlike hedonic well-being, this dimension, of a cognitive type, is characterized by giving sentiment, meaning and purpose to the existence of the person. The phenomenological experiences derived from such a life include self-realization, personal expressiveness, and vitality [84,86]. In relation to the built environment, eudaimonia derives from the interaction between the individual and the environment, such as global individual functioning in daily life. Examples of this type of behavior would be all prosocial behaviors, such as helping others or participating in activities that have a positive impact on the community, neighborhoods and public spaces [59].

Satisfaction with life is a cognitive component and is defined as an assessment that the person makes of their life [87–89]. Satisfaction with life refers to a global evaluation of life rather than to current feelings or specific psychosomatic symptoms, with the domains of functioning closest and most immediate to the personal life of individuals being those that would have the greatest influence on personal well-being [85,88]. Unlike hedonic measures of happiness, life satisfaction is assessed as a global or local measure pertaining to specific areas of life (for example, personal relationships, work, residence, income, etc.) [5].

## 2. Materials and Methods

A qualitative systemic review was carried out [90,91], which consisted of analyzing and summarizing the existing bibliographic evidence regarding the following research question: What elements of the built environment affect mental well-being?

For the search, selection, analysis and synthesis of the evidence presented, a bibliometric analysis was carried out on the characteristics and content of the scientific production associated with the built environment and mental well-being, as shown in Figure 1. For this, we used as a case study the Web of Science—WoS—database, which has a sterling reputation in the scientific community. The bibliometric analysis was carried out with the help of the specialized HistCite and VOSviewer software, which allowed us to analyze in detail the origin of various data such as the total number of citations per year, journals, and regions with the greatest scientific production, and finally conduct an analysis of co-occurrences of keywords and institutions with the highest production. In the search terms on the Web of Science, the following keywords were used: “built environment”, “well-being”, “subjective well-being” and “mental well-being”, which yielded a total of 309 documents, representing the total sample.



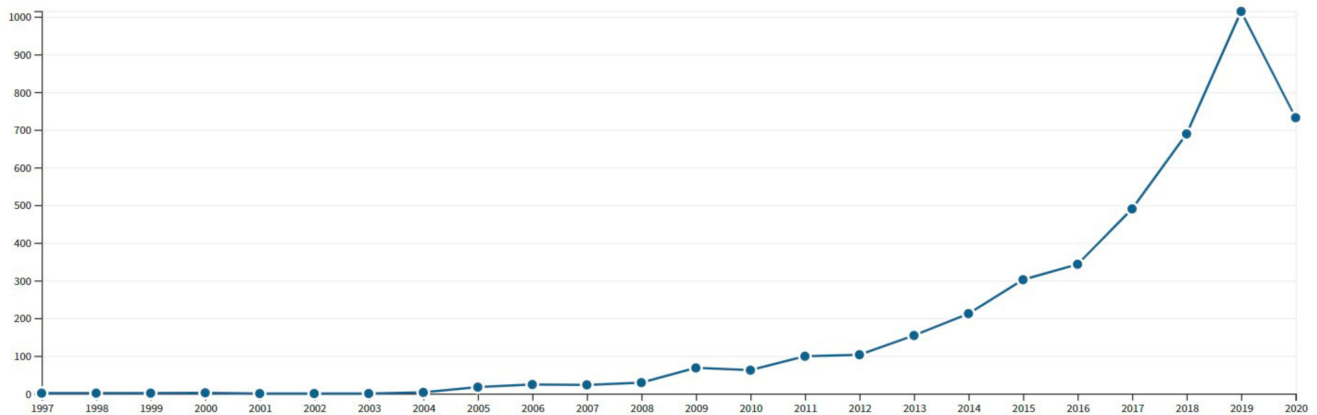
**Figure 1.** Methodological structure for the systematic literature review process. Source: Authors.

These records were saved with all the necessary fields for their processing in HistCite and VOSviewer: authors, institutional affiliation, title, journal, language, type of document, keywords, abstract and cited bibliography. The analyses to be carried out are the following: total number of citations per year, journals and regions with the highest scientific production, and finally analysis of the co-occurrences of keywords and institutions with the highest production. This allowed us to analyze where research on mental well-being and the built environment is concentrated, and determine the main thematic concepts and axes approached from the scientific literature. The time frame covered by the selection was from 1975 to 2020, spanning from the Web of Science databases inception year to the present. The identification of thematic axes is carried out by interpreting the data obtained from the keyword co-occurrence analysis in VOSViewer. For their interpretation, articles were categorized by incidence number and affinity in the themes observed from the co-occurrence analysis.

## 3. Results

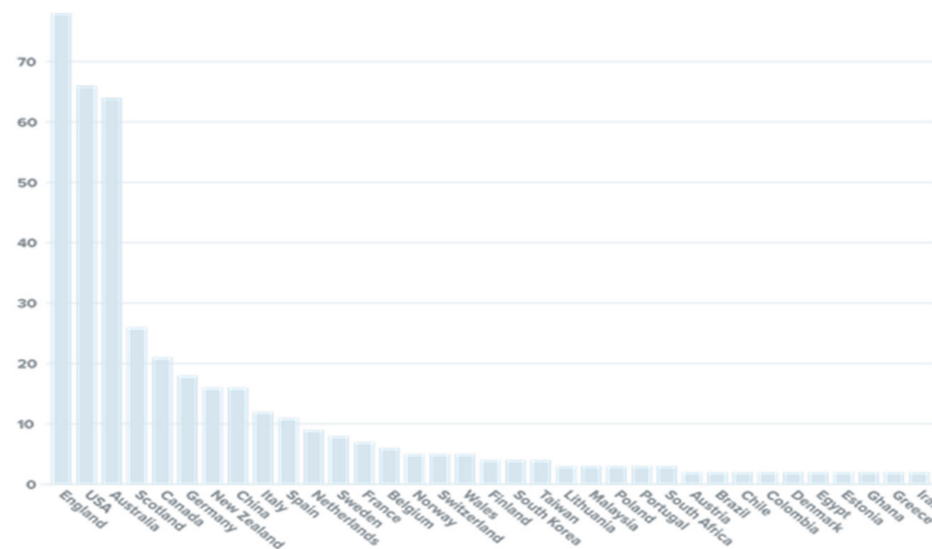
In general terms, analyses revealed 309 articles, 1059 authors, 263 journals, 35 reviews, 6 books, 12 book chapters, 12 early access, 14,234 cited references, 1343 keywords, the scientific production of 53 countries around the world, and 452 institutions of various kinds (universities, research centers, non-governmental organizations, among others). The evolution regarding the number of citations per year (h-index) shows an upward trend in terms of the number of publications between 1975 and 2020, with the highest increase recorded in 2019 with 1014 citations per year. This trend increases considerably from 2012 and 2016, respectively (Figure 2).

Número de veces citado al año



**Figure 2.** Evolution of scientific production according to the number of citations per year. Source: Authors based on Web of Science, Clarivate analytics, 2020.

It is observed that scientific production is concentrated in countries located mainly in North America, Europe, Oceania and Asia. The countries with the highest scientific production are England, the United States, Australia, Scotland, Canada, Germany, New Zealand and China, which are also the countries that produce high-impact research (Figure 3).



**Figure 3.** Countries with the highest scientific production. Source: Authors based on Web of Science, Clarivate analytics, 2020.

It should be noted that the categories that yielded the highest number of articles correspond to Public Environmental and Occupational Health with a total of 97 articles, followed by Environmental Sciences with 51, Environmental Studies with 47, Urban Studies with 35, Geography with 27, Construction Technology with 26, Transportation with 23, Green Sustainable Science Technology with 22, Regional Urban Planning with 22 and Environmental Engineering with 15 articles. This delivers a total of 309 publications. The predominance of Environmental and Occupational Public Health journals (97) stands out, while from Geography (27) and Urbanism (35) the research on mental well-being is quite minor.

Among the magazines with the highest number of publications are International Journal of Environmental Research and Public Health (16), Social Science Medicine (13), BMC Public Health (11), Health Place (10), Sustainability (10), Journal of Transport Health

(9), Cities (6), Building Research and Information (5) and Journal of the American Planning Association (5), while the magazines International Journal of Environmental Research and Public Health and Sustainability present the highest number of citations between 1975 and 2020 (Table 1).

**Table 1.** Scientific production and quantitative measurements of the main journals between 1975 and 2020. Source: Authors based on Web of Science, Clarivate analytics, 2020.

Journal Name	# of Publications	% of 309	Total Citations
International Journal of Environmental Research and Public Health	16	5.18%	196
Social Science Medicine	13	4.21%	56
BMC Public Health	11	3.56%	52
Health Place	10	3.24%	117
Sustainability	10	3.24%	142
Journal of Transport Health	9	2.91%	41
Cities	6	1.94%	34
Building Research and Information	5	1.62%	16
Journal of American Planning Association	5	1.62%	9
Ageing Society	4	1.29%	6
Building and Environment	4	1.29%	55
Building Services Engineering Research Technology	4	1.29%	6
Ecosystem Services	4	1.29%	28
Indoor and Built Environment	4	1.29%	18
International Journal of Behavioral Nutrition and Physical Activity	4	1.29%	28
Journal of Environmental Psychology	4	1.29%	23
Landscape and Urban Planning	4	1.29%	47
PLoS ONE	4	1.29%	40
Sustainable Cities and Society	4	1.29%	35
Urban Forestry and Urban Greening	4	1.29%	49
Urban Policy and Research	4	1.29%	8
Applied Geography	3	0.97%	6
Habitat International	3	0.97%	10
Architectural Science Review	3	0.97%	7

Regarding the analysis of co-occurrences of keywords according to the method of analysis tool VOSviewer, six themes related to issues of mental and built environment are detected: green space, density, walkability, environmental noise, spatial design and social interaction. According to Figure 4, the concept corpus reveals several study areas regarding phenomena determined in the constructed environment and its relationship to mental well-being, including adaptation, green space, architecture, walking, mobility, physical activity, neighborhoods, cities, spatial design, ambient noise, natural environment, soil use, density, interaction, participation and infrastructure. It was also possible to generate some associations in the themes we found mentioned within them. For example, in the first thematic axis—green space—there was evidence that in Australia the study of constructed environments and mental well-being is strongly related to architecture

and public space, design, biodiversity, building adaptation, fear perception, physical activity, and mental health. On the other hand, in China it was associated with residential satisfaction, residential density, happiness, and older adults. In England it was related to urban form, quality of life, older adults and pedestrian accessibility. These words are related to institutions from which this knowledge is produced. For example, the university with the greatest number of publications is the University of Melbourne (28), followed by the University of Western Australia (14), RMIT University (10), University College London (8) and University of Otago (8) (Figure 5).

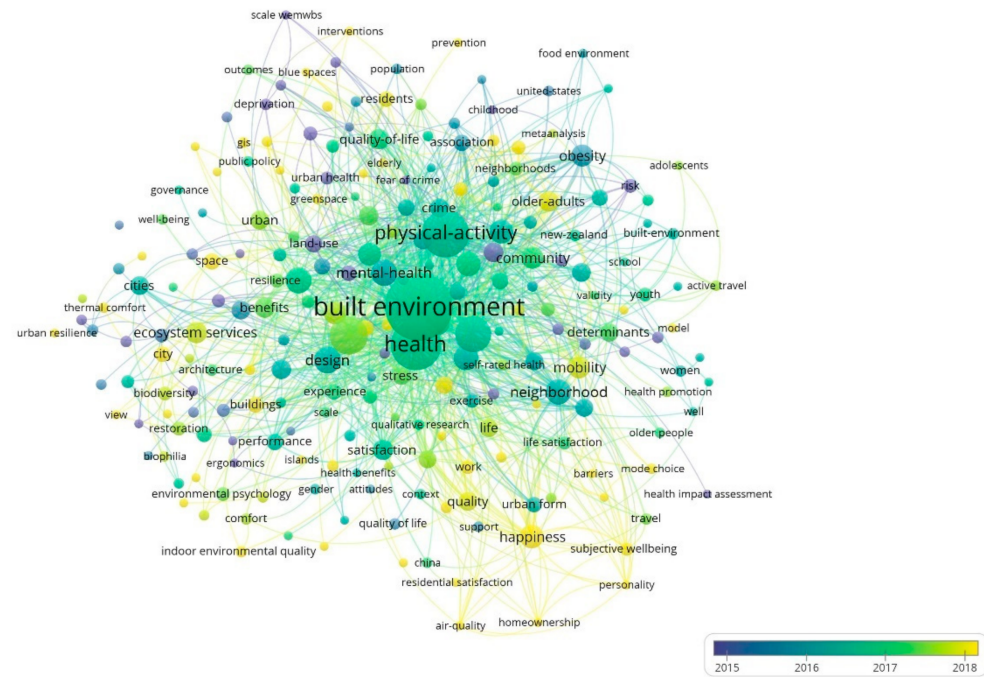


Figure 4. Co-occurrence of keywords and grouping of themes related to constructed environments and mental well-being. Source: authors.

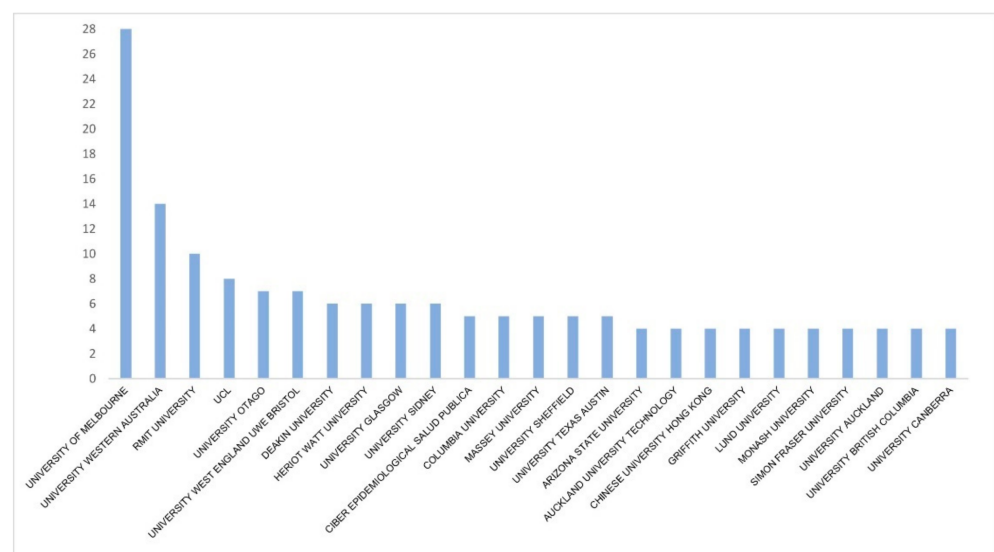


Figure 5. Universities and Centers generating the greatest number of yearly publications regarding well-being and constructed environments. Source: Authors based on Web of Science, Clarivate analytics, 2020.



#### 4. Analysis of Results

In the qualitative analysis of the systematic article review, six thematic axes were identified which were categorized by incidence number and affinity in the themes observed from the co-occurrence analysis: green space (24.3%), walkability (20.7%), density (18.8%), spatial design (16.8%), social interaction (14.5%) and ambient noise (4.8%), which are presented in Table 2 along with their respective authors.

**Table 2.** Classification of thematic axes and authors of studies related to review in constructed environment and mental well-being. Source: Authors based on Web of Science, Clarivate analytics, 2020.

Thematic Axis	Article Total	% of 309	Authors
Density	58	18.8%	Pfeiffer et al. (2016); Burton (2015); Feng et al. (2018); Giulini et al. (2020); Dempsey et al. (2012); Calve-Blanco (2013); Mouraditis (2018a); Ewing et al. (2008); Rodgers (1981); Guite et al. (2006); Cao (2016); Simmel (2005); Stock & Ellaway (2013); Squires & Lathrop (2019); Northridge et al. (2003); Suglia et al. (2011); Bond et al. (2012); Burton et al. (2011); Herrick (2009); Zhang & Zhang (2017); Feng et al. (2018); Badland et al. (2017); Hayward et al. (2015); Mason & Kearns (2013); Roue-Le Gall & Jabot (2017); Wu et al. (2019); Ige et al. (2019); Bhatti et al. (2017); Hermingway & Steven (2011); Chokhachian et al. (2020); Busayo et al. (2019); Barros et al. (2018); Foster et al. (2020); Nordin & Nakamura (2020); Kale (2019); Antonini et al. (2020); Ho et al. (2017)
Green areas	75	24.3%	Dong & Qin (2017); Ettema & Schekkerman (2016); Kaplan & Kaplan (1989); Gruehn et al. (2016); Nieuwenhuijsen et al. (2017); Kaplan (2001); White & Gatersleben (2011); Burton (2017); Bjrok et al. (2008); Dadvand et al. (2016); Frumkin & Fox (2011); De Vries et al. (2013); Corkery (2015); Korpela et al. (2002); Croucher et al. (2008); Van den Berg et al. (2010); Kazmierczak (2013); De Vries et al. (2013); Van den Berg et al. (2016); Evans (2003); Sarkar et al. (2018); Lumber et al. (2017); Douglas (2012); Rogerson et al. (2016); Wood et al. (2013); Tatcher & Milner (2014); Rogerson & Barton (2015); Perini et al. (2017); Everard (2015); Shih (2017); Rosenthal et al. (2007); Sunita et al. (2018); Coutts et al. (2014); Ambrey (2016); Laing et al. (2009); Joffe & Smith (2016); Opoku (2019); Mason & Kearns (2013); Hunter et al. (2019); Maller et al. (2016); Tang & Lee (2016); Dewulf et al. (2016); Pasanen et al. (2018); McEwan et al. (2019); Battisti et al. (2019); Sallustio et al. (2019); Jerome et al. (2019); Lvinger et al. (2018); Chang & Chien (2017); Curl et al. (2020); Childers et al. (2019); Andreucci et al. (2019); Vert et al. (2019); Zhang et al. (2019); Coloff et al. (2019); Rice (2019); Chaudhary et al. (2018); Han & Kim (2018); Adjei et al. (2017); Snell & Simmonds (2015); Pickford et al. (2020); Lynch et al. (2020); Keijzer (2020); Houlden et al. (2019); Santarino (2019); Zari et al. (2019); De Bell et al. (2018); Huang et al. (2016); Perini et al. (2017).
Spatial design (public spaces)	52	16.8%	Leyden (2003); Talen & Jeong (2019); Evans et al. (2003); Galea et al. (2005); Siksna (1997); Ewing & Cervero (2010); Zumelzu et al. (2020); Sevtsuk et al. (2016); Whyte (1980); Guite (2006); Sakar et al. (2013); Alonso et al. (2018); Knöll et al. (2018); Barret et al. (2015); Suglia et al. (2011); Hayley et al. (2015); Villanueva et al. (2015); Herrick, (2009); Burton & Sheehan (2010); Ige et al. (2019); Seresinhe et al. (2019); Wijnands et al. (2019); Kwon et al. (2019); Barros et al. (2018); Foster et al. (2020); Mouraditis & Hassan (2020); Antonini et al. (2020); van Creveld & Mansfield (2020); Romero (2020); Francis et al. (2012); Kimbro et al. (2011); Burton et al. (2011); Cao & Ettema (2014); Pfeiffer & Cloutier (2016); Villanueva et al. (2013); Brown (2014); Maller et al. (2016); Macmillan et al. (2018); Yu & Yoon (2010); Layton & Steel (2015); Chau et al. (2018); McIntyre & Harrison (2017); Andreuci et al. (2019); Gerhardsson et al. (2019); Birkeland (2018); Watson (2018); Shiue (2016); Howden-Chapman et al. (2015); Moore et al. (2019); Vollmer et al. (2020); Lepasoon (2015); Romero (2019).

Table 2. Cont.

Thematic Axis	Article Total	% of 309	Authors
Walkability	64	20.7%	Singh (2016); Herrmann et al. (2020); Burton (2000); Evans & Jones (2011); MacKerron & Mourato (2013); Wang & Wang (2016); Mouratidis (2019); Kowaleski-Jones et al. (2018); Roe & Aspinall (2011); Ala-Mantila et al. (2018); Jun & Hur (2015); Villanueva et al. (2014); Foster et al. (2014); Cheng et al. (2019); Barton & Grant (2008); Bornioli et al. (2018a); Bornioli et al. (2018b); Makarewicz & Nemeth (2018); Newton et al. (2015); Pfeiffer et al. (2020); Won et al. (2016); Mehdipanah et al. (2013); Hinckson et al. (2017); Van den Berg et al. (2020); Mondschein & Moga (2018); Noguchi et al. (2019); Winters et al. (2015); Pigliautile & Pisello (2018); Mason & Kearns (2013); Yu et al. (2017); Hayley et al. (2017); Macmillan et al. (2018); Kwon et al. (2017); Bornioli et al. (2019); Jaskiewicz & Besta (2016); Vert et al. (2019); Kwon et al. (2019); Marcheschi et al. (2020); Corcoran et al. (2018)
Social interaction	45	14.5%	Dempsey et al. (2011); Mouraditis (2018); Brown et al. (2009); Alonso et al. (2018); Gruebner et al. (2012); Diener, E. & Duh, E. (1997); Diener (2000); Badland et al. (2014); Suglia et al. (2010); Burton et al. (2011); Boyes (2013); Engel et al. (2016); Mouraditis (2019); McIntyre & Harrison (2017); Browne-Yung et al. (2016); Zhang & Zhang (2017); Husk et al. (2016); Hunter et al. (2019); Brown (2014); Feng et al. (2018); Hayward et al. (2015); Ye, & Runing (2019); Marzbali et al. (2016); Yuma-Guerrero et al. (2017); Alidoust et al. (2019); Bhatti et al. (2019); Ma et al. (2018); Li et al. (2016); Ho et al. (2020); Pearson et al. (2019); Cottrell et al. (2019); Hilger-Kolb et al. (2019); Corcoran et al. (2018); Carta et al. (2020); Held et al. (2020); Kim & Cubbin (2020); McGregor et al. (2017); Ram et al. (2016); Browne-Yung et al. (2016)
Ambient noise	15	4.8%	Kang et al. (2018); Sutcliffe et al. (2020); Clark et al. (2006); Ferguson & Evans (2018); Kang (2007); Kang & Schulte-Fortkamp (2017); Okcu et al. (2011); Foley et al. (2017); Schulte-Fortkamp & Jordan (2016); Pickford et al. (2020); Fitch et al. (2016); Ancaies et al. (2019); Zhang et al. (2019); Jain et al. (2020); Pfeiffer et al. (2020)

According to the interpretation of results from Table 2, built environments can influence, for example, personal relations, leisure activities, health and emotional responses to urban space [92–94]. Built environments can cause negative emotions when they are unsafe, isolated, extremely noisy, or considered to have a bad reputation, wherein factors including construction codes, ground use regulations (buildings, open and green spaces) have direct impact [78,95]. Negative affective reactions can also occur when one feels that the necessary basic services and installations for daily needs are not nearby [48]. Environments can also create positive effects on hedonic well-being when they are characterized by a high aesthetic, when they integrate natural elements including trees and flowers in streets and public spaces, or when they promote good relations with neighbors or when interesting events occur in them [96]. The following pages describe principal themes of the studies supporting the definition of the thematic axes.

**Green space:** Urban green spaces have been shown to offer measurable benefits for health and mental well-being [97–99]. These benefits, according to Burton (2017), are classified at three levels, each one with implications for urban and architectural design. First, seeing nature through residential or workplace windows can promote the reduction of stress and mental fatigue [100,101]. From urban design and planning, different authors emphasize that greenspaces are by no means the only form of greenery to be found in urban areas. Views of greenery appear to also be beneficial for well-being. It can be provided in the residential—even in high density housing—or work environment, through grass verges, street trees, street gardens, roof terraces and green balconies, providing the opportunity to recover from mental fatigue [58,101–105]. Similarly, in hospitals, those with a view of greenery from their ward are more likely to get better quickly, with less need for pain relief [99,102,103].

Second, experiencing nature: sitting in gardens or parks, smelling the flowers' scent, listening to birds or hearing water can provide stress relief and greater positive emotions. Different evidence found that in open green spaces, flowers have immediate and long-term positive effects on emotional reactions, mood, social behaviors and even memory for both males and females [104,105]. Several studies find that vegetation and trees in urban spaces are associated with lower crime [106]. Findings suggest that increasing tree cover in urban areas may result in increased sense of safety with mental well-being benefits. Such interventions could prove especially helpful in increasing the feelings of safety in denser and in poorer neighborhoods [105,106].

Third, being active in nature, fresh air and exercise are beneficial for mental well-being. Proximity and access to parks and green spaces offer opportunities for social interaction, whether they be informal meetings with friends, social events, gardening, walking or sporting activities. They provide destinations for people to walk to in the neighborhood and sources for physical activity. Fresh air and exercise are beneficial in turn for mental well-being. [102,107]. Recent evidence shows that private gardens can also compensate for the lack of access to public green spaces, being a fundamental resource for mental well-being in times of health crisis [108,109]. The existence of green spaces in an urban context, however, is not always equal to an environment which promotes greater well-being. The "quality" of green spaces is as important as "quantity" and "proximity". Greenspaces also need to be designed well. Small to medium areas of open greenspace are valuable if they are well defined, an aspect which is increasingly acknowledged in the literature [103,110].

**Walkability:** Walking is the most ancient form of urban transport, with important benefits for personal well-being and overall health [25,111]. The concept of "walkability" arose in the 1990s, highlighting the importance the built environment has on walking and the predisposition of people to walk, postulating that greater neighborhood walkability should generate an increase in walking [112,113]. Pedestrian accessibility is commonly referred to as a physical property of the environment. In this sense, active frontages are important for safety of streets. Streets with windows, retail frontage, good quality lighting and street activity provide a much safer environment for pedestrians. The scale and the design of streets can affect the attractiveness for walkability [114].

Furthermore, various studies indicate that shorter distances to a node of activity can positively influence walking and mental well-being [59,115–118]. Recently, sustainability-related accessibility studies have been oriented towards evaluating the effects of built environments on the physical activity and health of people [119,120]. This includes improvements in short-term mental well-being, demonstrated by cognitive and affective evaluations [121], raised levels of (hedonic) happiness, satisfaction [122,123], relaxation and reduced anxiety/stress [124,125]. From planning perspective, various authors maintain that in highly walkable communities, residents can interact with their environment with more regularity and, therefore, feel more connected to and responsible for their community, increasing individual calm, community trust and decreasing perceived danger in public space [66,126]. Interestingly, in Chile and Mexico recent articles which analyze subjective walking experiences highlight the connection between emotions and walkability [127–129]. For example, recent evidence shows the importance of wide sidewalks and active uses to ease walking, and also the importance of trees on sidewalks, which elicit wellbeing and happiness [127,130]. On the contrary, traffic noise, motorized traffic, narrow and deteriorated sidewalks and difficult crossings hinder walking, in particular for children, women and older adults, causing them stress [129]. Understanding walking perceptions and experiences of different people and communities could inform the conception and discussion of street design, emphasizing the need for planning approaches which prioritize social participation in decision-making [127].

**Density:** Evidence is mixed and sometimes contradictory. Generally, access to services and workplaces is better in high-density locations, where there is a higher proportion of pedestrian traffic and greater possibility for interactions and encounters between people, with benefits for mental well-being [6,130,131]. However, many studies related to property

configuration demonstrate the negative impacts of a lack of space or overcrowding, which can lead to problems with stress, anxiety and depression [132,133]. Recent studies show that urban areas with high density generate more impersonal and superficial relations between residents, making social relations weaker in high density urban areas, as well as in tall buildings on narrow streets, provoking stress and negatively affecting mental well-being [134–136]. In higher-density forms, such as terraced housing and flats, many authors conclude that privacy is sometimes compromised. In terms of urban design, some authors emphasize that higher densities can work if higher density housing is restricted to terraced forms with front doors into the street and roof terraces, and street layouts which incorporate grass verges and street trees [46,47]. Although high density has been defended for its multiple benefits to the urban environment [137], it is evident that extreme density tends to negatively affect residential satisfaction due to problems, including loss of privacy and exposure to noise [46,85,138]. Other studies suggest that streets with front gardens provide more opportunities for interaction. Paired and continuous housing is suggested by various authors as positive for mental well-being, since it achieves a clear differentiation of public and private space [139]. In recent studies, it has also been argued that low-density urban developments can offer calm, greater access to nature and strong interpersonal bonds [61,92].

**Spatial design:** Property configuration and spatial design of streets and public spaces has been widely studied in relation to promoting greater mental well-being [140,141]. Many studies show that the quality of urban forms affects the degree to which built environments promote relaxation and reduced anxiety in public spaces. Many studies have advocated for smaller city blocks due to their apparent benefits for walking [29,142–144]. Dimensions of street blocks between 70 m and 100 m are mostly recommended in the literature [32,142]. Blocks which face open spaces or façades with a greater percentage of windows are also associated with greater mental well-being [46,145,146]. High ranges of visibility of the street façades, from 50% to 75%, and accesses (doors) between six to ten meters are highly recommended to create active and safe streets. This allows greater opportunities for the relationship between the private and the public space, which increases social opportunities and the ability of people to interact with their environment [2,147,148]. The variety of façades in smaller lengths would give personality and diversity to the street, generating more positive emotions of a eudaemonic type and satisfaction with the environment. By contrast, very long or monotonous fronts lacking characteristics including windows, ornaments or accesses for many meters, blind walls or barren lots may have negative effects on mental well-being which can create boredom and negative emotions, which also limit social opportunities and reduce the capacity for people to interact with their environment [2,148].

The ratio of building height to street width is also a key spatial design factor to promote mental well-being [109,149]. Building heights that excessively exceed the street width could lead to feelings of claustrophobia and perceptions of insecurity. A correct building height/street width proportion can generate greater spatial comfort and positive benefits for mental well-being [109,144]. Similarly, building heritage is also associated with higher perceived well-being. Many studies consistently show that buildings with historical or artistic value could lead to feelings of happiness and positive mental well-being in streets and public spaces [77,113,126,134,149,150]. Finally, recent evidence shows that the presence of trees in the street and wide sidewalks (three or four meters wide), in good condition, are also associated with greater perceived well-being. The latter resulting especially important for women, the elderly and people with disabilities, where wide sidewalks generate well-being, comfort and safety [105,113,130].

**Social interaction:** Built environments have a major impact on promoting social interaction in public spaces, which positively impacts factors including residential satisfaction and eudaemonic happiness [31,96,151]. Classic authors including Jacobs [152] and Gehl [153] refer to the importance of mixed uses at the building level and visual permeability between lots and streets to contribute to social interaction and the perception

of safety. More recent studies have consistently shown that spaces with high mixed uses are related to greater level of perceived social support and lower angst levels [147,154]. A mix of uses can encourage social interaction as people meet at local facilities such as shops and pubs. In terms of planning, however, certain uses such as industrial ones or late-night bars may cause stress through noise irritation. Similarly, having many commercial properties in a residential area can cause concern for safety when they are shut up at night [9,135]. Many studies recommend that a mix of uses is good for social interaction and well-being, but it needs to be designed well, ensuring diversity of uses between residential, services and shops [2,74,141]. Many scholars have also shown that greater density is also often associated with increased urban vitality [59], although in the case of hyper density the opposite effect is demonstrated. Extreme vitality caused by extreme density in urban areas may generate stress and negatively affect mental health [32,78,155]. Various authors have shown the consequences of living in areas with extreme activity, such as spaces with high vehicular traffic and noise, arguing that people in homes on streets with more intense vehicular interact less with their neighbors than those in less congested streets [156,157].

**Ambient noise:** Noise is a fundamental element of the built environment and mediator between space and sensation. Various studies show that chronic noise exposure, like in an intersection between avenues with high congestion or crowds of people, can affect mental well-being, generating problems which can reduce satisfaction with life, increase stress and angst and reduce perceived spatial safety [158,159]. Traffic is the source of most noise in urban zones, but other sources can also cause problems: noise from airplanes, trains, industrial processes, construction work or noisy neighbors. For well-being, acceptable sound insulation in buildings, both from external and internal noise, is essential. In public space, trees and other forms of greenery can also mitigate the effect of noise annoyance [95,160]. However, the “soundscape” can act positively to increase mental well-being in environments. Various studies related to exploring ambient sounds suggest that there are “soundmarks” which can be culturally important for a community and deserve protection [160,161]. For example, birdsong, the sound of water or wetlands, tend to relax tensions and increase positive emotions in environments. In this sense, more recent studies suggest that the maintenance and enhancement of local flora and fauna in urban parks and green open spaces help promote positive emotions for mental well-being [60,162–165]. Besides, recent evidence highlights the importance of urban squares for people to relax, to communicate, to see others and to be seen, in which soundscape identity is important for a designated space [164]. For example, in UK, evidence confirms that natural sounds as a group are generally preferred in urban squares, with differences between age groups. Older people are more favorable to sounds relating to nature, culture, or human activities. By contrast, younger people are more favorable to music and mechanical sounds [161].

## 5. Conclusions

The results of the study show that built environment studies related to mental well-being on a global scale are recent. It shows an increase in the number of publications between 1975 and 2020, especially from 2012, reflecting the growing scientific interest in these themes. However, scientific production is concentrated in England, the USA, Australia, Scotland, Canada, Germany, New Zealand and China, highlighting the lack of studies around this topic in the Global South. Especially in Latin America, this review shows that studies on built environments and mental well-being are still incipient, with only a very small percentage (Figure 3) in Latin American countries including Chile (0.64%), Brazil (0.64%) and Colombia (0.64%) related to thematic axes including walkability, green areas and spatial design.

Articles about built environments and mental well-being are also principally published in journals of Public Environmental and Occupational Health (31.3%), while publications in Geography (8.7%) and Urbanism (11.3%) journals are considerably lower. This shows a preponderance of studies from environmental sciences, revealing a lack of attention to this topic from the social sciences, especially Geography, Urbanism and Architecture. It



is also important to add that regarding the interpretation of results, most of the evidence analyzed comes from quantitative methods; for example, the use of standardized surveys, regressive models and indicators. Qualitative approximations, by contrast, are scarcer and are closer to the thematic axes related to social interaction, spatial design and walkability.

The review undertaken in this study demonstrates not only the importance and contextual nature of the advances of studies associated with built environments and mental well-being, but also the most relevant thematic axes from international evidence including green areas, walking, density, spatial design, social interaction and environmental noise, which all strongly impact public spaces and streetscapes. More studies of this type are necessary, for example, from other platforms relevant for urban studies such as Scopus or PubMed, which could complement the appearance of other thematic axes as well as reveal other data sources from countries in Latin America and other countries in the Global South.

It should also be noted that urban planning and design can promote, or inversely disincentivize, the presence of the built environment elements which positively impact mental well-being. Thus, urban planning can determine the amount of green spaces in urban zones, protect natural elements, regulate densities, promote friendlier street designs for pedestrians and cyclists, and foment urban development, which reduces ambient noise—especially traffic noise. This is especially important in the planning and design of public spaces and streets. In the case of Chile, for example, public policies have recently started to pay attention to increasing the walkability of neighborhoods.

However, in Chile, urban planning instruments do not explicitly refer to mental well-being; neither the General Urbanism Ordinance, nor the Transit Law or the Urban Route Manual mention well-being, mental well-being or subjective well-being. Therefore, we can observe not only a lack of urban policies explicitly promoting mental health, but also a lack of conceptualization of this term in Chilean urban planning instruments.

There is no “formula” which urban planners and developers can use to create positive emotional ties between a person and their environment. However, environmental design can increase the chance that positive emotional bonds develop from the creation of attractive public spaces and places, which incorporate natural elements, promote social interaction and invite people to walk and relax, creating more walkable and sustainable environments.

The present study reveals that in Latin America, studies about the impact of the built environment on mental well-being are still very scarce. Considering that mental health is defined as a fundamental right of every human being [14], and that the UN Agenda 2030 for Sustainable Development seeks to promote the welfare of urban dwellers of all ages [15], it is very important to research in Latin America how the built environment affects mental health, contributing empirical results from urbanism to public policies. In particular, we must understand which elements of the built environment have positive effects, and conversely, which ones negatively affect mental well-being, from the experience and perception of people themselves and different communities, considering possible age, gender and socio-cultural differences.

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