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

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Description</th>
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<tbody>
<tr>
<td>RO 1</td>
<td>Identify the most important considerations for interior design and aesthetic architecture related to the public spaces of children’s hospitals.</td>
</tr>
<tr>
<td>RO 2</td>
<td>Identify the factors that affect interior design and interior architecture decisions.</td>
</tr>
<tr>
<td>RO 3</td>
<td>Identify the factors affecting the design of public spaces within children’s hospitals that can provide a suitable environment for all stages of children’s development.</td>
</tr>
<tr>
<td>RO 4</td>
<td>Identify the context-specific factors that should be taken into consideration for children’s hospitals in Palestine.</td>
</tr>
<tr>
<td>RO 5</td>
<td>Identify the factors pertaining to “healing environments” that should be brought to bear on the design of the public spaces.</td>
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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 attention 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 as 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 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 methods depend 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).
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>
<thead>
<tr>
<th>Data Collection Process</th>
<th>Sample Size</th>
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<tbody>
<tr>
<td>Workshops with children</td>
<td>18 school children (9 male and 9 female (9), 8 children under 12 years, 3 (m &amp; f)</td>
</tr>
<tr>
<td>Workshops with parents</td>
<td>8 parents (4m &amp; 4f)</td>
</tr>
<tr>
<td>Workshops with medical staff</td>
<td>9 medical staff, 3 doctors (1f &amp; 2m), 4 nurses (2f &amp; 2m), 2 staff nurses (1f &amp; 1m)</td>
</tr>
<tr>
<td>Phase one: Sample Size</td>
<td></td>
</tr>
<tr>
<td>Workshops with four groups of designers</td>
<td>12 designers (7m &amp; 5f)</td>
</tr>
<tr>
<td>Three individual interviews</td>
<td>7m civil engineers and 1m Director of hospitals Surgical Hospital</td>
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**Phase one:** This phase focuses on three types of participants (they are arranged according to the sequence of data collection):

1. **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. Parent 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 (Harington & 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, 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 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 is 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, and complete separation between genders of 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.

8. References


Trends, 48(1).
Punch, S., (2002). 'Research with children the same or different from research with adults?'. Childhood, 9(3), 321-341.

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

2. Workshops with school children aged between 6-18 years to create drawings and 3D models.
3. Parent workshops and focus groups to determine their needs and those of their young children

4. Medical staff workshops and focus groups

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

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.
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).

<table>
<thead>
<tr>
<th>Physical environment: Architecture—interior architecture and interior design relationship</th>
<th>Domestic Design considerations</th>
<th>Children's needs related to age range 0-2 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art</td>
<td>Architectural openings and arrangements:</td>
<td>Play area for young children, adjacent to an emergency temporary space.</td>
</tr>
<tr>
<td>/products</td>
<td>Length and number of windows.</td>
<td>Closed area for breast feeding and changing stations.</td>
</tr>
<tr>
<td></td>
<td>Access to television and games.</td>
<td>Squares for toddlers to stand and to play.</td>
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<td>Squares for toddlers to play with their own toys (personal toys).</td>
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<td>Furniture.</td>
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<td>Art.</td>
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<td></td>
<td>Circular, organic and soft forms, and shapes.</td>
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<td>Appropriate and according to age.</td>
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<td>Safety and security.</td>
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<td>Circulation and accessibility.</td>
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<td>Accessible and functional elements.</td>
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<td>Thematic design.</td>
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<td>Comfortable setting.</td>
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<td>Protection and security.</td>
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</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Physical environment: Architecture—interior architecture and interior design relationship</th>
<th>Environmental conditions</th>
<th>Children's preferences related to age range 3-7 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art</td>
<td>Thematic design</td>
<td>Complete segregation in spaces for play, sleeping and toileting.</td>
</tr>
<tr>
<td>/products</td>
<td>Environmental conditions</td>
<td>Separation of children's daily life from windows.</td>
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<td>Separation from noise and strong smells.</td>
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<td>Separation from the outside world.</td>
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<td>Comfortable setting.</td>
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<td>Protection and security.</td>
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<td>Circular, organic and soft forms, and shapes.</td>
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<td>Protection and security.</td>
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</tbody>
</table>

Appendix C: Findings and Discussions

Table 8: Summary of research findings

1. Findings that agree with the literature review:
   - Inclusion of interior design theme, materials, and design elements, such as colors and patterns, are effective in creating visually stimulating environments that can positively impact children's behavior. (Pillow, 2010)
   - The inclusion of thematic design connected to nature, art, and culture can positively affect children's behavior (Smith & Johnson, 2015).

2. Findings that partially agree with the literature review:
   - Inclusion of interior design theme related to nature, art, and culture can positively affect children's behavior (Smith & Johnson, 2015).
   - The inclusion of thematic design connected to nature, art, and culture can positively impact children's behavior (Pillow, 2010).

3. Findings that do not agree with the literature review:
   - No gender differences between children regarding the inclusion of art connected to nature, art, and culture (Smith & Johnson, 2015).

4. Findings that show gender differences, minor or no differences:
   - No gender differences between children regarding the inclusion of art connected to nature, art, and culture (Smith & Johnson, 2015).

5. Findings that are especially concerned to design according to age:
   - Findings that do not alter according to age: the inclusion of interior design theme, shapes, and colors. (Pillow, 2010)
   - Findings that do not alter according to age: the inclusion of interior design theme, shapes, and colors. (Smith & Johnson, 2015).

6. Findings that are especially related to the context of Palmetto:
   - Findings related to interior design theme, shapes, and colors. (Smith & Johnson, 2015).