

Investigating Architectural and Space Design Considerations for Post-Traumatic Stress Disorder (PTSD) Patients

Post-Traumatic Stress Disorder (PTSD) is a prevalent condition among general U.S. population but in particular veterans. Anecdotal evidence points at the effect of urban design features on mental well-being of PTSD patients. However, evidence-based architectural and space design guidelines for PTSD patients is largely absent. Having access to such guidelines, might help to alleviate PTSD symptoms, and improve patients' quality of life. Interviews were conducted with combat veterans who were diagnosed with PTSD (sub population focus) to gain insights into their thoughts, needs and expectations, and experiences with physical indoor and outdoor spaces. The findings suggest that certain indoor and outdoor design elements such as sharp corners, narrow pathways, blind spots, etc. increase anxiety and leads to triggers while others (e.g. open spaces, situational awareness providing features such as lack of clutter open floor plan) contribute to soothing features that relax veterans.

INTRODUCTION

Post-Traumatic Stress Disorder (PTSD) is an anxiety-based psychiatric condition that is experienced by individuals who get exposed life-threatening (traumatic) events that are accompanied by the feelings of fear, helplessness and horror (American Psychiatric Association, 2013). Combat veterans are especially prone to such exposure and therefore a high percentage of them suffer from this condition. Veterans Affairs (VA) had treated about 510,000 unique veterans from Iraq and Afghanistan by 2009 a number which has increased steadily over the past decade resulting in growing costs of care (Geiling & Rosen, 2012). Combat-related medical costs are expected to further increase due to recent conflicts and chronic conditions a large portion of which represent costs related to mental health such as PTSD and comorbidities (Geiling & Rosen, 2012). The estimated societal cost per person including lost earnings and overlap suicide costs is about \$16,000 per case over a two-year period (Kilmer et al., 2011).

With anecdotal evidence suggesting high suicide rates among veterans with PTSD, recent focus has shifted toward understanding and mitigating factors contributing to PTSD triggers. While environmental and contextual factors such as large crowd sizes, gun powder odors, loud noise and unexpected advances have been known to result in PTSD triggers, most such contributors occur in the context of social interactions. Less attention has been given to personal spaces or the effect of architectural and urban design elements of patients' residence on triggers. Given the isolation-seeking symptoms of PTSD, veterans may spend a considerable amount of time in their own personal space (e.g., their residence). Therefore, understanding any linkages between architectural design elements and PTSD triggers is critical to ensure the well-being of veterans. A veteran-centered design is needed to identify and mitigate any potential triggering elements which may have a considerable influence on reintegration of veterans into the society.

Background

Review of literature suggests that a well-defined, bounded, clear and extensive body of literature regarding

mental health and urban design is absent (Gharib et al., 2017). However, some preliminary studies are present providing insight into several design aspects. The most common example is of the use of green spaces (open spaces that include vegetation) to facilitate coping techniques that address anxiety and stress (Thompson et al., 2012). Green spaces have also shown to reduce incidences of depression (Cohen-Cline et al., 2015). In addition to green spaces, the presence of water is associated with a significant positive impact on mental health (Miller et al., 2012; Nutsford et al., 2016). Other features investigated the impact of room corners (sharp vs. rounded) and found that sharp corners increase aggressive behavior, whereas rounded corners that flow well with the rest of the environment are linked with pleasantness (Hess et al., 2013). Haddad et al., (2014) stated that the place of birth increases the odds of developing schizophrenia by up to 28% to 34.3% since early life urbanity may change the brain regions anatomically. These examples suggest urban design considerations do impact mental health in the epi- and ecophenomenal impact of environment on general health (Gharib et al., 2017).

Despite the above-mentioned evidence, research on urban design considerations for improved mental health is in its infancy (Shepley et al., 2013). Urban design to protect against PTSD is going to play a vital role in mental health factors and design considerations, not just for post-war environments, but also reintegration into society for returning veterans. Some of the recommendations from previous studies include but are not limited to removing environmental features that trigger trauma related memories, improvements to design to provide better wayfinding, easy entry and exit and protection against unwanted symptoms that might trigger PTSD (Golembiewski 2016). Many of the mental disorders including PTSD might be triggered by social and urban design elements such as loud noises, lack of exits, large crowd gathering, and narrow pathways. The need for developing a body of literature regarding how physical environments affect people living with mental disorders have been raised in recent articles (Gharib et al., 2017).

Some of the important symptoms exhibited by PTSD patients include intrusive memories associated with trauma, self-absorption, emotional numbing and hyper-arousal

(American Psychological Association, 2000). In addition, PTSD patients might experience self-regulation issues that could lead to hindrance in their ability to achieve goals and deal with environmental demands (Tangney et al., 2004). These aforementioned issues can make public outings anxiety-prone experiences for veterans and their families that might lead to further social isolation (Hayes et al., 2010). In order to create guidelines for research and design interdisciplinary collaborative studies would be required to assess the design considerations in order to fulfill the needs of current and future PTSD veterans. Some of the design considerations that can be used to cater to the needs of PTSD patients are optimization of environments. This has the potential to improve health outcomes and in turn reduce future costs associated with mental health complications for veterans. Some of the examples that can be used to reduce social isolation for veterans using optimization of environment include using service dog training facility, sustainable farming, rehabilitation centers, wildlife plantings, soft landscape, hyper-arousal social support picnic spaces, duration controlled smoking areas, physical obstacle course that provides graded stressors, etc. these could improve physical and mental well-being of veterans with PTSD (Wagenfeld et al., 2013). These places can provide opportunities to reduce intrusive thoughts of trauma as well as provide positive distractions for PTSD patients.

Previous studies have identified characteristics of the physical design considerations in the topic of behavioral health facilities that can be applied to other mental conditions such as PTSD. These design considerations include providing a flexible and homelike environment (Carr, 2011; Devlin, 1992; Grosenick & Hatmaker, 2000; Priebe & Broker, 1999; Potthoff, 1995; Shepley et al., 1999; Tapak, 2012; Ulrich et al., 2012; in Wagenfeld et al., 2013). Additionally, the maintenance, furniture and landscaping of social spaces must be of high quality (Potthoff, 1995; Holahan & Saegert, 1973; Grosenick & Hatmaker, 2000; Christenfeld et al., 1989), and the distance between the seating should be increased to reduce social pressure (Townley et al., 2009). Additionally, interior spaces need to be well-lit, using a combination of artificial and natural light (Gutkowski & Guttman, 1992), and creating a welcoming reception area (Gutkowski & Guttman, 1992). Overall, humanistic values need to be encouraged through colors and graphics (Whitehead et al., 1984), with the aid of art displays to create positive social engagement (Nanda et al., 2010). Physical environment can be used to reinforce appropriate behavior and negative reinforcement to potentially harmful behaviors.

The motivation for research in this area is to create standards for design considerations for social spaces for PTSD that improve outcomes and reduce costs associated with treatment. Current available guidelines are not comprehensive (Shepley et al., 2013). Studies are not validated and repeat studies are limited due to which guidelines are difficult to create based on evidence.

This paper documents the early stages of our veteran-centered approach in understanding architectural and design elements of indoor and outdoor environments while soliciting design requirements from patients towards a comprehensive

set of architectural and urban design guidelines for PTSD patient population.

METHOD

Semi-structured interviews are being conducted with veterans diagnosed with PTSD to understand the indoor and outdoor architectural design elements contributing to PTSD triggers. This paper presents our findings from 5 pilot interviews.

Participants

Five participants were recruited during an event organized by Project HERO (a non-profit organizing bicycle-ridings activities for veterans and first responders diagnosed with PTSD). The mean age (standard deviation) was 39.2 (7.80). All the participants were male and had different military branch affiliations. The VA disability ratings ranged from 30% to 100% with the mean of 70%.

Procedure

Participants were requested to answer questions regarding their own experiences with various architectural design aspects (e.g., their personal residence or public spaces) and effects of such elements on their mental well-being and in particular PTSD triggers. The interview was semi-structured allowing for probing and clarifying questions. The interview took a maximum of 30 minutes. The interviews were audio recorded and participant consent was obtained for the recording. The audio recordings were transcribed and analyzed using a qualitative data analysis software called MaxQDA. No personal identification information was obtained and the recording and the transcripts were secured using password-protected computers. The study received approval from the authors' Institutional Review Board (IRB). The IRB number: IRB2017-0108D.

During the interview, participants were asked about their thoughts regarding the design of buildings, rooms, doors, hallways that could trigger PTSD hyper-arousal symptoms. Participants were also asked about design considerations for their personal living spaces that positively or negatively affected their mental health. Participants were then asked about their ideal living space that would help them deal with their PTSD symptoms as well as a similar question regarding social spaces.

RESULTS

The findings from these interviews were organized into three categories: 1) general space design considerations, 2) considerations for private living spaces and 3) considerations for public spaces.

General Design Considerations

Several generic guidelines are produced based on thematic analysis of interviews:

- 1) Places need to be designed according to a core logic (numbering system, bulkhead numbers, military standards for numbering, etc.), organization and familiarity in layouts for veterans to feel comfortable.
- 2) Privacy is an important factor in the design for PTSD patients. Veterans expressed strong desire to have situational awareness of the surroundings and people around them.
- 3) Veterans prefer to live with people who are going through the same thoughts and routines. Such “peers” may have better appreciation for daily struggles and provide a supportive environment that is built on trust.

Considerations for Private Living Spaces

In terms of private living spaces, important themes or repetitive patterns that emerged were:

- 1) Veterans generally prefer open spaces and low furniture clutter in their private residence.

“... I like an open space area. If its cluttered with furniture then I’m not comfortable. And its probably something (one of the only things) that I can relate to. We lived cramped for so long that I like open areas.”

- 2) Circular layout preferred over a square layout. This is in line with Hess et al.’s (2013) findings.

“I notice colors. Green, makes me feel calm. When I was in [military camp], there was no green, it was just brown and that made me feel depressed. Also, very square, like this being very square, I don’t like that too much. I prefer round. It feels like it’s more space. Maybe it’s me but, circular and green, feels comfy.”

- 3) Living areas need to have at least 2 exits and a low number of windows. Veterans expressed the importance of having access to several exit points. Windows on the other hand, were claimed to be a stressor. This might relate to military requirements to check windows for potential enemy targets.

Several requirements were related to privacy. Veterans were generally very sensitive about this requirement and expressed strong dislike towards their residence being visible to neighbors or public.

- 4) The windows and doors need shading to improve privacy.
- 5) Veterans prefer to spend time in their private for variety of daily activities that are commonly conducted in public spaces. Veterans requested private space for relaxation, exercise, “own comfort bubble”, and training.

“I have to have a goal, a mental goal, a physical goal. How can I interpolate that into physical, I have to have the bike, the right space, an area that I can warm up.”

- 6) Since noise is a major trigger, living quarters that are away from loud noises are preferred.
- 7) Veterans need to aware of who is entering and exiting their house or living area.

“All the doors are open all the time. I want to be able to hear what’s going on. And I still wake up even when I’m medicated when my kid comes home and I know who it is because the dog will bark or not bark based on who is outside.”

- 8) Veterans prefer all the furniture and people in a room to be visible when they are entering a room, the door should not block vision and blind spots should be avoided.

Considerations for Public Spaces

The important design considerations for the design of public spaces were:

- 1) Veterans prefer to avoid spaces where they cannot see people’s movements and intentions when in a public setting (e.g. mezzanine floor).

“...a lot of my issues came with an overabundance of people and when there’s too many people I can’t keep my eyes of everybody and if I can’t keep my eyes of everybody then there is a better chance that something could happen and I wouldn’t be aware of it.”

- 2) Design should not trap people or hinder movement in public spaces (e.g. avoid congestion in aisles, corridors).
- 3) Familiarity with the space with reduce the overall anxiety level among veterans. Maps and layout diagrams help veterans get familiar with the surroundings.

“...I’ve studied the map and now I know every possible way there is but if something’s closed it will stress me out... malls...and inside the malls...department stores are designed to keep you in there, and so I have to do a perimeter walk and get the layout so I can memorize it and then I’m okay.”

- 4) Public spaces that are away from frequent foot and car traffic are preferred. This is to avoid the most common PTSD trigger, namely large crowds. Veterans prefer environments that are stimulating so that it motivates them to venture outside and reduce social isolation. For example, a dog park where the veteran’s service animal can play might be less stressful than a shopping mall (interaction with a lot of people might lead to stress)
- 5) Design logic and order was mentioned as a mitigating factor. For example, veterans would prefer a numbering system to locate rooms in a building.
- 6) While round corners are preferred, sharp corners are acceptable as long as a mirror is present to allow awareness of others’ presence.

“... I don’t like walls and stuff I can’t see, I don’t like corners, like I can’t see around that corner so I don’t want to go around

that corner, because I don't know what's there so maybe if you had those mirrors where you could see down that hallway, it has to do with a lot of the unknown..."

- 7) Glass doors and glass walls are preferred wherever possible to improve visibility and awareness of surroundings.

"The ideal space, where I am living now is pretty good, it's kind of like, you have the downstairs, it's almost set up like this where you have the main lobby and the day room right here and a tv room right here with all glass so you can see in there at all times."

- 8) Training and specific roles should be considered in the design of public spaces. For example, while most prefer open spaces, snipers would prefer confined spaces.

"So I'd rather not sit in a booth because its more confined, I'd rather not be in a confined space. Small restaurants I prefer not to be in because it's too confined for me, so large restaurants but I'd like to be close to where there's an exit, those types of things."

- 9) Restaurants or places with public sitting areas need to be designed for more open spaces and visible exits.

"...no, my big thing is just knowing where the exits are, as long as I know where the exits are I will be fine. There used to be a time when if I couldn't see the exits, I would be freaking out, but I have kind of gotten past that just as long as I know where the exits or at least the nearest exit to me, so maybe an exit sign pointing to the exits."

"And to me a big thing is exits. Knowing how to get out of places. Not that I need to flee or panic but I just...I want to know. I want to know how many options there are, how many ways there are to get out."

DISCUSSION

Our preliminary findings suggest a clear pattern of design guidelines classified into considerations for private and public places. While the proposed guidelines are not comprehensive are based on a small sample, early saturation of interviews is an indication of importance and acceptable generalizability of findings. It seems that architectural and space design considerations are of particular importance to veterans who enthusiastically participated in this preliminary inquiry.

Given the limited amount of evidence and guidelines in the literature connecting space design features to PTSD triggers, this paper's contribution is notable. While the research is still in its early stages, these preliminary results can inform the design of living spaces dedicated to veterans such as living camps and residence complexes.

Future work consists of conducting additional interviews with veterans to validate the preliminary findings and expand the knowledgebase. More comprehensive guidelines can be developed for public and private spaces for

veterans dealing with PTSD and post war redevelopment efforts facilitating a more efficient recovery and reintegration back into society.

CONCLUSION

The paper explores the relationship between urban design considerations for veterans diagnosed with PTSD and their preferences and experiences regarding private and public spaces. A short set of design considerations and guidelines were elicited from PTSD positive combat veterans through semi-structured interviews. Sample questions included asking about the design features that positively or negatively impacted their personal mental health. Findings suggest the importance of privacy, awareness of surroundings, and uncluttered private spaces as well as open spaces, situational and surrounding awareness, clear exit paths, and familiarity with space for public spaces.

Comprehensive and general guidelines for design considerations are not yet available, not only for the mental well-being of PTSD patients, but also for other mental health disorders. These preliminary findings based on the pilot initial interviews contribute to this gap and can inform current and future space design efforts for veterans many of whom suffer from PTSD. Work is in progress to solicit more veterans' feedback with the overarching goal of establishing comprehensive guidelines for design of private and public spaces for PTSD patients.

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