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Bringing The Outdoors Indoors: Immersive Experiences of Recreation in Nature and Coastal Environments in Residential Care Homes

This paper critiques the opportunities afforded by immersive experience technology to create stimulating, innovative living environments for long-term residents of care homes for the elderly. We identify the ways in which virtual mobility can facilitate reconnection with recreational environments. Specifically, the project examines the potential of two assistive and immersive experiences; virtual reality (VR) and multisensory stimulation environments (MSSE). Findings identify three main areas of knowledge contribution. First, the introduction of VR and MSSE facilitated participants re-engagement and sharing of past experiences as they recalled past family holidays, day trips or everyday practices. Secondly, the combination of the hardware of the VR and MSSE technology with the physical objects of the sensory trays created alternative, multisensual ways of engaging with the experiences presented to participants. Lastly, the clear preference for the MSSE experience over the VR experience highlighted the importance of social interaction and exchange for participants.

Key words: immersive experience, virtual reality, multisensory, recreation, nature, health

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Introduction

Improvements in life expectancy have seen a worldwide increase in the proportion of older people (WHO, 2011). Governments recognise that health and social care agencies are finding it increasingly difficult to support this rise with a resulting negative impact on the health and wellbeing of older people. Further, older people are more at risk of conditions, such as arthritis, diabetes, heart disease and dementia which can lead to a deterioration in mobility and presents difficulties in many living environments (Divo et al, 2014; Kuh et al (2019). Many older people spend most of their time indoors which may further contribute to mental and physical health difficulties (Bamzar, 2019). Loneliness and social disconnection are significant issues as older people struggle to undertake outdoor recreation and community-based activities (Shankar et al, 2011). Ongoing issues with the provision of community-based care and the heavy reliance on informal family carers means that an ever-increasing number of older people live in residential care homes, thus further increasing the likelihood that they become less engaged with outdoor recreation and tourism focused activities (Bone et al, 2016). Research into the potential for new technological innovations that can facilitate healthy ageing and improve is urgently required. This research is part of a wider project on Living Environments for Healthy Ageing (LEHA) which focuses on investigating the role of the living environments for the promotion of healthy ageing. For this paper, we focus on critiquing the ways in which immersive technologies can contribute to the creation of stimulating, innovative living environments that bring virtual mobility opportunities and multisensory stimulation into care environments to promote and realise healthy aging. Specifically, the project seeks to examine the potential of two assistive and immersive experiences; virtual reality (VR) and multisensory stimulation environments (MSSE).

Literature Review

As Jung et al (2017) suggest, the adoption of immersive technologies, such as VR, have received increased attention from researchers and businesses alike in recent years. Whether offering opportunity to engage with destination offerings (Huang et al, 2016; Tussyadiah et al, 2018), immersing visitors in cultural heritage and bringing historical events to life (Bec et al, 2019; Chiu et al, 201), or in some cases providing a substitute to travel itself (Cheong, 1995; Williams & Hobson, 1995), the debates surrounding the role and function of immersive technologies and our understanding of the opportunities and challenges associated with these have increased in pace. This research therefore builds upon work by authors such as de Greef et al (2016), who suggest immersive telepresence tourism creates opportunities for increased engagement in recreational activities for mobility-restricted participants, and Wan et al (2019) who evaluate the opportunities for ARNature in enhancing tourism experiences with outdoor natural environments.

Indeed, such immersive technologies, including: augmented reality (AR), virtual reality (VR) and multisensory stimulation environments (MSSE), can be used to create invigorating surroundings (Feng et al, 2018; Siriaraya & Ang, 2014; White et al, 2019). It can also help people to experience recreational natural environments that they otherwise would not have access to (White et al, 2019). Research has demonstrated that green (e.g. woodland) or blue (e.g. sea) natural environments have a restorative effect (Bell et al, 2018; Finlay et al, 2015; Rosenberg, 2017). Restorative effect has been conceptualised as a reduction in cognitive fatigue and stress levels as well as increased positive affect (Annerstedt et al, 2013; Valtchanov et al, 2010). However, not everyone has access to restorative outdoor environments, for example because of frailty and mobility issues associated with ageing (White et al, 2010). Research by authors such as Annerstedt et al (2010), Valtchanov et al (2010), Kjellgren & Buhrkall (2010) and Tabrizian et al (2018) has demonstrated that technology may be used to effectively bring the outdoors indoors by comparing recreational natural environments with

simulated recreational natural environments. Valtchanov et al (2010) and Kjellgren & Buhrkall (2010) found that a simulated natural environment had a similar impact on increasing positive affect and decreasing stress, compared to real natural settings. Moreover, Annerstedt et al (2010) found that stress recovery can be advanced by adding sounds of nature to a virtual green environment in a laboratory setting.

Although none of the aforementioned studies explored the effects of simulated natural environments on older adults, the body of research into the use of immersive technologies with older adults (≥ 60 years) has been growing over the past few years. Findings from a scoping literature search (Arksey, 2003; Arksey & O'Malley, 2005) of four databases (IBBS, CINAHL, MEDLINE, and Scopus) resulted in 1326 articles being identified to explore how simulated natural environments created using immersive technologies (VR and MSSE) impact on factors associated with healthy ageing, specifically the ability to build and maintain social relationships as well as the ability to retain a level of mobility despite frailty due to ageing. Largely, there was evidence of a positive impact of simulated natural environments created through immersive technologies. Specifically, VR and MSSE improved the ability to build and maintain relationships and to retain some mobility despite frailty due to ageing. Indeed, both VR and MSSE have been found to have a positive impact on emotional, psychological and social wellbeing as well as mobility. A link was found in several studies between the use of immersive technologies and increased engagement, most notably in older adults with dementia. When a direct link with the restorative outdoors was present (i.e. a natural blue or a green space), the impact of the use of immersive technology appeared to be greater. It is therefore clear that a gap in knowledge exists in understanding the impact of virtual representation of restorative recreational environments on frail older adults (as opposed to those with cognitive impairments, such as dementia), and it is on this that our study focuses.

Methodology

The aim of this research was to first, develop two prototype experiences using assistive and immersive technologies, and second, to explore the adoption of these prototypes and understand the ways in which VR and MSSEs allow people to interact with the natural recreational environment. Prior to developing the immersive content, the research team conducted PPI (patient and public involvement) workshops at the local care home partner. Participants were asked what content they would prefer for the immersive experiences; suggesting revisiting places that are distinctive for them. Findings were in keeping with the rationale for the LEHA project as it includes the promotion of mobility through access to local recreational natural environments, such as coastal areas and woodlands.

Subsequently the research team collected footage from both green (i.e. woodlands) and blue (i.e. coastal) natural spaces in the surrounding areas of Surrey and Hampshire and completed editing, rendering and production of 360o video footage through Adobe Creative Cloud. Once developed, the team pilot-tested the immersion in-house at the University of Surrey and with the care team in the partner site. Immersions were then conducted with residents of the partner care home over 2 full days in July 2019. Working within ethical guidelines, a total of 10 residents took part, with an even split between male and female residents. In addition, two care team members participated. Participants were invited to test both MSSE and VE experiences and asked to provide feedback on their experiences, in line with the research objectives, through semi-structured interviews and observations of video recordings. Data is currently being analysed using thematic coding. In the spirit of the call for papers, what is presented is the initial findings as this develops.

Multisensory Stimulation Environment (MSSE) Experience

A multisensory stimulation environment (MSSE) is a dedicated space where sensory stimulation can be controlled (intensified or reduced), presented in isolation or combination, packaged for active or passive interaction, and matched to fit the perceived motivation, interest, leisure, relaxation, therapeutic and/or educational needs of the user. A MSSE was created in the partner care home. The MSSE content displayed the same green (woodland) and blue (coastal) recreational environments as the VR experience (see figure 1). The room used was a small, common area with no clinical or therapeutic purpose. The 180° video projections were complemented by associated sensory trays that introduced participants to objects with different smells and textures that were related to the scenes on the video. For example, for the green themed video the trays included pine cones, lavender, moss and bark. For the blue themed video, the trays included sand, shells and pebbles as well as different types of seaside candy (e.g. Brighton Rock and candyfloss). Additionally, an aroma diffuser was used in the room, dispersing associated smells. While they were watching the video, participants were prompted by the researcher to talk about what they saw. Most participants reminisced about past experiences, for example about past travels they went on or hobbies (e.g. sailing) they used to have. Some participants preferred to watch the video in silence and seemed completely immersed in it. Conversational interviews continued after the videos finished, with many participants requesting the videos played more than once.

Virtual Reality (VR) Experience

The VR experience was circa five minutes in duration. Participants were asked to wear a VR headset over their eyes (they had the option of choosing between a headset with integrated audio or one without headphones). Use of the VR reality equipment was explained to the participant before using it, with the researcher and/or the care team member demonstrating the

VR goggles by putting them on themselves. Participants verbally confirmed that they are happy to go ahead with the experience. Participants were seated throughout the entire experience to mitigate risks of motion sickness as well as risks associated with moving around (e.g. tripping). Participants could tell the researcher at any time to stop the experience. Conversational interviews were conducted with participants during their experience. On completion of the experience, conversations continued once participants were reorientated with their surroundings.



Figure 1: MSSE coastal experience. Author's own image.

Findings

Throughout both VR and MSSE experience, participants and carers expressed an overwhelming positive response to engaging with both green (e.g. woodland) and blue (e.g. coastal) experiences. It should be noted that given the novelty of such experiences within this setting, carers expressed an overwhelming surprise at how well the participants had engaged with the technology with such positive response. Challenging perceptions of immersive experiences being primarily for younger audiences, the research found that by focusing on

creating immersive experiences that require very little to no technical literacy by participants, thus primarily relying on familiar sensory engagements through viewing video projections either through 180° video projections or within the context of a VR headset, and using associated auditory, tactile and olfactory senses, the importance of an embodied connection to place and recreational experience drew participants further into the experiences presented. As such, the embodied performances and remembrances that ensued provided the key avenues of connection between participant and the immersive environments presented. This will now be explored in further detail.

“This is the first time in 18 months that Charles has come out of his room for something other than a doctor appointment” (Charlotte, Health Care Worker)

Findings can be presented in three key areas. The first of these is the ways in which the introduction of VR and MSSE experiences facilitate an opportunity for participants to reconnect with, stimulate and share past travel and recreational experiences as the content of immersive experiences provides a sense of place and offers the opportunity for participants to reengage with and bring past experiences back into their present situations. As well rehearsed in existing literature, visual content serves to trigger memories (Scarles, 2009) and create an embodied connection to place (Edensor, 1998). Becoming immersed in ‘walking through’ woodlands or along beaches, personal memories fused with that of a collective memory as participants share experiences of sailing on lakes and in the sea, of past holidays, day trips to the seaside and recreational walks with pet dogs. As such, the general scenes shared in the immersions created spaces for familiarity and connectedness, as participants used these multisensory experiences to reconnect with past experiences. Yet, such reflection was overwhelmingly supported by an increased socialisation and interaction, both as remembered from the past and as shared within the space of the interview. Participants were able to take the

general scene of the immersive experience and personalise these according to their own life experiences; creating personal authenticities within the collective and share these as we watched the scenes together. Indeed, conversation often moved from past experiences to the sharing of desires to travel to new, or perhaps more personal spaces.

Secondly, the combination of the digital presence and function of the VR and MSSE experiences and physical sensory objects created alternative ways of engaging with the recreational experiences presented to participants. Indeed, particularly noticeable was the ways in which participants interacted with the scenes portrayed. The fusion of content and the sense of ‘being in’ a place as generated through the creation of an immersive experience, enabled participants to situate themselves in the scenes portrayed. Through a fusion of body language, voice and expression, they accommodated that which they were viewing into their own personal experiences. Many reached out towards the screen, moved their heads as they followed sounds of birdsong, insects, or watched as dogs played in water as they were taken on walks through the woodland; gesturing and making noises as if they were themselves part of the scene. In one case, when viewing the coastal scenes of paddling at the edge of the sea, one participant commented that she didn’t like getting her feet wet and requested the video was stopped and switched to a woodland setting. The importance of immersion and a sense of presence in the virtual spaces presented therefore become central in creating connections to that which is presented and the ways in which participants make sense of, and find connection with, that which is presented.

Thirdly, and last, a clear contrast between the VR immersive experience and that of the MSSE was the opportunity for socialisation. Whilst this is not necessarily a surprise, given the wide acknowledgement of VR as an isolating technology, it was the overwhelming preference for

the MSSE that highlights the need for technology solutions that facilitation social interaction and engagement within the context of care homes. Removing the isolation of the VR headset as only able to be used by one person at a time, and viewers not being fully aware of what the participant is actually viewing, or looking at, at a particular moment, MSSE opened new opportunities of shared experience as the immersions were viewed collectively. As such, the importance of social exchange and interaction became clear as participants reflected on their wishes to share these experiences with friends, family and other residents, where they are no longer able to spend prolonged periods together in the physical outdoor environments. In addition, participants shared that they enjoyed being part of something that we did together; creating spaces for reminiscing, sharing experiences of places they have frequented in the past. As such, immersive experiences can offered the opportunity to recreate the social exchanges of recreational activities; walking through woodlands or along beaches together, building experiences as participants become part of a collective response to what is unfolding, talking and sharing reactions and memories stimulated by that which is shared in the immersive experience.

Conclusion

This paper has sought to explore and critique the opportunities afforded by immersive experience technology for the creation of stimulating, innovative living environments for long-term residents of care homes for the elderly. This recognised the possibilities afforded by such technology in creating the opportunity for residents to experience natural environments that they would otherwise not have or, have only limited access to (Bell et al, 2018), the study adopted two immersive experience technologies, VR and MSSE to create immersive experiences of blue (e.g. coastal) and green (e.g. woodland) environments. The latter of these included the introduction of sensory objects commonly found within each of these

environments and used these, along with a diffusion of associated aromas, to create a multisensory immersion into each of the environments.

The findings proposed build upon research by authors such as (Annerstedt et al, 2010; Valtchanov et al, 2010; Kjellgren & Buhrkall, 2010; Tabrizian et al, 2018) who have demonstrated that technology may be used effectively to bring the outdoors indoors by comparing natural environments with simulated natural environments. As such, we proposed three main areas of knowledge contribution. First, the introduction of VR and MSSE facilitated participants re-engagement and sharing of past experiences as they recalled past family holidays, day trips or everyday practices such as walking their dog in similar surroundings. As such, technology, and in particular the MSSE experience, mobilised the sharing of individual and collective memories as the content viewed served as a mooring point, enabling participants to make sense of what they were viewing and connect to it through their own personal experiences of similar encounters. Secondly, the combination of the hardware of the VR and MSSE technology with the physical objects of the sensory trays created alternative, multisensual ways of engaging with the experiences presented to participants. Many shared a sense of ‘being in place’ as they used their bodies, expressions and gestures to enact and ‘take part’ in the scenes presented. Lastly, the clear preference for the MSSE experience over the VR experience highlighted the importance of social interaction and exchange for participants. Moving away from the relative isolation associated with VR headsets and immersions, participants shared that they enjoyed being part of something that we did together; creating spaces for reminiscing, sharing experiences of places they have frequented in the past, and indeed, creating new, virtual encounters as we walked through previously unknown environments and made sense of them together.

It is clear that immersive technologies in the form of VR and MSSE hold the opportunity to create stimulating environments that facilitate a reconnection of those with

limited mobility to outdoor, recreational environments. Indeed, extending this further into the tourism domain to explore destinations that participants have travelled to in the past, or indeed, have a desire to experience but have yet been unable to, would facilitate deeper understanding of the opportunities afforded by immersive technologies. Further research into the effects of different formats of immersive experiences and the resulting engagements and reactions they yield and the importance of the role of multisensorial stimulation within these would also enable deeper insight into the role of technology and our senses as immersive experiences hold the potential to elevate not only the visual, but how we evoke reactions to places and experiences using our range of senses.

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