Article

Healthy and Inclusive Neighbourhoods: A Design Research Toolkit for the Promotion of Healthy Behaviours

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Abstract: Addressing urban health through the built environment requires cross-disciplinary approaches, where design plays a crucial role. Gaining insights from a design-led research perspective to find situated solutions for promoting healthy behaviours is a requirement that must be clarified. Therefore, we ask the following question: what kind of design research instruments may help in applying the urban health approach from a design-led perspective? With this research question, and to contribute to the mentioned issues to be clarified, this paper presents the application of a framework adopted in a local action research project, namely the Healthy Neighbourhoods Hub (HNH) research project. The HNH framework was used as a design research toolkit for collecting contextual data and identifying insights to build scenarios and strategies for all the involved design disciplines. Around 169 participants among local stakeholders and citizens in two case studies in the city of Florence (Italy) were involved in semi-structured interviews, Healthy Labs, and Open Space Lab. As a result, the participatory activities provided a wide variety of qualitative data, such as themes related to user needs ($n = 15$), critical issues and points of weakness ($n = 32$), potentialities and points of strength ($n = 27$), strategies ($n = 38$), design insights ($n = 30$), and a collection of 40 local projects (40 in 5 themes), that contributed to the subsequent co-design activities of the project. This richness suggests the potential of using the adopted resources to build the HNH Toolkit as a design research instrument for addressing urban health and gaining design knowledge for the promotion of healthy behaviours through the design of the built environment.

Keywords: healthy and inclusive neighbourhood; design thinking; urban health; design research; co-design; participatory research
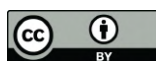
1. Introduction

1.1. Urban Health, Neighbourhoods, and the Built Environment

Studies that address urban health underline the fact that the built environment is a determinant of health; places, streets, buildings, urban furniture, activities, and social capital [1–8] determine the possibility for the citizens of an area to adopt healthy lifestyles (e.g., favouring walking, cycling, and socialising) and thus improve their health condition through prevention [9–11], including mental wellbeing [12]. As shown in several types of research, the neighbourhood's built environment is crucial in promoting citizens' health by assuming both a housing perspective (e.g., [13,14]) and a street perspective; factors such as walkability, crossroad safety, bus stop quality, cyclability, and street furniture are crucial for healthy neighbourhoods [15–18], in addition to avoiding exposure to health risks, such as air pollution and potential violence [19–21]. Indeed, these kinds of research have the identification of several urban factors that impact citizens' health in common. These are, essentially, the core tenets of possible urban health strategies (cf. [22]) that can also be

used to determine when a neighbourhood is healthy. In this paper, we refer to the urban health approach as being applicable at the neighbourhoods scale, both as healthy places and at a scale where it is possible to better understand people's living, experience, and existence (see [23]). In addition, we mostly focus on the built environment as a determinant of urban health [24], even if we are aware of the fact that health issues in cities can be addressed by several different determinants, such as those studied in the context of smart cities (e.g., [25,26]).

Healthy neighbourhoods' issues are also addressed from an age-friendly environmental perspective in line with reports and indicators provided by the World Health Organization [27,28]. From this perspective, some studies highlight the fact that the built environment contributes to social relationships by acting on factors of the neighbourhood, such as the dimensions and conditions of pavements, seating quality, and spaces with shelters [29], as well as subjective factors such as the perception of living in a safe neighbourhood (e.g., see [30–32]). Research that assumes similar perspectives also proposes the "streets for life" approach [31,32], where familiarity, distinctiveness, comfort, legibility, accessibility, and safety comprise a framework of crucial aspects for promoting streets that are enjoyable for everyone, including older people with dementia, for example. As often happens for research in this area, the "streets for life" approach includes recommendations and checklists for designing both new urban areas and maintaining existing ones. Indeed, checklists are often provided as tools for design with a health lens. Research that addresses urban health often provides this kind of output, such as in the following cases:

- The "Lifetime Neighbourhoods" [33] approach proposes a checklist of questions to understand how to enhance a neighbourhood's quality, listen to residents' needs, design accessible and linked environments, promote social networks, and support home quality.
- Guidelines on active design [34–36] provide checklists that help in making healthy places, leveraging inclusive spaces, facilities, furniture, and places to encourage physical activity, walking, and cycling.
- Forsyth et al. [23] provide checklists based on principles for understanding (i) the process (i.e., exploring neighbourhoods, understanding the needed changes, and implementing the changes) and (ii) the components (i.e., planning for vulnerable people, fostering multiple health dimensions, making places accessible, connecting places, and reducing hazard exposures) to make places healthier.
- The healthy street approach also provides a checklist based on a framework for understanding how to improve the quality of transport through the built environment [16,17]. Ten sets of indicators are presented that focus on observing and analysing aspects of streets, such as the possibility for pedestrians to walk safely, enjoy contexts with things to see, breathe clean air, easily find seats to rest, or be able to cross busy streets safely, just to name a few. All of these aspects are presented as measurable and assessable in both a qualitative way and a quantitative way.
- The City of London Street Accessibility Tool (CoLSAT) [37] provides a series of instructions for designing more comfortable streets based on twelve needs profile segments based on disability categories.
- London [38] introduces the "diagram of seven health targets" as a checklist for understanding how to plan to improve health. They work at the scale of urban planning that should follow the seven health targets (i.e., clean air, contact with nature, social interaction, feeling safe, living somewhere healthy, peace and tranquillity, and regular exercise).
- The Italian Ministry of Health introduced a framework for urban planning with a health lens [39] based on criteria that work as urban planning strategies [7,8,40]. The ministry, by taking suggestions from previous research (cf. [40]), provides criteria to be assessed for understanding how providing an urban health strategy. The criteria are divided into macro-areas: "environment" (air and smells, water, acoustic noise pollution, and ionizing and non-ionizing radiation); "soil and subsoil" (land

consumption, soil permeability and water management, geological, hydro-geological, and seismic risk, contaminated sites, and areas with high environmental risk); "sustainability and hygiene of the built environment" (solid waste collection, urban waste collection and disposal, energy, and reduction in emissions); "urban and social development" (residential density, functional and social mixitè, universal design, and social inclusion); "mobility and transport" (street infrastructure network and parking systems, public transportation, and pedestrian and cycling path systems); "outdoor spaces" (outdoor space systems, urban green systems, lighting, and visual comfort).

- The UN-Habitat Urban Lab provides a toolkit [41] for understanding how to design a sustainable neighbourhood where health is an implicit topic.

All these checklists are mostly based on frameworks that shape the basis for understanding how to promote health through the built environment. While it is still difficult to find tools—or, more specifically, protocols to understand how to transform the analysis provided with the checklists to design insights for the transformation—this is essentially a design problem. At the same time, these lists and guidelines mostly represent the urban planning scale with lower indications for different lower design scales (e.g., product design for urban furniture).

However, the research on these topics is vast, and some frameworks in the literature address broad perspectives of urban health (beyond the built environment). For instance:

- The Inclusive Healthy Places Framework [42] proposes drivers and indicators based on four principles focused on the context, process, design and programmes, and fostering conditions.
- The England National Health Service [43] provided the "Putting Health into Place" guidelines to create healthier communities using ten principles divided into sections for understanding the following: (i) citizen needs; (ii) things to design for improving health through places; (iii) developing and providing health care services.
- The "restorative cities" perspective [44] offers a view of how urban design can favour mental health and wellbeing through restorative environments made by equal accesses (inclusive), nature at the core (green), access to water (blue), five senses immersing (sensory), social cohesion (neighbourly), wellbeing through mobility (active), and creativity and play (playable).
- The WHO [3,45] introduced suggestions, best practices, and entry points for health as inputs and outcomes in urban design and territorial planning.

In general terms, the resources that are available for planning healthy places are vast. For instance, the World Health Organization [46] built a repository of two hundred open-access resources for designing urban areas from a health perspective. Only nine of these resources respond to the keyword "neighbourhood", suggesting a need to address this dimension. In addition to those already introduced (see [23,33,41]), these resources focus on the neighbourhood as a strategic portion of a wider healthy city environment plan (e.g., [47]) or for developing "active neighbourhoods" for an "active city" [48]. By closing this perspective, it is worth mentioning that, despite not being so common in the literature, some research addresses the health issues for the neighbourhood scale from an inverse perspective. It is the case of the Unhealthy Neighbourhood Syndrome framework [49] that takes into account perceived and objective sets of factors based on physical and social environments. They serve as "symptoms" to analyse and provide advice for decision making on urban design.

These kinds of research provide frameworks, guidelines, and checklists mostly from an urban planning perspective. What is difficult to find is a design research perspective that allows us to address the urban health approach from different design disciplines (e.g., urban product design, product–service system), or how to apply the aforementioned resources to obtaining contextualizable design insights to guide design interventions. Indeed, through this research work, we explored what kind of design research instruments may help in applying the urban health approach in neighbourhood contexts by adopting a design-led perspective. This is the research question that we addressed both from empirical experience

with an action research project at a local scale and as an aspect that we found there to be a gap for within the design literature. For this reason, in the next paragraph, we introduce studies which can be called upon to frame clearer connections among contemporary design cultures [50,51].

Design Thinking, Collaborative Design, and Health

What needs to be underlined is that addressing health issues in urban contexts requires multidisciplinary approaches, where design is crucial in connecting public health and the built environment [52]. In this context, design thinking has been described as a method to develop urban health solutions based on the situated exploration of people (specifically, older people) [5]. This sounds similar to approaches such as active design [34–36], where creative design solutions provide stimuli and incentives for assuming healthy lifestyles and behaviours through physical activity, through the design of the built environment. The built environment, in terms of services and place proximity, can be interpreted through the caring concept. This is described in Manzini's idea of the city that cares [53,54], which is based on proximity dimensions [55] and emerging models of the 15 min city [56,57]. In this context, the design for social innovation [58] plays a strategic role in developing the condition for enacting proximity in a city that cares [53]. The urban health literature also emphasises the importance of engaging local communities to both improve awareness and embed citizen voices. Some authors emphasize the importance of involving, empowering, and developing communities for health purposes by driving processes from both national/local health departments [59] and universities [60]. Involving citizen voices for healthy neighbourhood purposes is also a way to embed potentially excluded city voices [61], including traditionally uninvolved citizens, such as children (e.g., [62]), or as in co-design activities engaging stakeholders to work in an active ageing society (see [63]). Resources that promote guidelines and principles for building healthy places suggest carefully understanding citizen needs and the status of the environment before any intervention is made (e.g., [23,33,47]); a few provide toolkits on how to involve communities in the research and planning process (e.g., [48]). Design, in the form of co-design (thinking), plays a strategic role through practices for engaging communities, developing participatory action research processes, co-analysing data, and understanding mechanisms of change (e.g., [64,65]). Co-designing the neighbourhood's built environment is a strategy in applying design to promote health. Indeed, the built environment has an impact on our behaviours, where design solutions can create the triggers for healthy or unhealthy choices [66], especially if a design for behaviour change [67] approach is adopted. Similarly, the ways of thinking which "nudge" (see [68]) through design can impact the way we make healthy or unhealthy choices through our behaviours. In this direction, disciplines such as product design may help to creatively impact the way urban furniture can promote health through factors that should focus on "physical exercise functions, communication seating facilities, ease of use and understanding, resting and sitting facilities, and facility structure" [4]. In general terms, design thinking is a strategic resource to be adopted for co-designing healthy neighbourhoods, and for emphatic problem solving in urban planning (e.g., [69]). From a general design research perspective, research through design (RTD) [70–72] may also help in assuming the design process as the epistemological medium to gain knowledge for the promotion of health through the built environment. However, the way in which gaining insights from a transdisciplinary design-led approach, to be transformed into situated design solutions for the urban health approach, remains unclear. We aim to contribute to the solutions for these issues by facilitating a relationship among multidisciplinary teams of designers, citizen needs, and situated problems, and by assuming a health design thinking lens. We argue that we need to apply "design research" tools to the discussed issues to address the complexities of health promotion through the built environment from several levels and disciplines, starting from the neighbourhood perspective.

1.2. The HNH Framework

The paper presents the application of a framework adopted in a two-year action research project, Healthy Neighbourhoods Hub (HNH) (Quartieri Sani HUB) [73,74]. This study introduces the HNH framework as a design research tool for addressing the urban health approach through the built environment and with a multidisciplinary design thinking perspective. The HNH framework was adopted in two case studies in the city of Florence (Italy) for (i) developing participatory activities and (ii) exploring the actual status of the neighbourhood's built environment through expert observations. This study focuses on the usage of the framework for the first set of activities. The HNH framework is an output of the aforementioned project, with partners such as the University of Florence, the municipality of Florence, the Metropolitan City of Florence, the Local Health Authority, Central Tuscany (i.e., the Azienda USL Toscana Centro), the Florence Health Society (i.e., Società della Salute di Firenze), and an urban furniture manufacturing company (i.e., Metalco Group). The research team was made up of researchers from the Department of Architecture at the University of Florence. Four design disciplines (i.e., urban and landscape planning, architecture, and product design) were involved with two researchers each. The project started in January 2022 and the objective was to identify neighbourhood design scenarios and strategic factors for improving healthy lifestyles through the built environment [73,74]. The early research phases provided literature reviews and a collection of best practices to interpret the meaning of designing inclusive and healthy neighbourhoods from the involved disciplines. As an early result, "inclusion" [75–77], "healthy lifestyles" [10], and "proximity" [53,56] through design were identified as the core topics of the HNH framework [73]. These topics were interpreted through a framework (Figure 1) that describes seven themes for a healthy and inclusive neighbourhood [73]: (i) the neighbourhood for all, to ensure accessibility, inclusivity, and safety; (ii) the neighbourhood of interactions, to favour relations and citizen interactions; (iii) the active neighbourhood, to facilitate physical activities and the development of active places; (iv) the neighbourhood of the senses, to support pleasurable conditions for all the senses; (v) the green neighbourhood, to develop green neighbourhood strategies; (vi) the smart neighbourhood, to create conditions to inform citizens and let them communicate with the city; and (vii) the neighbourhood of 1500 m, that focuses on active mobility and intermodal public transport. The seven themes embed spatial and environmental factors that contribute to promoting the pursuit of physical, environmental, and perceptual health and wellbeing objectives at the neighbourhood level [73]. Each theme presents a series of characteristics that describe factors and variables for achieving a high-quality neighbourhood. The HNH framework was applied in five districts in two case studies of the city of Florence, both of which were in the presence of the public neighbourhood facility for health services (Casa della Salute, "the House of Health"—HoH).

1.3. Significance of the Paper

The novelty of this paper is related to two crucial aspects of applications of the urban health approach. First, the HNH framework is itself a novel interpretation of the urban health approach at the neighbourhood level and encompasses multidisciplinary support for understanding how the built environment can promote health in urban contexts. For instance, most of the literature focuses on urban planning as the main design discipline for driving spatial transformations. The HNH framework equally introduces urban planning, architectural design, and product design (e.g., for urban furniture) as entry disciplines for addressing the urban health approach through the neighbourhood's built environment. On the other hand, the paper presents explanations for how the HNH framework has been applied in real contexts to gain design knowledge for providing multi-level design interventions and promoting healthy lifestyles through the built environment. The HNH framework has been applied as a design research instrument by designers. With respect to the literature, we mainly focus on how designers can work with urban health frameworks to gain design insights for prompting healthy behaviours through the neighbourhood's

built environment, with implications for both urban furniture and strategic urban design. Consequently, if the presented framework is applied as it is presented in this paper, then it does work as a scalable, adaptable, and replicable design research toolkit—i.e., the HNH Toolkit. In addition, the HNH Toolkit presents a clearer understanding of its application in the design process. Indeed, differently from the literature, this paper focuses on an in-depth understanding of the design applications, from transforming the framework into a tool to designing the process for involving citizens and extrapolating relevant design insights from in-the-field experiences. This starts from the hypothesis that the HNH framework—if applied in action research projects—has the potential to provide design insights to develop contextual design knowledge for addressing the urban health approach with a set of design-led instruments.

Figure 1. The HNH conceptual framework (adapted from [73]).

Finally, to summarise this chapter, we first presented the literature that introduced the main theme behind this work, which is related to the application of the urban health approach at the level of the neighbourhood, where the built environment is a crucial determinant of health. Secondly, we introduce studies from the literature to understand how design and design thinking can be used in addressing the urban health approach (e.g., by adopting design thinking as a method, or through participatory design, and by design for social innovation theoretical perspectives). Then, we introduced the HNH framework as a result and a design research medium for an action research project developed in Italy. The HNH framework adopts a multidisciplinary approach, and it is introduced in this paper as a design research instrument for gaining design knowledge that is useful in understanding how one can adopt an urban health approach from a design perspective.

2. Methodological Approach

2.1. The HNH Framework as a Design Research Tool

We take up the HNH framework as a driver for producing design knowledge [58,78] in terms of understanding products, processes, and people (i.e., [79,80], design research taxonomy) for the co-design phases of the HNH project. Consequently, the framework has been used as a design research tool both for developing specific research material

and for designing participatory activities, enabling us to understand the contexts and the local actors in terms of needs, problems, opportunities, strategies, and design insights to define design scenarios and strategies. The HNH framework was used for developing semi-structured interviews, card sorting, non-formal encounters, Healthy Labs and Open Space Labs with local actors, stakeholders, and citizens in two case studies in Florence. Firstly, we co-designed the HNH framework presented in Figure 1 by involving the research team. Consequently, we co-designed templates, the praxis through the methodological constructs, and the instructions for involving participants to identify design insights by using the HNH framework as a toolkit (Figure 2). The "conceptual framework" (Figure 1) and the city's "case-study maps" were the two basic visualizations adopted in all the activities; these were jointly used with other materials and methods that we describe in the following paragraphs.
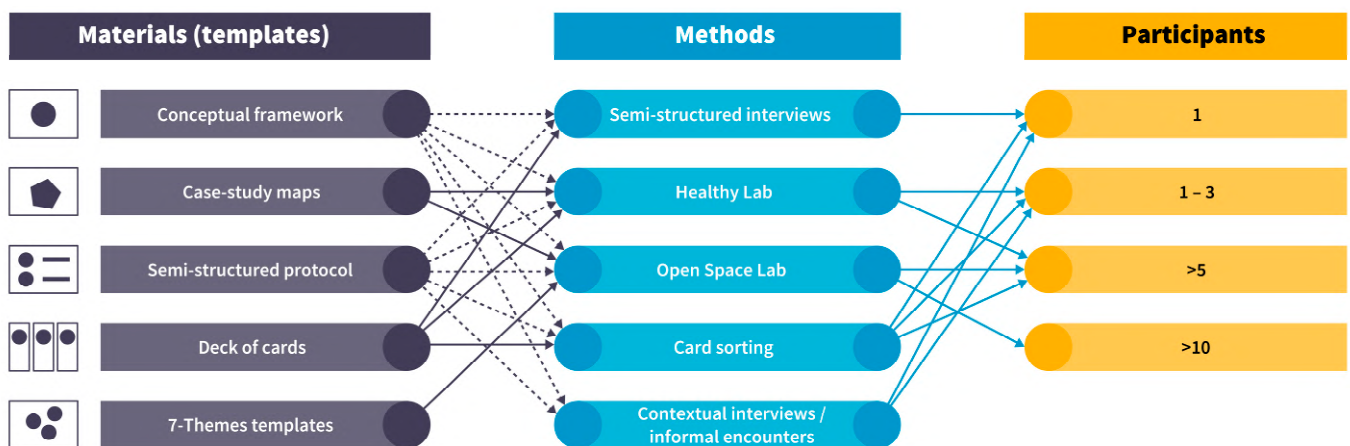

Figure 2. The synthesis of the designed materials and methods/techniques to apply the HNH framework.

2.1.1. Protocol Design for In-the-Field Activities

Firstly, we designed a common protocol to be followed for all the activities to involve citizens and stakeholders. We were interested in exploring the objective characteristics of the built environment and citizens' perspectives of the contexts of the case studies in the city of Florence. Specifically, we were interested in exploring the citizens' and stakeholders' perspectives on problems, opportunities, and critical and potential areas for the actual built environment; we were additionally interested in eliciting the citizens' needs, behaviours, habits, and preferences, according to the themes of the HNH framework. We designed a structure for involving people in semi-structured interviews and participatory laboratories with open-ended questions in five stages: (i) introducing the HNH project with information materials; (ii) presenting objectives and activities; (iii) following a semi-structured script for in-the-field activities (including interviews and participatory labs) with questions about peoples' needs, behaviours, (health) activities in the neighbourhood, problems, opportunities, and critical or potential areas of the neighbourhood; (iv) introducing the HNH framework with information materials; (v) exploring priorities, problems, opportunities, and the most important/interesting themes of the conceptual framework. The protocol was used as a guide, and as a semi-structured protocol (cf. [81,82]) to develop all the activities presented in this study.

In terms of privacy data treatment, every activity provided for the HNH project is aligned with Italian and European privacy laws for research activities. Specifically, every participatory activity of the HNH project (including Open Space Lab, Healthy Labs, and semi-structured interviews) provided an initial step for the engaged participants where information materials were administered, and participants were verbally informed about the data treatment. Nonetheless, no personal data were captured, except for the email addresses. In this case, informed consent was signed by the participants before the activity

started. Also, in the case of the involvement of health personnel in the spaces of the local health system, every activity was previously agreed upon with the local health system privacy office to both inform them about the activity and privacy policies and to align the provided activity with the legal requirements of the Italian health system.

2.1.2. Card Sorting Design

To support the main structure of the in-the-field activities, some cards were designed to enable card sorting and to facilitate the dialogues that were undertaken with non-experts and citizens on the HNH framework. According to protocol, card-sorting sessions were used as an investigative phase to relaunch the dialogue in a partially structured way [83]. In general terms, card sorting is a collaborative design technique mainly adopted to design and develop digital products and services [84]. However, it is possible to apply card sorting (with card-based tools) to address complex subjects in a short time, facilitating dialogues with non-experts [85]. The aim is to understand what people think by making meaningful associations and groupings for assigned themes and/or objects of the investigation [86]. We designed a seven-card-based tool of the seven themes of the HNH framework. Every card holds flat graphics (Figure 3) to synthesise the meanings of the theme, a title, and the general characteristics of each theme to be used as keywords for describing the complexity of the themes. Most of the time, the deck of cards was used in a printed version.

Figure 3. Cards designed for exploring the HNH framework with non-expert citizens and stakeholders.

2.1.3. Templates Design for Collaborative Activities

Similarly, we designed a template for involving non-expert citizens and stakeholders in addressing the general and specific characteristics of the HNH framework. Designing tools to facilitate the transfer of relevant information for design knowledge is relevant both for designers [87] and for impacting the non-expert's mindsets [88], as is the case in citizen science processes [89,90]. We co-designed a template (Figure 4) within the research team to support the collective creativity that happens in collaborative-design-based processes [91–93]. The template was conceptualized as a personas profile [84,94] to help focus citizens on neighbourhood health. Personas are archetypical profiles [95], depicted as characters, which converge huge amounts of data about users. Inspired by this design tool, we created a template to reflect on the "profile of the healthy district" as an archetype of the healthy neighbourhood, and through elements that generally are used to describe personas profile templates (e.g., [96]) adapted for the HNH framework. We designed seven templates (one for each theme) with the same logic and by only changing the specific characteristics and the keywords of the themes. Every template held the following: (i) a flat graphic to illustrate the theme value and the related title; (ii) a section for evaluation using a Likert scale (1 is the lowest weight and 5 is the greater weight) to determine how whether the theme is considered a priority, a problem, or presents opportunities for the district; (iii) an open section to describe additional considerations; (iv) a section to evaluate the specific characteristics of the theme with a Likert scale; (v) an open section to describe any additional specific characteristics that might be suggested.

Figure 4. An example of the seven-themes template: this was used to provide a healthy district profile.

The Likert scales were not used for capturing user perception to be quantitatively analysed. Rather, they were used to strategically help non-expert participants in addressing the complex factors reported in the templates. Indeed, we used those scales as a strategy to increase the usability of the collaborative tool, rather than for capturing the pure data. Indeed, these tools were used in collaborative workshops within the Open Space Labs (see Section 2.2.3) and in combination with physical maps of the district of the case studies. Consequently, before reflecting on the maps, people were asked to reflect on the factors that are reported in the seven-themes template to account for and decide on the aspects to be

focused on and to determine which qualitative aspects/comments/feedback were provided in the group discussion. Due to ranking and Likert scales being quite diffused at present, they were used to help participants in starting a group reflection on the specific aspects reported in the templates. We know that rating is a process that helps people make decisions (see [97]) and facilitates moderated discussions. Consequently, the scale helps groups of people collaboratively discuss the aspects to be highlighted—in qualitative terms—as a common decision to be qualitatively underlined and reported. We were interested in capturing the qualitative data (e.g., verbal responses that we noted during the collaborative workshops and written notes by facilitators or participants in the templates and the maps) rather than the single quantitative data provided through the scales. These would be typologies of specific analysis to be eventually provided in future research connected with the HNH project (concluded in December 2023).

2.2. Application of the HNH Framework and Data Collection

More than forty activities among the aforementioned were guided through the HNH framework by involving around 169 participants.

They were selected from among the stakeholders involved in the HNH project, including representatives of the public and local governments, the third sector, and the area of the local public health system (Figure 5). Each group of stakeholders included experts, policymakers, coordinators, and active citizens. The priority was to engage people who had direct experience with the two case studies in Florence. These groups were involved in the following activities: semi-structured interviews, card-sorting sessions, Open Space Labs, Healthy Labs, and contextual interviews or informal encounters. The labs were planned as "collaborative design-led events" [98] in a system where interviews and card-sorting sessions provided data and pre-engagement activities. Participants were informed about the project details with communication materials (e.g., project flyers and website) as well as via written or verbal communication to explain the main themes and topics to be addressed.
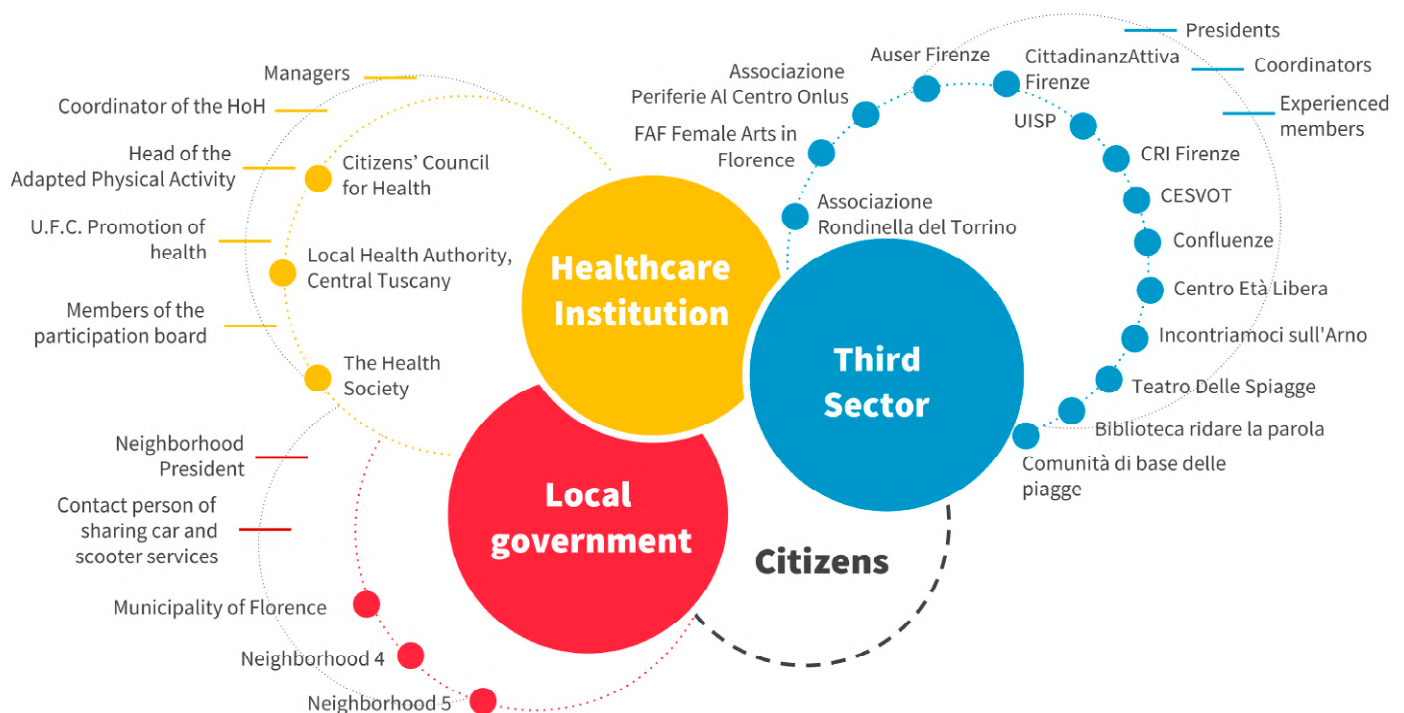

Figure 5. Groups of stakeholders involved in the in-the-field activities.

2.2.1. Semi-Structured Interviews and Card Sorting

Twenty-nine participants were involved in the semi-structured interviews, using the protocol mentioned in the previous paragraphs. The sample of the engaged people

has been extrapolated from groups described in the previous paragraph. Specifically, the participants involved in this kind of interview were from the third-sector entities ($n = 18$ participants), policymakers from the local government ($n = 4$ participants), and local healthcare institutions ($n = 7$ participants). We adopted a convenience sampling approach by choosing individuals that meet the following criteria:

- They live or work in one of the HNH project case study areas;
- They facilitate activities for or with citizens who live or work in one of the HNH project case study areas;
- They are in a position to know the expectations, activities, problems, and opportunities of/for the citizens that live or work in one of the HNH project case study areas.

Semi-structured interviews, as a qualitative primary research method, are essentially made by topics which are identified by the researchers and proposed in a predetermined sequence with follow-up questions that depend on the participant's ongoing answers (cf. [99]). In qualitative research, the number of interviews depends on several factors, such as the context, the project's objective, the resources, and the time available [100]. A few studies have point out that data or theme saturation occurs around the point of the twelfth interview [101]. However, we saw that our theme saturation was reached around the presented number of participants ($n = 29$), as was the case in similar contextual qualitative studies and neighbourhood contexts (cf. [102]). To arrange the interviews with the group of stakeholders mentioned in Section 2.2, we sent an email or established telephone contact with those who were selected from a list of people who were considered to have relevant experience for the HNH research project. During the first point of contact, we informed the participants about the HNH project, the specific objectives, and the topics of the interviews; additionally, at this point, we requested that they participate in the semi-structured interviews. All invited participants responded positively, and we proceeded to meet them. Before starting the interviews, informed consent was obtained.

In operative terms, after the presentation of the activity's aims and background (Section 1, Figure 6), participants were invited to discuss the open questions which had been divided into two sections: the first (Section 2, Figure 6) addressed activities, needs, problems, and opportunities; the second (Section 3, Figure 6) addressed the feedback on the HNH themes with the support of card sorting (e.g., in Figure 7).

2.2.2. Healthy Labs

Thirty-nine participants ($n = 34$ stakeholders of the public health system, and $n = 5$ citizens and participants from third-sector entities) were involved in nine Healthy Labs sessions. These sessions had a minimum of two and a maximum of fifteen participants each, with sessions lasting between 45 min and 2 h. These kinds of sessions were designed to adopt the same structure of the aforementioned protocols in the presence of multiple participants simultaneously. We mainly adopted this format with stakeholders from the local health system, such as doctors, nurses, psychologists, specialists, healthcare workers, and administrators. Their working days are particularly busy, and the interview was considered to be particularly stressful for these stakeholders. The Healthy Labs helped to involve these actors by saving time, resources, and personal efforts. This format is based on focus groups engaging in open discussion on the main topics of the project and generating new perspectives with the invited participants by impacting the subsequent design process through insights [103,104]. Rather than being extractive techniques for taking information from participants, the Healthy Labs were designed to be participative activities that can drive future changes (e.g., see [64]).

Interview contents	Supporting materials

Introduction

1
1. The background, problems, aims and ambitions of the project;
2. The status of the project activities;
3. The reason for the interview;
4. The case studies and the expected results.

Information materials:
- deck of slides (ppt)
- project brochure

Core of the interview

2
1. What are the activities in the space of the case study; how do these activities impact the built environment, or how these activities affect by the built environment;
2. What are the needs and behaviours of the citizens in the built environment of the case study:
3. What are the problems, the critical areas, as well as the potentiality for urban health and the opportunities according to the actual status of the built environment of the case study.

Collection materials:
- smartphone
- tablet
- notebook
- paper
- case study maps (if necessary)

HNH themes - card sorting

3
1. Informing the participant about the general structure of the conceptual aspects and the related seven themes;
2. Asking to reflect on the characteristics of the HNH framework, theme by theme and with the help of the deck of the seven cards (those presented in Figure 4);
3. Inviting to discuss ideas and comments on the seven themes according to the following structure:
    a. Describing and motivating what is the priority theme in the case study that was the focus of the interview; eventually making a sort of ranking among the three most priority themes in the territories of the case study;
    b. Describing and motivating what is the most problematic theme in the case study; eventually making a ranking among the three most problematic themes;
    c. Describing and motivating what is the theme that presents the most evident potential or opportunities in the case study; means that some aspects are already developed or considered in the case study;
    d. Describing and motivating what is the theme that most struck the interviewee respect their knowledge and experience of the case study.

Card sorting materials:
- visualization of the conceptual framework
- deck of cards
- case study maps (if necessary)

Figure 6. Semi-structured interviews: content and materials used for involving participants.

2.2.3. Open Space Labs

A similar structure was also adopted for an additional format named Open Space Labs, which we designed for multi-stakeholder public events (including citizens, participants from third-sector entities, and policymakers) with more than twenty participants. We applied this format in two public events developed in two different contexts in the two case studies of the project. The Opens Space Labs (Figure 8) were promoted as part of a 4-h event that was run on two different weekends during the project's development period. Both events followed the same structure, with the following steps: (i) presentation of the event through the introduction of the main invited partners and stakeholders; (ii) panels on the main topics of the HNH project; (iii) Open Space Labs with participants divided into groups; (iv) final discussion for presenting the results of the Open Space Labs.

Specifically, we ran three work tables with a minimum of 9 and a maximum of 14 participants each in the first event with a total of 59 participants. Then we ran one table with around 20 participants in a second event with a total of around 40 participants. Every Open Space Lab was managed at least by one facilitator among the research team, and one or two supportive researchers to help with technical aspects, such as managing the materials, helping with the discussion, and taking pictures and notes recording the participant's feedback and comments.

Figure 7. A few examples, in different contexts, of the card-sorting sessions during the semi-structured interviews and the Healthy Labs.

Figure 8. Participants during the two Healthy Labs.

The Open Space Labs were run according to the following activities:

1. Ice-breaking to get to know each other and create a good atmosphere.
2. Presentation of the specific tasks, topics, and the materials to be used.
3. Division of the participants into small groups and tasks to collaboratively complete the profiles of the healthy district (seven theme templates) (Figures 4 and 9).
4. Discussion with all the group members about their reflections on the previous steps.
5. Collective discussion about problems, opportunities, critical and potential areas for development, as well as solutions for the built environment in the case study area, using a shared map of the district. Here, participants were invited to draw, mark with post-it notes or dots, and localise the previously discussed aspects.

6. Conclusive discussion about proposals and solutions for addressing the aforementioned issues.

Figure 9. A few examples of the seven-themes template (profiles of the healthy district for case study 1) that were completed by the participants.

The activities were also reported through pictures, audio and video recordings (where possible), and by taking notes, as well as by using the templates as instruments for collecting data related to the participants' feedback, comments, and ideas.

2.3. Data Analysis

All the aforementioned activities produced qualitative data that were analysed with a thematic analysis [105] with the following steps: (i) familiarising with the data; (ii) creating initial codes; (iii) deciding what coding to use; (iv) supporting the codes with excerpts and quotes from the data; (v) grouping the codes into themes; (vi) narrating and visualising the analysed data. To familiarise ourselves with the data, in a group of more than five researchers, we arranged a shared document in Google Drive with all the contents related to the aforementioned activities, including people's comments during interviews, Healthy Labs, Open Space Labs, and a few contextual interviews and informal encounters. Consequently, for creating initial codes, we used predetermined macro-themes arranged through Google Drive workspace tools with the elements shown in Figure 10.

Consequently, we used the table shown in Figure 11 to group the codes into themes and divide them according to the two case studies. We obtained the groups in the manner that is explained in Figure 11. In addition, the feedback on the seven themes was also analysed through a content analysis [106] produced by the feedback of the participants. Specifically, we measured the frequency of people who mentioned a specific theme for addressing the questions we made throughout the card-sorting sessions.
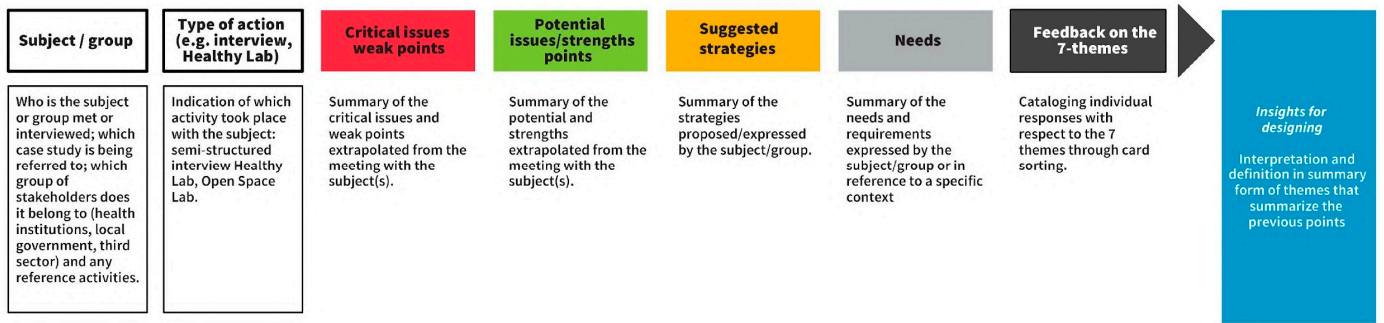
Figure 10. The logic for coding the data through a shared table in Google Drive: the columns used in the table are those represented in this schema.

Figure 11. Groups of themes with their respective coding systems.

The narrations of the analysed data are the main results that will be described in the next paragraph. Indeed, each list mentioned in Figure 11 can be considered as material that impacts both the formulation of the insights for each case study and the design process for the co-design phases that have followed those presented in this paper.

In summary, we have described how we adopted the HNH framework as a design research tool for driving qualitative design research activities which involved people in two case studies of the HNH project. We also introduced all the materials we used, such as the specially designated templates, the protocols, and the card-sorting sessions for developing participatory activities such as semi-structured interviews, Open Space Labs, and Healthy Labs in the real contexts of the two case studies. We finally presented the qualitative data analysis procedure, which has been adopted in developing the thematic analysis of the data obtained from the aforementioned activities.

3. Results

The HNH framework enabled us to catalyse a huge amount of data from the in-the-field activities by addressing the complexity of focussing on the wide perspective of urban health, as applied in the research project. The framework and the related materials have been used as a toolkit for applying the perspective offered by the HNH project in a design research activity, aiming to involve citizens in participatory activities. The following paragraphs report the evidence of these aspects by emphasizing the data we obtained through the application of the HNH framework.

3.1. User Needs

We identified twelve categories of needs for case study 1, nine categories of needs for case study 2, and seven categories of needs for both cases; these latter have been described as diffused needs for all the districts of the city. Among the most important needs emphasised throughout the user research activities, we report five sets of topics among those which most consistently emerged from the needs expressed by participants in each case study (Figures 12 and 13), with both cases (Figure 14) divided for the actors' profiles.
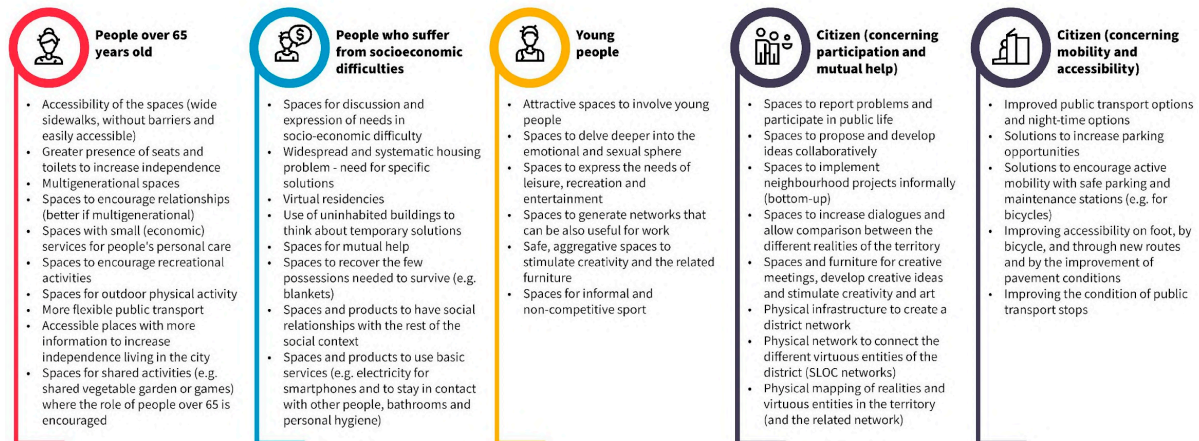
Figure 12. Synthesis of the most pressing topics from the needs expressed by participants in case study 1.
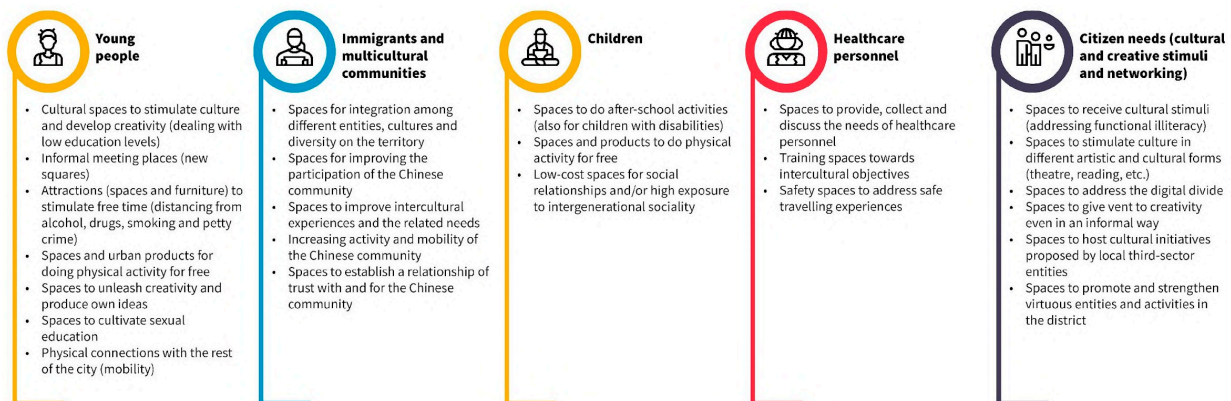
Figure 13. Synthesis of the most pressing topics from the needs expressed by participants in case study 2.
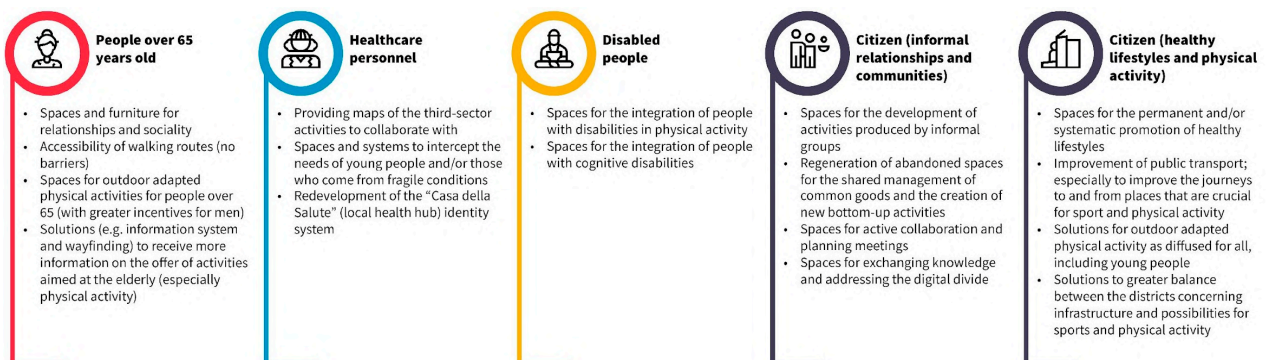
Figure 14. Synthesis of the most pressing topics from needs expressed by participants in both case studies.

3.2. Insights from the Stakeholder's Involvement

Critical issues, points of weakness, potentialities, and points of strength, as well as suggested strategies and insights which arose through the stakeholders' involvement, were identified according to the quantities presented in Table 1.

Table 1. Quantitative distribution of the typology of data (themes) from the stakeholders' involvement.

	Critical Issues and Points of Weakness	Potentialities and Points of Strength	Suggested Strategies	Insights (Conceptual Themes to be Developed for the Co-design Phases)
Case study 1	15	15	18	14
Case study 2	11	11	13	12
Both cases	6	1	7	4
Total	32	27	38	30

Through thematic and content analyses, we can frame both the themes and their frequency in relation to the following areas: (i) critical issues and points of weakness (Figure 15); (ii) potentialities and points of strength (Figure 16); (iii) suggested strategies (Figure 17); (iv) emerging insights (i.e., conceptual themes to be developed for the co-design phases) (Figure 18). Every theme has a proper qualitative explanation; the frequency (indicated by the most intense colours in Figures 15–18) can be used by designers in understanding which terms they can use in addressing problems, opportunities, and strategies for developing solutions and making decisions. However, this paper intends to refrain from analysing the results of the application of the HNH framework in terms of specific results revealed in the case studies. On the contrary, we want to describe how the results can facilitate the understanding of how the HNH framework and the related processes can be used. With this purpose, we highlight the most important themes and insights for each case study by reporting the most relevant aspects that emerged for the critical issues and points of weakness, the potentialities and points of strength, the suggested strategies, and the insights that can be adopted as conceptual themes to be developed for the co-design phases.
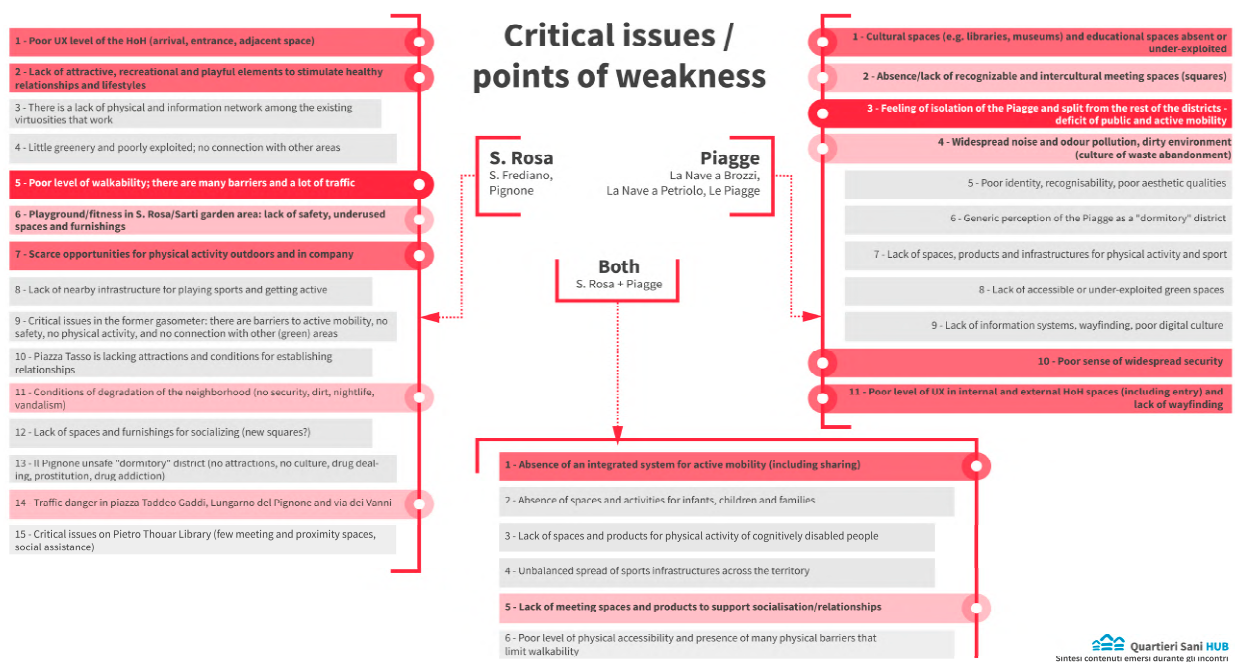

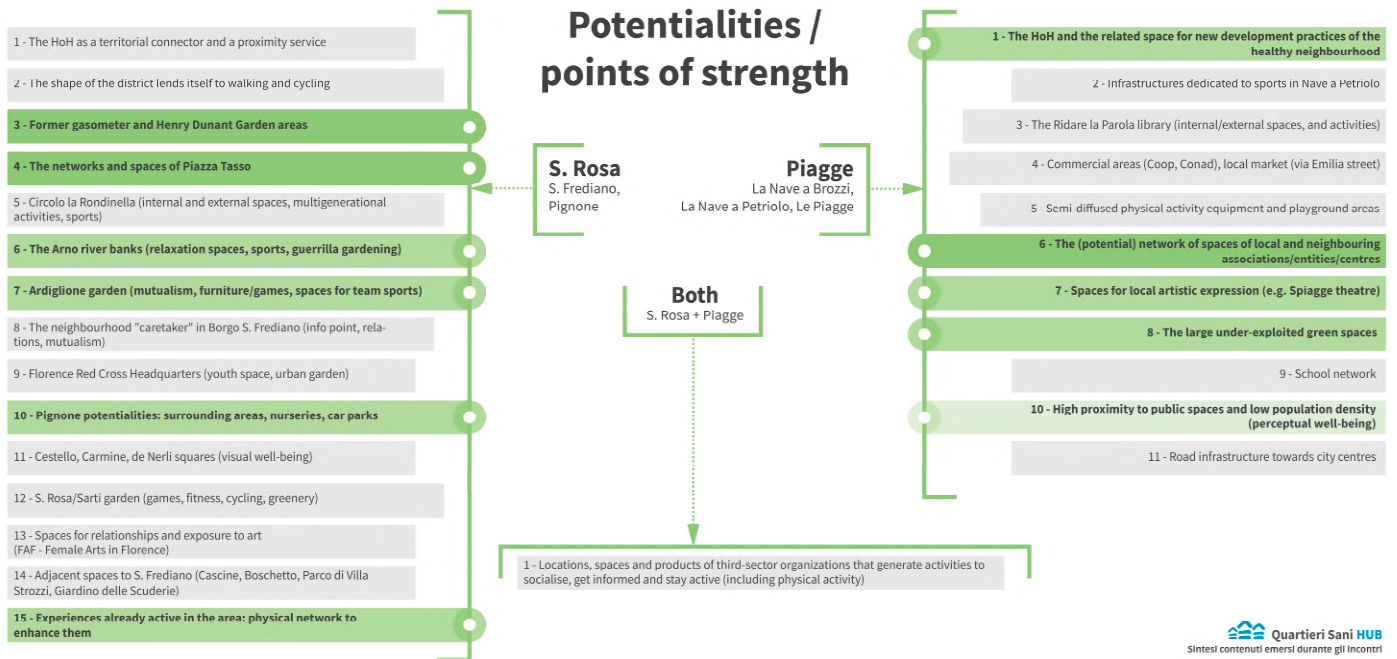**Figure 15.** The emerging themes that are related to the critical issues and points of weakness.

Figure 16. The emerging themes related to the potentialities and points of strength.

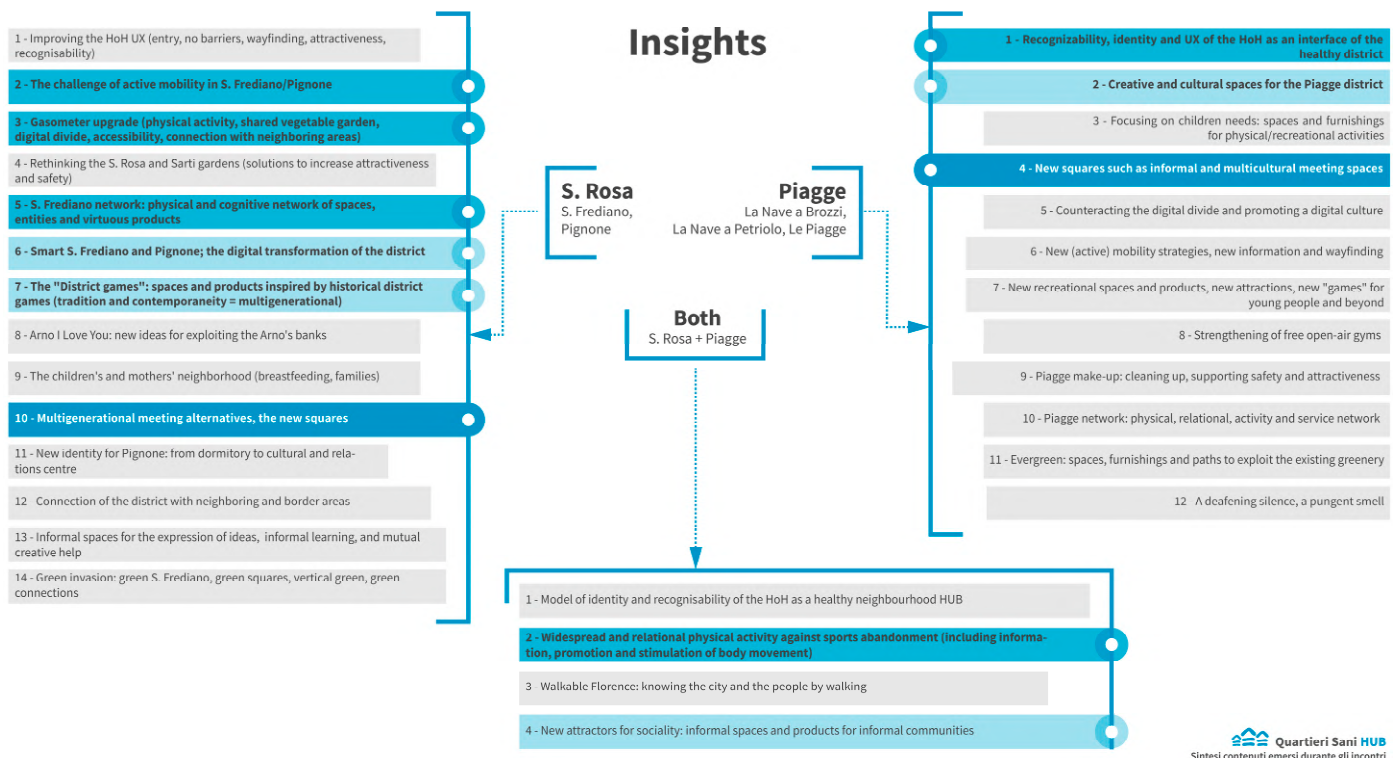**Figure 17.** The emerging themes related to the suggested strategies.

Figure 18. The emerging themes related to the insights can be adopted as conceptual themes to be developed for the co-design phases.

3.2.1. The Most Pressing Themes and Insights for Case Study 1

For case study 1, one of the most pressing themes is related to the poor level of walkability. Indeed, as critical issues and points of weakness, participants reported the presence of many barriers, poor conditions for walkers due to vehicle traffic, the presence of uneven and narrow sidewalks, and little presence of parking for all kinds of vehicles (both cars and active mobility vehicles). In addition, the lack of any real possibilities for fully utilising a neighbourhood that is potentially predisposed to active mobility leads to perceptions of the district as being chaotic and unprepared for embedding active mobility solutions. Also, the lack of wayfinding solutions discourages the exploitation of the district in the "active" mode. The scarcity of intermodality solutions also discourages the usage of public transport solutions. The result is a district that is full of polluting conditions and the presence of a perception of high insecurity among citizens. An additional set of critical aspects for case study 1 is represented by the lack of attractive, recreational, and playful elements to stimulate healthy relationships and lifestyles; this is understood as a lack of spaces and products to stimulate real relationships among people; moreover, there is a lack of traditional crafts and products to facilitate a sense of belonging.

In parallel, as one of the emerging themes related to the potentialities and points of strength, there are a couple of public spaces that assume a hybrid function. The first is a public area comprising a public garden and a court used by three local associations for undertaking community activities. The second is a public garden that is managed as a commons by a local association. Both examples have green areas, space, and furniture for encouraging community activities, as well as a series of preventative measures ensuring the safety of the users, such as protective barriers and a management system upheld by third-sector entities. An area that presents potential aspects for the health of the citizens also presents the possibility for use for physical activities. Both the areas have urban furniture for socializing (such as benches, tables, and furniture for gardening) and provide children's play areas.

In terms of strategies, the participants suggested boosting and connecting the aforementioned areas in the district. Embedding furniture for physical activities in these areas may increase the possibility of people encountering each other and assuming a healthy lifestyle. In addition, connecting these areas with nearby green areas can increase the possibility of creating new active mobility solutions for the district. Also, embedding furniture to support the spontaneous activities of the third sector that operates in this area can increase the development of these spaces by favouring healthy lifestyles. Finally, connecting these areas with an inclusive wayfinding system can increase the possibility of using these spaces easily by also improving the usability of the space in terms of understanding the possibilities of the territory and their health connections. More strategies were also suggested in terms of favouring community development through the built environment. For instance, participants suggested creating intergenerational and multicultural conditions through the following: (i) spaces, laboratories, and related furniture for spontaneous intergenerational and multicultural activities; (ii) spaces and furniture to support existing mutual aid activities; (iii) new (conceptual) "squares" for a new generation of encounters; (iv) spaces for co-construction workshops where furniture with recycled and/or local materials are co-designed. Finally, these aspects enable us to frame three insights for the co-design phase. The first is related to the need for spaces of encounter for the citizens of the district (e.g., new squares). Every strategy, piece of furniture, or arrangement of the space that can contribute to this issue is a good solution for addressing these needs. The second insight is related to the promotion of areas and actual solutions in the district that already present a kind of predisposition to reach the aim of the first insight. The third is related to addressing the mobility issues. In the case study of the city of Florence, developing active mobility solutions means improving the quality of the routes (e.g., the quality of the road surface, the dimensions, and the predisposition to accommodate needs related to disabilities and/or age); creating safe and secure parking for bicycles and other light vehicles (e.g., scooters) and providing repairing stations for bicycles; introducing pedestrianized areas or 30 km per hour areas; as well as making the pathways more attractive through new furniture with new, fascinating activities to participate in.

3.2.2. The Most Pressing Themes and Insights for Case Study 2

For case study 2, one of the most stressed themes for the critical issues and points of weakness is the lack of cultural and educational spaces (e.g., libraries, museums), which are currently either absent or under-exploited. As a set of problems, participants underlined the lack of the following: (i) cheap, nearby, informal, and relational places for cultural activities; (ii) public spaces to unleash creative and artistic expression; (iii) exploitation of the cultural spaces which are not valorised, not accessible (lack of wayfinding), and not supported by spaces or products. An additional set of problems is related to the feeling citizens have about the sense of isolation and rift with the rest of the districts. The deficit of public and active mobility is also perceived as highly stressful for living healthily in the district. Difficulty in connecting with public transport, the absence of alternative systems of mobility and connections, and poor connections with other city areas (including the city centre) are all factors that influence the perception of citizens living in an unhealthy place. For instance, the absence of cycle paths and wayfinding systems, and a generic deficit of public and active mobility services, make the district a potentially isolated area.

In terms of the themes related to the potentialities and points of strength, firstly, participants underlined the possibility of improving the activities that are available at the external spaces of the community hub for the health public services (the HoH) to develop a healthy place for the local community. These spaces are suitable for the engagement and activation of new healthy neighbourhood practices; additionally, the garden and green path (benches included) are predisposed for embedding new furniture and areas for healthy activities. These spaces are already informally used by young people in the district to meet each other, even if the space has been not designed to address these possibilities. This

should be enhanced. Secondly, the spaces of the voluntary associations and the mutual help centre in the district have been highlighted as crucial areas for the citizens of this part of the city. In these areas, there is already a sense of community and collaboration, as well as informal associationism that alters the space where they need to undertake activities for the community.

In terms of strategies, participants suggested a focus on the aforementioned spaces for improving and supporting the sense of community by embedding attractions for all ages, furniture to let people encounter each other, and association-organised activities. Supporting the aforementioned spaces with design solutions such as new pathways, furniture for physical activities and for socializing, as well as with wayfinding systems for informing and orienting citizens, are the main easily implemented actions which can support a strategy for the valorisation of these areas. People suggested the creation of a new concept for "new squares" that can meet their needs and make the place more active and sociable. Finally, participants underlined the importance of creating spaces to let people socialize, and from this pre-condition, create cultural stimuli and mutual help. In some potential areas, a small set of furniture would be enough to meet the need for "new squares". However, this insight suggests that these new squares should also function as connectors among the multiple entities that already create the community's sense of belonging, such as voluntary associations and active citizen organizations.

3.2.3. The Most Pressing Themes and Insights for Both Case Studies

A few themes emerged as being diffused for all the city districts. In terms of problems and critical issues, the following were identified: (i) effective and diffused active mobility solutions; (ii) spaces and products for improving social activities with real encounters. As emerging themes related to the potentialities and points of strength, participants underlined those spaces and products used by third-sector entities to generate activities to socialise, be informed, and stay active (including physical activity). As strategies, participants suggested that there is a need to focus on the following: (i) developing the community hub for the public health services (the HoH) to provide strategic public spaces; (ii) finding solutions to ensure that physical activity is a diffused system; (iii) supporting spaces for intergenerational activities and connecting these areas with physical systems. Insights emerged into the idea that building informal spaces which follow the aforementioned strategies can increase the possibility of naturally developing stimuli, enabling citizens to assume active and healthy lifestyles.

3.3. Feedback about the HNH Themes

Also, we extracted specific data from the responses that participants gave us about the seven themes of the HNH framework by considering whether they are a priority, problematic, present opportunities, or caught their attention because of the territories of the two respective case studies. A quantitative distribution of the responses for both cases (Figure 19)—which was not used for statistical insights—gave us an idea of the frequency of the answers and helped us in narrating the qualitative results. These responses are results from the content analysis of the qualitative responses captured during the card-sorting sessions in both the semi-structured interviews and in the Healthy Labs, as well as the qualitative responses captured during the Open Space Lab.

Consequently, we can support the discourse on the seven themes by stating the following qualitative aspects. The green neighbourhood was described as the most attractive in terms of the potential opportunities; indeed, several participants remarked on the importance of green development being one of the main focuses for a healthy district. Creating connections with the already-existing green areas, as well as boosting them with attractive furniture and activities, were some of the recurrent suggestions from the participants.
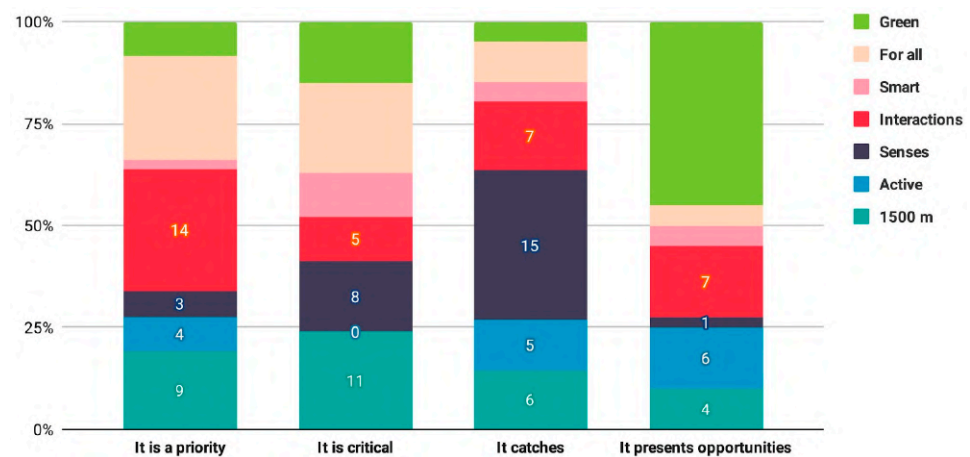
Figure 19. The emerging themes (total values on the two case studies) related to the insights that can be adopted as conceptual themes to be developed for the co-design phases.

The neighbourhood "for all" and that of "1500 metres" were identified as the two most problematic themes for the two case studies. Indeed, the lack of good walkability conditions, the poor conditions for active mobility, and the lack of real attractiveness in the streets led to people perceiving the district as insecure and not predisposed to active and sustainable mobility solutions. Also, the districts are perceived as hardly accessible for people with conditions rendering them vulnerable (such as people over 65 years old, disabled people, pregnant people, and children). These two themes were also discussed as priorities for the districts of the two case studies. However, in terms of priorities, the neighbourhood "of interactions" was discussed as one of the most important, with the potential for developing conditions preventing good health. Despite evident structural issues in the district (such as traffic congestion and the lack of furniture for social and physical activity), people underlined the urgency of creating spaces (e.g., the "new squares") to make the district a place where citizens can socialize and create encounters. Spaces with products and activities that generate the feeling of belonging to the community (e.g., collaborative workshops and community events) are one of the most pressing requirements expressed by participants in the two case studies. They were depicted as crucial assets for transformation and change in the district in pursuit of healthy and inclusive solutions.

Finally, in terms of the themes that caught their attention, the neighbourhood "of the senses" is recurrently the one which people demonstrated high interest in. According to some participants, the idea of having multisensory stimuli in the district is "a dream" for the future. Harmony with the built environment can be holistically established by capturing all the senses. Spaces, pathways, and furniture that can address these wishes are welcomed, with the potential to create a pleasurable experience for the citizens and increase the possibility of assuming positive attitudes towards healthy lifestyles.

3.4. Mapping of Local Activities, Initiatives, and Projects for Supporting Healthy Lifestyles

We also identified forty-two local initiatives and projects for supporting healthy lifestyles, mainly from local third-sector entities in collaboration with local governments and local public health institutions. They aim to promote good health through themes such as:

- Promoting body movement activities (e.g., walking, cycling, doing physical exercises).
- Informing citizens about healthy lifestyles and contrasting harmful habits such as the use of alcohol, smoking, unhealthy foods, and sedentary lifestyle.
- Promoting a sense of belonging and community with cultural projects.
- Promoting cultural events (e.g., art) to create social networking, community, and caring for the territory (e.g., walking experiences through the city art and cultural heritage).

- Creating educational events to raise public awareness about accessibility and inclusion regarding the needs of the most vulnerable population groups.

These kinds of projects and initiatives represent a map of the state of the art in the districts of the case studies to understand how health can be promoted in built environments.

3.5. Emerging Thoughts for Applying the HNH Framework

Practical insights emerged which aid our understanding of how to apply the HNH framework. Despite the literature and best practices suggesting the adoption of structural changes in building a healthy district (e.g., walkable streets, sustainable mobility solutions), participants mainly stressed the importance of building healthy conditions, as follows:

- Increasing opportunities for socialisation, through places and urban products that support spontaneous encounters, community activities, citizen discussions, and systematic action planning for promoting healthy lifestyles; these aspects are requirements for developing healthy and inclusive places, promoting healthy lifestyles and behaviours.
- Creating connections among already-existing spaces, entities, and key district points through physical and cognitive infrastructures; these are crucial aspects in ensuring citizens' healthy lifestyles; they should be made through both physical developments (e.g., wayfinding systems, urban furniture) and cognitive developments (e.g., services, initiatives).
- Developing a diffused sense of belonging and emotional experiences through spaces and furniture to create positive stimuli for the human senses, not only protecting them (e.g., solutions for noise pollution); healthy lifestyles are favoured when pleasurable physical environments enable one to favour healthier psychophysical conditions; furniture and architectural design may help in creating attractive spaces that favour a holistic perpetuation of health, security, belonging, inclusion, and community.

As an additional qualitative result, we registered an increase in awareness among the participants of our in-the-field activities. Those taking part in participant interviews and the Healthy Labs, as well as those who took part in public events, explicitly expressed a short-term impact on their understanding of health and its promotion. Several participants autonomously expressed a surprisingly positive feeling in thinking about health from the perspective offered by the HNH framework. We registered several positive comments after the participatory activities that underlined the participants' awareness and positive surprise about the relationship between health and the built environment. Even if they mostly knew this relationship, they did not know how to address these aspects in ordinary life in a concrete manner. Participating in the HNH framework activities helped them to better understand this complexity. A few of them declared that they would start to observe the city differently because the framework gave them a new insight into how health promotion can be developed through the physically built environment. In other words, the logic of the HNH framework, on the one hand, increased participant awareness of the whole aspects that affect the health of the citizens. On the other hand, it is a practical and easy-to-use lens for reducing the complexity of health issues without losing the systemic perspective. Thus, it works as a research and design instrument and also as an informative, educational, and communicational tool, favouring the building of healthy communities.

In summary, we presented a rich variety of qualitative data that we obtained by applying the HNH framework and the related tools as a design research instrument. Themes surrounding user needs, critical issues and points of weakness, potentialities and points of strength, strategies, local initiatives, and considering design insights were presented as the main findings of the application of the HNH framework in the activities of the HNH project in the real contexts of two case studies of the city of Florence. These findings are crucial for the HNH project. They have been used to identify design scenarios and design strategies for addressing the urban health approach at the neighbourhood level, with design-led activities. Also, the application of the HNH framework was presented to understand how proposing (multidisciplinary) solutions can promote healthy lifestyles and

behaviours through the design of the built environment in the two case studies, specifically starting from the data captured in the contexts of the case studies. In this section, we detailed how the HNH framework can also be useful in stimulating participation in complex themes and developing awareness of urban health issues among participants.

4. Discussion

4.1. Contribution to Design Practice and Research: Comparison with the Hypothesis and Discussion of the Obtained Results

In the introduction of this paper, we described the hypothesis of this work related to the HNH framework: "if applied in action research projects, has the potential to provide design insights to develop contextual design knowledge for addressing the urban health approach with a set of design-led instruments". By discussing the obtained results, it is possible to understand the fulfilment of the hypothesis. Specifically, the application of the HNH framework as a design research instrument provided a wide variety of qualitative data that can be applied in subsequent design actions (e.g., the development of design scenarios and strategies). The analysis of the data provided priority themes that give designers (and policymakers or other decision makers) a clear idea of how to provide interventions for certain groups of citizens' needs, to address their problems, through critical aspects, opportunities, and potentialities, and by addressing specific strategies as suggested by the involved actors. From a design perspective, these results are fundamental in formulating design briefs and interventions, as well as design outputs (e.g., scenarios, strategies) for making the HNH framework actionable according to the needs of the studied contexts. However, the empirical application of the HNH framework in an action research project requires a few processes to be implemented as related to co-designing: (i) semi-structured protocols to provide flexible and adaptable activities for engaging the citizens of the two case studies; (ii) specific tools and materials (e.g., the deck of cards) to facilitate the introduction of complex ideas to non-experts citizens and stakeholders; (iii) the selection and involvement of several stakeholders in flexible and adaptable participatory activities.

Without these three key points, it is not possible to apply or adapt the HNH framework to specific contexts, nor is it possible to adopt an evidence-based approach to the contexts. As expected, these are time-consuming processes which require human resources as well as expert designers for the participatory processes. At the same time, the results—in terms of the obtained design insights—compensate for the required efforts. Table 1 presents a synthesis of the variety of the obtained results. Every typology of data (e.g., critical issues and points of weakness; potentialities and points of strength; suggested strategies), in terms of themes, provides the potential to give designers more opportunities for interventions. For instance, designers, in collaboration with citizens and policymakers, may decide to address the contextual design interventions by addressing all or just one of the presented insight typologies. This means that every typology can be presented as an entry point for addressing urban health in the specific context of a given case study. These insights provide a platform for both decision making and designing. Also, the process of obtaining each insight is clear; thus, it becomes clear how we can scale and replicate them to obtain a similar variety of insights. This enables us to think about considering the HNH framework and its process, as it is applied in the HNH action research project, as a tool.

These kinds of data and results, in frameworks, guidelines, and checklists, are generally not discussed in the urban health literature, nor are they provided by the design literature, which lacks specific urban health applications.

By generalizing the results that we have discussed so far, the HNH framework contributes to design research because it is relevant to the production of knowledge for design practices, as several authors have pointed out in the literature (e.g., [71,78,82,107–112]. Indeed, the user research activities allow us to obtain a series of results that can be used to create design insights that are useful for designing representative design scenarios and strategies—these are the most significant contributions of the HNH project (Figure 20). The

application of the HNH framework as a research tool, on the one hand, enabled the results to be defined; on the other hand, it simplified the definition of the insights. In practical terms, the HNH framework represents the driver and the lens for conducting in-the-field activities. The multiple interpretations of the framework that we used in our research activities helped us to cluster the results; it created a structure for the dialogical activities to take place with stakeholders. Therefore, the HNH framework has been adopted as a lens: (i) for designing the research processes; (ii) for developing in-the-field research activities; (iii) for analysing and coding the obtained data; (iv) for clustering the results in terms of possible design insights. All these aspects contribute to simplifying the identification of the possible design scenarios and strategies.
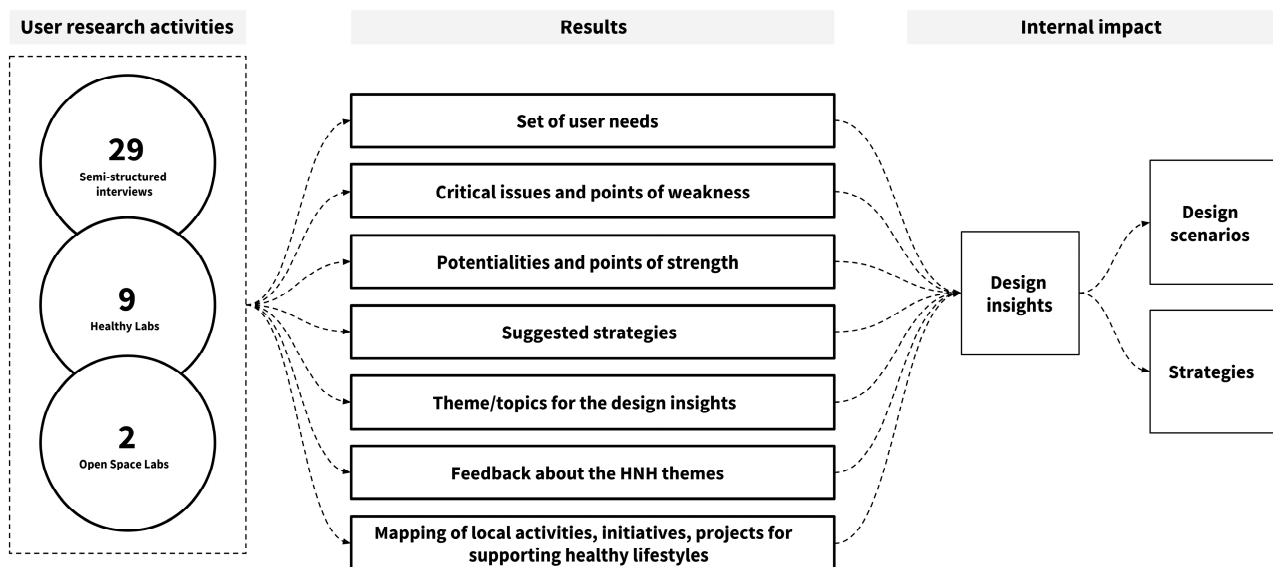

Figure 20. The impact of the user research activity on the internal development of the project.

Also, the results comprise a set of contextual knowledge about the case studies in the city of Florence that can have multiple impacts in the co-design phase. Indeed, the co-designed activities can be addressed from multiple perspectives and entry points. For instance, a co-design team may seek to find solutions starting from the "critical issues and points of weakness" area, and others may start from the suggested strategies. Both the entry points are valid due to the number of results, all being connected under the lens of the HNH framework. We suggest that the whole set of results is considered as a platform for understanding the priorities or crucial points that must be addressed by a specific design discipline or in a specific development project. From a wider design research perspective, the HNH framework and the related tools are research instruments to develop research about and for designs that are essential in developing an RTD approach that is guided by the design research process [71].

From our study, the adoption of the HNH framework in the process depicted in Figure 20 is equivalent to developing the early stages of a design thinking process. For instance, if we assume the Double Diamond [113] approach as a reference for understanding the design process, then we can claim that the HNH framework and the related tools help in following the first two stages (discover and define) and aid in identifying the design brief. Consequently, the HNH framework as a tool may help in addressing urban health strategies through design, and assist in taking a specific context perspective to challenge the contextual healthy behaviour of the citizens. The process for applying the HNH framework works as a toolbox (Figure 21) for (i) exploring the contexts where the HNH framework should be applied; (ii) framing qualitative data (e.g., through thematic and content analysis) for understanding needs, problems, opportunities, and possible strategies; (iii) framing design insights and topics to impact the co-design practices. Research activities with the

HNH framework as a tool can be addressed with multiple or single elements of the toolkit (e.g., for each column as presented in Figure 22).
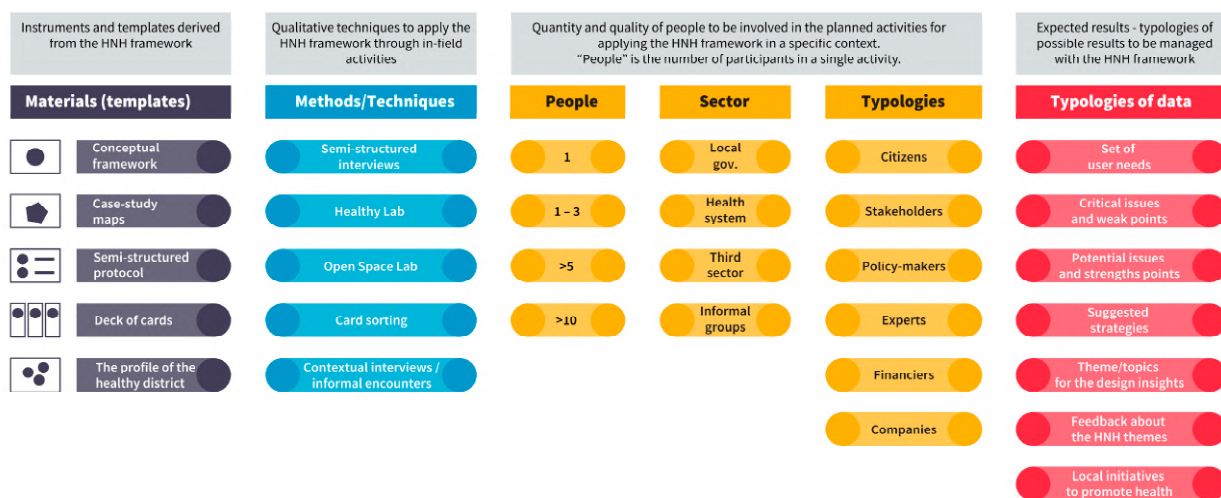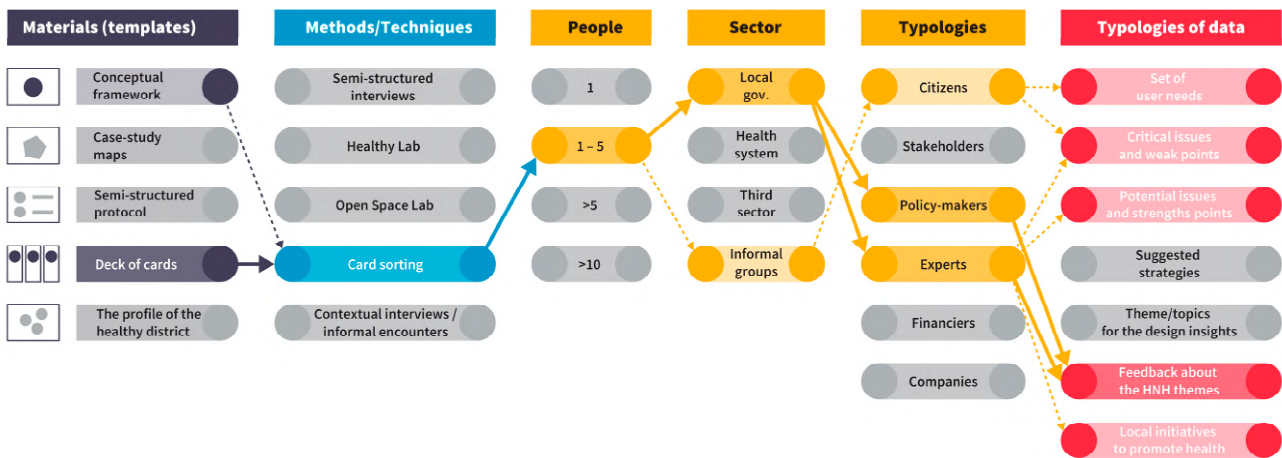

Figure 21. The instruments used for in-the-field activities of the HNH project: a toolkit version.

4.2. Contribution to the Urban Health Approach: A Comparison with the Literature
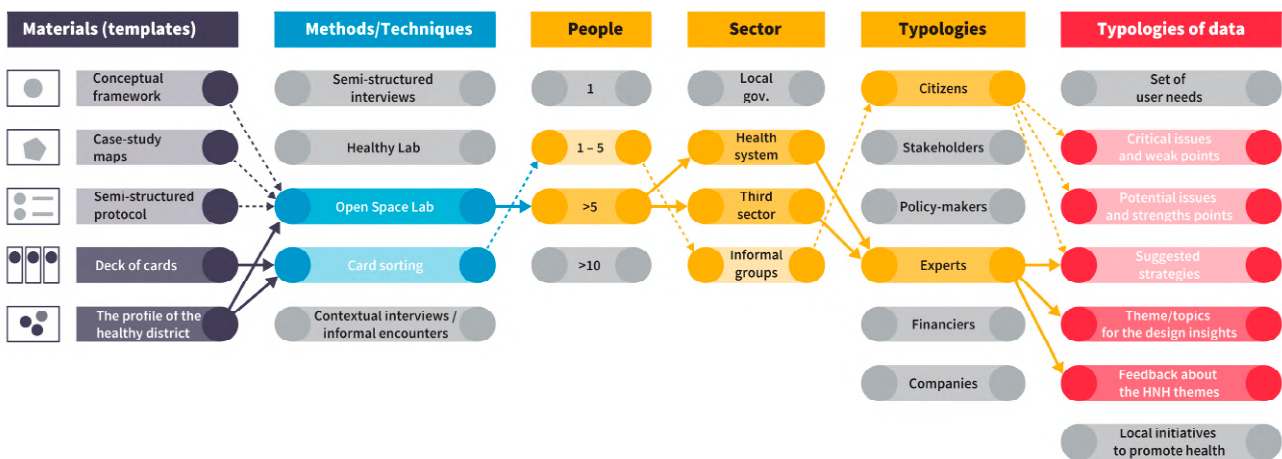
Most of the research presented in the introduction addresses urban health through neighbourhood built environments by highlighting factors that impact citizens' health in urban spaces. Those factors are often presented as frameworks, guidelines, or checklists with different focuses (e.g., [15–21,49]), including those that assume an age-friendly perspective (e.g., [27]). Often, the factors of the built environment are the same, but are presented in different ways and through different perspectives. The HNH project also promotes a synthesis among the frameworks in the literature to give designers the resources to make these frameworks easily operable. Indeed, most of the presented resources for addressing urban health provide guidelines and checklists as the main design tools to be used by urban designers and policymakers (e.g., [16,17,32–41]). The HNH Toolkit is an exploration tool for understanding how to apply the synthesis of those checklists with a design-led approach. The HNH Toolkit provides an advantage in terms of operative applications for understanding how to apply those frameworks, guidelines, and checklists with a design-led approach. It is a step forward for creating this application with the specifics of the contexts where design interventions are needed.

Some studies address the neighbourhood from the wider urban perspective [42–44] by it more complex to understand the different scales (e.g., those more in touch with the daily citizen issues); they become hardly addressable from a micro-scale perspective, such as the urban product design perspective, which we know is an influential factor for urban health [1–8]. The instruments presented in the literature are mainly suggested for urban planners and policymakers who need to make decisions (e.g., [49]) and provide interventions in the urban environment. Those resources rarely focus on multiple design perspectives for spatial transformations, such as from urban planning to product design. Several studies [15,16,18,23,27,32,36–39,42] have provided instruments for multiple city actors, including urban planners, designers, and citizens. However, no specific instructions are distributed to these kinds of actors on how to gain specific insights. For instance, the authors of [23] provided directions and guidelines to understand what kind of interventions are needed according to the citizens' opinions. However, it is still difficult to obtain a clear picture of how to assume a design-led perspective over the analytical phases. The HNH toolkit helps this shift and the experience provided with the HNH project is an example. Essentially, the HNH Toolkit exposes to an in-depth understanding and experience those who apply the HNH framework as a design research instrument. This is the main novelty presented by this work—it also fills the gap in the literature that is related to specific
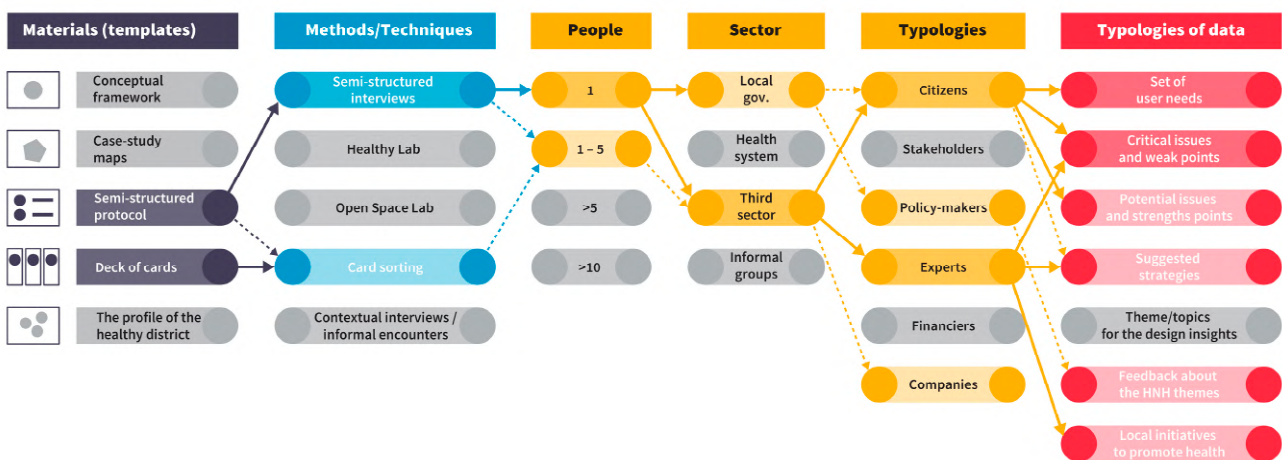
operational tools both for understanding the contexts and for transforming understandings of design insights, in context.

Figure 22. Examples of how to apply the HNH toolkit.

Indeed, while specific frameworks provide convincing checklists and guidelines that can be addressed by multiple actors (e.g., [23]), these kinds of resources hardly describe how to embed this transformation process through design-led perspectives. For instance, research in this area often invites us to follow the introduced framework by involving citizens. However, such studies have not yet focused on aspects that clarify how one can gain design insights from this participatory process using the presented frameworks. In addition, they do not give insight into how one might design processes and tools for transforming frameworks in operative models. Indeed, less attention is given to the practical implications of gaining design knowledge. With the HNH project, we explored how to contribute to this lack of design-led aspects; we sought to both contribute to the urban health approach and to give a tangible experience through an action research project. The richness of the obtained data that are easily transformable to design insights for specific design interventions demonstrates the potential of the HNH framework—it can be transformed in a toolkit if it is applied in similar activities as those that have been described for the HNH project. The HNH Toolkit that has been presented here has the potential to achieve the following goals: (i) contribute to applying a framework for healthy neighbourhoods; (ii) become a driver for operative models for urban health guidelines and checklists by integrating the options for working in this area; (iii) give a clear overview of options on how it is possible to customise the process in the contexts; (iv) equip designers with the potential to capture data to be transformed into contextual design insights.

These in-depth features are often disaggregated or difficult to find in the literature.

In parallel, from a design research perspective, it is still difficult to find a direct connection between a design thinking perspective and the urban health approach. This is true with the exception of a few cases, where design thinking is considered to be a method of developing urban health solutions [5], or where the design for social innovation is proposed as a way in which design can contribute to the development of innovative city models [53,54]. To support these aspects, the HNH Toolkit forms a connection between the HNH framework and its potential to be implemented in a design process, such as the Double Diamond approach (as discussed previously). This is a novel aspect of this paper that also clarifies how it is possible to use urban health instruments for developing design processes with an RTD approach. This is an aspect that is lacking in the literature and it could potentially increase the possibility of using design as a strategy to address urban health issues and promote healthy behaviour.

It is still difficult to find studies that specifically explore design which promotes behavioural change [66–68], as can be adopted for applying the urban health approach. The HNH Toolkit may also help in this direction, paving the way for new design conversations.

Finally, the HNH Toolkit is in line with the consensus in the literature on promoting citizens' participation in the process of both understanding and providing interventions for urban health. Several perspectives from the literature underline the importance of providing participatory approaches (e.g., [23,33,47,48,59–65]) by also emphasizing principles, guidelines, and methods that can transform these intentions into actions. However, it is still difficult to find instruments which can meet the following needs: (i) robustly connect participatory activities with the framework behind the application of an urban health approach; (ii) implement these activities with a design-led perspective in a (co)design process; (iii) adapt the frameworks for contextual needs; (iv) transforming data from the analytical activities into participatory mediums to gain design insights; (v) consequently frame design insights that are consistently robust with respect to the original framework that guided the contextual explorations. The HNH Toolkit may also contribute to these aspects. Finally, it is still difficult to find a common framework and a common design protocol or operative model that enables an understanding of how one can adopt a design-led approach that connects all the aforementioned aspects. Most of the cited sources that widely address the urban health approach seem to be disconnected and far from being applied with a design-led perspective. The HNH project and its toolkit

may also contribute to the creation of a common and shared operational base that can be worked with at the neighbourhood level.

4.3. Strengths and Challenges of the HNH as a Research Tool

In terms of strengths and challenges, the HNH framework has been perceived as a complex tool, with some themes that can be misrepresented. Despite the framework being designed to also be communicated to non-experts, some terms of the framework can be misunderstood if not supported by a well-designed process. We prepared the participants through a step-by-step information-sharing process. From the first point of contact (email or phone call), we introduced the main themes of the project; the visual aspects of the framework were shared with participants during the in-the-field activities. However, misinterpretations happened but provided unexpected feedback that was very helpful in understanding possible improvements that can be made to the framework and the design insights.

In parallel, a few themes allowed participants to increase their understanding and awareness of the concept of a healthy environment. This effect boosted the dialogues with participants (e.g., during the interviews and Healthy Labs) by emphasizing the educational and inspirational features of the HNH framework to understand healthy (or unhealthy) contexts and imagine urban transformations through the built environment design process. In general terms, the participants appreciated the complexity that was described by the HNH framework. They appreciated the synthesis that enabled them to address such a complex set of themes through an easy-to-use set of visualisations. This allowed the participants to understand the potential role of designers in affecting behaviour changes towards healthier lifestyles in urban contexts.

Regarding card sorting, the participants reflected that the cards were useful in understanding the HNH framework among non-experts (cf. [85]). Also, the cards were perceived as being playful and informal; these are features that helped the dialogues to be more open and spontaneous. However, a few aspects—such as some terms and images of the cards— should be improved to facilitate a better understanding of urban health terminologies; this is necessary as it is often discussed in the design of card sorting (e.g., [84]). Enriching the deck with more cards (or sub-options) could be useful in opening new discussions on the themes raised by the HNH framework. The cards assumed an educational role in informing people about the promotion of health through the built environment and the potentially related citizen behaviours. However, we found that card sorting was more effective if additional tools were used with them in a structured process. The templates we used in the HNH Toolkit, on one hand, were useful in understanding the "district profile" (e.g., the healthy district profile template) that narrates the actual status of district health conditions through the built environment. On the other hand, they helped in framing design insights where it was possible to create design interventions for the district through the built environment.

In general terms, the application of the HNH Toolkit inspired both the participants and the research team to create a common language for debate and discussion of the impacts that the built environment might have on the citizens' health behaviours. Essentially, the HNH Toolkit aids in design thinking and has a role in finding creative design solutions which will help promote healthy urban behaviours. However, one of the major challenges we need to address with the HNH Toolkit lies in sharing it with policymakers who can use it systematically to make decisions and orient the planning of actions for health policies. The big challenge for the HNH Toolkit is its future evolution, as a tool to be used by citizens and policymakers to improve awareness and promote behaviour change in facilitating healthy lifestyles.

Finally, through this study, we argue the HNH Toolkit can be used as a design-led and participatory instrument, as follows: (i) to support existing models and policy tools such as the Behaviour Change Wheel [114] and other urban health checklists from the literature; (ii) to facilitate design requests from citizens and third-sector entities to make bottom–up

proposals and improve the quality of the districts' built environments, promoting improved health; (iii) to contribute to identifying design strategies and scenarios through design insights from user research and participatory activities.

4.4. Implications for Developing a Healthy Design Culture

By observing the results and the discussions provided so far, it is also possible to present a few implications for the concept of developing a healthy design culture. Indeed, from a research team perspective, the HNH Toolkit created a common and comprehensive structure for adopting a cross-disciplinarity perspective. The instruments in the toolkit were useful in navigating a common research process with different design disciplines for different scales of application (product, architecture, and urban design). The HNH Toolkit allows each discipline to achieve the following: (i) interpret research data through their specific knowledge, contributing to additional design research sessions (e.g., co-design phases); (ii) establish creative connections among different areas and disciplines by using the HNH framework as the main driver of the whole research process; (iii) adopt a design approach that is both situated and scalable. As a consequence, we argue that the application of the HNH Toolkit supports the development of a situated cross-disciplinary design culture for urban health issues, meeting the following: (i) the needs of the involved stakeholders; (ii) the status of the application contexts; (iii) the general principles, best practices, and guidelines from the literature. It can help in the development of a healthy design culture in a context where design culture itself develops according to specific contexts (e.g., [50,51]). The HNH Toolkit may help in the adoption of a general framework to assume a design thinking perspective for impacting healthy lifestyles through the urban built environment. This can be achieved while respecting the peculiarities of specific contexts.

4.5. Design Knowledge and Design Research for Health Promotions

By applying the HNH Toolkit, we have produced knowledge that is useful for the co-design phases of the HNH project. By taking Cross's design research taxonomy [80] into account, we gained information about people, processes, and products through in-the-field activities that allowed us to identify problems, critical aspects, opportunities, strategies, and local best practices and examples. Through this information, we were able to understand the following: (i) how we can address the health issues in the two case studies from a design perspective, according to which kinds of problems and opportunities arise (design epistemology perspective); (ii) what kind of practices and processes we can adopt (design praxiology perspective) while involving people, replicating best practices, and even approaching with new design processes; (iii) what kind of design output we can produce to evidence the possibility of finding design solutions for promoting healthy lifestyles (design phenomenology perspective). In practical terms, for the first aspect, we can interpret the data with the involved design disciplines in the co-design phases. For the second, we propose that the process and the operative model we used in the HNH project can be used as a research protocol and an operative model to be adopted for designing healthy neighbourhoods, while addressing and respecting contextual needs and peculiarities. For the last aspect, we are co-designing a few design scenarios which can enable citizens and policymakers to understand the kinds of urban products that can be implemented to improve the quality of the built environment, facilitating more healthy solutions. These aspects will be more tangible in future works of this project, due to the ongoing phases of the aforementioned design research actions.

In summary, we have presented a discussion on how the variety of the results allowed us to consider the HNH framework as an actionable design research tool to gain design insights for making interventions in the neighbourhood's built environment. Consequently, the application of the HNH framework allowed us to identify the HNH Toolkit; this works as a design research instrument. In this section, we have also described how the HNH Toolkit works, and we have discussed its implications for gaining design knowledge. The HNH Toolkit works as an instrument to be used in the first phases of the Double Diamond

approach, adopting an RTD approach for facilitating improved urban health; consequently, it assists in understanding how we can promote healthy behaviours among the citizens of cities through the design of their built environments. Concerning the literature provided in the Introduction, the HNH Toolkit introduces a novel set of possibilities for applying this approach with a design-led perspective; this is achieved through adopting a multidisciplinary approach and by considering the possibility of developing a situated design culture surrounding the facilitation of healthy lifestyles.

5. Conclusions

In conclusion, we experimented with applying the HNH framework through participative research activities. We designed tools, processes, and research protocols with the aim of ensuring their ease of use by participants; at the same time, we sought to answer the research questions of the HNH project. We therefore experimented with the application of the HNH framework as a design research tool in two case studies in the city of Florence. We directly involved local people in interviews, card-sorting sessions, Healthy Labs, and Opens Space Labs. We obtained qualitative data that we analysed with qualitative analysis procedures. Consequently, we observed that the process we followed and the instruments we adopted can be used as research tools for designing research practices to frame problems, solutions, opportunities, strategies, and insights; these can be used in the design of scenarios and strategies for promoting healthy lifestyles through built environments. Despite some limitations in the whole process and the instruments, we observed that the practices and instruments can be interpreted as a toolkit for exploring and orienting design projects that seek to promote health behaviours through the built environment, by including the four design disciplines we adopted in the HNH project: product design (micro-scale), architectural design (meso-scale), urban and landscape design (macro-scale). From a design research perspective, the HNH Toolkit works as an instrument to perform research for and about design in an RTD process that addresses the urban health approach. From a design thinking perspective, and by taking the Double Diamond approach as a reference, the HNH Toolkit aids in discovering and defining research phases; thus, it can be used in preparing the design process to enter the most creative phase, finding creative solutions to be developed. This is possible based on the accurate exploration of the people's needs and contextual, situated problems, opportunities, and possible strategies.

The HNH Toolkit has been designed to apply a conceptual framework that aims to address the urban health approach through design. Consequently, it can be used as a design-led research tool to understand methods of facilitating healthy urban behaviours through designing creative solutions, addressing the contextual needs of citizens.

Finally, we argue the HNH Toolkit has the potential to be a policy instrument for analysing and controlling health policy designs, as well as for increasing citizen awareness about healthy behaviours and enabling people to be comfortable in proposing bottom–up solutions for developing healthy places.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

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