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Individual differences in the definitions of health and well-being and the underlying promotional effect of the built environment

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ABSTRACT

Although “health” and “well-being” have been the center of attention within the medical and psychological fields for many centuries, a growing body of evidence suggests that this interest has been expanding to many other disciplines, such as architecture and engineering. Consequently, more inclusive definitions of “health” and “well-being” are needed to incorporate the contribution of other fields, which will facilitate interdisciplinary studies on the topic. However, health and well-being are complex concepts, therefore, more research is required to understand the individual differences presented within those definitions and how the contribution of other fields is perceived. Therefore, the present study adopted a mixed-methods approach to investigate how “health” and “well-being” have been defined within the literature and in the community with the aim to clarify the definitions of those two terms further. A Rapid Evidence Assessment (REA) review was conducted to summarize the definitions of “health” and “well-being” within the literature, particularly within the field of built environment. Additionally, an online survey was administered to experts and laypeople to explore their own definitions of “health” and “well-being”. The results from the REA review demonstrated a paradigm shift over the years, with “health” being perceived on a continuum and with an emphasis on people's ability to adapt to any presenting physical or mental conditions. However, there was still limited reference to the environmental contributions to the definitions of “health” and “well-being”. The findings from the survey indicated that there are four groups of people, those who believe that either health or well-being are necessary, those who believe that there is no interconnection between the two constructs, those who believe that there is an interconnection between them and those who believe that health goes beyond well-being. Future studies could explore these individual differences in definitions further in order to clarify whether the differences in perception are based on knowledge on the concepts or on people's different piorities in life and how these findings could be incorporated in future definitions of “health” and “well-being”. New working definitions are proposed suggesting a paradigm shift in defining health and well-being based on the underlying processes involved.

1. Introduction

Health and well-being have been the center of attention within medical and psychological studies for many centuries. However, in recent years, it is observed that there is a growing interest in health and well-being studies from many researchers across disciplines [1–3]. This is mainly because of the general acknowledgement that the underlying processes leading to health and well-being are

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complex, and interactions between several risk factors need to be investigated [4]. Additionally, there is an alarming increase in health difficulties presented within the population, suggesting that some risk factors to health are not yet considered or implemented within preventive strategies [5]. However, due to the absence of a universal definition of those terms, interdisciplinary research groups find it difficult to communicate and operationalize those terms to extend the research on the underlying risk factors.

The most cited definition of health is that of the World Health Organization in 1946 which defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" [6]. This definition has been criticized as being utopian, idealistic and no longer valid as it is difficult to maintain a complete state of physical, mental and social well-being in today's imperfect society [7]. Furthermore, it is criticized that not only the absence of disease, but many other aspects must be considered to define health. Nevertheless, Hafen [8] argued that perceiving "health" in this way helps to transfer the meaning of "health" in a clearer way. He explained that there is no way to observe "positive" symptoms of health, like we can observe with well-being in the form of emotions [8]. Consequently, "health" cannot be really perceived on a continuum [8]. Despite the criticism, the WHO has not changed its definition of health since 1946, so new ideas towards a more up-to-date and consistent definition of health are presented by other researchers.

Misselbrook proposes different concepts of health, including a narrower biomedical model where health is considered as the absence of biomedical abnormalities and a more functional model where health is defined as 'the strength to be' and the ability to overcome obstacles in a dynamic life [7]. Others specify health as the ability to fulfill social roles, control one's own life, and do something independently with optimism and energy, or even include spirituality in the concept of health [9–12]. Moreover, it is stated that not only internal aspects as adaptation and self-management, but also external aspects such as socio-economic and environmental policies play an important role for one's health [13]. Thus, the factors considered for health vary in the literature but the importance of finding a consistent definition is undeniable [14].

Similar challenges arise when trying to find a definition for well-being. Various internal and external as well as subjective and objective factors are included in proposed definitions for well-being [15]. Compared to health, well-being is considered a more emotional and social concept [16]. The literature distinguishes two main aspects in defining well-being. First, well-being is considered as the presence of positive feelings, and second, the aspects of positive functioning and contribution to society are emphasized [17–19].

The existence of an interconnection between health and well-being is also frequently addressed in the recent literature on these topics [20,21]. Some definitions even include the presence of well-being as a necessary condition and part of health, for example above mentioned WHO definition which directly names physical, mental and social well-being as a part of health [6,22].

Different definitions of health and well-being exist in different disciplines and parts of society [11,18]. Each person perceives health and well-being in a different way, based on their individual characteristics and needs [23,24]. Therefore, there is a subjective component to health and well-being that could explain the absence of a universal definition. Studies have attempted to find definitions of health and well-being for different age groups such as students, children, or older people [11,25,26]. However, it is proposed that an interdisciplinary approach targeting the different risk and resilience factors to health and well-being might be more successful as a first step in developing a definition for both terms that different age groups and individuals can agree on [19].

An emerging area in this research is the attempt to define and analyze the impact of the (built) environment on human health and well-being. This idea is not new, as Hippocrates addressed the issue of healthy and unhealthy places as early as 500 BCE [27]. Nevertheless, this topic is gaining importance nowadays as living and especially working conditions are changing and people now spend over 80 % of their daily life indoors being constantly exposed to the built environment [28]. Some studies already claim that the built environment may have a relevant impact on health and well-being in general [29–34]. Fox et al. even state directly that people cannot be healthy in an unhealthy environment [35]. The contribution of the built environment to health and wellbeing has been very thoroughly explored in a recent review by Engineer, Gualano [36], who synthesized outcomes of previous studies on the connection between the design of the built environment and the seven domains of integrative health as stated by the Andrew Well Center for Integrative Medicine [37]. These seven domains include sleep, resilience, environment, movement, relationships, spirituality and nutrition. In their framework, Engineer, Gualano [36] embedded integrative health into building design and explained how the access to circadian light could influence our sleeping patterns, our stress and exercise and how space layout could encourage meditation, social interactions, views to nature, exercise and reduction of stress. Engineer, Gualano [36] focused also on conceptualizing well-being in the built environment in the post-COVID era since the pandemic emphasized the importance of the built environment design in maintaining health and well-being. Additionally, a review by Amatkasmin, Berawi and Sari [38] on healthy buildings emphasizes the interaction between the building and the occupant and the balance needed in the environmental characteristics in maintaining a healthy environment. Explicit ideas about how the built environment affects health include its influence on recovery from illness or the spread of a disease, as seen in the recent COVID-19 pandemic [39–41]. Furthermore, the building design, materials and smart technologies implemented within a building can help mitigate the infection of diseases [42]. Thus, changes in the built environment, where people spend increasing amounts of time in, can both promote and impair human health and well-being [33,43–47]. The current state of the literature agrees on the need for more research on the effects of built environment on health and well-being [48–51].

Taking this into account, it becomes clear that the (built) environment must be considered when defining health and well-being, since not only the external natural environment, but also architecture has a non-negligible impact on these two concepts [27,51–54].

As with the definitions of health and well-being, it is important to note that the built environment has different influences on age groups that need to be considered in studies on this topic. Lyu et al. conducted a study that revealed significant differences in the relationships between self-rated health and environmental indicators among age groups [55]. In general, older people faced more health-related challenges in their built environment, and other environmental aspects impacted their self-related health compared to younger people, which needs to be considered within the different definitions and concepts of health and well-being [55].

An early attempt towards a definition of health that incorporated the environment was presented by Wylie in 1970 and is as follows: "Health is the perfect, continuing adjustment of an organism to its environment" [56]. Despite several attempts and a growing field of research, it has not yet been possible to find universal and general definitions of health and well-being that researchers can agree on [17].

The aim of this study is to find and clarify the definitions of these two terms, health and well-being, especially within the built environment research, by analyzing existing definitions of well-being and health within and beyond the built environment field and comparing them with layperson opinions on the subject. Since both health and well-being are very complex concepts, the existing definitions within the literature reflect the expertise and knowledge on the subject, while layperson opinions were collected to identify any blindspots or unexplored ideas within those definitions from their personal experiences. The definitions of health and well-being presented in the literature are often considered too general and not realistic in society. Therefore, it is important to ask people directly to formulate their own definitions that incorporate the personal factors that influence these issues for them in their daily perception and include the mentioned points in universal definitions of health and well-being to obtain realistic and consistent concepts within the currently established theoretical frameworks, such as the one provided by Engineer, Gualano [36]. Finally, this study aims to find similarities and themes in the definitions and to analyze whether similar characteristics including age, social background, or working fields can be found in groups of people with almost the same definitions of the concepts of health and well-being in order to shed some light on the individual differences on those definitions. Identifying commonalities and differences will enhance our understanding on which aspects of those definitions need to be addressed in order to be able to propose one definition for health and well-being that can be applied for all ages and social backgrounds and can be shared within several fields working on studies regarding the built environment. Age was considered an important characteristic for individual differences since previous studies supported different effects of the built environment on younger people than older people [55]. Additionally, social class strongly determines one's environmental influences. Lastly, the working field of the participants signifies the lens that the participants are using for defining health and well-being within the built environment, which could help to identify differences within the fields for the same constructs.

2. Methodology

2.1. Design

This study followed a mixed-method design which consisted of a Rapid Evidence Assessment (REA) review [57,58] and a qualitative survey. The REA review was conducted to identify existing definitions of well-being and health within and beyond the built environment field using a top-down approach, while the qualitative survey was conducted to collect lay and expert opinions on the subject using a bottom-up approach.

2.2. REA procedure

The REA review was conducted between February 2021 and July 2022. Search terms related to well-being, health, definition and built environment were used to create certain search strings to identify relevant papers within EBSCOhost, PubMed and Google Scholar published before July 2022. The search strings are reported in Table 1. A wide range of disciplines were included in this search, such as architecture, engineering, psychology, social and health sciences to capture a wide range of definitions.

The searches yielded a total of 3,586,742 papers, of whom the top 6677 were selected for further consideration. From those papers, 6598 were excluded (6510 from title and abstract and 88 after reading the full-text). A total of 79 articles were considered eligible for this review.

2.3. Qualitative survey procedure

An online survey was prepared on SoSciSurvey. The survey was circulated to researchers in the field of Built Environment via convenience sampling and mailing lists and to laypeople via two online research platforms (Mturk and Prolific). After completing the survey, laypeople were compensated with a small monetary reward for the time and effort (~12.00 €/hr).

Table 1
REA Review – Search strings.

Search engine	Search String
EBSCOhost	health + defin* or meaning of
EBSCOhost	defin* + well-being + building or indoor or built
EBSCOhost	well-being + architecture
EBSCOhost	well-being + defin*, 2021–2022
EBSCOhost	health + defin*, 2021–2022
Google Scholar	allintitle: health definition environment
Google Scholar	Health definition built environment
Google Scholar	built environment "definition of health"
PubMed	health + definition
PubMed	"definition of health" + architecture (Title/Abstract)
PubMed	"health definition" + architecture (Title/Abstract)
PubMed	health + architecture
PubMed	health + buildings (Title/Abstract)

2.4. Measures

The qualitative survey included several open-ended questions to understand how laypeople define health and well-being and how the built environment could influence them (see Supplementary Material). Additionally, it included an assessment of the subjective health status and well-being of the participants and some demographic questions. Although the order of the questions to define health and well-being were randomized for each participant, these questions were always presented before participants were asked to explain the contribution of the built environment to health and well-being to ensure that the participants were not prompted to include the built environment in their definitions of health and well-being.

2.4.1. Definitions of health and well-being

Participants were asked to describe what health and well-being mean to them, factors that could influence health and well-being and to describe the positive and negative effects of the built environment on the two variables of interest.

2.4.2. Subjective assessment of participants' health & well-being

Participants were asked to describe their health status on a 4-point Likert scale ranging from "Poor" to "Excellent", and to indicate whether they have any current diagnoses. The subjective well-being of the participants was assessed using the commonly used and validated questionnaire named World Health Organization-Five Well-being Index (WHO-5) [59]. The WHO-5 has been translated in more than 30 languages and has good construct validity [60]. It consists of 5 items assessing well-being and respondents rate each of these statements on a 6-point Likert scale ranging from 0 (At no time) to 5 (All of the time). A total score is calculated (range = 0–25), which is multiplied by 4 to give a final score. Higher scores indicate better well-being. These assessments were considered as potential explanations of the variance found in the responses to the open-ended questions.

2.4.3. Demographic questions

Participants were also asked to complete some demographic questions, such as age, gender, marital status, education, ethnic/cultural background, employment, economic status, area of expertise and engagement in relevant research.

2.5. Participants

A sample of 128 participants (M = 57, F = 71) was recruited, of whom 49 were researchers and 79 were laypeople. This sample was considered to be appropriate based on data saturation calculations [61]. The age of participants ranged from 18 to 75 years old, with the most popular age group being between the ages of 26 and 30 years old. Most of the participants were educated, with 21.2 % of them reporting having completed an undergraduate university degree, 21.9 % a postgraduate degree and 14.4 % a PhD or higher. Ninety-three of them reported being Caucasian or white, 11 reported being Asian, 3 reported being African, 2 reported being black, 1 person refused to answer and the rest were from other ethnic minorities. Most of them were married or in a cohabitating relationship (45.9 %). Ninety-three of them reported having a middle economic status (63.7 %). More than half of them reported having no current diagnosis (N = 92, 63 %).

2.6. Data preparation & analysis

The answers from the open-ended questions regarding the definitions of health and well-being, the influencing factors of health and well-being and how the built environment could contribute to them, were analyzed using thematic analysis [62]. Themes derived from the thematic analysis were imported into the Statistical Package for Social Sciences (IBM SPSS Statistics, version 29.0) [63] as separate variables and were used to identify clusters of themes, which represented the definitions provided by laypeople. A two-step cluster analysis was conducted as it is most suitable for categorical data [64]. After producing each cluster, demographic analyses were conducted to identify possible profiles of the participants reporting each definition cluster, taking in this way into consideration the individual differences influencing the perception of the definition of health and well-being. Before running any analyses, the data was checked for missing data and outliers, which were handled appropriately. The Missing Completely at Random (MCAR) test was significant ($p < .001$), suggesting that the data was not missing at random [65]. Therefore, imputation of the missing data was not recommended. Participants with missing data were excluded from the analysis. No outliers were found. Nine participants used answers from the Internet as their response to the qualitative questions and hence, they were excluded from the analysis. Additionally, one participant replied that he did not respond to the questions seriously and was excluded from the analysis. A Spearman's correlation analysis was conducted to identify possible correlations between the profiles created, participants' WHO-5 score, subjective health status and area of expertise (based on categories). Lastly, Kruskal-Wallis analyses were conducted to identify differences in subjective health status and well-being between the clusters.

2.7. Ethical concerns

Ethical approval was granted by the relevant ethics committee at RWTH Aachen University before circulation of the online survey. Information about the study was provided to the participants and an informed consent was obtained before participation.

3. Results

3.1. Definitions of health and well-being in the literature

The definitions of both health and well-being have been addressed in the literature. From the REA review, it became apparent that researchers focused more on the physical aspects when they were referring to "health", while when defining well-being emphasis was

given to social and emotional aspects in someone's life. Additionally, older definitions of health assigned a more negative connotation to the word "health", while recent publications suggest to give "health" a more positive connotation, similarly to well-being.

3.1.1. Health

As previously mentioned, one of the most commonly cited definitions of health (~86 % of the 28 reviewed papers, which cited a definition of health), is the one provided by the World Health Organization [6].

Many studies ($N = 25$) supported that the definition of "health" is influenced by factors, such as people's subjective perception of "health" [9], which could be influenced by age [11]. This difference in perception of what "health" means to each individual was highlighted by Stucki, Rubinelli and Bickenbach [66] who suggested that WHO's definition is more in line of what medical doctors are interested in knowing about the status of their patients, but it is not reflecting of what it is actually important for their patients. Patients are more interested in perceiving their "health" in terms of how they feel and whether they can still function in their everyday life.

Interestingly, recent studies suggest that the definition of "health" is expanding towards the concept of "well-being" because of the growing recognition that none of us is perfect and everyone has aspects that need care [67]. Alternatively, Bircher [22] suggested that "health is a dynamic state of well-being", categorizing "health" as part of "well-being", which seems to be a new emerging paradigm [68].

Other researchers addressed the limited perspective of how "health" is perceived and reported that health should also be considered in terms of biology, personal factors, relationships, culture, social structure and socio-economic and environmental policies [13,14,69]. Badura [69] also mentioned that "health" can be conceptualized based on someone's ability to cope with external stressors and environmental conditions. This concept of adaptation within the definition of "health" was supported by Shilton, Sparks[10].

Although the interaction of each individual with his/her environment was considered an important part of defining "health" [28,29,33,35,43,44,56], specific physical aspects of the built environment, such as temperature and noise were mainly neglected. One aspect of the built environment that was associated with the concept of "health" was ventilation, as a consequence of the COVID-19 pandemic [41].

3.1.2. Well-being

In contrast to the concept of "health", "well-being" within the literature is considered as an umbrella term encompassing a variety of factors. For example, Ross, Hinton [15] tried to define well-being by separating it into different categories: i) subjective and ii) objective well-being. According to Ross, Hinton [15], subjective well-being emphasizes personal experiences and individual fulfillment and hence, they argued that it is further divided into "eudaemonic well-being" and "hedonic well-being". They defined "eudaemonic well-being" as the ability of people to find meaning in their life and to experience a sense of personal growth, while "hedonic-well-being" focused on people's feelings of happiness and satisfaction with their life. Reported objective forms of well-being were indicators of quality of life, such as income, food, housing, education, health, political voice and social networks [15].

The complexity of the word "well-being" was reflected in the Magyar and Keyes [17] study, who commented on the focus of researchers on individual aspects of it (e.g. emotional well-being and psychological well-being), neglecting the overall structure of subjective well-being. Huppert and So [16] identified 10 features of positive well-being (combination of hedonic and eudaimonic aspects): i) competence, ii) emotional stability, iii) engagement, iv) meaning, v) optimism, vi) positive emotion, vii) positive relationships, viii) resilience, ix) self-esteem and x) vitality, which all focus on personal aspects, neglecting the risk factors associated to these aspects. Five conditions listed by Coburn and Gormally [19], which influence well-being were: i) "creating a sense of community", ii) "having a strong volunteering ethos", iii) "creative networking and partnership", iv) "positive use of language", v) "enhancing relationships with others".

The impact of the environment was indirectly considered in studies trying to define "student well-being". "Student well-being" was viewed as a population-based term reflecting the "inner capacity" to overcome the difficulties associated to the student life and learning, supporting an adaptation process within "well-being". However, one could argue that students need to adapt to challenges faced due to the school environment, too [70]. The concept of "comfort", which is closely associated to research on the built environment, was also associated with the word well-being [18,71]. According to Hanc, McAndrew and Ucci [18], 42 studies out of the 59 eligible ones in Hanc, McAndrew and Ucci [18] review, mentioned the theme of environmental quality, satisfaction and/or comfort when referring to the concept of "well-being". Other researchers attempted to define well-being within the context of "sustainable buildings" and they argued that well-being is "a holistic concept comprising both physiological and psychological elements that can be subcategorized into physical, intellectual and emotional well-being corresponding to body, mind and spirit" [72]. Nevertheless, a direct and clear inclusion of aspects of the built environment was missing within the literature defining "well-being".

3.2. Definitions of health and well-being provided by experts and laypeople: Thematic analysis of survey responses

The thematic analysis of the open-ended questions regarding the definitions of health and well-being, the influencing factors of health and well-being and how the built environment could contribute to them of the online survey yielded seven distinct themes related to the definitions of health and well-being: 1) Health is an interconnection of physical, mental and emotional aspects without a universal definition, 2) Well-being includes even more than health: a state of living, satisfaction with yourself and interconnection with surroundings rather than a state of being, 3) Both health and well-being are necessary to function, move forward and live a satisfying and fulfilling life, 4) Health and well-being are interconnected and can influence/determine each other, 5) Health and well-being are affected by internal and external aspects, 6) Positive impact of built environment via its aesthetics, functionality and impact on the psychology of occupants, 7) Negative impact of built environment due to lack of environmental comfort. All these themes high-

light the complexity of both terms and the numerous factors that contribute to their definition. See Supplementary Material for more explanation how the themes were derived based on certain codes. The following sub-sections highlight examples and differences between these seven themes.

3.2.1. Health is an interconnection of physical, mental and emotional aspects without a universal definition

Although participants mentioned similar definitions of health as described by WHO, which emphasized the "absence of disease", they interestingly added some other factors that could contribute to the concept of "health" and looked at "health" from a "mental" rather than from a "physical" perspective:

> '[Health] is the absence of ailments, mental, physical and emotional health, maintaining a lifestyle that serves one's different aspects of health.' [expert]

and

> '[Health] means that I'm capable of doing any form of activity, feeling good, and not being depressed or [have] any kind of mental health issues that would make me mentally unhealthy.' [layperson]

Other participants made the interconnection of physical, mental and emotional aspects clearer by saying:

> 'Health means both physical and mental wellness. A state in which I don't think I require medical supervision nor do I worry about myself. It also means having the drive to wake up and do things so on that part [of] health in my opinion is connected to happiness.' [layperson]

and

> '[Health means] not getting sick often, being able to do the things one needs to with relative ease without physical pain. Feeling fine physically, emotionally, mentally.' [layperson]

and

> 'Health goes a lot deeper than physically feeling ill, it is how a person feels mentally, emotionally as well. All these are equally important to each other' [layperson]

One participant also included the environment in this interconnection:

> 'Health to me is a combination of physical and mental factors (when talking personally) or the environment, economy and political climate when talking externally.' [layperson]

Two other participants used a more holistic term to describe health, such as being "alive", a term which includes numerous underlying functions and processes, which could be affected by the environment [73]:

> ' … A feeling of being alive and healthy and operating at a good level of energy and stamina' [layperson]

And

> 'Health means life. If someone has a good health they will live a longer life and would be able to enjoy it … ' [layperson]

Lastly, one participant viewed health as a continuum:

> 'Health is somewhat subjective term in that it implies a range of condition from peak fitness down to simple absence of a debilitating condition. It is also relative to our usual physical and mental state. Arguably, those born with or later afflicted by a condition that renders these states "sub-optimal" in relation to the population as a whole, can still said to be healthy, if there are no other conditions that exacerbate their existing one … As body and mind are not separate it follows that both physical and mental health need to be considered as a whole before any assessment of health of an individual is made'. [layperson]

3.2.2. Well-being includes even more than health: a state of living, satisfaction with yourself and interconnection with surroundings rather than a state of being

A general description of a particular state of living was used from the participants to explain what well-being means for them, which seems to be in addition to the interconnection of physical and mental health described in the previous theme. The described state of living was emphasizing the sense of security and happiness:

> 'Well-being means that both mind and body are in good health. That is eating a (mostly) balanced diet and getting enough exercise for your body. This should lead to a healthy brain, supplemented by social activities which are also important.' [expert]

and

> '[Well-being for me means] being able to pay bills without worry. Feeling secure about your future. Being able to do daily activities without pain. Mental health play an important part of it.' [layperson]

and

> '[Well-being for me] is about happiness and keeping my family happy and healthy'. [layperson]

and

> 'Well-being is having confidence, a sense of purpose and good relationships with friends and family. It includes feeling secure in your way of life and finding. [layperson]

and

> 'Well-being means how satisfied I feel about my emotional, mental and physical state. It represents how well I am managing my life and the environment I am currently in.' [layperson]

The concept of "peace" became also apparent in the answers of the participants on what well-being means for them:

> 'Well-being means tranquillity. Being at peace with my mind, body, and soul. This means I eat what I need not necessarily what I crave. Then I hang out with people that encourage me and grow me.' [expert]

and

> 'Well-being for me is a state of being at peace with my emotions, body and relationships' [layperson]

and

> 'A sense of calm and peace. Being comfortable with what is happening to me and having the ability to influence that if necessary. The process of "looking after" myself to be healthy and well.' [layperson]

Additionally, having healthy habits was mentioned as part of well-being:

> 'Feeling healthy, eating healthy food, exercising … ' [layperson]

3.2.3. Both health and well-being are necessary to function, move forward and live a satisfying and fulfilling life

Participants emphasized that both health and well-being are important for people's future and that impairment in one of those aspects could lead to a less satisfying, fulfilling and functioning life. Participants reported that health is necessary to move forward in life, especially during the COVID-19 pandemic.

> '[My health is] good because I realized I had resilience in finding the positive aspects of the lockdown and find internal resources.' [expert]

and

> 'I think due to these uncertain conditions and pandemic I have some dark points in my mind that sometimes affect my daily activities and also my mental conditions.' [expert]

Additionally, participants commented on the impact when "health" or "well-being" is afflicted and how it can act as a warning for our ability to function or live a satisfying life:

> 'Health is more serious, if it's affected it can cause more negative results, while well-being if affected you can live with it just not very happy or productive.' [layperson]

and

> 'I would like to see well-being more like an early-warning system. It is much more present in our day to day life. Health is more something we notice when it is gone or affected.' [expert]

and

> 'Health means that you are well enough to carry out your daily [activities] without inconvenience or issue or underlying issues that are affecting you.' [layperson]

3.2.4. Health and well-being are interconnected and can influence/determine each other

Despite the interconnection of numerous aspects to define health and well-being individually, participants reported that health and well-being are interconnected too, and influence each other, as previously suggested in the literature [74]:

> 'Well-being is necessary to be in good health and good health cause well-being' [layperson]

and

> 'One feeds into the other. Without one, you're unlikely to have the other to any great extent.' [layperson]

and

> 'If you are healthy, then your well-being is in a good place. By aiming to live healthily can improve your well-being significantly.' [layperson]

Interestingly, conflicting views were provided regarding the overarching concept. Some of the participants considered health as part of well-being, other participants supported well-being as part of health supporting WHO's definition [6].

'Health is a measure of well-being of the mind and body of an individual or group.' [layperson]

and

'Health is a fundamental part of well-being, it is impossible to separate them.' [layperson]

and

'Well-being is a prerequisite for good health. Absence of well-being will lead to impaired health.' [expert]

Lastly, some of the participants found it difficult to distinguish "health" from "well-being" (21 % reported that there is no difference between "health" and "well-being"):

'I think they represent fundamentally the same things and it's hard to differentiate between the two. They both deal with all aspects of a person's condition.' [layperson]

and

'I feel these words are very close, rather synonymous.' [expert]

3.2.5. Health and well-being are affected by internal and external aspects

Participants reported numerous factors that can affect health and well-being such as:

'My day-to-day activities are very important like exercise, running, etc can influence my personal well-being.' [layperson]

and

' … good food, relaxation, motivation, exercise, companionship, purpose, security.' [layperson]

and

' … finances, diet, exercise, stress levels, genetics, luck' [layperson]

Several participants reported the influence of the environment on health and well-being before being asked:

'.. unspoilt environment, avoiding stressful situations, healthy food, right quantity of free time and rest, sport, good people around you.' [layperson]

and

' … happiness, hunger, location, smell, air' [layperson]

and

'eating healthy, exercising, good habits, clean environment' [layperson]

and

' … sleep, food, surroundings, inherited illness, viruses, money, access to healthcare, medicines, mind, neighborhood … ' [layperson]

3.2.6. Positive impact of built environment via its aesthetics, functionality and impact on the psychology of occupants

The positive impact of the built environment was recognized by several participants, who emphasized its effect on the psychology of the occupants:

'[The built environment] contributes to stay healthy,[provide a] good atmosphere and to keep [people] energized.' [layperson]

and

'Good color combinations, safety, stimulating, relaxing, useful.' [layperson]

Some participants described more practical implications of the built environment on our health and well-being by focusing on distinct aspects of the built environment such as indoor air quality, presence of biophilia, acoustic aspects and its contribution to social relationships. Interestingly, there were less references to the thermal aspects of the environment.

'Just providing comfort in the worst seasons and when not feeling good. Using natural materials for construction could help, like wood. Improving aeration and granting a no-roof open area to catch some sunlight could help too.' [layperson]

and

'Clean air, water, plants are essential for our personal health and well-being.' [layperson]

and

'I feel much better being at home surrounded by family members … as for the built environment, I feel positive if it's clean, less noisy, and people are friendly.' [layperson]

and

'Built environment can promote physical activity and social interaction.' [layperson]

and

'Providing you with a healthy and balanced space to work, the proper light, the right chair for the time in front of your computer, having plants, and a healthy and balanced environment to work, a clean and organized space could affect positive in your performance during the day.' [layperson]

and

'[The built environment contributes positively] by providing shelter, facilities, utilities, security, comfort, protection, peace and quiet' [layperson]

3.2.7. *Negative impact of built environment due to lack of environmental comfort*

The negative impact of the built environment was described within the context of the COVID-19 pandemic.

'In this COVID-19 situation, [the environment] leads to more anxiety, depression, agitation and [feeling] sad.' [layperson]

and

'If your space is dirty or unorganized, it may contribute negatively to your well-being.' [layperson]

However, more general negative effects of the built environment were additionally reported:

'Dark spaces, lack of connection to nature, thermal discomfort and lack of opportunity to adapt or change circumstances, loud noise, situations that spread disease, lack of way finding help, feeling of being surveiled, dehumanised security measures.' [expert]

and

'A poorly built environment makes me feel a lot more sad, lazy and makes studying and working very hard.' [layperson]

and

'If you don't separate the spaces for work from the places where you rest, if you don't have a proper desk a chair to work, if your place is messy, if you don't have mental breaks, and if you can't share time with your family it could affect dramatically your physical and mental health.' [layperson]

and

'[The built environment can cause] isolation, boredom, depression, despair, loneliness, being trapped.' [layperson]

3.3. *Cluster analysis*

A four cluster solution was supported. Theme 2, Theme 4 and Theme 3 had the highest predictor importance to this result, with an importance of 1.0, 0.8 and 0.6 respectively. The least important theme, was Theme 5 which referred to the internal and external factors influencing health and well-being. The themes being reported in each cluster are indicated in Table 2. The cluster quality was good (Silhouette measure of cohesion and separation: 0.6).

3.4. *Cluster demographics*

The demographic characteristics of each cluster are presented in Table 3. Cluster 3, which was the cluster with the highest number of respondents, included a bit older participants, around the age of 36 years old and above, which included an almost equal number of males and females, the most educated sample, who were mainly married or in a cohabiting relationship, of middle economic class and included participants who were not engaged in research and had the highest number of people proportionally with a current clinical

Table 2
Themes reported in each Cluster.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Theme 1 – Health as an interconnection	✓	✓	✓	✓
Theme 2 – Well-being more than health	✓	✓	✓	X
Theme 3 – Both necessary to function	X	✓	✓	X
Theme 4 – Interconnection of health and well-being	✓	X	✓	✓
Theme 5 – Both affected by internal and external aspects	✓	✓	✓	✓
Theme 6 – Positive impact of BE	✓	✓	✓	✓
Theme 7 – Negative impact of BE	✓	✓	✓	✓

Table 3
Demographics for each cluster.

	Cluster 1 (N = 34)	Cluster 2 (N = 30)	Cluster 3 (N = 51)	Cluster 4 (N = 21)
Age group				
18–25	7	6	2	1
26–35	12	11	3	10
36–45	8	6	13	4
46–55	6	1	14	1
56–65	1	3	13	0
66–75	0	0	6	0
Gender				
Male	15	10	26	6
Female	19	17	25	10
Education				
Part of high school	0	0	2	0
High school	2	2	10	1
Part of undergraduate degree	4	3	7	0
Undergraduate degree or college	12	4	14	1
Part of postgraduate degree	1	5	3	3
Postgraduate degree	11	4	9	8
PhD or higher	4	9	5	3
Other	0	0	1	0
Marital Status				
Single	5	11	10	4
In relationship	9	4	5	4
Married/in a cohabitating relationship	19	11	29	8
Divorced	1	1	5	0
Widowed	0	0	1	0
Economic status				
High	5	1	2	2
Middle	25	24	33	11
Low	4	2	16	3
Employed				
Full-time	20	18	21	13
Part-time	5	2	8	3
Not at all	3	4	4	0
Retired		1	9	0
Unemployed due to disability	1	0	1	0
	Cluster 1 (N = 34)	**Cluster 2 (N = 30)**	**Cluster 3 (N = 51)**	**Cluster 4 (N = 21)**
On sickness or parental leave	0	0	1	0
Other	3	2	7	0
Reported Engagement in Research				
Yes	7	11	4	5
No	26	16	47	11
Sample				
Laypeople	27	13	47	7
Researchers	7	17	4	14
Current diagnosis				
Yes	7	6	20	3
No	27	21	31	13

*No responses are not included in this table but are reflected when the numbers do not add up to the total cluster number.

diagnosis. The least populated cluster was cluster 4, which included younger educated participants, who were more likely to be employed full time. Cluster 2 included people with a completed PhD and above and who were more likely to be involved in research. Cluster 1 included younger participants, mostly with a postgraduate degree, who are currently more likely to be employed full-time and assign themselves mainly in the middle economic class.

3.5. Correlations of clusters with health, well-being and area of expertise

Participants' clusters were only correlated to participants subjective health status, although their subjective health status was significantly correlated with their total well-being score in WHO-5. Further information about the correlation analyses are presented in Table 4.

3.6. Post-hoc analyses

Post-hoc analyses were conducted to identify if there were any significant differences between the average WHO-5 total scores and average subjective health status of the participants between clusters, which could indirectly be influencing the correlation between cluster and subjective health status. The results from the post-hoc analyses are presented in Table 5. Although significant differences

Table 4
Correlations between clusters, WHO-5 total, Subjective health status and area of expertise.

	Cluster	WHO-5 total	Subjective health status
Cluster	–	–	–
WHO-5 total	−0.09	–	–
Subjective health status	0.19*	−0.46**	–
Area of expertise	−0.01	−0.10	0.15

*p < .05, **p < .01.
*Area of expertise was separated into the following categories: i) computer science/IT/graphics/software engineering, ii) engineering, iii) finance/business administration, iv) social sciences, v) law, vi) healthcare/child care, vii) neuroscience/psychology, viii) architecture/building physics/environment, ix) education/teaching, x) languages/translation, xi) installer/construction/handicraft/electrician, xii) other sciences, xiii) librarianship, xiv) communication/writing/editing/journalism/media, xv) art, xvi) marketing, xvii) tourism, xviii) logistic/sales/retail, xix) customer service/civil service/administration.

Table 5
Differences observed between clusters on their average WHO-5 total and average subjective health status.

	Cluster 1 (N = 33)	Cluster 2 (N = 27)	Cluster 3 (N = 50)	Cluster 4 (N = 16)	$X^2(3)$	Significance
***WHO-5 total** M(SD)*	54.06 (18.98)	47.70 (18.14)	47.24 (24.09)	50.25 (19.70)	2.27	.52
***Subjective health status** M (SD)*	2.09 (0.62)	2.07 (0.55)	2.41 (0.78)	2.31 (0.48)	6.82	.08

were found between clusters for subjective health status, no significant differences were observed between clusters in terms of subjective well-being (WHO-5 scores).

4. Discussion

This study aimed to investigate the definitions of "health" and "well-being" within the literature, among researchers and within the general population. Findings from the REA review indicated a shift in paradigm in the last few years, with researchers focusing more on the perception of "health" in a multifactorial continuum than the restricted black-and-white "utopian" version of health as described by the WHO [6]. For the definition of "health" focus has been placed on the ability of people to function and adapt to a situation despite the presence of any health-related issues. Researchers also attempted to include other aspects beyond physical, mental and social health, such as social structures, biology and environmental policies. The definition of "well-being" appeared to be more encompassing including aspects of subjective and objective "well-being", such as meaning in life and indicators of quality of life (i.e. income, food, education) respectively. The findings from the qualitative survey also reflected this shift in paradigm.

The majority of the participants focused on mental status to describe "health" instead of physical status, giving emphasis to the subjective interpretation of health. There was a common agreement that "health" and "well-being" are umbrella terms and that they are influenced by external and internal factors. The more educated the participants were, the less they believed that "health" and "well-being" are interconnected, which raises the question whether the distinction between "health" and "well-being" is driven by knowledge on the two concepts. It also raises the question whether the two concepts of "health" and "well-being" can be really distinguished from each other based on their definitions given the common variables underlying both concepts, such as mental and social aspects. One could debate that experts on the topic already distinguish these concepts based on their underlying mechanisms, which are not reflected within the stated definitions. For example, within the context of the built environment, health can be perceived from an adaptation perspective both in the REA review and in the thematic analysis while well-being reflected the feeling of comfort elicited by the built environment, which potentially leads to the general well-being of a person. Consequently, including these underlying mechanisms in the definitions might provide a clearer distinction between the two evolving terms. Making the decision to either merge the two concepts under one umbrella, or completely distinguish them by removing common determining factors and adding their underlying mechanisms might aid researchers to better work with these terms and to avoid confusion between disciplines.

Only a few participants commented on the contribution of the built environment to "health" and "well-being" before being asked directly. The air quality of a space was considered important contributor to the definition of "health" particularly during the COVID-19 pandemic, while aspects, such as temperature conditions were completely neglected despite the global worries for climate change. This could be an indication that less information is provided to the general public on the contribution of the core aspects of the built environment (i.e. air quality, visual, acoustical and thermal conditions) [75] on health, although some participants were able to name a few contributions. A clean and organized space with plants was considered to positively contribute to "health" and "well-being". This layperson view is supported by literature, which supports the positive effects of biophilic elements on health and well-being [76]. A space that entraps and isolates a person from other people and activities was considered a negative contributor to "health" and "well-being". This is also supported by literature on open spaces and their positive contribution to social interaction and hence, potentially health and well-being [77,78]. An alternative explanation could be the effect of season on the outcomes, since the questionnaires were administered during a transition season (March & April) without temperature extremes, which could have directed the attention of the participants away from the thermal conditions of their environment and their influences on health and well-being.

In general the narratives on the contribution of the built environment to "health" and "well-being" supported the Engineer, Gualano [36] framework. The narratives included references on the space layout and characteristics and how someone could adapt or

feel comfortable within the environment leading to changes in resilience, the environment itself, movement, relationships, spirituality and nutrition. Less references were collected regarding the influence of the built environment on sleep.

Four different cluster groups of people were derived from the data: Cluster 1 – a group of people who believe that either "health" or "well-being" is necessary for someone to function and live a rewarding life, Cluster 2 – a group of people, who support that there is no interconnection between "health" and "well-being", Cluster 3 – a group of people, who support that both terms are umbrella terms and they are interconnected, and Cluster 4 – a group of people, who support that "health" is more than "well-being" and only one of the two is necessary to function. Significant differences were observed between clusters in terms of their subjective health status but not on their subjective rate of well-being, which could explain the differences observed between clusters. Additionally this finding could reflect individual differences observed in the perception of what "health" means to each person, in contrast to possibly a commonly agreed perspective on "well-being". Cluster 3, which was the only group that supported that both "health" and "well-being" are important and that they are interconnected, scored higher on their subjective perception of their own health despite being on average older than the participants, who were grouped into other clusters. Taken into consideration that older people are more likely to experience physical problems [79], it is hypothesized that their subjective perception of the definition of health influenced also their subjective rating of their health, which would be an important methodological factor when assessing laypersons' health status.

These findings are in accordance to previous studies on the definitions of "health" and "well-being", which suggest that both concepts of "health" and "well-being" include more than physical aspects and that the definitions of "health" and "well-being" are very subjective [15,24]. This subjectivity observed within the definitions might be one reason why a universal definition of "health" and "well-being" does not exist already. Another reason could be the difficulty observed in operationalizing the continuum of all the underlying contributing factors to "health" and "well-being" as Hafen [8] suggested. However, the findings of this study should be considered in the light of its limitations. Firstly, the study was conducted during the COVID-19 pandemic, which likely influenced participants' responses. The scales used were not consistent between questions, which might have introduced some confusion to the participants. Additionally, the outcomes are restricted to a convenience sample and a specific ethnic/culture background. Therefore, it is recommended that further studies are conducted on the topic to explore definitions of "health" and "well-being" within other ethnic cultures, to ensure the inclusion of as many contributors to "health" and "well-being" as possible and to identify other potential grouping clusters to tackle the individual differences observed. Despite the restricted sample included in this study, the outcomes provide important insights on the individual differences in perceiving "health" and "well-being" and their correlation to subjective health status. Furthermore, the study provides a combination of professional and laypeople's perspectives, which accounts for the limitation of including just laypeople, who might not be aware of health/well-being risks and promotional factors like the built environment, as it was reflected in their responses.

Laymen people were less confident in distinguishing the two concepts than researchers and found it difficult to explain how the built environment could contribute to health and well-being beyond the psychological component. Nevertheless, the results from the survey mainly reflected the summary from the REA review since the change in paradigm towards a more subjective interpretation of health and well-being was apparent within the participants' responses. Similarly to the state-of-the-art, less laypeople supported the absolute presence or absence of health as described by WHO, suggesting that researchers should cite more often definitions that explain the concept of "health" on a continuum.

4.1. Suggested definitions of health and well-being

Given the findings of the aforementioned study, we suggest that it might be best to clearly distinguish the two concepts using their underlying processes and propose two distinct working definitions for health and well-being, which could be used as a basis for developing a definition within the built environment research across disciplines.

We define health within the built environment as the ability of a person to physiologically, psychologically, and socially adapt to the prevailing conditions consisting of physical aspects of the indoor environmental quality like thermal, visual, acoustic and air quality conditions, spatial layout, aesthetics, among others. This definition excludes maladaptive changes resulting from the adaptation to the physical aspects of the indoor environmental quality, such as maladaptation to industrial chemicals caused by occupational and environmental exposures [82]. Well-being within the built environment is defined as the outcome of a repeated feeling of comfort elicited by the prevailing conditions consisting of physical aspects of the indoor environmental quality like thermal, visual, acoustic and air quality conditions, spatial layout, aesthetics, among others within healthy limits. We consider that long-term exposures to the same comfortable indoor environmental conditions might go beyond healthy limits, due to the reduced opportunity of an individual to engage in adaptation behaviours [83]. The concept of comfort within the definition is perceived as a multidimensional construct, which includes the subjective perception of the individual, and is also influenced by the feeling of control of environmental conditions [84,85]. Both "adaptation" and "comfort" depend on individual characteristics and preferences, reflecting the person-centered approach adopted for developing these definitions. Future studies could empirically explore these definitions and revise them accordingly.

5. Conclusions

In conclusion, the current mixed-methods study conducted a REA and a qualitative study to explore the definitions of "health" and "well-being" within the literature and among researchers and laypeople. It was found that the definitions of "health" and "well-being" have become more encompassing of different underlying factors throughout the years. However, there are still important contributors to "health" and "well-being", which are mostly neglected, such as the contribution of the built environment. It is suggested that a universally-agreed definition of both concepts is restricted to the lack of basic understanding how the two concepts could be distin-

guished, which contributors should be included in the definition of each concept, how those contributors can be operationalized on a continuum and how individual differences influence these definitions. Working definitions for health and well-being within the built environment were suggested, operationalizing "health" via its adaptation component and "well-being" via the feeling of comfort elicited by environmental conditions. Future studies could explore these definitions further until an established definition is agreed upon, which will encourage multidisciplinary collaborations. As long as such definition is lacking, it is indispensable to clarify one's own definition of health and well-being when working in collaboration with other researchers or laypeople.

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CRediT authorship contribution statement

Rania Christoforou: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Writing – original draft, Writing – review & editing. **Svenja Lange:** Data curation, Formal analysis, Writing – original draft, Writing – review & editing. **Marcel Schweiker:** Data curation, Funding acquisition, Methodology, Project administration, Resources, Supervision, 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.

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

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