

HEALTH-PROMOTING URBAN PLANNING: A CASE STUDY OF AN EVIDENCE-BASED DESIGN PROCESS

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Abstract

Planning and building health-promoting, sustainable, and resilient urban environments is a complex challenge. Beside the negative effects caused by stressors in our urban living environments, health status also drops because of our way of life, e.g., stress-induced illnesses increase, we exercise less, obesity is a growing health problem, and loneliness and lack of human relations are also risk factors for disease and premature death.

A growing amount of evidence shows that access to nature and urban greenery has positive effects on human health and well-being. Hence, landscape design could contribute to meeting the goals for public health and well-being. This stresses the need to investigate methods and tools that aid the process of evidence-based planning and the design of health-promoting outdoor environments, as well as the need to consider how to incorporate such methods in planning and design processes.

This study explores the application of an evidence-based approach in urban planning for design of health-promoting urban green spaces, e.g., parks. A two-step study using participatory action research as the overarching method enabled us to take part in and observe a collaborative practitioner-research process in a municipal planning and design context. Use of evidence-based methods and tools for design of urban public spaces was explored, and experiences were shared and discussed between landscape architects and researchers.

The results show that evidence-based design principles are useful for guiding design interventions concerned with health-promoting environmental qualities in an urban planning context, for people in general and for specific user groups, e.g., intending to design health promoting environments for the elderly or to aid in stress relief. In addition, landscape architects found that the evidence-based process inspired design solutions and gave a higher sense of meaning to their work.

However, descriptions of the environmental qualities defined need to be adapted to the specific context, using descriptive examples of aspects more relevant for public spaces. The study also identifies a need to connect health-promoting environmental qualities to urban planning guidelines for access to green space and points out a need to identify preconditions in earlier planning phases that enable or limit landscape architects' ability to develop some of the health-promoting environmental qualities. Furthermore, to surmount the time-consuming threshold of learning how to use new tools and methods, landscape architects ask for more concrete and easily applied guidelines or checklists to aid design decisions. Altogether, the results presented illuminate possibilities for an evidence-based design process and shed some light on the factors that need to be considered in such processes.

Keywords: *Health-promoting | evidence-based design | landscape planning | urban planning | participatory action research*

Introduction

Building health-promoting, sustainable, and resilient urban environments is a challenge for modern city planners. Future cities are expected to meet the needs of fast growing urban populations, to resist the environmental degradation that follows with urbanisation, to be adaptable and resist climate changes, and on top of that form good and healthy living environments. To build cities that support and promote health and well-being for their inhabitants is a complex task; nevertheless, the need to do so is escalating [1, 2, 3, 4, 5, 6].

At the same time, health status is dropping due to increased lifestyle-related diseases. We live stressful lives, many feel lonely, we exercise less, and we are affected (biologically and psychologically) by negative stressors in our urban living environments. Health agencies report increased mental illness, especially among young people, citing stress-induced illnesses as one of the main reasons. Obesity is a growing health problem for over half the Swedish population and constitutes a risk factor for high blood pressure with increased risk for heart and cardiovascular diseases.

Loneliness and bad human relations are even more serious risk factors for disease and premature death than obesity or physical inactivity [7, 8, 9, 10, 11, 12, 13].

A growing amount of evidence shows that access to nature and urban greenery has several positive effects on human health and well-being [6, 14, 15, 16, 17, 18]. Urban green spaces can help to enhance the health condition of the public by providing close and easy access to urban nature and greenery with spaces designed to have health-promoting environmental qualities that support stress restoration, stimulate physical activity and promote social interaction [19, 17]. Research has pointed out the need to translate research into practice but has also identified challenges related to that process [20, 21, 22].

It is important to increase our understanding of how, in practice, to plan and design for environments that promote human health and well-being. Earlier research has pointed out the need to identify different specific environmental qualities that benefit health and well-being to enable future landscape design that take advantage of these benefits [23]. Other research has pointed out the need for models and tools that facilitate the use of evidence in participatory design processes [24, 25, 26, 27, 28]. This stresses the need to investigate models and tools that aid landscape architects in the process of planning and designing health-promoting outdoor environments [29, 30, 18, 31, 16, 32, 9, 20, 21].

Research question

This study aims to explore and evaluate the implementation of an evidence-based approach in urban planning for the design of health-promoting urban green spaces, e.g., parks.

Knowledge of the outdoor environment as a health-promoting resource is steadily growing, but how could this knowledge be put into practice? Are there existing models and tools for use in evidence-based design processes that could be tested? What could be learned from the process of trying to use such tools?

Method

A collaborative project between landscape architects in a municipality (in the Stockholm region) and researchers at the Swedish University of Agricultural Sciences (SLU) gave an opportunity to study the use of evidence-based models and tools in the planning and design of health-promoting urban, public outdoor environments.

Landscape architects in the municipality had recognised the potential benefits of health-promoting design and turned to researchers for support on how to translate research-based knowledge into design processes in urban planning. This initiated a collaboration between practitioners and researchers based on a mutual interest in developing evidence-based health-promoting public outdoor spaces.

Methodological approach

In order to study the possibilities and challenges of using evidence-based tools and models in urban planning, participatory action research (PAR) [33, 28] and case-study methodology [34] were used as overarching methods. The combined PAR and case-study approach enabled the researchers to participate in and observe the process in a real-life context, with the intention both to study the implementation of research, and to evaluate the practical use of tools intended to support an evidence-based design approach. Case-study research is known to be useful for finding knowledge useful for practical application in a real-life context [34] and was considered appropriate for the present study. Note that the intention was not to study the health effects of the design, but to study the use of evidence-based models and tools in a design process.

Activities performed in this case study were observed and documented in a research diary. The researcher's observations and landscape architects' experiences were analysed and evaluated in joint discussions during work meetings and workshops in different steps of the case study [34, 27]. The case-study set-up had an iterative approach, using the first part of the study as a pilot to inform the second part [35].

The possibility to study the use of evidence-based tools and models in urban planning was facilitated by the opportunity of the first author to take part in the study both as a participant working in the authentic development context in the municipality, as suggested by e.g. Ahnberg [27], and as an observer following, describing and analysing the process and the application of the tools and methods used, see e.g. Katoppo [28].

Tools and models investigated in this study

The Quality Evaluation Tool (QET) [36] was used as the framework for the present study. Earlier research has pointed out a need for models and tools for use in evidence-based design processes of outdoor environments [24, 25, 37, 38], and for identifying specific environmental qualities that benefit health and well-being [23]. The QET was developed to meet the above-mentioned needs [39].

Furthermore, since the QET has a holistic approach to design that includes aspects that are important both for health promotion and ill health prevention, it was considered a relevant and useful tool for the present study.

The Quality Evaluation Tool

Use of the QET involves three steps (see Fig.1); 1) making an inventory of existing environmental qualities identified to support health and well-being [36, pp. 881, Table 1], 2) investigating user-specific environmental needs in relation to four zones of contact with the outdoor environment, 3) proposing design interventions based on the result of the first two steps.

Environmental qualities	Step 1. Investigation of environmental qualities in the outdoor environment using the four zones of contact	Step 2. Evaluation of qualities' importance to potential users and in relation to the four zones of contact	Step 3. Suggested measures and design proposal
Section A. Six environmental qualities allowing people to be comfortable in the outdoor environment			A. Suggested measures for comfortable design
Section B. Thirteen environmental qualities supporting people's access to nature and surrounding life			B. Suggested measures for inspiring design

Figure 1. Practical construction of the QET – outline of steps supporting an evidence-based design process (Bengtsson & Grahn, 2014).

The QET highlights the importance of the relationship between indoor and outdoor environments by relating the user's health-promoting experiences to the following four zones of contact with nature (Fig.2) [39]:

- starting with the visual contact from inside a building (zone 1),
- including the connection between indoors and outdoors (zone 2),
- focusing on experiences in the closest outdoor environment, like a garden (zone 3),
- taking into account the health-promoting qualities of the surrounding environments (zone 4).

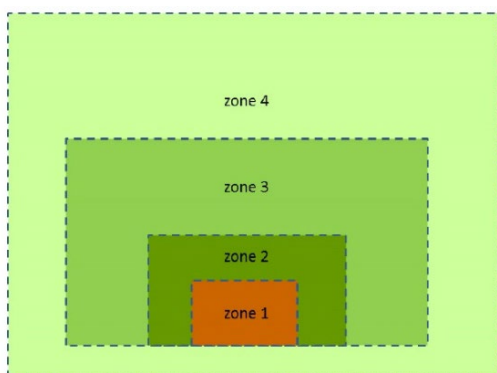


Figure 2. Model of four zones of contact with the outdoor environment (Bengtsson, 2015).

The holistic approach to the design process, including environmental qualities corresponding to needs and preferences of a wide range of users, makes it interesting to explore the use of the QET, and to investigate its potential value in the context of urban planning where the wide range of all the city residents' health and well-being needs must be taken into account.

Case study part 1 (pilot) – Evaluation of a design proposal based on QET

This study was set up as a case study in two parts, in an iterative process where the result from the first part of the study was used to inform the construct of the second part of the study.

Case study: part 1 (pilot) – case-study setting

A park (Fig.3) in a municipality in the urban Stockholm region, scheduled for future development by the municipality, served as case-study setting in the first part of the case study.



Figure 3. Site overview, park to be developed into a health park based on research knowledge on health-promoting environmental qualities in case study part one. Photo: overview in Orto-photo, provided by the municipality.

Case study: part 1 (pilot) – objective and work process

The main objective of the first part of the study was to identify aspects of importance for the implementation of use of evidence-based design in an urban planning context, both from a practitioner and research perspective.

Table 1. Case-study design and work process of pilot study following the QET design process.

Case study - part one
(Pilot study)

Main activity	Timeline	QET - STEP 1 Investigation of environmental qualities in the outdoor environment using the four zones of contact	QET - STEP 2 Evaluation of qualities' importance to potential users and in relation to the four zones of contact	QET - STEP 3 Suggested measures and design proposal	Evaluation	Activity performed by:
1.1	2015	Inventory of existing health promoting environmental qualities of Section A: <i>Comfortable environment</i>				The first author, as MSc student at the master program 'Outdoor Environments for Health and Well-being' at SLU
1.2	2015	Inventory of existing health promoting environmental qualities of Section B: <i>Access to nature and surrounding life</i>				The first author, as MSc student at the master program 'Outdoor Environments for Health and Well-being' at SLU

Main activity	Timeline	QET - STEP 1 Investigation of environmental qualities in the outdoor environment using the four zones of contact	QET - STEP 2 Evaluation of qualities' importance to potential users and in relation to the four zones of contact	QET - STEP 3 Suggested measures and design proposal	Evaluation	Activity performed by:
1.3	2015	Identifying the environmental relationship of <i>Four zones of contact</i>				The first author, as MSc student at the master program 'Outdoor Environments for Health and Well-being' at SLU
1.4	2015		Interviews with local key experts focusing on local priority target user groups' specific environmental needs in relation to the park. <i>Targeted user groups identified by the municipality</i>			The first author, as MSc student at the master program 'Outdoor Environments for Health and Well-being' at SLU
1.5	2016, Q2			Developing a conceptual design proposal for development of a health park		Researchers at SLU as consultants for the municipality
1.6	2017, Q1				Presentation and evaluation of the conceptual design proposal. Workshop with local stakeholders in the municipality, both internal (politicians, municipality officials) and external (representatives from local interest groups with different user perspectives)	Facilitated by the municipality, held by landscape architects in the municipality and researchers at SLU together in collaboration.
1.7	2017, Q2				Citizens dialogue	Landscape architects in the municipality
1.8	2017, Q3				Synthesis – evaluation of conceptual design proposal in relation to result from citizens dialogue and feedback from internal and external stakeholder	Landscape architects in the municipality and researchers in collaboration.

Researchers followed the three steps of the evidence-based design process outlined in the QET (Fig.1), and developed a conceptual design proposal for a health park in dialogue with landscape architects in the municipality (see details in table 1).

Case study: part 1 (pilot) – documentation and analysis

The proposal, i.e., the result of the design process using QET, was presented, discussed and evaluated in several collaborative activities involving citizens (Table 1, activity 1.7) and local stakeholders representing specific user groups as well as politicians and planners (Table 1, activity 1.6).

Landscape architects and researchers discussed and evaluated the design proposal in light of the feedback from citizens and local stakeholders, e.g., planners and politicians, and jointly drew conclusions and summarised the results (Table 1, activity 1.8). Study visits to Alnarp Rehabilitation Garden and Kristianstad Health Garden served as reference objects in the discussions.

Landscape architects' and researchers' joint conclusions pointed out what aspects were important to consider in the second part of the case study in regard to the design process as well as design content.

One researcher (the first author) observed and documented all activities and all parts of the process.

Case study part 2 – Evaluation of the application and use of the QET in urban design processes

Drawing on the results from the first part, the second part of the study scaled up the perspective and investigated how the QET can guide planning in a wider context.

Case study: part 2 – case-study setting

The municipality's intention to produce a programme proposal to guide the municipality in future development of a larger urban area served as a case-study subject in the second part of the case-study. The programme (Table 2, activity 2.4) involved three centrally located parks (including the park studied in the first part of the study) with potential to form a cluster of connected health-promoting parks (see figure 4) serving as a 'green corridor for health' in the municipal city core.

However, feedback from landscape architects' experiences of using the tool (Table 2, activity 2.3) also included other sites in different ongoing development projects.



Figure 4. Area of connected parks serving as case-study object for evaluating the application of QET in the process of forming a programme proposal for development of a larger health-promoting park area in an urban city core in the Stockholm region.

Case study: part 2 – objective and work process

Based on the result from the first part of the study, the objective of this part was to evaluate the application and use of QET in urban planning and design processes, and to study landscape architects' experiences of using the tool. A second aim (based on the municipality's needs) was to form a development programme proposal for the overall structure and content of a larger health-promoting park area, to guide the municipality in future development of the area. Two main activities were planned to meet these objectives, see activity 2.2 and activity 2.4 in Table 2.

After preparatory educational activities, such as research seminars (Table 2, activity 2.1), where researchers presented research evidence and tools, and showed examples of how to use the QET [36, 40], landscape architects used the QET in ongoing development projects (Table 2, activity 2.2). Landscape architects in the municipality carried out QET steps 1 and 2 (Fig. 1), and from that devised a programme to guide consultants (following Swedish legislation on public procurement) in performing QET step 3 (Fig. 1).

In the other main activity, a programme for development of a larger health-promoting park area (Table 2, activity 2.4), was created in co-production between landscape architects and researchers, performing the QET steps together (Table 2, activity 2.4.1-2.4.5). A detailed inventory of existing health-promoting qualities (QET step 1) was made using different inventory techniques (Table 2, activity 2.4.1-2.4.3). Important user groups, and user-specific needs to consider in different parts of the area were identified (QET step 2, Fig. 1) on an overarching level (Table 2, activity 2.4.4). A development programme was produced (Table 2, activity 2.4.5), giving overarching design guidelines (QET step 3) for future development of the area. The programme described existing health-promoting environmental qualities of high value (QET step 1, Fig. 1), it pointed out challenges and weak spots important to consider from a health perspective, and suggested potentially important user groups to consider in different parts of the area (QET step 2, Fig. 1).

Researchers were available to support the work process (Table 2, activity 2.2 and 2.4.1-2.4.5). Landscape architects' experiences were presented to researchers and discussed in a workshop (activity 2.3, Table2).

Table 2. Case-study design and work process of part two following the QET design process.

Case study part two

Activities planned and performed based on the result of case study - part one

Main activity	Timeline	Learning, education	QET - STEP 1	QET - STEP 2	QET - STEP 3	Evaluation	Activity performed by:
			Investigation of environmental qualities in the outdoor environment using the four zones of contact	Evaluation of qualities' importance to potential users and in relation to the four zones of contact	Suggested measures and design proposal		
2.1	2018, Q3	Preparatory educational activity, educational seminar, theme: "Health promoting landscape planning"					Held by researchers, for the department of landscape architects in the municipality
2.2	2018, Q3-Q4		Using/testing the QET tool in ongoing design and development projects in the municipality.				Landscape architects in the municipality. Researcher available to guide use of the tool/working in parallel in the municipality.
2.3	2018, Q4					Workshop, theme: "Health promoting landscape planning in practice" Feed-back from landscape architects to researchers on their experiences of applicability and usability from using the QET in an urban planning context	Held by landscape architects in the municipality for researchers. Joint discussions.
2.4	2018, Q1-2019, Q2		Create/propose a development program to guide future design-interventions of three connected urban parks (including the health park studied in part one of the case study), with the intention to create a large health promoting park area/corridor for health close to the central city core under densification.				Landscape architects in the municipality and researchers in collaboration.
2.4.1			Inventory of existing health promoting environmental qualities of Section A: Comfortable environment				Landscape architects in the municipality and researchers in collaboration.

Main activity	Timeline	Learning, education	QET - STEP 1 Investigation of environmental qualities in the outdoor environment using the four zones of contact	QET - STEP 2 Evaluation of qualities' importance to potential users and in relation to the four zones of contact	QET - STEP 3 Suggested measures and design proposal	Evaluation	Activity performed by:
2.4.2			Inventory of existing health promoting environmental qualities of Section B: <i>Access to nature and surrounding life</i>				Landscape architects in the municipality and researchers in collaboration.
2.4.3			Identifying the environmental relationship of <i>Four zones of contact</i>				Landscape architects in the municipality and researchers in collaboration.
2.4.4				Inventory of user specific environmental needs on an overall strategic level using GIS-data. Identifying user specific environmental needs along the area by mapping of municipal functions such as schools, different kind of housing areas, etc.			Landscape architects in the municipality and researchers in collaboration.
2.4.5					Forming a Program proposal that describe and guide future development of three connected parks into a health promoting park area/corridor for health		Landscape architects in the municipality and researchers in collaboration.
2.4.6	2019, Q3-Q4 and onwards				Implementation of the 'Development program' in the municipal organization		Landscape architects in the municipality <i>(Activity outside the scope of this case-study)</i>

Case study: part 2 – documentation and analysis

During the work of applying the QET to produce a programme for the larger park area, landscape architects and researchers worked closely together (Table 2, activity 2.4.1-2.4.5). They continuously discussed and reflected on the process.

The landscape architects' experiences of using the QET were also collected in a workshop (Table 2, activity 2.3) where they gave feedback directly to the researchers, and the application and use of the QET in an urban planning context were discussed.

One researcher (the first author) observed and documented all activities and all parts of the process (Table 2, activity 2.2 and 2.4). Then the documentation was analysed by the two authors. The overall intention of the analysis was to reveal challenges and possibilities experienced by the landscape architects using the QET.

Results from case study part 1 (pilot)

The results from the first part of the study are based on the evaluation of the conceptual design proposal developed by researchers applying research evidence on the health-promoting natural qualities in an urban planning context. With a focus on the process of implementing the QET in urban planning in the next step, the main outcome from the first part of the study (Table 1) is the construct of part two of the case study (described in Table 2).

Evaluation of a design proposal based on the QET

The conceptual design proposal developed in the project suggested an overall layout of the park using thematic areas guiding design interventions. Environmental qualities important to the concept and for specific user groups were identified (to keep, develop and/or add) in each thematic area, and health-promoting design interventions for different user groups were proposed and arranged in relation to thematic areas (Fig. 5).

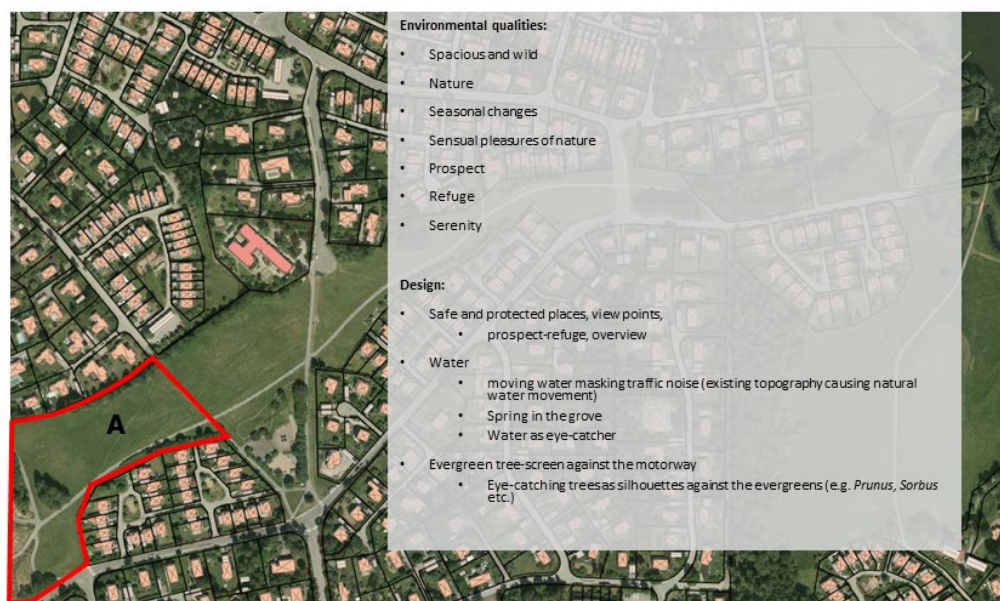


Figure 5. Example of a conceptual design proposal for one thematic area in the park.

Local stakeholders in the workshop gave overall positive feedback on the proposal. General concerns related to feelings of safety based on lighting conditions, vegetation and low social presence were discussed and different user views were presented. Aspects related to practical landscape design and urban planning such as water flow management and traffic solutions affecting the design proposal were addressed.

Results from dialogue processes with local residents showed divergent opinions among local residents, some very positive to the proposal and some having concerns. Private one-family houses with gardens surround the park closely. The local residents' priority was to keep and renovate an existing playground. Several expressed a wish not to develop a health park, and comments such as "Don't make this into an attraction, we don't want anyone else to come here" expressed concern about how the proposed interventions might change the place and its content and attract new users.

Conclusions from evaluation of the design proposal in case study part 1

The results from case study part 1 (Table 1, activity 1.8), concluded by landscape architects and researchers, based on the evaluation of the conceptual design proposal and feedback from dialogue with citizens (Table 1, activity 1.7) and stakeholders (Table 1, activity 1.6), identified two main findings.

First, the place did not fit the aim of the conceptual design proposal. This was related both to local users' perspectives raised in dialogues with citizens and stakeholders, as well as practical aspects of municipal management, for instance political values or organisational aspects affecting the realisation of suggested service functions, e.g. public toilets and a manned greenhouse. However, an area comprising several parks was identified as possible to develop into a larger connected area of health-promoting parks, allowing for an overall layout that could provide a broader scale of health-promoting environmental qualities.

Second, the landscape architects raised concerns regarding lack of clarity on how to go forward with the conceptual design proposal in municipal design processes. Landscape architects who had not been active in the design process

and had not used the tool themselves, experienced a limited ability to describe the proposal in dialogue with internal/external stakeholders and to explain design choices.

The joint evaluation by researchers and landscape architects informed the design of case study part 2, focusing on evaluating how the QET could be applied and used in urban (municipal) design processes. This led to an extended co-operation, aiming to create a programme proposal for a wider area of three connected parks, formed by landscape architects and researchers in co-production, and also initiated educational activities to enable landscape architects to use evidence-based tools that could help them to plan and design health-promoting outdoor environments.

Results from case study part 2

The results from the second part of the study reveal the challenges and possibilities that the landscape architects experienced using the QET.

Evaluation of application and use of the QET in the urban design process

Starting to use a new design tool was found to be an obstacle in itself. It takes some time to learn how to use the tool, which to some extent delayed or hindered implementing use of the tool. Landscape architects pointed out a need for more easily applied guidance from researchers on how to apply evidence-based tools in the context of designing public outdoor spaces. Landscape architects testing use of the QET in development projects also raised a need for support to make time estimations for performing the QET steps in order to aid work planning.

Landscape architects testing use of the QET in the municipality sometimes found that they were involved too late in urban planning projects. Some aspects that were important for design interventions of health-promoting environmental qualities were found to be limited by aspects defined in earlier planning phases. Land-use, and the size and localisation of green spaces in relation to the built environment are examples of aspects found to restrict landscape architects' freedom and to determine what health-promoting design interventions can and cannot be implemented. Involvement in early planning phases was found important in order to be able to identify and save existing health-promoting environmental qualities in a development site, and to create good pre-conditions for adding such qualities in design.

The landscape architects also found that using the QET helped to inspire the design process itself. They reported that using the QET in the process of analysing inventory results (QET step 1) to identify environmental qualities and evaluating user-specific needs in regard to the place (QET step 2), actually inspired new design solutions (QET step 3, Fig. 1). The landscape architects also said that using the QET to apply research knowledge gave increased understanding of how their design interventions could promote health and well-being for the public they serve. That also brought a sense of meaningfulness to the work and evoked positive feelings of being able to make a positive difference for local residents.

Evaluation of inventory of 'Four zones of contact with the outdoors' in urban planning

Using the model of 'Four zones of contact' (Fig. 2) in design processes normally starts by analysing the experience of the outdoors from inside a building, in zone 1, and builds on that with the connection to the outdoors via zone 2 and focuses on the design of the part of the outdoor environment closest to the building, zone 3. When the model is used in urban planning it needs to be reversed. Landscape architects in the municipality studied, work with public outdoor spaces, in Swedish defined as "allmän platsmark", which included public outdoor environments such as parks, walking paths and plazas, but not facilities such as schools, health care buildings etc. In relation to the model 'Four zones of contact' this means that they mainly develop and maintain spaces defined as zone 4 areas, often without any access to or means to change the content of zone 1-3 areas.

Still, the model 'Four zones of contact' (Fig. 2) was found useful. In this study the model was used to identify specific user groups important to relate to in specific parts of the outdoor environment (Fig. 6). For example, the model was used to locate different housing areas and public service functions such as pre-schools or housing for senior residents in the park area and to determine whether they had access to their own zone 3 area or not. Such knowledge can guide the landscape architect when making design choices and identifying how the design or development of [a specific] urban public place (zone 4) can compensate for insufficient access to green space and/or lack of health-promoting environmental qualities that are important to nearby inhabitants/users.

Such information was found to guide the overall layout of public outdoor environments, helped identify focus points for certain user groups, and was used to identify how a public outdoor space can be developed to compensate for lack of access to appropriate outdoor spaces for especially fragile user groups in the surrounding built environment.



Figure 6. Example of access to zone 3 areas from housing or public service functions in the development area, with examples of identified user-specific groups important to consider in different parts of the environment.

Evaluation of inventory of health-promoting environmental qualities in urban planning using the QET

When the QET was used to investigate existing health-promoting qualities in the environment (Fig.1, step 1) [36, pp. 881, Table 1], the landscape architects sometimes found it difficult to translate the meaning of environmental quality [40, pp. 33-35] to the urban context. Some descriptions of environmental qualities were perceived to be specific to health care settings, or to more garden-like environments, which led to discussions on how to interpret them in this context.

Different approaches to inventory techniques were tested. Descriptions of how the investigated qualities were represented in the environment, accompanied by photos providing a comprehensive picture of the environments, were useful on a detailed level in later design steps. Other approaches applied, that were perceived as time-saving and that simplified use, were to grade the presence of the quality from e.g. 0-3, 0 corresponding to “not present” and 3 meaning “strong”, or to identify the presence of an environmental quality in terms of a “weak”, “medium” or “strong” presence (see example in figure 7). This was reported to be an easy and fast approach when applied in a park or larger urban area and was perceived as more useful when producing programmes to guide design by contractors and entrepreneurs used in urban development projects.

The inventory of qualities of a ‘Comfortable Environment’ (A1-A6, Fig.1) [36, pp. 881, Table 1 "Section A"], was found to be quite extensive since these qualities describe fundamental factors that make the environment accessible and user-friendly, which means that all six environmental qualities of ‘Comfortable environment’ were evaluated over the whole area (Fig. 7). This part of the inventory was found to be the most time-consuming part of the process. Important aspects to consider for each quality can differ between different user groups. To make a detailed analysis of a site, including all user perspectives, would mean making landscape analysis maps of all six ‘Comfortable environment’ qualities for each user group. In attempting to add or merge different user perspectives of the qualities to the analysis (Fig.1, step 2) the overall picture becomes very complex and difficult to use.

Using the applied analysis of ‘Four zones of contact’ (Fig. 6) was helpful in the process of identifying and prioritising user groups that would be especially important to consider in different parts of the area. This made it possible to make a more generalised analysis of the area, and yet be attentive to the special needs of different user groups in different parts of the area.

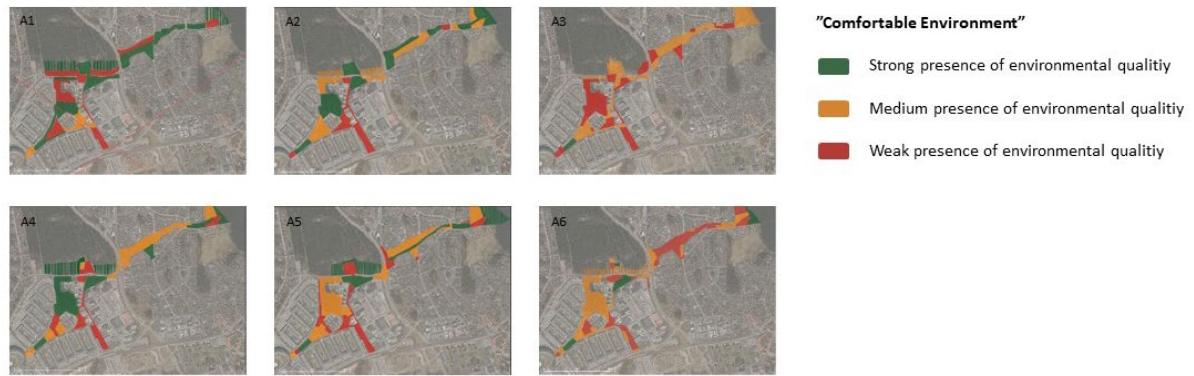


Figure 7. Example of inventory of six environmental qualities of a "Comfortable Environment" (A1-A6). The presence of each quality evaluated as 'strong', 'medium' or 'weak' over the whole area subject to development.

The qualities of 'Access to nature and surrounding life' (B1-B13, Fig.1) [36, pp. 881, Table 1 "Section B"], were perceived as more straightforward to identify. Here the inventory focus was on identifying where in the environment these qualities existed or not (see example in Fig. 8), and then identifying lack of access to these qualities in relation to different user-specific needs in different parts of the area. Again, the applied use of 'Four zones of contact with the outdoors' (Fig. 6) was useful.

Attempts were made to cluster health-promoting environmental qualities into categories that gave specific and targeted health-promoting effects, for instance some combinations of qualities build up restorative environments, other combinations stimulate social interaction and meetings, while others support physical activity. Information in existing GIS-layers was used to identify such clustered categories of environmental qualities. Using such clustered categories of health-promoting environmental qualities was found both to simplify the landscape analysis and to clarify the connection between health-promoting environmental qualities and health-promoting design interventions. From a pedagogic perspective it also eased internal dialogue processes between officials and politicians by providing a clearer explanation of how the suggested design interventions could contribute to meet public goals for health and well-being.

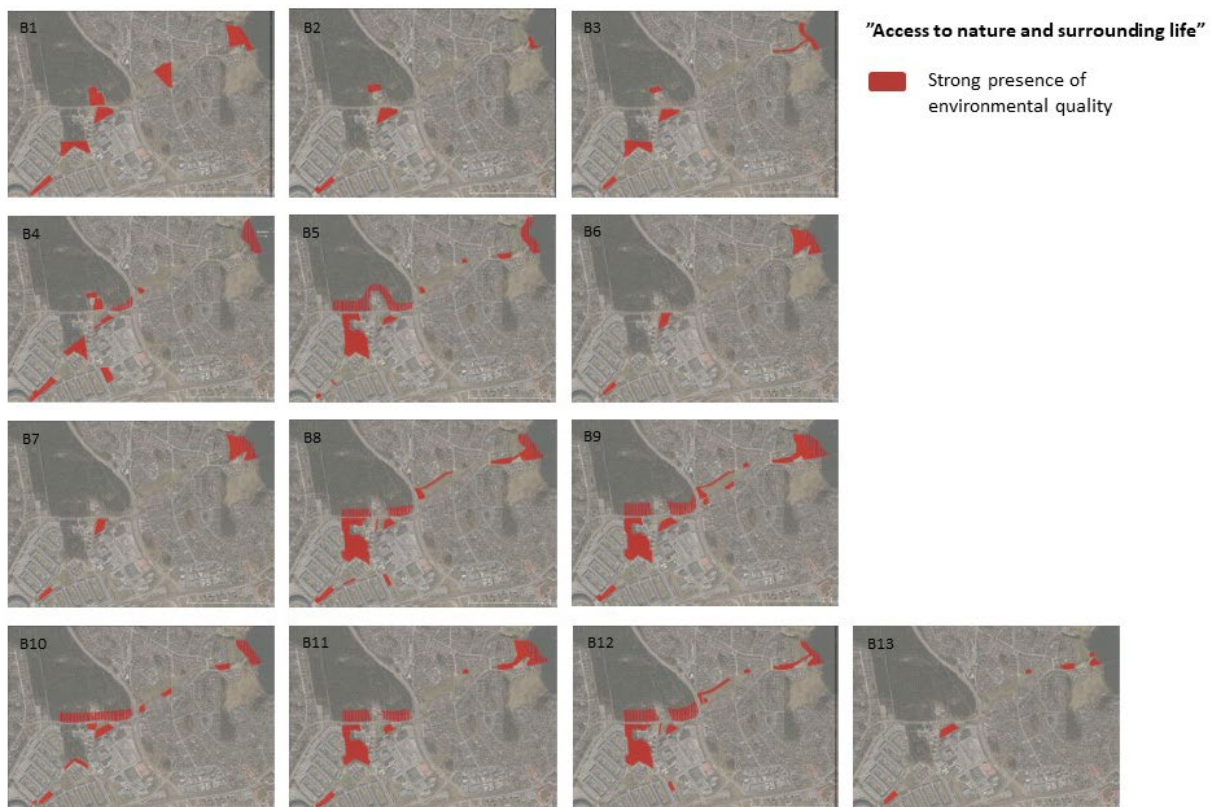


Figure 8. Example of inventory of 13 environmental qualities of "Access to nature and surrounding life" (B1-B13). For each quality, places with existing strong qualities are identified in the development area.

Discussion

Transforming research evidence into practical design solutions is not a straightforward process, and as put forward by Krizek et al. [22], to learn how research evidence can be included and used in planning processes, there is need for empirical research. Using a two-step design, the first part of the case study made it possible to identify what aspects were most important to focus on in the second part, both from a practitioner and a researcher perspective [20]. The co-production and prestige-less sharing of knowledge between researchers and landscape architects in this study has helped to increase practical understanding of how research can be translated into practical knowledge in urban design processes.

Application and use of the QET in urban planning

The results highlight a need to continue developing existing tools and methods to make them more effective and easy for landscape architects to use, and a further need to determine which environmental aspects are most relevant and important for the specific application and use in urban planning.

Environmental qualities in the QET

Overall, the practitioners requested more practical guidance on how to apply the QET [36], in urban planning contexts. For instance, important aspects of the environmental qualities need to be exemplified in relation to different user perspectives, and there is a need to show how environmental qualities relate to urban contexts, e.g., by clarifying the aspects or parameters of each quality.

As the result from inventories of environmental qualities of QET shows (see example Fig. 7 and 8), there is a difference both in aim and inventory method used, between the inventory of the six qualities of “Comfortable Environment” (A1-A6) and the thirteen qualities of “Access to nature and surrounding life” (B1-B13) [36, pp. 881, Table 1].

The qualities of ‘Comfortable Environment’ relates both to physical and mental obstacles and solutions in the environment that may hinder or enable users as they try to access and use the place and thereby benefit from any health-promoting qualities in the environment. Therefore, these qualities need to be evaluated over the whole area, using both a generalised perspective and paying attention to aspects that are important for fragile user groups.

The qualities of ‘Access to nature and surrounding life’ are qualities that together provide a broad variety of health-promoting activities and experiences on a scale related to a gradient of challenge. Different qualities, and combinations of qualities, give experiences that promote health and well-being for different users. The landscape analysis of these qualities focuses on identifying where these qualities exist strongly today, since they represent health-promoting assets to safeguard in the future development of the area. The analysis provides an overall picture of the distribution of these qualities over the area and also shows a lack of access to certain qualities that needs to be addressed in the development programme to guide future design of the area.

Four zones of contact

The study found that when applying ‘Four zones of contact’ in urban planning of public spaces the model needs to be used with a reversed perspective, approaching the built environment from zone 4. By locating focal points important to (locally) prioritised user groups and public service functions for specific user groups and identifying to what extent the surrounding built environment has access to their own zone 3 areas or not (as example in Fig 6), the landscape architects are provided with important information to guide design choices in the design process.

Using the QET to guide an evidence-based design approach in urban planning

Since aspects of the qualities in the QET could have different meaning and/or importance for different user groups, the person doing the analysis and interpreting the result for a design intervention is required to have good knowledge about different user group’s special needs in regard to the outdoor environment. As put forward by Krizek et al. [22] it is relevant to discuss whether the concept of an evidence-based design can be applied at all in the context of urban planning. In the development process in the municipality landscape architects perform steps 1 and 2 in the QET design process, and from that form a programme to guide consultants that are contracted to transform the programme into a design proposal, a design proposal which will then be built by a (another) contracted entrepreneur. Such a process, with many actors involved in different and often totally separated steps, poses a challenge to an evidence-based design process, with a risk that important information may be lost or misinterpreted in the process.

A research-informed design is sometimes argued to be a more relevant concept to use instead of an evidence-based design. However, when comparing these concepts, as expressed by Peavey and Vander Wyst [38], it is relevant to reflect on the difference in ambition that lies within the definition of these two concepts. A research-informed design is based on “a narrow slice of information (research) that is being broadly applied (informed)” [38] implying a weaker base of scientific knowledge available to aid design decisions, while evidence-based design is based on “a broad base

of information types (evidence) that are narrowly applied (based)". If we truly seek to create public outdoor environments that aim to support and promote health and well-being for all city dwellers, urban design interventions need to be motivated by the broadest scientific research findings possible and should be applied to serve both a general public, but should also be capable of being narrowed down to meet the unique needs of specific user groups.

Linking the parameters that make up the qualities of the QET to existing GIS data and clustering them into categories more directly corresponding to public health goals, as attempted in case study part 2, could be a way to simplify applied use of the QET in urban planning and design processes. Identifying such parameters (attributes that build up each environmental quality in the QET) and clustering them into categories to meet generalised public health goals, could aid the process of making inventories of health-promoting environmental qualities available in GIS data, enabling urban planners to plan for the distribution of health-promoting environmental qualities on a larger urban scale.

The landscape architects found that aspects such as land use, size and localisation of green spaces, that were defined in earlier planning phases, could limit the possibilities for health promoting design interventions. Thus, there is a need for future research to scale up from a detailed design to higher planning levels and identify what parameters in earlier planning phases need to be considered, on different levels, to enable the creation of health-promoting qualities.

Evidence-based design sometimes receives criticism for restricting creative freedom [22]. Interestingly, the landscape architects gave feedback that they found the discussions they had when using the QET to identify environmental qualities (step 1) and relate them to user-specific needs (step 2) actually inspired design solutions (step 3) and did not rigidly steer the design process.

To elaborate on the actual outcome of the planned design intervention, there is a need to follow up and evaluate the effects of built design interventions in the long term. This has the implication for a fourth step to be added to the QET design process, using for instance post occupancy evaluations, to allow study of the assumed positive outcomes.

Reflections on using Participatory Action Research methodology

Being involved in collaborative activities using PAR [33, 28] reveals aspects of practical usability and limitations of using the QET in this context. The traditional research role fosters objectiveness and ethical codes that stress the importance of not affecting your results. However, such an approach may not always be the most appropriate. As this study illuminates, translating research into practice requires teamwork between researchers and practitioners, where sharing of knowledge is key to mutual progress. For example, when researchers and practitioners evaluated the results and process together, some contextual aspects that need to be balanced against research knowledge in evidence-based design decisions were identified. Local residents' subjective views and practical management issues related to organisational issues or local political priorities in the municipality are examples of such contextual aspects.

Confirming previous recommendations to bridge the research-practice gap [20], the results show the value that close collaboration between researchers and practitioners can bring to both parties, exemplifying how aspects of importance to the design process can be identified along with questions in need of further research. It was evident from the results that both the researchers' and the practitioners' perspectives are equally important in the process of applying evidence-based tools and methods in urban planning.

Conclusion and future research

Applying research evidence on nature's health-promoting qualities does not by default mean that you create an environment that promotes health for its users. Local knowledge is needed to identify important local user perspectives. Further, local political undertakings steer local priorities and organisational and management aspects may also affect development and design processes. Combining both research and practitioner perspectives aids understanding of how research can be practically applied in urban planning.

Using the QET to investigate health-promoting environmental qualities can guide urban landscape design processes and give landscape architects a greater sense of the meaningfulness of their work. However, more easily applied guidelines and contextualised descriptions are demanded. The results from this study focus on the application and use of the first two steps of the QET process (Fig. 1) from which landscape architects devise programmes to guide consultants and entrepreneurs in the urban development process. An important next step in future research would be to investigate how an evidence-based design process can aid consultants and entrepreneurs in the process of translating such development programmes (intended to be based on research evidence) into realised evidence-based design interventions.

The study also recognised a need to identify what aspects of earlier planning phases may affect the design possibilities of health-promoting environmental qualities, and a further need to investigate and provide practical guidance on different user needs that are important to consider in a public urban context.

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