

Design Through Research: The Methodology for Designing Public Spaces In Children's Hospitals

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Abstract : This research aimed to determine: (1) key design factors, functions, constraints and programme requirements for designing the public spaces of children's hospitals in an age-appropriate way to promote healing; (2) how context-specific issues relating to Palestine play a role in determining the key design factors.

In Palestine, qualitative data were collected during nine co-design and co-creation workshops that included arts-based activities and semi-structured interviews. Participants included children from 3-18 years, parents, doctors, nurses, reception and admissions staff, and four groups of designers. All participants, excluding the designers, participated in drawing and modeling activities. The use of drawings with children is an indispensable tool because their verbal expression is often not highly developed, and because preferences and ideas can be expressed more intuitively. Similarly, models can be effective tools because children can express ideas and preferences about form, materials and size through them in a way that words alone cannot describe.

This study uses a thematic analysis approach to analysing the qualitative data. The results of data analysis were sorted into main themes and sub-themes. The key findings of this study are: context-specific issues; physical environments: interior architecture and interior design – medical spaces; non-medical spaces interior design elements, and environmental considerations. These findings will inform guidelines and recommendations and will be supported by visual models for the design of children's hospitals, particularly public spaces in the particular context of Palestine. The guidelines will contribute to the creation of supportive healing environments for all stakeholders, but particularly for children.

Keywords : Children's hospital, Healing environment, Interior design, Co-design, Co-creation, Context of Palestine.

1. Introduction : This research focuses on how to provide and design a supportive healing environment from the perspective of interior architecture and interior design in the public spaces of children's hospitals, which comprise the main entrance, atrium areas and thoroughfares. These areas can serve as organising elements and can help people to orient themselves (Komiske, 2005), to socialise and to way-find. The context is Palestine, which has certain cultural and religious considerations.

Based on literature review, there is a lack of empirical evidence that focuses on environmental considerations related to children (Harris et al, 2002). There is only limited research that focuses on the interior architecture and design of children's hospitals (Bishop, 2008) especially in public spaces, such as atriums; and there are still gaps in the empirical evidence that designers should understand the

importance of creating appropriate and comfortable environments that are conducive to supportive healing (Del Nord, 2006). Few studies include the preferences of children and associated stakeholders in the environmental design of the public spaces (Koller & McLaren, 2012). Also, there are very few studies that have discussed in detail how the medical functions in hospitals affect the design of the main entrance and atrium of children's hospitals, or their relationship to supporting healing (Adams et al., 2010). Moreover, there tends to be a lack of clarity and consistency with respect to the functions and requirements of the interior spaces, including the specific functions and supportive activities that are accommodated in the public spaces (Clift et al., 2007); for example, some hospitals provide a play area for smaller children in the main entrance, whereas others do not (Coyne, 2006). Children's hospitals should offer spaces and provide

welcoming interior environments for children as well as facilities that accommodate children of all ages, and allow them to feel comfortable and at ease (Tonkin, 2015). Generally, however, interior design spaces are still not designed to meet the specific cognitive needs of children (Lambert et al., 2014). For instance, many Palestinian children are treated in adult hospitals that do not have a comfortable or child-oriented environment that conducive to healing (Gunkel, 2010).

These issues stimulated us to ask: For a new children's hospital in Palestine—'how should the public spaces of children's hospitals (i.e. main entrance, atrium and thoroughfares) be designed so that they are conducive to healing and are suitable for all age ranges of children (i.e. 0-18 years) especially in the context of Palestine?'. Five research objectives provided a structure for data collection (Table 1).

Table 1: research objectives

Research Objectives	
RO. 1	Identify the most important considerations for interior design and interior architecture related to the public spaces of children's hospitals.
RO. 2	Identify the functions of the public spaces in children's hospitals that affect interior design and interior architecture decisions.
RO.3	Identify the key factors in the design of public spaces within children's hospitals that can help create an appropriate interior environment for all stages of children's development.
RO.4	Identify the context-specific issues to be taken into consideration for a children's hospital in Palestine.
RO.5	Identify the factors pertaining to 'healing environments' that should be brought to bear in the design of the public spaces.

2. Appropriate Research Methods To Be Used With Children :

Conducting research with children is different from conducting research with adults (James et al., 1998). Children have different social competencies and they experience life differently from adults. Many things in children's lives are controlled and limited by adults; thus they face unequal power relations with adults (ibid). Moreover, children are constitutionally and genetically different and need special treatment in research (Punch, 2002). Children may have limited and different use of vocabulary and understanding of words in comparison to adults, and between themselves, and they have less experience of the world and may have a shorter attention span. Thus, it is problematic to assume that research with a five year-old child is the same as with a sixteen year-old (ibid). Design for children should be distinct from design for adults (James et al., 1998). The spaces are be for children of different ages, and so the interior design needs to be flexible and adaptable (Punch, 2002). Such needs can be translated into supportive healing spaces. Despite this, we still find interior spaces that do not address the needs of children across all ages (Gunkel, 2010). Instead, they

tend to support the views of adults or may encompass themes that are appropriate for younger children but not for adolescents. Hence, it is important to include the views of children of all ages in the design, as well those parents' views, in order to develop best practice (NHS Estates, 2004).

In literature, scholars suggest several ways to conduct research with children:

1. Not imposing the researchers' own ideas. To understand the perspectives and visions of children, researchers have to understand children's point of view to prevent enforcing their views, particularly when they use qualitative methods (Punch, 2002). Also, they are encouraged to use Participatory Action Research (PAR) to enhance children's communication (ibid). This technique can help to facilitate children's participation in research and help them to express themselves.

2. Clarity of language. Children may have some limitations regarding their language clarity and literacy (ibid). This limitation can vary according to the ages of children. Younger children may have more difficulty in articulation and language than older children (ibid). To overcome these problems, researchers have to use clear language when forming method tools and research question. According to literature, using qualitative research methods is useful when conducting research with children, particularly with younger children because may they have difficulties in verbalising their experiences or answering indirect questions (Tonkin, 2015).

3. Validity and reliability. Researchers with children are encouraged to build up a friendly relationship to prevent negative behaviours, and support trust (i.e. avoid fear, lies, evasion) and confidence (Ennew, 1994). Researchers also need to be aware that "children may give answers that are determined more by their desire to please than their desire to be truthful" (Green & Hogan, 2005, p.9).

4. Research context and setting. Researchers may face some difficulty in finding suitable spaces to conduct their research with children. For example, conducting participant observation with children at schools may be accepted by some children because they are in the places where they learn; however, others may feel uncomfortable and under pressure to give the correct answer because they feel that schools are controlled by adults. Children may feel more comfortable to do participant observation with

adults in their own spaces (e.g. at home), while other children do not like adults to invade their environment (Punch, 2002).

5. Analysis. Researchers must take care when they interpret children's views in their research because the interpretation and inclusion of children's data could prevent bias and misinterpretation (ibid).

6. Building Rapport. It is seen as important for the researcher to build rapport with all participants (ibid). Punch (2001) suggested a strategy to communicate with children and have a good relationship. Her strategy is to "react to the children and follow their guidelines" (p.9).

7. Using appropriate methods. Using an appropriate research method with children may need more consideration and effort to develop interesting, fun and 'child-friendly' methods (Punch, 2002). Such method depends on: the research question; the children's age, class, gender and ethnicity; (Lewis & Lindsay, 1999), their level of understanding, knowledge, interests; their particular location in the social world (Greene & Hogan, 2005); and the specific research context and setting (Punch, 2002).

It is indicated that, using innovative methods (i.e. drawings, pictures, diaries, writing and sentence completion), can provide interest and fun for children and researcher (Punch, 2002). Innovative methods can be considered as a 'research-friendly' technique. Child-friendly techniques are considered to be flexible methods because they can be used in combination with other data- collection methods, and can be used to collect data, or help to lead to another method of data collection. For instance, drawing and writing techniques are used by themselves or as an opening to an interview (Tonkin, 2015). Other examples of child-friendly techniques that have been used with school children are: sentence completion; art and play methods such as drawing and photography; writing a diary; worksheets; storytelling; videotaping; reacting to video recording; and body movements (ibid). Also, research-friendly or child-friendly techniques are more applicable and adaptable for children than the traditional methods and they are useful in accessing children's perspectives and views (Lewis & Lindsay, 1999). However, it can be more valuable if researchers used a range of methods that includes both traditional and innovative (Punch, 2002). Children have many different types of preferences

and competencies, and it is difficult to fulfil them all because each child is different. Using traditional and innovative methods can help provide a balance and address some of the ethical and methodological issues (ibid); can decrease the boredom and increase interest; and can prevent bias arising from over-reliance on one method (Morrow & Richards, 1996).

Several scholars encourage the use of participatory research and design. It can be defined as the process "of enabling users to participate in the design process and with the task of generating ideas by means of generative toolkits and workshops" (Baek & Lee, 2008, p.173). Bishop (2008) pointed to the values and strengths that can be achieved from having children and young people participate, particularly in healthcare design. These values and strengths provide insight into children's lives; challenge adult's depictions and assumptions about children lives; reveal the unique perspectives of children's experiences; and, in turn, all these values can help in creating healing and supportive environments for children. Also, Baek and Lee (2008) indicate that participatory research is considered more appropriate for children because it is less dependent on language skills and verbal expressions; helps researchers deal with variations in cognitive development of children; and makes it fun for the children. Participatory practices with visual approaches can be used to study children's experiences alongside other qualitative approaches that utilise observations and interviews (Mand, 2012). In addition, it is distinguished from traditional research by focusing on things people do, in order to extract what they feel and think about. In contrast, traditional methods focus on observational research and questionnaires, which might not allow for such creativity (ibid). Using traditional research methods with children such as participant observations and interviews may require the children to be treated in the same way as adults (Punch, 2002). However, utilising special, 'child-friendly' techniques can support their experiences and competencies, empower them for greater participation in society, and support them in being decision-makers. Thus, children need more innovative approaches such as task-based methods that help them to feel more comfortable with the adult researcher, which can aid in the generation of relevant data (ibid).

There is no right or wrong in choosing appropriate methods. However, the researcher should make a

choice based on what he/she is trying to discover, and the societal context and broader reflection in which the methods will be utilised (Silverman 2013). Choosing data collection methods in qualitative research design can flow from the research question, context, structure, research topic, the type of data that can illuminate the research topic, practical issues, time of research, and techniques of data collection that can achieve creativity (Ritchie, 2014). Using a combination of qualitative methods helped to reflect children's views about quality of life issues and their environment (Morrow, 2001). Visual methods were considered successful because they helped to engage participants, produced data for the purpose of the study, and provided a visual approach to understanding children's quality of life and everyday experiences (ibid).

As children are the cornerstone of this research they should have full participation in it. It is necessary to use innovative and creative methods, especially when the aim of research is connected directly to their lives. Thus, for the above reasons, and to reflect the context, participants' perspectives, experiences and interpretations about the interior environment for a new children's hospital in Palestine, this study uses qualitative research that uses an innovative workshop format. Using such methods, particular in the context of Palestine, is considered innovative. To the author's knowledge, using such methods (i.e. workshops) has not previously been looked at in Palestine, particularly in the context of children's hospital design.

3. Design Process and Research Methods

This research employs qualitative research that uses an innovative workshop format. The forms of this participatory research design can be described as using co-design/co-creation in a workshop format with 55 participants from children aged between 3-18 years, parents and medical staff. The data collection process for the primary data was divided into two phases. Details are given in Table 2.

Table 2: Data collection process

Data Collection Process	
Phase one:	Sample Size
Workshops with children	18 school children: (9 male (m) and 9 female (f)), 5 children under six years: (1m & 4f)
Workshops with parents	8 parents: (4m & 4f)
Workshops with medical staff	9 medical staff: 3 doctors (1f & 2m), 4 nurses (2f & 2m), 2 staff members (f) working in admissions and reception
Phase two:	Sample Size
Workshops with four group of designers	12 designers (7m & 5f)
Three individual interviews	2m civil engineers and (1m) director of Rafidia Surgical Hospital.

Phase one: This phase focuses on three types of

participants (they are arranged according to the sequence of data collection):

I) Workshops with school children aged 6-18 years to create drawings and 3D models. In this phase, the choice was to work with school children rather than children who were patients in hospitals because non-medical spaces can be more accessible, thus saving time, and achieving more valuable data (e.g. using drawings, modelling, and visual materials). The eighteen participating school children were divided into six groups (see Appendix A-1/table 3). Such issue contributed to Piaget's theory of cognitive development suggests that children can be divided into four stages (i.e. 0-2, 3-7, 7-11, and 11-18) and at each stage the child will have a different level of knowledge, information and understanding (Gallagher & Reid, 1981). Research suggests that children younger than six years old need to engage their parents to establish communication with them (see online Naranjo-Bock, 2011); also, they cannot conduct tasks for a very long time; they have difficulty expressing what they like or dislike; and they tend to only concentrate on one aspect of a task and neglect others (Hourcade, 2008). The children participated in two activities (see Appendix A-2/figure 1-4):

1. Creating drawings with children: In this activity, I asked the children to create freestyle drawings with the following activity titles: (1) My favourite places that make me feel safe, happy and playful; (2) A place where I would like to be while I'm waiting my turn (Johnson et al., 2012). The children used A3 sheets of paper, pencils, sticky notes, scissors, crayons, stickers, and collage materials. Such methods and tools are considered a suitable and enjoyable activity for children (ibid). I then asked the children to explain their drawings and to write down their explanations. Every child had a chance to describe their drawings verbally and I recorded their interpretations. The inclusion of the children's interpretations of their drawing in conjunction with the 3D models method (Guillemin, 2004) helped to identify new themes related to interior design and architecture of spaces for children. Such activities can contribute to understanding the requirements for the atrium.

2. Creating 3D models. The same groups of children also created models, which helped to further draw out their ideas, perceptions and insights that were included in the research data. These types of methods can help to create inclusive insights into the social

world of children that cannot be achieved by traditional anthropological data collection methods (Johnson et al., 2012). For instance, they can aid in understanding the functions of the design space, and can facilitate representations (Dunn, 2013). The recorded interviews were transcribed, and an initial analysis was provided to inform the parents' workshops.

ii) Parent workshops and focus groups to determine their needs and those of their young children. In this workshops, the thirteen participants were divided into three groups. An equal number of men and women was chosen; gender is an important contextual variable in this research so a purposive sampling was to obtain similar numbers of mothers and fathers (Gray, 2004). Parents participated in two activities

(see Appendix A-3/figure 5,6):

1. Drawing a flow chart. Parents drew a flow chart that outlined the problems they have faced when entering hospitals with their young children (0-6 years) in terms of functions, spaces, aesthetics, and facilities (see Appendix A-3/figure 6-a).

2. Creating 3D models. Parents were provided with the same materials as the children to create 3D models. I asked parents to create a model that expressed both their and their young children's needs to feel happy and more comfortable when they entered the hospital.) the children's and parent's needs that emerged from their respective workshops. The aims of this activity were to address any contradictions and consistencies between medical spaces and children-friendly spaces, and to determine the context of child-friendly spaces within the context of the hospital.

Phase Two: This phase comprised two types of participants:

i) Workshops with designers to develop ways of designing the public spaces of a children's hospital

This phase involved workshops with four groups of designers in Palestine. These methods can strengthen the process of collecting rich perspectives from the participants, and can support the input of the stakeholders through activity-based research (Harrington & Martin, 2012). The workshops involved 12 participants. We chose this sample size based on the available time and resources (SilavUtkan, 2012). Before conducting this workshop, some initial analysis of the children's, parents' was conducted, and medical staff workshops using tables, reports and

memos. The initial data was sorted according to the four groups of designers and questions identified for each group. This process helped designers understand in more depth the type of research, their role shops, and enabled them to prepare ideas about how to deal with the data to design the spaces. The findings and workshop agenda were presented in Phase 1 and questions were taken before and during the group work.

1. Interior architecture: This group of designers discussed the initial results of the data that emerged from the Phase 1 workshops. They drew sketches and diagrams on the A3 and A4 sheets, and used hexagon cards to present their ideas about how to deal with the architectural and interior architectural elements that were highlighted by parents, medical staff and children. For example, they suggested how to determine the integration between inside and outside (Appendix A-5/figure 9).

2. Interior designers: They followed the same process as the interior architecture group, with their ideas concentrating on interior design elements.

3. Graphic designers: They suggested some ideas about the concept design and materials that are available in Palestine, and the importance of connecting way finding signs in the entrance and atrium with the interior architecture and interior design concepts (Appendix A-5/figure 10).

4. Artists and ceramicists. Using the hexagon cards, they jotted down their suggestions and ideas about the concept design of art, materials and how to determine how culture in the arts can be suitable for adults and children. Also, they highlighted the importance of using children's drawings and models in the concept design of art.

ii) Three individual interviews. These interviews to determine the availability of appropriate materials, constraints, and design considerations for the admission areas.

4. Data Analysis and Results

A thematic analysis approach was used to analyse the primary data (Braun & Clarke, 2006). It is a useful method that uses a participatory research paradigm that includes participants and is collaborative, can help to create initial analysis that can shape further data collection (see Appendix B-1/figure 11-13); can highlight similarities and differences across the data; allows for social as well as psychological

interpretations of the data; and help researchers to broaden many other forms of qualitative research (ibid). The qualitative approach is incredibly diverse, and complex (ibid). Such approach was used in order to deal with such complexity. The process of analysing such data is recursive; it needs to move back and forth between research data (Braun & Clarke, 2006). The data analysis helped to identify two major themes:

1- Context (i.e., culture, appropriateness of visitors area & hospitalization, and family and friends support).

2-Physical environment: interior design and interior architecture (i.e., medical spaces, non-medical spaces, design elements and specific items, and environmental design).

The emerging themes include participants' preferences and needs regarding those factors they considered essential for their comfort within public spaces of a children's hospital. They were presented and supported by direct quotations from the participants (see Example 1-3). The results of children's preferences (see Appendix B-2, Tables 4-6) were presented according to three age ranges (i.e. 3-7, 7-11, 11-18 years).

Example 1: I like green, the colour of wood and water because they provide me with a feeling of majesty and they connect you with nature....(Girl, 15-16 years) ...Using cartoon images on walls may make you feel dull. However, including nature can be appropriate for all age levels. These pictures related to fish and water on the ground make me think of Summer season, and I feel happy...(Girl, 16-17 years). In front of the reception desk, I put a picture from our culture to provide people with a sense of pride that they are in their country (Girl, 13-14 years). Here is a modern style of furniture. Here there is a bedroom and dresser... I like the reception to be modern and different e.g. using organic and flexible lines (Girl, 13-14 years) ... I used these beautiful and unusual forms and shapes of tables because I need them to grab the attention of people (be attractive) more than the ones usually found in restaurants (Girl, 16-17 years). Domes and arches are more beautiful, it gives me a feeling that it is connected to the Dome of the Rock in Jerusalem and to the old era like the old Souq or Khan al-Tujar in Nablus city (Children, 9-11).[...] Beside the main entrance of the door, there is a guitar to help people find and see the door more clearly and quickly (Boy, 8-11 years).

Example 2: We prefer to divide the age ranges of children into three age ranges (0-6, 6-12, 12-18) (M&F). Dividing children into three age ranges can help to alleviate the congestion particularly in the outpatient's reception area, where a huge number of children are crying when they arrive with their parents. Maybe we can provide a play area adjacent to the waiting area for the emergency to alleviate children's stress. We divided the main entrance of the hospital into two parts; one for the entertainment things and the other for the medical issues in order not to affect the psychological issues of children.... We need a waiting and a rest area for children with play area, and we need to see them and observe them from the emergency department (Medical staff).

Example 3: In the waiting area, there should be a television and some features related to water, an area for smoking, and non-smoking, outdoor green area, toilets, area for music that has a piano, and playing the guitar... I divided the reception into three departments (0-6, 6-12, 12-18 years) to facilitate the flow and the movements of patients to find the unit that can be appropriate for their child's case (Father).

It is important to connect long visit, and short visit waiting areas inside the children's hospital with a green outdoor area so that one can have fresh air and a calm environment to have a rest. ... The green outdoor area should have part of it to be open and another part closed to use in winter (Mothers & Fathers).

We created here an open area for having food. We prefer to position it adjacent to the waiting area. We provided integration between water, green area, and waiting areas. Also, here we included the environment of the sea, and we used walls of water. Water can express an environment which can give you a feeling that you are in nature. We used glass partitions, particularly in the waiting and in the restaurant area to connect them with nature and with the environment of the sea. Such issues can help children to move between these two spaces to feel that they are in one space, and can help mothers to observe their children while they are eating and playing. We also provide a specific area for children and another one for parents to eat (Mothers).

5. Findings and Discussions

The findings of this research were classified and prioritised into six groups (see Appendix C-1). These help in identifying new knowledge and meaningful information; finding relationships in structures;

reducing complexity; and seeing the object from different angles (Kwasnik, 2000). In addition, they helped to: answer the research question and research objectives of this study; to develop initial recommendations for the design of public spaces of children's hospitals; and to draw out the final conclusions. The criteria used to classify the findings were linked with the field research findings and literature review, as well as the perspectives of designers during the subsequent workshops. They were also related to the research aims, research question, and to the objectives of this research. Findings in relation to the research objectives were:

Regarding **Research Objective 01** (Table 8), findings identified two important design considerations: 1) interior architectural plans related to perceptions of preferred activities and design spaces in the public areas of a children's hospital. These design considerations encompass the importance of providing: easy access to medical and non-medical spaces; integration between outside, green areas and inside spaces; security and safety; clear wayfinding signs; environmental design considerations; supplementary spaces and facilities; aesthetic components; and specific design considerations related to age and gender preferences.

In relation to **Research Objective 02**, the research findings showed that there are two primary kinds of spaces to be considered: 1) the medical functional spaces and 2) the non-medical spaces. The relationship between these spaces requires special consideration regarding interior design and interior architecture. For example, the emergency admissions should not be placed close to the children's waiting areas; however, the emergency department should be close to the triage room. Also the findings indicated an open design concept space for non-medical spaces, and it is important to address all the potential design considerations including: ventilation, lighting, and hygiene, avoiding infection, isolation of noise, aesthetics, and types of materials.

Regarding **Research Objective 03**, the research findings identified five factors related to:

1. Specific preferences of age ranges of children. The findings showed differences and similarities across the age ranges of children.
2. Thematic design connected to nature, telling stories, materials, and open design concept, and integration between exterior green areas and interior spaces. The

research findings identified a strong preference by all stakeholders to include nature in the design spaces (i.e. green courtyards), outdoors spaces and landscape, art, materials, etc. However, there should be a consideration relating to how children depicted nature according to their cognitive development and age-range level. Also, the findings strongly identified the provision of open design concepts, particularly for non-medical spaces to provide comfort and ease of vision, and integration between interior spaces and outdoors green areas to provide easy access between the waiting areas and the green outdoor areas. In addition to the above issues, designers strongly recommended using storytelling in the thematic design concepts by using the children's preferences and artwork.

3. Design according to age regarding interior architectural spaces and design elements. For instance, different perspectives were identified regarding the division of public spaces (waiting areas, play areas, admission and reception spaces) according to children's age ranges.

4. Home-like design. The findings showed a strong preference from participants to include home-like design (e.g. furniture, personal toys) to provide comfortable and age-appropriate design and supportive healing environment for everyone.

5. Various types of forms and shapes for interior design and architecture. The findings identified a strong preference for the inclusion of circular and organic forms and shapes (i.e. for furniture, reception and admissions desks, interior design elements).

6. Gender issues. The research findings identified the importance of determining gender differences between children in order to provide age-appropriate design.

According to **Research Objective 04**, the research findings identified five factors related to: 1) culture (i.e. separation between genders, referencing cultural heritage and traditional architectural elements); 2) design according to age and cognitive development; 3) specific needs of particular age ranges of children; 4) gender issues; and 5) other specific elements (i.e. age-appropriateness, hospitalisation, healthcare services).

In relation to **Research Objective 05**, the research findings incorporate the previous four objectives to recommend essential factors that contribute to the creation of a supportive healing environment in the

public spaces of children's hospitals.

Based on the discussion presented in above, three types of recommendations have been developed related to design public spaces of children's hospitals:

1. Recommendations that are essential to provide healing environment and age-appropriate design for children. Such recommendations are contributed to the inclusion of: aesthetics issues (i.e., art connected to nature and culture, colours, music, and thematic design related to nature and home-like design); various forms and shapes (i.e. circular, organic, smooth, gable roofs, symmetrical, l-shape, and irregular forms; attractive and appropriate way findings signs; various types of materials (i.e., bright, textured, safe, transparent, soundproof, connected to nature, and non-absorbent); attractive and distraction elements for children to be included at main entrance, waiting areas, and registrations areas; gender differences, minor or no differences.

2. Recommendations that are essential to the provision of treatment and well-being for children:

The architectural design plan for dedicated children's hospitals should include eight functional medical spaces in close proximity, on the same level as the main entrance and atrium, in order to insure they are readily accessible, namely: emergency, triage room, x-ray, laboratories for diagnosing and testing, outpatient department, pharmacy, physiotherapy, and orthopaedic department.

3. Recommendations related to the specific context of this project- Palestine: The Palestinian authority should give serious consideration to the creation of a dedicated children's hospital in Palestine that serves the age range 0-18 years. In Addition to that, it essential to provide separation between genders in the public spaces on religious and cultural grounds (i.e., complete separation between genders in the spaces designated for praying, sleeping, and in the toilet areas), partial separation in the waiting and playing areas for children over seven years of age, and complete separation between genders of children above the age of thirteen.

6. Validity and Rigour of the Research Findings

In this qualitative research, validity and rigour were achieved through credibility, dependability, confirmability, transferability (Vaismoradi et al., 2013), and trustworthiness (Holloway, 2005). Credibility is "building confidence in the accuracy of data gathering and integration" (Gray, 2004, p.397).

Dependability is when "the positivist employs technique to show that if the work were repeated, in the same context, with the same methods and with the same participants, similar results would be obtained" (Shenton, 2004, p.70). Confirmability is "the qualitative investigator's comparable concern to objectivity" (ibid, p.71). However, Trustworthiness is 'including the question of transferability, which refers to the extent to which the findings can be transferred to other settings or groups' (Graneheim and Lundman (2004, p.110)

Based on the literature review, providing sufficient transferable findings in qualitative research can be achieved through a thick description (Morrow, 2005). Given this importance, this study provides thick description through context and culture, methodology and methods, results, findings and conclusions (Holloway & Wheeler, 2013).

7. Conclusions

This study demonstrates that practical design methods in the research process can be very effective in fostering creativity and in drawing out ideas and preferences from young children and other stakeholders. Such methods provide a novel approach to the design of healing environments for children. Following this, designers should incorporate the five previous objectives (i.e. O1-O5) to create the public spaces of a new children's hospital in Palestine, (i.e. main entrance, atrium, and thoroughfares) so that they are conducive to healing and are suitable to all age ranges of children (i.e. 0-18 years). Despite this, further exploration and evaluation is needed in larger studies that consider variables of this study regarding age, culture, gender, and physical environment attributes to produce further layers of useful design specifications. For instance, this study did not include disabled children because of time constraints. Also, it would be more beneficial to include more people working in the reception areas to garner their insights, information and understanding about the particular functions of those areas. Furthermore, exploring and testing the findings in real-world design settings such as children's hospitals, and by triangulating this research through survey research will provide further valuable insights into how to provide a supportive healing environment, particularly in the public areas that are appropriate for all age ranges of children.

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Ethics Issue: Before starting data collection, researchers acquired necessary ethics approvals from the RSO Ethics Committee at Lancaster University.

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Appendix A: Design Process and Data collection

1- Data collection and participants groups

Table 3: Summary of the data collection and participants of this study

No	Workshop	Purpose	Participants	Outcomes
1-	Children from governmental school aged 6-7 years. Location: Beit Wazan elementary school	To draw and create a 3D model, which identifies their favourite place that makes them feel happy and comfortable.	4 girls (1 aged 6 and 1 aged 7), 4 boys (1 aged 6-7 and 1 aged 7-8).	Individual drawings and individual models that identified: • The type of spaces they like, interior design and interior architecture elements, entertainment activities, culture and gender.
2-	Children from private school aged 8-11 years. Location: Pioneers schools		4 girls (1 aged 10-11, 1 aged 8-9)	Individual drawings and 1 model that identified: • The type of spaces they like, interior design and, interior architecture elements, entertainment activities, culture and gender.
3-	Children from private school aged 10-11 years. Location: Pioneers schools		4 boys (aged 10-11)	Individual drawings and 1 model that identified: • The type of spaces they like, interior design and, interior architecture elements, entertainment activities, culture and gender.
4-	Children from private school aged 12-14 years. Location: Pioneers schools		4 girls (1 aged 12-13, 1 aged 13-14)	Individual drawings and 1 model that identified: • The type of place, interior design and interior architecture elements, entertainment activities, cultural elements and gender.
5-	Children from governmental school aged 15-18 years. Location: Al-Malik Talal School		4 boys (1 aged 15-16, 1 aged 16-17, 1 aged 17-18)	Individual drawings and 1 model that identified: • The type of spaces they like, interior design and interior architecture elements, entertainment activities, culture and gender.
6-	Children from private school aged 15-18. Location: Tala' Al-Ainul Schools		4 girls (2 aged 15-16, 1 aged 16-17)	Individual drawings and individual models (1 girl didn't participate in the model activity). These activities identified: • The type of spaces they like, interior design and interior architecture elements, culture, gender, and entertainment activities.
7-	Parents of young children aged 3-6 years. Location: A-Najah University	To identify children's needs in the age range 0-6 years and to represent them via charts and 3D models.	4 fathers and 4 mothers	Individual charts, 1 model for fathers and 1 model for mothers that identified: • Children's needs (0-6 years) in terms of the interior design and interior architecture elements, arrangements of the functional spaces, how to provide distraction for children, age appropriate design, cognitive development, and parents' needs for long and short visits.
	Children aged 3-6 years	To draw their favourite place that makes them feel happy and comfortable.	4 boys (aged 5-6) and 4 girls (3 aged 3-4, 1 aged 4-5)	Individual drawings that identified: • The type of spaces they like, interior design and interior architecture elements, entertainment activities, culture and gender issues.
8-	Doctors, nurses, admissions, and reception staff (from private and governmental hospitals). Location: A-Najah University	To determine their needs, and children's and parents' needs, by classifying tables, drawing charts and discussing a sample 3D model.	4 doctors (1 female, 2 males), 4 nurses (2 females, 2 males), 1 admission and reception, staff member (male)	Tables (1 table for 2 male doctors, 1 table for a female doctor, 1 table for the admissions staff, 2 tables for nurses (male and female)), 4 charts (working in groups) and all who participated in the discussion of the sample model. These activities determined: • The context of the hospitals in the main entrance and the atrium (i.e. function, hygiene, clean, functional constraints, materials, flow, culture, and gender), employees', children's and parents' needs for long and short visits.
9-	Designers (fine art, ceramics, architecture, interior, landscape and graphic design). Location: A-Najah University	To draw out ideas and concepts that help in designing public spaces of children's hospitals. Designers were provided with tables, children's models and drawings, and parents' and doctor's comments.	4 interior designers, 4 interior architects, 4 fine artists and ceramicists, and 2 graphic designers	Groups of designers drew out their perspectives by using cards and A3 sheets that identified: • Ideas for how to design and use the results of the workshops in terms of the art issues, interior architecture and interior design spaces, Landscape, signage or way finding elements, materials, style, thematic design, constraints and cognitive development of children.
9-	Individual interviews appropriate materials, constraints, and design considerations for the admissions area. Location: A-Najah University, Ministry of Health & Rafidia Surgical Hospital	To determine the availability of appropriate materials, constraints, and design considerations for the admissions area.	1 civil engineer (Ministry of Health), 1 admissions manager at the Rafidia surgical Hospital and 1 manager of the engineering department at A-Najah University.	Interviews that identify: • The availability and types of materials, hygiene, easy to clean materials, problems and constraints faced on completion of the interior construction of hospitals in Palestine. • The function of the admissions department, its relationship with surrounding spaces, and design considerations (i.e. form, location, materials and age-appropriate design).

2. Workshops with school children aged between 6-18 years to create drawings and 3D models.



Figure 1: Drawing activity (Boy aged 11 years)



Figure 2: Drawing activity (Girl aged 15 years)



Figure 3: Recording Individual child aged 7 years



Figure 4: Recording group of children aged 9-11 years)

3. Parent workshops and focus groups to determine their needs and those of their young children



Figure 5: Focus group discussion around fathers' model.



Figure 6: Recording individual chart activity

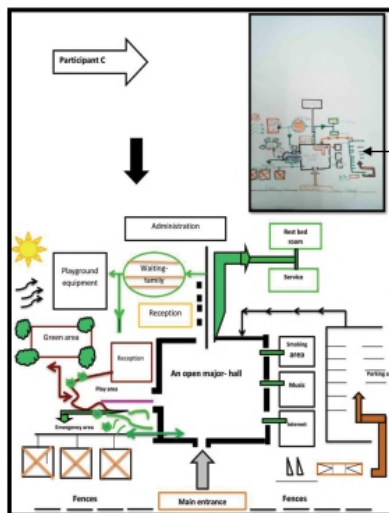


Figure 6- a: Individual chart activity (improve from parents' chart)

4. Medical staff workshops and focus groups



Figure 7: Recording the medical staff focus group discussion

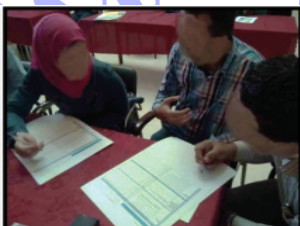


Figure 8: Doctors group arranging and classifying the preferences of children and parents.

5. Workshops with designers to develop ways of designing the public spaces of a children's hospital



Figure 9: Discussing, drawing, creating ideas and recording the interpretations of interior architecture group



Figure 10: Discussing, drawing and creating ideas (graphic designers)

Appendix B: Data Analysis

1. Initial data analysis from children's workshops

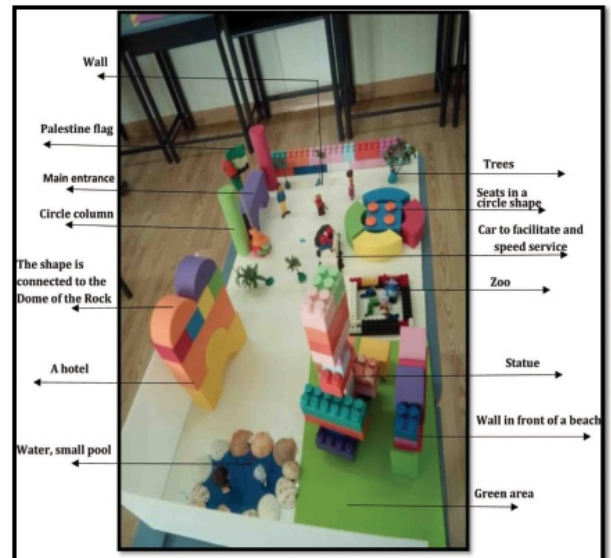


Figure 11: A 12-year-old girl's model illustrating elements that she likes to see while waiting her turn. Notice her preferences related to interior design elements and interior architecture spaces.

Figure 11: A 12-year-old girl's model illustrating elements that she likes to see while waiting her turn. Notice her preferences related to interior design elements and interior architecture spaces.

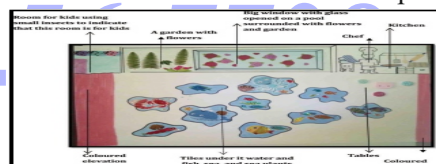


Figure 12: A 15-year-old girl's drawing illustrating elements that she likes to see while waiting her turn. Notice her preferences related to nature themes, interior design elements and interior architecture spaces.

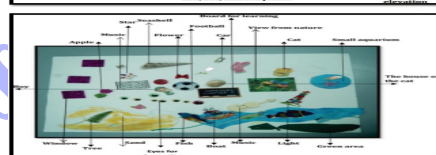


Figure 13: A 7-year-old boy's drawing illustrating elements that he likes to see while waiting his turn. Notice his preferences related to nature themes, types of games and aesthetics.

2. Children's needs regarding to age ranges (0-2, 3-7, 7-11, 11-18 years)

Table 4: Children's needs regarding age range 0-2 years as suggested by Parents (P) and medical staff (MS).

Children's needs related to age range 0-2 years old		
Thematic Design	Preferences	NO
Physical environment: Architecture—interior architecture and interior design related themes	Architecture and interior architecture design consideration:	
	• Play area for young children, adjacent to the emergency department.	P (1/8)
	• Closed area for breast feeding and changing diapers	P (5/8) MS (8/10)
	• Spaces for toddlers to crawl and to play	P (4/8)
	• Spaces for toddlers to play with their own toys (personal toys)	P (2/8)
	Interior design considerations:	
	Art:	
	• Semi-permanent type of art to attract the attention of children in the reception desk	P (4/8)
	Forms and shapes:	
	• Circular, organic and soft forms, and shapes	P (8/8) MS (1/8)
	Furniture	
	• Adaptable	P (8/8)
	• Circular forms and shapes	P (8/8)
	• Appropriate and according to age	P (7/8) MS (9/10)
	Materials	
	• Bright and glittery materials	P (8/8) MS (8/10)
	Colours:	
	• Bright colours to the main entrance, and reception areas to provide distraction	P (2/8) MS (3/8)
	Attractive and distraction elements in front of the main entrance i.e. small animals, colours, nature, and water features	P (8/8) MS (10/10)
	Thematic design	
	• Connected to nature	P (4/8)

Table 5: Children's preferences related to age range 3-7 years that provide them with a comfortable environment

Children's preferences related to age range 3-7 years old		
Thematic Design	Preferences	NO
Physical environment: Architecture—interior architecture and interior design related themes	Context related themes	
	• Complete separation in spaces for prayer, sleeping and toilets	6/6
	• No separation in the play area	6/6
	• Elements from traditional architecture	5/6
	• Support of the children by family and friends	5/6
	• Elements connected to culture i.e. art connected to culture	3/6
	Architecture and interior architecture design consideration:	
	• Including spaces for having familiar food	6/6
	• Outdoor waiting areas	6/6
	• Combined modern and traditional architectural forms i.e. arches supported by large circular columns to attract attention of children and to make the spaces beautiful	5/6
	• Home like design waiting areas	2/6
	• Indoor L shape waiting areas for adults	2/6
	• Safety and security in the main entrance	2/6
	• Architectural openings and arrangements i.e. connect the eating areas with natural water features	2/6
	• Play areas that include several types of games and entertainments activities (see Table 5.15)	
	Interior design considerations:	
	Art:	
	• Connected to nature and water features	6/6
	• Connected to culture	3/6
	• Semi-permanent type of art to attract the attention of children in the reception desk	3/6
	• Connected to music	1/6
	Forms and shapes:	
	• Circular, organic and soft forms, and shapes	6/6
	• Forms and shapes connected to culture	5/6
	• Various forms and shapes	5/6
	• Gable roofs	4/6
	• Symmetrical	3/6
	Image design:	
	• Home-like image design	2/6
	• Looked like a park or entertainments centre	6/6
	Furniture	
	• Modern and attractive	6/6
	• Circular forms and shapes	4/6
	• Outdoor furniture	2/6
	• Home-like design furniture	2/6
	Materials:	
	• Transparent materials	6/6
	• Materials with textures	5/6
	• Connected to nature	3/6
	• Modern and light materials	2/6
	• Bright and glittery materials	1/6
	Including symbols to express their love to culture (2/6), and family (2/6)	
	Colours: Purple (1/6), pink (3/6), green (4/6), brown (3/6) blue (4/6), and yellow (4/6)	
	Wayfinding signs:	
	• Attractive	1/6
	• Signs that give identity and distinctive character for the building	1/6
Environmental considerations	• Fresh and comfortable smell (1/6), effective ventilation (6/6), and light (1/6)	

Appendix C: Findings and Discussions

Children's preferences related to age range 11-18 years old		
Thematic Design	Preferences	NO
Physical environment: Architecture—interior architecture and interior design related themes	Context related themes	
	• Complete separation in spaces for prayer, sleeping and toilets	8/8
	• Support of the children by family and friends	8/8
	• Partial separation in social spaces e.g. waiting, eating spaces, and play areas	6/8
	• Provide separation in the playing areas	6/8
	• Elements connected to culture i.e. art connected to culture	2/8
	• No separation in the play areas	2/8
	Architecture and interior architecture design considerations:	
	• Outdoor waiting areas	7/8
	• Architectural openings and arrangements i.e. connect the eating areas with natural water features	6/8
	• Form and shape i.e. combined modern and traditional architectural forms i.e. arches supported by large circular columns to attract attention of children and to make the spaces beautiful	5/8
	• Home-like design waiting areas	5/8
	• Indoor circular form and shape waiting areas for children	5/8
	• Home-like design spaces for food i.e. open design kitchen	4/8
	• Indoor L shape waiting areas for adults	2/8
	• Spaces for having food i.e. restaurants, and cafeteria	2/8
	• Play areas that include several types of games and entertainments activities i.e. watching television (4/8), football, swimming, and listening to music (3/8 for each), playing music (2/8), and fishing (1/8)	
	Interior design considerations:	
	Art:	
	• Connected to nature	7/8
	• Abstract art	5/8
	• Connected to water features	5/8
	• Connected to music	3/8
	• Connected to sport	2/8
	• Connected to culture	2/8
	• Impressionistic piece of art	1/8
	• Semi-permanent type of art to attract the attention of children in the reception desk	1/8
	• Connected to the function of the space	1/8
	Forms and shapes: Connected to culture (2/8), symmetrical (3/8), circular and organic (6/8), gable roofs (3/8), and various forms and shapes (5/8)	
	Image design: Home like design (6/8), and looked like a park or entertainment centre (8/8).	
	Furniture	
	• Circular forms and shapes	7/8
	• Outdoor furniture	6/8
	• Home-like design furniture	6/8
	• Modern attractive	3/8
	Materials: Connected to nature (5/8), with textures (8/8), bright and glittery (2/8), transparent (7/8), modern (1/8), soundproof (1/8)	
	Symbols: Connected to music	3/8
	Colours: Turquoise (3/8), white (3/8), black (2/8), red (5/8), pink (3/8), green (7/8), brown (3/8), orange (4/8), blue (6/8), purple (3/8), and yellow (7/9).	
	Wayfinding signs:	
	• Signs that give identity and distinctive character for the building	3/8
	• Signs for safety issues	1/8
	Environmental considerations	
	• Prevent noise (5/8), effective ventilation (2/8), enough and natural light (2/8)	

Table 8: Summary of research findings

1.	Findings that agree with the literature review: -Inclusion of Interior design elements (i.e., attractive materials, wayfinding signs, attractive and distraction elements particularly in the main entrance i.e., art, colours, waiting, reception, admission, and registration areas, circular and organic forms and shapes. -Inclusion of interior architecture design elements (i.e., play areas, various types of waiting areas-outdoor and indoor for long and short visit, easy accessible and visible wide main entrance, provision of an open design plan for reception areas, and play areas, but the design should provide semi-private, designated spaces for both genders, integration between public spaces i.e. waiting areas, main entrance, play areas, reception or information areas, spaces for food, and outdoor green areas. -Environmental design issues (i.e., effective ventilation, enough light, comfortable smell, and prevent noise).
2.	Findings that partially agree with the literature review: -Inclusion of Interior design elements (i.e., symmetrical, irregular forms and shapes, thematic design connected to nature in the waiting areas, bright colours, and inclusion of green, blue, brown, and yellow colours). -Inclusion of interior architecture design elements (i.e. traditional architectural elements connected to culture).
3.	Findings that do not agree with the literature review: - No gender differences between children regarding the inclusion of art connected to nature. -Separation between genders in the public spaces related to play and waiting areas.
4.	Findings that show gender differences, minor or no differences: - No gender differences between children regarding the inclusion of art connected to nature; inclusion of green, blue, brown, and yellow colours. - A gender differences across age range of children regarding the inclusion of abstract art, and colours i.e. boys appreciated white, black, turquoise, and orange, however girls appreciated red, purple, and pink colours. - Minor differences in gender regarding the inclusion impressionistic types of art, and inclusion of organic and smooth lines and forms.
5.	Findings that are especially connected to design according to age: - Findings that do not alter according to age: the inclusion of six types of colours i.e. blue, green, yellow, purple, pink, brown; the inclusion of thematic design connected to nature, entertainments activities related to active/physical (i.e. football, swimming, fishing); learning (i.e. playing music); passive/solitary (i.e. watching television and aquariums, and learning music); the inclusion of soft and circular forms and shapes of furniture; the inclusion of art connected to nature, abstract, culture, and music themes; the inclusion of home-like design; the inclusion of textured, bright and related to nature materials; and the inclusion of symbols. - Findings that are after according to age range: the inclusion of play areas and entertainments activities can be divided into two age ranges (i.e. 3-11, 11-18 years) rather than four age ranges; and the inclusion of spaces for food appeared to alter with age and cognitive development.
6.	Findings that are especially related to the context of Palestine: - Findings indicated to include art, courtyard, forms and shapes that encompass traditional elements, motifs and references to cultural heritage; and the notion of separation between genders.