

# Healing Gardens in Children's Hospitals: Reflections on Benefits, Preferences and Design from Visitors' Books

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There is increasing interest in the use of healing gardens in healthcare settings to provide therapeutic benefits. However it is not yet well understood how patients, patient families and friends, and staff who spend time in these gardens use these spaces, and whether the intended benefits are experienced. This paper evaluates visitor feedback about healing gardens at the Lady Cilento Children's Hospital in Brisbane, Australia, to gain insight into end-user experiences compared with existing literature about experiences of healing gardens and natural contexts. We have coded and analysed unsolicited comments left in visitors' books over a period of two months immediately after the hospital was opened. Several themes have been identified relating to reasons for which people access the healing gardens; benefits they perceive from spending time in these spaces; and features and aspects of the gardens that are most appreciated. We conclude that the gardens at the Lady Cilento Children's Hospital provide emotional respite to visitors, through appreciation of the views, being able to have time out, being in nature, restorative experiences, and access to outdoor air. The visitor feedback suggests that the original intention of the garden design has been largely successful, and provides insight into particular aspects of the garden design that are critical to enhancing visitor benefits.

## Keywords:

Horticultural therapy, biophilic urbanism, urban greening, podium gardens, contextual design

## Introduction

There is growing interest in the use of gardens and vegetation in healthcare settings to provide healing and wellbeing benefits to patients. Examples of the deliberate incorporation of gardens and vegetation into these environments can be found around the world, including for example the Khoo Teck Puat Hospital in Singapore, the University Medical Center Brackenridge in Austin, Texas, the Dell Children's Medical Center in Texas. However space and funding challenges are frequently such that gardens have not emerged as a mainstream prescription for enhancing healing environments (Whitehouse et al., 2001). There is a need for empirical evidence of the benefits of healing gardens to facilitate decision making around their inclusion in healthcare settings, as well as to assist therapists and healthcare workers with integrating the use of healing gardens into treatment plans.

The Lady Cilento Children's Hospital (LCCH) was opened in November 2014 in inner-city Brisbane, Australia with 11 healing gardens integrated into the hospital layout (Figure 1, Figure 2). The gardens were designed to appeal to all senses, and respond to needs of patients, their families and hospital staff by reducing stress and anxiety and afford a place for retreat and contemplation (Conrad Gargett, 2015). Seven years of extensive research and collaboration went into the design and development of the gardens as part of a broader, integrated approach to the hospital design.



**Figure 1:** Aerial view of hospital, showing the Secret Garden (left), Adventure Garden (right) and QCH Plaza beneath (Source: Ethan Rohloff)



**Figure 2:** Schematic of the 11 healing gardens and 2 community spaces (#1, #13) (Source: Conrad Gargett)

This paper reports on the use and benefits of the gardens in the months following the opening of the hospital, to contribute to emergent appreciation of these spaces and the value they provide. We begin with a discussion of the research and theory relating to human responses to nature and gardens is reviewed to provide background to the potential benefits that such gardens may provide in healthcare settings. We include a summary of findings from similar key studies reviewing the use and benefits of hospital gardens elsewhere. We then present the findings from analysing unsolicited comments left in visitors' books in four of the gardens, reflecting on insights gained from the end-user experiences of these spaces. We anticipate that our findings will be immediately useful to landscape architects, designers and healthcare professionals around the world who are considering best practice opportunities to promote well-being in patient care.

## Human responses to nature and gardens

Gardens have been integrated into human built environments for millennia, reflecting an inherent appreciation of the importance of the importance of such spaces for human wellbeing (Cooper Marcus & Barnes, 1999; Ward Thompson, 2011). Several streams of scholarly thought have more recently explored and sought to provide a theoretical framework to explain human responses to natural settings.

Attention Restoration Theory proposes that the ability to sustain directed attention is finite, and that natural environments have particular qualities that are restorative to this ability (Kaplan, 1995; Kaplan & Kaplan, 1989). Settings that promote recovery from attention fatigue require four characteristics, including (1) a sense of being away (physically or conceptually) from the attention demanding tasks; (2) sufficient 'extent', or richness and coherence of detail so as to be perceived as a 'whole other world' (Kaplan,

1995, p. 173) and to engage the mind in inquiry and exploration; (3) a sense of fascination such that attention is effortlessly captured and other stimuli do not have to be ignored; and (4) compatibility with an individual's purpose and inclinations such that they can relax and not feel overly attentive to their activities and behaviour (Kaplan, 1995). A growing body of evidence supports the contention that natural environments are restorative to people's ability to pay attention (Berto, 2005; Hartig, Evans, Jamner, Davis, & Gärling, 2003; Lee, Williams, Sargent, Williams, & Johnson, 2015).

Several hypotheses have been put forward regarding evolutionarily derived preferences for particular natural settings, which suggest that humans have a tendency that has evolved over time to preference, pay attention to and respond positively to features and configurations in the environment that have been conducive to survival (e.g. running water, vegetation, prospect, shelter) (Ulrich, 1991). For example, the Biophilia hypothesis proposes that human have genetically based, evolved affinity for the natural world and living things, reflecting particular physical and mental adaptations to the natural world that have proven instrumental in physical and mental health and well-being (Kellert, 1993). Others have similarly explored evolutionary bases for human preferences of particular environments (Appleton, 1975; Orians, 1986).

Ulrich (1991) proposed a psycho-evolutionary theory derived explanation for human responses to natural settings, which includes a broad range of quick-onset emotional and physiological arousal responses to natural arrangements and forms, including recovery or restoration. According to Ulrich, humans display "immediate, unconsciously triggered and initiated emotional responses" (Ulrich et al., 1991, p 207) (as opposed to controlled cognitive responses) to certain settings, which have played a key role in assuring survival. Natural settings conducive to survival, such as running water and flowering plants stimulate parasympathetic nervous activity and trigger a sense of pleasure and calm (Maller et al, 2006). Threats in nature – such as a snake, or a precipice – trigger an emotional reaction (e.g. fear), whilst also stimulating a sense of dislike and focused attention, which stimulates physiological mobilisation and motivates the individual to avoid the threat. Similarly, once a threat has been avoided, the stress response should decline to restore energy and promote physiological conditions conducive to other behaviours such as seeking food and water and digestion. Restorative responses would include attention and interest in the safe setting, reduced levels of fear and other negative feelings, and reduction in physiological arousal. From an adaptive evolutionary perspective, such restoration should occur fairly quickly (within minutes). Researchers such as Hartig, et al. (2003) and Tyrväinen et al. (2014) have produced evidence that supports this theory.

## Healing gardens in children's hospitals

Researchers have investigated the impact of viewing nature in healthcare settings over several decades, beginning with a seminal study by Ulrich in 1984. Ulrich reviewed data of post-operative, adult cholecystectomy patients, finding that patients with the tree view compared to a view of a brick wall required less time in hospital, had fewer negative evaluative comments in nurses' notes, required less pain medication, and had slightly lower scores for minor postsurgical complications. The need for further investigations to determine whether these findings could be generalized to other settings and patient types was emphasized (Ulrich, 1984). Studies since then broadly reinforce these findings that views of nature can improve rates and experiences of healing (Cooper Marcus & Barnes, 1999; Diette, Lechtzin, Haponik, Devrotes, & Rubin, 2003).

A research focus on gardens in children's hospitals has emerged over the last 20 years, with recognition that such gardens require specific design elements to attract and provide a healing environment for children (Moore, 1999; Cooper Marcus and Sachs, 2014). Several key studies have investigated the impact of healing gardens in children's hospital, as summarised in These studies have found that adults and staff tended to seek out places to sit and relax in the gardens, whilst children tend to be active and seek to interact with garden features (Pasha & Shepley, 2013; Sherman, et al., 2005; Whitehouse, et al., 2001). The younger the child, the more likely they were to be engaged in active and explorative play (Whitehouse, et al., 2001), and visitor feedback of one garden was for more interactive 'things for kids to do' and more trees and greenery (Whitehouse, et al., 2001).

Areas without formal seating, or features of interest tended to be less well used (Pasha, 2013; Whitehouse, et al., 2001), with a lack of shade having reduced the frequency and duration of garden visits amongst all garden users in Texas (Pasha, 2013). Hospital staff tended to use the gardens for breaks and 'time out' (Sherman, et al., 2005; Whitehouse, et al., 2001), with one study finding a preference for gardens with limited patient and visitor access to enhance the sense of 'being away' from the hospital (Pasha, 2013).

Preliminary evidence from studies suggested lower emotional distress and pain for all garden users (Sherman, et al., 2005), that the garden environment is perceived as a place of restoration and healing (Whitehouse, et al., 2001). Adults surveyed endorsed going to the garden for relaxation, get away from stress, relax and rest, or to improve mood (Whitehouse, et al., 2001), with 90 per cent of garden users in one study reporting a positive change in mood after being in the garden, attributed to combinations of the garden features including running water, being outdoors in an enclosed natural space, seeing the trees, plants, and flowers, and enjoying the colors and artwork (Whitehouse, et al., 2001). Usage of the garden space was correlated with increased satisfaction with the hospital (Whitehouse, et al., 2001).

**Table 1: Key studies reviewing healing gardens in children's hospitals**

Reference	Research summary
<b>Whitehouse et al. (2001)</b>	<ul style="list-style-type: none"> <li>- Post-Occupancy Evaluation (POE) of a healing garden at Children's Hospital and Health Center, San Diego to determine whether the garden was reducing stress, restoring hope and energy, and increasing consumer satisfaction.</li> <li>- The garden was opened in July 1997, and includes features for children, flowers and plants selected for medicinal value, large trees for shade and seating.</li> </ul>
<b>Sherman, Varni, Ulrich, and Malcarne (2005)</b>	<ul style="list-style-type: none"> <li>- POE of 3 healing gardens at a Californian paediatric cancer centre.</li> <li>- Gardens opened in 1999 to provide a calming healing space for patients, families and staff. Gardens contained varied seating &amp; plants.</li> </ul>
<b>Pasha (2013)</b>	<ul style="list-style-type: none"> <li>- An evaluation of garden design characteristics related to garden use in five children's hospitals in Texas, U.S.A.</li> <li>- A survey questionnaire was customised for staff and visitors. Surveys included four key sets of questions, including respondent demographics, garden visitation habits, barriers to garden visitation and garden evaluation.</li> </ul>
<b>Pasha and Shepley (2013)</b>	<ul style="list-style-type: none"> <li>- An extension of Pasha (2013)</li> <li>- An established garden audit tool by Cooper Marcus and Barnes (cited in</li> </ul>



Reference	Research summary
	study, unpublished) was used in conjunction with shade maps, and observational and survey data to evaluate garden design characteristics and garden use.

Interviews conducted inside the hospitals in these studies reveal that most respondents do not know that the gardens are there. Whitehouse, et al., (2001) and Pasha (2013) concluded that lack of awareness was one of the biggest barriers to patient and family garden usage. Sherman, et al. (2005) and Whitehouse, et al. (2001) found that few patients used the gardens, and Whitehouse, et al. (2001) suggested that garden use be integrated into therapy programs to increase patient visitation.

These studies have found that adults and staff tended to seek out places to sit and relax in the gardens, whilst children tend to be active and seek to interact with garden features (Pasha & Shepley, 2013; Sherman, et al., 2005; Whitehouse, et al., 2001). The younger the child, the more likely they were to be engaged in active and explorative play (Whitehouse, et al., 2001), and visitor feedback of one garden was for more interactive ‘things for kids to do’ and more trees and greenery (Whitehouse, et al., 2001).

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## Methodology

Our research sought to build on this existing work to provide additional perspectives and insight to the emerging field of design of healing gardens in children’s hospitals, considering the following three questions:

1. How are the healing gardens perceived and valued by various end users including patients, patient families and staff.
2. What kinds of activities are being undertaken in these spaces.
3. How do the benefits end-users associate with time spent in the gardens compare with the intended design outcomes.

For this study, we accessed comments left in visitors’ books (i.e. “Bench Diaries”). Ethics approval to use the comments from the visitors’ books was obtained from both QUT

(Approval no. 1500000599) and Children's Health Queensland (HREC No: HREC/15/QRCH/182) for the current study. The cover of our Bench Diaries contained the inscription: "Tell me, why are you here? How are you feeling? What do you enjoy? Tell me what is on your mind...?" (see Figure 2).



**Figure 2:** Bench diary in situ and example image from bench diary (deidentified)

The use of comments left in visitors' books to better understand peoples' experiences has precedent (for example, (Macdonald, 2005; Stamou & Paraskevopoulos, 2004)). This research method is often used as it provides a relatively unique way of gathering people's reflections and comments, without the researchers' influence and framing of these (such as can occur through surveys, focus groups and interviews). There are limitations to this research method; including the inability to guide the visitor towards providing comment on particular aspects of interest, and comments may be relatively superficial at times. Further, the context of visitors' books can be said to shape people's responses; namely that the 'guest', or visitor does not want to be impolite to their 'host' or the institution being visited (Macdonald, 2005). Notwithstanding these limitations, visitors' books have been used in studies around the world to provide valuable and unsolicited insights into user experiences.

Bench Diaries were left in four of the gardens: Secret garden (SG, see Figure 3), Adventure garden (AG, Figures 4 and 5), Staff garden (StG, Figure 6) and Babies garden (BG, Figure 7).



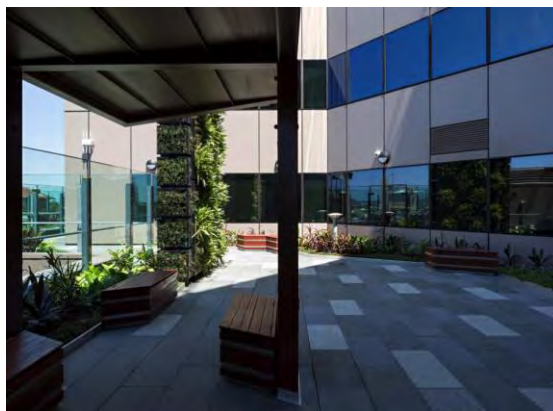
**Figure 1:** Secret garden, sheltered seating area (Source: Christopher Frederick Jones)**Figure 2:** Secret garden, grassed lawn area and view (Source: Christopher Frederick Jones)



**Figure 4:** a) Adventure garden, a section of the grassed green wall and therapy area (Source: Christopher Frederick Jones); b) Grassed green wall in Adventure garden covering the building façade, which attracts people to touch it (Source: Kylie Gow)



**Figure 6:** Staff garden, showing covered area which now features tables and chairs, and the garden areas with a green wall (Source: Christopher Frederick Jones)



**Figure 7:** Babies garden with seating areas, green wall and garden beds (Source: Christopher Frederick Jones)

Comments in the Bench Diaries from two of the gardens (Secret Garden, Staff Garden) were transcribed, with names or personal identifying information changed to preserve anonymity. Comments that did not pertain to the garden or the views were deleted from the transcripts and not used in the analysis.

A thematic analysis was used to evaluate the comments (Boyatzis, 1998). Two researchers independently reviewed comments, each firstly identifying comments that do not refer to the gardens or the garden space. Once agreed upon, these comments were removed from the data. The researchers then independently identified patterns in the comments and independently identified emergent themes. The researchers compared findings to produce a set of common themes.

The researchers then coded the comments according to the themes, and looked at how frequently each of the themes appeared; how frequently any two themes appear together in the same comment; and any nuances or patterns that can be observed relating to that



theme from the data. The themes were then compared with the intentions of the design noted above.

The research provides preliminary evidence of user experiences of these gardens from a relatively small sample size of self-selected participants. It should be emphasised that the data provides insight into the perceptions of visitors and their own attribution of benefits. Further work is needed to assess, for example, relationships between physiological markers of stress and time spent in the gardens, or impacts of garden visitation with rates of healing. Whilst it was often possible to identify whether a writer was staff, patient or family/friend by their comments, the analysis did not look for patterns relating to experiences of these different end-user groups as not all comments could be identified by end-user.

## Results

**Error! Reference source not found.** summarises the number of comments left in each of the gardens and information about the garden's location and accessibility. Our analysis subsequently focused on comments left in the SG and AG Bench Diary as these are accessible by staff and patients, as well as visitors for the SG, and as the other Diaries were considered to have too few comments to allow for a broad set of perspectives.

**Table 2:** Catalogue of comments left in bench diaries in four healing gardens at the LCCH

Garden	Garden accessibility & description	Comments
Secret garden [SG]	<ul style="list-style-type: none"> <li>- Located on Level 5, facing North West, 200 m<sup>2</sup>, accessible to staff, patients and visitors.</li> <li>- Gardens include sheltered seating, a central lawn and views of Brisbane CBD, river and the Southbank precinct which has colourful gardens and landmark features.</li> <li>- Vegetated features include epiphyte green walls predominated by epiphytes, which create zones and secluded areas; grassed lawn areas and garden beds with a diversity of plantings.</li> </ul>	Total: 62 Relating to garden: 41
Adventure garden [AG]	<ul style="list-style-type: none"> <li>- Located on level 6, facing North West, 500 m<sup>2</sup> accessible only to staff and patients, swipe card access.</li> <li>- Therapy equipment includes a climbing wall, basketball hoop, wheelchair training area and swing. The garden includes sheltered seating, lawn &amp; paved areas and views similar to the SG. Vegetated features include a sloping, grassed green roof and wall, detached green walls throughout the garden that create semi-secluded areas; grassed lawn areas and garden beds with a diversity of plantings.</li> </ul>	Total: 28 Relating to garden: 17
Staff garden [StG]	<ul style="list-style-type: none"> <li>- Located on Level 7, facing East with some southerly access, 350 m<sup>2</sup>. Accessible only to staff, swipe card access.</li> <li>- Gardens include outdoor setting for lunch and staff functions, lawn &amp; paved areas and a variety of planting. Vegetated features include garden beds with a diversity of plantings, and a green wall predominated by epiphytes.</li> </ul>	Total: 11 Relating to garden: 1
Babies garden [BG]	<ul style="list-style-type: none"> <li>- Located on Level 9, facing East, 285 m<sup>2</sup>. Accessible only to staff and patients, swipe card access.</li> <li>- Gardens include sheltered seating, and paved areas. Views from the garden are of buildings and transport infrastructure. Vegetated features included garden beds with a diversity of plantings, and a green wall predominated by epiphytes.</li> </ul>	Total: 1 Relating to garden: 0

Within this context, ten codes were identified in the thematic analysis of comments, summarised in Figure 8 and in Table 3. The four most frequently observed codes in the SG indicated that visitors were (1) seeking ‘time out’ from their experiences of being at the hospital, (2) a desire for a ‘dose of nature’ (greenery, beautiful garden), as well as (3) fresh air, and (4) that the garden space provided a restorative experience to them in some manner. For the AG, comments relating to the view were by far the most frequently, with other codes appearing with a relatively low frequency.

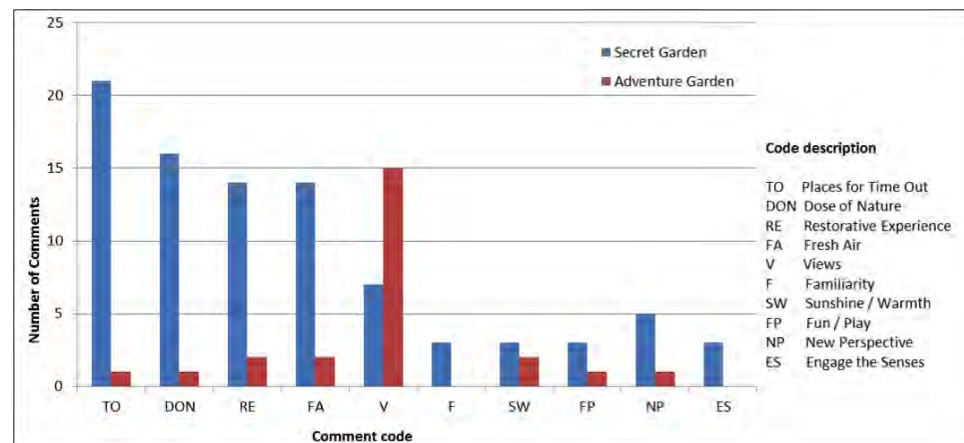


Figure 8: Summary of coded comments in the Secret Garden bench diary at the LCCH

Table 3: Results of thematic analysis of Secret Garden Bench Diary comments

Code	No. of comments	Example comments
Places for Time Out [TO]	SG -21 AG - 1	[SG7] My son [...] had his appendix out, the staff here have been great, but as an active boy, wanted to get outside but was not allowed to leave this level for a while. This garden is just what he needed.[TO, FP] [AG10] ... the tales of the bench ...To my ol mate Benchy! ... I am just here sitting by the big city lights wondering about life the universe and everything else ... its quite possibly one of my favourite places to eat dinner ... xx ☺ [V, RE, NP]
Dose of Nature [DON]	SG -16 AG - 1	[SG10] My name is [...] and this is my friend. He has a large cut on his hip and pins inserted. We have come outside to get some fresh air! The garden is beautiful and the nurses are fantastic. [DON, TO, FA] [AG8] What a beautiful space this is! Green! Open! Fresh air! River and City views – beautiful! Thank you [V, DON, FA]
Restorative Experience [RE]	SG -14 AG - 2	[SG12] Hi! I love coming out to the garden on night shift. The city is so quiet and peaceful at 1 am and the city lights are wonderful! [TO, V, RE] [SG39] Air, light, moon and sun, a place to stretch and walk, a place to laugh and cry with loved ones. My hand goes out with love to all those who use and designed this garden. We find ourselves here in time of fear and are soothed. Thank you!! [RE, ES, DON] [AG2] Hallo there Benchy ol mate! I am feelin' fine, full and fantastic. Look at this view! How can you not be happy with that! Always so peaceful up here, especially at night watching the sun go down. Sitting in the morning sun with a fresh earl grey is the stuff that makes me happy. The simple pleasures in life. ... xo ☺ [V, RE, SW]
Fresh Air [FA]	SG -14 AG - 2	[SG15] We are nurses from 5c oncology. We love coming outside for our tea breaks, it is so nice to get some fresh air and admire the views. [TO,FA, V] [AG23] Hey Benchy, Great spot to fill your lungs with fresh air! Onwards and upwards, started here and Now! [FA]

Views [v]	SG -7 AG - 15	[SG19] What a lovely spot to come out and get some fresh air and enjoy the city view. For myself and son we have spent 18 days on various wards –first day out today – yeah – glad to sit here looking at the greenery. [TO, FA, V] [AG9] Hi Mrs Bench and everyone reading this- I usually come out here to clean so I thought I would take the time to write in here and say a big hello to everyone reading this. This view is so beautiful, although today is a little nippy, I can't complain. ... [V]
Familiarity [F]	SG -3	[SG16] We are here with our 6 week old daughter. After more than a week in hospital with without spending time in the sunshine and fresh air. I found this garden all the beautiful plants made me cry. We miss our home and this garden really helps. Every hospital should have many of these. [FA, SW, F, DON] [SG21] My 16 year old daughter is having her 1 <sup>st</sup> infusion today. She was diagnosed with Lupus 2 years ago. I am scared that if she doesn't realise how important it is for her to be strict with taking her meds that she will die. Positive note: Sitting out in the garden in the middle of the city feels like my country back yard. Love this bench diary idea!! [F, NP]
Sunshine/ Warmth [SW]	SG -3 AG - 2	[SG23] My name is [...], we are here at the LCCH with our 20 month old daughter. She has a rare neuromuscular disorder called a 'Nemaline Rod Myopoly'. 3 weeks ago she went into total Respiratory Failure and nearly died. We have been in the PICU the whole time and still have a little way to go. We bring her up to this beautiful garden for fresh air and sunshine. We are 7 hrs away from home, so it's a welcome peaceful space up here to refresh, away from PICU. Our other 3 kids love to come up here when they visit too. [FA, SW, TO, DON] [AG18] Hallo Benchie, We are having our team meeting in the morning sun. Thanks for being here – ☺. [SW]
Fun/Play [FP]	SG -3 AG - 1	[SG42] Our names are [...] and our baby and she is very sick. We bring her to the garden so she can play with us. We love 'XX's Garden' [FP, F] [AG13} Hey Mr Bench, This place is amazing and I can see the whole city from here. I see the buildings and towns and schools and playgrounds. The gardens and parks and hotels. I wish I could play and stay here all day but dad won't let me jump on the tramp. [V, FP]
New Perspective [NP]	SG -5 AG - 1	[SG27] This garden has saved our sanity. It is a beautiful quiet place. [DON, NP, RE] [SG34] Just finding this space has made the world of difference when I want to yell or scream at the world. [NP, RE, TO] [SG49] Hallo, I am sick and staying in hospital and I came up here to have some fresh air and enjoy the view. I feel like I am in the botanical garden because it is beautiful here. The view is great and relaxing. I forgot that I am sick when I look around. [FA, V, DON, RE, NP]
Engage the Senses [ES]	SG -3	[SG41] My mum brought me outside to the gardens and my eyes lit up. I was so happy to be outside. What a beautiful garden. I run on the grass and wiggled it through my toes. Thank you for making this a great place to be. [TO, ES, DON]

## Discussion

The number of comments left in bench diaries, and overwhelmingly positive nature of these comments, provide a strong indication of the value of the gardens to users, concurring with previous studies. In particular, the LCCH gardens appear to provide a sense of 'being away' from the hospital and reality of being sick, having a sick child, or providing treatment. Visitors frequently report feeling peaceful, calm and restored from



time there. The gardens appear to be used mostly by adults (staff and parents of sick children), however the self-selection bias is significant in terms of who is likely to write in the Bench Diaries. The comments appear to reinforce findings from other children's hospitals cited above, including the importance of providing quality seating with good views, and that people predominately come to the gardens to rest and reflect, being largely sedentary whilst there. These points are discussed in further detail below.

### ***Perceptions and values of the healing gardens***

Comments in bench diaries in both the SG and AG were overwhelmingly positive, frequently expressing gratitude for the garden space. Many comments have a sense of optimism and suggest that the writer is seeking to find a positive perspective and outlook in the midst of a difficult time. There is a frequent sense that the gardens provide people with something for which to be grateful, for example:

*Hi, my name is [...]. I am 1 year old. I have been in and out of hospital since I was born. Thank you so much to the doctors and nurses for fixing my bowels to be able to be just like I should be. My mum brought me outside to the gardens and my eyes lit up. I was so happy to be outside. What a beautiful garden. I run on the grass and wiggled it through my toes. Thank you for making this a great place to be. (SG41)*

*Hallo, I am sick and staying in hospital and I came up here to have some fresh air and enjoy the view. I feel like I am in the botanical garden because it is beautiful here. The view is great and relaxing. I forgot that I am sick when I look around. Much love [...] xxo (SG49)*

*My 16 year old daughter [...] is having her 1st infusion today. She was diagnosed with Lupus 2 years ago. I am scared that if she doesn't realise how important it is for her to be strict with taking her meds that she will die. Positive note: Sitting out in the garden in the middle of the city feels like my country back yard. Love this bend diary idea!! (SG21)*

In terms of features or aspects of the gardens that appeared to be valued by users, comments in the AG Bench Diary related predominately to the view, and that the gardens provided a sense of peacefulness and calm, for example:

*"Hallo there Benchi ol mate! I am feelin' fine, full and fantastic. Look at this view! How can you not be happy with that! Always so peaceful up here, especially at night watching the sun go down. Sitting in the morning sun with a fresh earl grey is the stuff that makes me happy. The simple pleasures in life." (AG2)*

*"Sup Mr Bench! I like coming up here to start my day, I love the view of this amazing city. I feel really happy and excited for today's events. I'm having morning coffee and I don't think there is anywhere I'd rather be. If anyone reads this. Enjoy your day. Keep living, keep loving, keep learning." (AG5)*

By contrast, comments in the SG referred to the beauty of the garden, greenery and the view and frequently referred to the quality of the space and kind of experience that this afforded. As noted in Table 3, visitors commented frequently on having nature (16 comments), fresh air (14 comments), views (7 comments) and sunshine/warmth (3 comments) as well as that this provided a sense of 'time out' (21 comments), a restorative experience (14 comments) and a new perspective (5 comments). For example:

*We have come outside to get some fresh air! The garden is beautiful (SG10)*

*I love coming out to the garden on night shift. The city is so quiet and peaceful at 1 am and the city lights are wonderful (SG12)*

*We bring her up to this beautiful garden for fresh air and sunshine. We are 7 hrs away from home, so it's a welcome peaceful space up here to refresh, away from PICU. (SG23)*

*All she wants to do is come down to the garden ... Thank you for the idea of the garden. It's such a beautiful place to come and visit. (SG30)*

*I am a mental health patient. I love this garden. It is so quiet. And breath ... let time stand still. (SG32)*

*Come out for some fresh air and focus. (SG43)*

This difference in the kinds of comments left in the two gardens may reflect design and use differences – the AG incorporates facilities for use in therapy (for example, a wheelchair enabled swing, trampoline, wheelchair training facility, and a rock climbing wall) and has fewer garden features; whereas the SG includes green walls, climbing vines, garden beds, lawns and a number of built features that provide a more comprehensively greened space. Both gardens face towards the North, and both include bench seats with views of the Brisbane city centre and river. The AG is located only one level above the SG, so both gardens have similar vantage points. As the AG has restricted access, and many patients and staff who access the garden are doing so specifically for a therapy session, these garden users may be less likely to comment in the Bench Diary (no comments in the diary referred to therapy) and may furthermore pay less direct attention to the garden and view amenity.

In both gardens, users appeared to particularly appreciate a place to sit and having the benches themselves, particularly ones that provide a view.

### ***Activities undertaken in the healing gardens***

The predominant activities identified from the comments in both the SG and AG were sitting and relaxing, and having a meal or tea/coffee. This may reflect a bias in people likely to write in the bench diary, which would require someone to be sitting or at least be stationary near one of the benches where the diaries were located, with individuals undertaking more active activities or spending time in other parts of the garden less likely to comment. These findings reinforce those from healing gardens elsewhere, as discussed above, regarding the importance of well placed seating.

*Hi, My son [...] and I are sitting out here with a coffee and a chocolate milk wasting time between blood tests and appointments. It's a great view and better than sitting inside. (SG13)*

*We love coming outside for our tea breaks, it is so nice to get some fresh air and admire the views. (SG15)*

*[...]’s first day out today – yeah – glad to sit here looking at the greenery. (SG19)*

*I am just here sitting by the big city lights wondering about life the universe and everything else ... its quite possibly one of my favourite places to eat dinner (AG1)*

Some comments appear to be written by parents of patients, indicating that their children (patient and siblings) enjoy the gardens for a space to be active, and to just be outdoors, for example:

*My son [...] had his appendix out, the staff here have been great, but as an active boy, [...] wanted to get outside but was not allowed to leave this level for a while. This garden is just what he needed. Thanks Lady Cilento, great job. (SG7)*

*Hi, my name is [...]. I am 1 year old. I have been in and out of hospital since I was born. Thank you so much to the doctors and nurses for fixing my bowels to be able to be just like I should be. My mum brought me outside to the gardens and my eyes lit up. I was so happy to be outside. What a beautiful garden. I run on the grass and wiggled it through my toes. Thank you for making this a great place to be. (SG41)*

*Hi my name is [...] and my 13 yr old daughter has been in hospital for 2 weeks with pneumonia in both lungs. All she want to do is come down to the garden (SG30)*

*we are here at the LCCH with our 20 month old daughter [...]. [...] has a rare neuromuscular disorder called a [...]. 3 weeks ago [...] went into total Respiratory Failure and nearly died. We have been in the PICU the whole time and still have a little way to go. We bring her up to this beautiful garden for fresh air and sunshine. We are 7 hrs away from home, so it's a welcome peaceful space up here to refresh, away from PICU. Our other 3 kids Love to come up here when they visit too. (SG23)*

*My name is [...] and I am nearly 2. I have burnt my arm and hand. The people here are looking after me very well. I love playing in the garden and looking at the boats in the water.*

One entry in the AG bench diary suggested that staff use this for meetings:

*Hallo Benchie, We are having our team meeting in the morning sun. (AG18)*

### ***End-user associated benefits with time spent in the gardens***

As noted above, the LCCH gardens were designed to appeal to all senses, and to assist in reducing stress and anxiety and provide a place for retreat and contemplation (Conrad Gargett, 2015).

The Bench Diary comments strongly indicate that the gardens provide a multi-sensory experience, in particular through the combination of diverse and attractive visual stimuli and 'views' (SG -7 comments, AG – 15), being located outdoors with 'fresh air', which may stimulate the olfactory (among other) sense (SG -14; AG – 2), as well as having sunshine and warmth on the skin (touch - SG -3, AG – 2).

Comments also appear to suggest that the gardens do provide a place for retreat and contemplation, with visitors appearing to relate this to the peacefulness and beauty of the gardens.

*This is such a lovely and quiet view of the city. This is a place where you can refresh your memory and gather your thoughts (AG10)*

*Such a beautiful garden to open up the mind. (SG48)*

*It's a welcome peaceful space up here to refresh (SG23)*

*I love to come out to the pubic garden to let it all out (SG53)*

*Come out for some fresh air and focus. (SG43)*

Whilst comments in the Bench Diaries did not indicate direct awareness of the stress and anxiety-reducing effects that research elsewhere has found from viewing plants and nature, however these effects may underpin many of these experiences that visitors did share, such as:

*The view is great and relaxing. I forgot that I am sick when I look around. (SG49)*

*Come out for some fresh air and focus. (SG43)*

*it's a welcome peaceful space up here to refresh, away from PICU. (SG23)*

*Fresh air is my healer for the moment (SG11)*

*We are here with our 6 week old daughter [...]. After more than a week in hospital with [...] without spending time in the sunshine and fresh air. I found this garden all the beautiful plants made me cry. We miss our home and this garden really helps. Every hospital should have many of these. (SG16)*

*This garden is a peaceful retreat (SG56)*

*We find ourselves here in time of fear and are soothed (SG39)*

*I love this area because it is so peaceful. (SG35)*

*Just finding this space has made the world of difference when I want to yell or scream at the world. (SG34)*

*This garden has saved our sanity. It is a beautiful quiet place. (SG27)*

## Conclusion

As an inner-city children's hospital with significant space constraints restricting ground-level gardens, the integrated podium gardens throughout the LCCH provide a significant and timely example of how design can support the development of functional, healing gardens in a dense urban environment.

This preliminary investigation provides unsolicited evidence of the value attributed to the healing gardens, including that they provide a space within the hospital confines that is accessible to patients, patient families and staff – yet which does not 'feel' or 'look' like the hospital. Comments reflect an appreciation of the fresh air, the gardens and the views – and that this provides a sense of normalcy, a different perspective, a break from focusing on the trauma and illness they are experiencing. In particular, comments left in Bench Diaries indicate that having the garden setting located outdoors, with attractive views and substantial seating as well as places for play, and substantial greenery are appreciated by users. Similar to studies of healing gardens in children's hospitals elsewhere, it appears that visitors to the LCCH gardens primarily seek a place to sit and relax, however the findings from this study are likely biased by the data being collected in diaries left on benches.

Visitor comments overwhelmingly refer to the beauty of the gardens and the view, that it is a peaceful place and that they provide a sense of 'time out' from the hospital. This may emphasise the importance of the design of the gardens and the use of particular features and plants to create a sense of seclusion, visual amenity, and verdant greenery amongst an otherwise busy and heavily built environment. This is noteworthy, given the space constraints of this inner-city hospital and that as podium gardens there were technical constraints on the design and plant selection. This demonstrates the value that can be created, even from relatively small gardens spaces that are well designed and situated.

Whilst further research is needed, the Bench Diary data provides strong indications that the gardens are playing a critical role in alleviating the emotional impact of being in the hospital. This in turn may influence the healing process for patients, and the quality of the experience of being at the hospital for patients, families and staff. Future research in the



LCCH gardens may consider therapeutic benefits from time spent in the gardens as well as therapy conducted in these spaces, as well as investigating ways of quantifying and monetizing the benefits for all garden users.

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