

More Than Immersion: How Virtual Cultural Experiences Influence Identity, Reflection and Presence Among Migrants

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Figure 1: Sri Lankan migrants experiencing iBelongVR, a culturally immersive VR prototype.

ABSTRACT

Loneliness is a subjective emotional state that arises from unmet expectations of social relationships. For migrants, loneliness is often intensified by disconnection from cultural identity and familiar lifestyles. Such feelings create defensive mechanisms, which can hinder formation of meaningful social connections and trap individuals in a recurring loneliness cycle. Empirical studies reveal that missing traditional festivals primarily contribute to emotional disconnection among migrants in their host country. Despite the ethnicity, missing own New Year festival emerges as a significant factor. Insights from empirical work, findings from existing literature and expert consultations, informed the design of a culturally immersive Virtual Reality (VR) experience - iBelongVR. Given the subjective nature of loneliness and culture, at this phase the prototype was designed targeting the Sri Lankan ethnic community living in New Zealand. User studies conducted with first generation migrant adults (N=23) of this community demonstrated that the experience supported identity expression, self-reflection, and a strong sense of presence. This paper presents findings from a mixed method descriptive analyses, and discusses design implications for culturally sensitive VR experiences. In particular, the paper highlights the importance of everyday cultural artefacts, ritualized activities, multisensory cues, and opportunities for personal and social meaning-making supported through immersive experiences. The work specifically contributes to XR research by demonstrating how culturally familiar objects, activities and spaces in immersive environments can extend beyond visual realism to encompass cultural identity, autobiographical recall and emotional resonance.

Index Terms: Loneliness, Belonging, Migrants, Cultural Identity, Self Reflection, Virtual Reality, Human Computer Interaction.

1 INTRODUCTION

Loneliness is a subjective emotional state that arises from unmet expectations in social relationships. While some individuals respond to loneliness by seeking increased social engagement, others

voluntarily withdraw from social contact, which can further intensify feelings of isolation and helplessness [4, 47, 35, 13]. Loneliness is declared as a global public health concern as well as a pandemic [35, 36]. Loneliness among migrants is often rooted in disconnection from cultural identity and accustomed ways of living. As a coping response, some migrants' behaviour may further reinforce the cycle of isolation and loneliness [1, 39]. Much of the existing research on migrant mental health is framed through Western and individualistic perspectives [17]. In New Zealand, migrant status has been identified as a significant risk factor associated with higher levels of loneliness [43, 47]. National statistics indicate that migrants are the second most lonely group in the country, with Asian migrants identified as particularly vulnerable [44]. Despite Oceania having one of the highest proportional migrant populations globally, research addressing the emotional and mental health needs of migrant communities in New Zealand remains limited [37]. This highlights a critical need for interventions that address migrant loneliness in a culturally sensitive and subjective manner. Many of the available interventions require initial community engagement, which conflicts with the voluntary social withdrawal commonly practised by lonely migrants. Existing research often cluster diverse ethnic groups into broad categories and predominantly focus on older adults (65+), leaving significant gaps in understanding loneliness among mid aged migrant populations [17]. The use of VR as a tool to reduce loneliness has also been minimally explored [41, 48]. Existing VR interventions frequently lack cultural tailoring due to broad regional representations, and rely heavily on fictional or non-human representations, which can lead to feelings of disconnection rather than belonging [21, 3, 10]. These gaps, alongside the emerging potential of culturally sensitive VR interventions, motivated this research. Multi-phased empirical studies investigated the role of culturally meaningful VR experiences in addressing migrant loneliness [2]. Findings highlighted the loss of traditional festivals, specifically New Year celebrations, as a major source of emotional disconnection in migrants' new lives. Migrants internalising loneliness as a personal failure and being unable to break the loneliness cycle was also signified. These facts were addressed by developing a culturally immersive VR experience - iBelongVR, which specifically focuses on migrant festivities. This paper discusses the findings and insights from the qualitative and quantitative evaluation of the culturally located VR prototype. The aim was to examine the emotional and psychological impact of engaging with the virtual cultural environment, and assess how interactive cultural experiences influence identity, re-

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flection, and presence of migrants. Another aim was to explore the possibility of these influences towards helping migrants alleviate loneliness and identify challenges or barriers in adopting VR for social and cultural integration. This work contributes to immersive technologies research by investigating how cultural specificity influences experiential qualities of VR including presence, autobiographical memory activation, embodied interaction, and emotional resonance. As a migrant, the researcher's experiences of cultural disconnection and loneliness have strongly influenced the motivation and direction of this research. Although this insider perspective helps ensure cultural authenticity in the prototype, the potential for bias is recognized and therefore to balance and enrich the design, the researcher has engaged with diverse migrant and professional voices through surveys, interviews, and focus groups. Time to time consultations with experts in psychology, counselling, and cultural representation was also carried out.

2 BACKGROUND AND RELATED WORK

2.1 Migrant Loneliness and Belonging

Migrants feel lonely due to not being able to express their identity, unable to perform their day to day cultural practices and being culturally disconnected. Acculturation and culture shock contribute to heightened loneliness when familiar social structures and traditions are replaced with unfamiliar ones [33, 29]. Harsh culture shock may result psychological phenomenon such as reactive ethnicity among migrants, which can create backlash from the host community [1, 39]. In particular, migrants transitioning from collectivistic to individualistic society face increased stress, highlighted by language barriers, lack of access to familiar materials, or community members who share the same customs [16, 9, 40]. These reasons can hinder migrants' sense of belonging to their surroundings. The emotional and social gap can lead to significant feelings of loneliness, some experiencing during the initial stages and some even several years after settlement in the host country. New Zealand statistics indicate a growing trend of loneliness among recent migrants compared to long-term migrants or New Zealand-born residents, with Asian migrants identified as the loneliest [15, 32, 44]. By 2025, almost one-third of the country's national population consist of migrants, with citizens from India, the Philippines, China and Sri Lanka being the highest contributors to the migration gain respectively [45]. There is a growing need for culturally sensitive interventions focused not only on older adults, but also on diverse groups such as working-age migrants and ethnic minorities [17, 40]. Resources guiding design, delivery, and evaluation of initiatives addressing loneliness among migrants and ethnic minority communities highlight identity support fostering belonging, one-to-one befriending schemes and intercultural encounters [40]. However, research addressing the mental health and emotional needs of these populations, specifically in New Zealand remains limited [37]. Therefore, interventions tailored to address migrant loneliness in a subjective manner need to be researched.

Belongingness can be influenced differently across generations (e.g. first generation influenced by cultural adaptations and second generation influenced by navigating dual identities) and lifespan stages (e.g. adolescents, adults) [26]. Therefore, it should be noted that this research focus on first generation adult migrant belongingness. In addition, belonging in this research is identified as a subjective and culturally grounded sense of feeling recognised, connected, and emotionally at home, shaped by one's ability to engage with familiar cultural identities, practices, and meanings within a social or experiential space.

2.2 Culture, VR and Wellbeing

Recent advances in VR and Mixed Reality (MR) have transformed how culture is represented and experienced in immersive environments. While early XR applications focused on Intangible Cultural

Heritage (ICH) such as digital reconstruction and virtual museums, recent work has shifted towards emotionally meaningful, participatory experiences. These support cultural engagement, identity expression, and social connection through multisensory interaction and embodied activities [8, 22, 12, 38]. However, inaccurate, overlooked or stereotypical cultural elements in XR design can alienate users, diminish authenticity, and reinforce harmful stereotypes, highlighting the importance of culturally grounded design within immersive systems [3]. Social VR platforms consist of culturally meaningful avatars, virtual spaces, multilingual communication, and non-verbal interaction. These have proven to strengthen identity expression, cultural pride, and interpersonal connection among geographically dispersed communities [19, 3], motivating a growing interest in XR as a medium for supporting psychological wellbeing [3, 10]. However, many existing commercial VR environments rely on broad regional aesthetics (e.g., generic "Asian" or "African" environments) and fictional or ethnically mismatched avatars, limiting their ability to authentically represent everyday lived experiences and cultural identities [21, 3, 20]. Recent work has explored immersive storytelling, intercultural empathy experiences, cognitive behavioural therapy interventions, and community-centred immersive environments to support migrants and diasporic populations experiencing cultural displacement [27, 48, 50, 38, 12]. Collectively, these studies demonstrate that immersive technologies can support emotional engagement and psychological reflection beyond entertainment, suggesting opportunities for XR systems to incorporate cultural familiarity as a design resource. Despite these advances, an important gap remains. Existing work has predominantly focused on cultural heritage preservation, educational experiences, or generic social VR platforms, with comparatively little research examining how culturally authentic immersive environments influence presence, autobiographical memory, emotional reflection, and identity continuity among migrants living away from their home culture. While previous work demonstrates the value of immersive storytelling for appreciating cultural heritage, considerably less is understood about how familiar cultural spaces themselves become psychologically meaningful environments that support reflection and reconnection. Our work addresses this gap by positioning culture not simply as heritage content, but as a core design dimension of immersive experiences. Rather than evaluating VR as a definitive intervention for reducing loneliness, we investigate how culturally familiar sounds, environmental cues, and ritualistic interactions shape presence, autobiographical memory, emotional engagement, and reflective wellbeing among first-generation Sri Lankan migrants. In doing so, the study contributes empirical evidence and design guidance for culturally situated XR experiences at the intersection of immersive technologies and psychology, extending immersive cultural heritage research toward applications that support identity continuity and psychological wellbeing.

2.3 Self Reflection and Immersive Interventions

Reflection is a core aspect of human cognition, defined as the inward-facing process of understanding situations, examining one's role within them, and deriving new meanings from challenging life events [48]. In psychological frameworks, self-reflection is critical for identity development, emotion regulation, and positive therapeutic outcomes [18]. However, achieving deep self-insight is cognitively demanding and requires structured environmental encouragement [48]. Human-Computer Interaction (HCI) and XR research has heavily adapted Schön's classic paradigms of reflection-in-action (thinking about actions while performing them) and reflection-on-action (evaluating memories to derive future lessons) to design interactive systems that support psychological growth [5]. Compared to desktop or mobile systems, immersive technologies have proven to offer unique affordances for self-

reflection. Compared to MR and Augmented Reality (AR), fully immersive VR insulates the user from environmental distractions, creating a controlled "cognitive laboratory" highly conducive to guided reflection [48]. While voice-based and customized conversational agents in VR have proven effective by offering personal and context-appropriate interactions [34, 28], recent immersive intervention methodologies take advantage of task-based embodiment and situated learning to stimulate deeper cognitive processing. Studies show that converting cultural heritage knowledge into interactive first-person experiences encourages users to actively engage, reflect, and learn through their own experiences [46, 22]. These multi-modal engagements guide the user's attention inward, demonstrating how interactive system design can systematically trigger self-reflection and emotional regulation. Our study explores how culturally significant objects, spaces, and active, reflective tasks can facilitate self-reflection in immersive environments. By investigating both reflection-in-action and reflection-on-action, we examine how culturally sensitive immersive experiences may help migrants reinterpret displacement, reconnect with their cultural identity, and construct new personal meanings. We intent to contribute empirical evidence and design guidance for culturally situated XR, extending immersive technology research in psychological wellbeing through reflective engagement.

2.4 Presence and Embodiment in VR

Presence is widely regarded as a defining characteristic of immersive virtual environments and a key determinant of users' experiences in XR. It is commonly conceptualised as comprising place illusion (feeling physically located in the virtual place) and plausibility illusion (feeling that the virtual scenario is actually occurring) [31]. Together, these illusions encourage users to perceive and interact with virtual environments as if they were real, resulting in intuitive spatial reasoning, natural object interaction, and increased experiential realism [23, 42]. Previous XR research has consistently demonstrated that presence is shaped not only by the level of technological immersion but also by interaction design, multisensory feedback, and narrative context [22, 3]. Greater presence has been associated with deeper user engagement, stronger autobiographical memory recall, enhanced emotional responses, and more meaningful user experiences compared with traditional media [23, 14, 48]. Furthermore, immersive experiences can influence users' cognitive and affective processes, contributing to changes in attitudes, emotional responses, and behavioural intentions [24]. Recent work in immersive cultural heritage suggests that cultural authenticity represents another important contributor to presence. Recreating culturally significant places, traditions, and rituals has been shown to evoke autobiographical memories and increase the perceived authenticity of immersive experiences [6, 49]. Community-led mixed reality projects further demonstrate that accurately representing cultural environments, practices, and protocols can strengthen both presence and co-presence by allowing users to engage with culturally meaningful spaces in ways that reflect their lived experiences [12, 38]. Similarly, culturally congruent avatars have been found to support identity expression and embodiment. However, instances like unmatched avatar ethnicities have proven to disconnect users from their real selves [3, 20]. This creates a gap of understanding complex dynamics shaping VR experiences across different demographic groups. Despite these advances, relatively little is known about how cultural familiarity itself shapes presence and psychological engagement among migrant communities. While prior work has largely focused on cultural heritage preservation, education, or social interaction, fewer studies have investigated how culturally authentic environments can create a sense of presence which can support autobiographical reflection, emotional resonance, and identity continuity. This study addresses these gaps by investigating how culturally familiar spaces, everyday objects, environmental



Figure 2: Prototype depicting a village home of the migrants' home country



Figure 3: Interactive, visual and textual methods for instructions

sounds, meaningful interactions, and reflective activities contribute to presence and emotional engagement within a culturally situated VR experience. We examine how cultural authenticity functions as a design dimension in XR shapes presence, autobiographical memory, identity affirmation, and reflective wellbeing.

2.5 Prototype

The primary setup of the virtual reality experience in iBelongVR is a village home in Sri Lanka with the timeline being the New Year season (See Fig. 2). The virtual environment include interactive objects, culturally immersive spatial designs, environmental sounds, and opportunities to perform traditional rituals and New Year related activities. Prompts of reflective questions encouraging nostalgia and contemplation of future possibilities are integrated to some of the virtual objects (See Fig. 1). Instructions are provided through a combination of interactive, visual, and textual methods. These methods include in-game UI panels with instructions displayed in the main three languages used in Sri Lanka, audio guidance (e.g. sound of burning firewood), and physics-based interaction hints (e.g. glowing objects urging user to grab). Furthermore, perceptual affordances and environmental cues (e.g. visible stand of "Eye on the Elephant" game inviting users to play) within the VR environment were used to attract attention and encourage intuitive interaction of participants. Fig. 3 shows these methods. Objects were intentionally placed randomly in the VR environment, allowing participants to freely arrange their virtual surroundings in ways that felt personally meaningful and familiar to them.

3 METHODOLOGY

3.1 Research Goals

The main question of this research is "How can a culturally immersive VR environment facilitate alleviation of loneliness of mi-

Table 1: Participant Demographics.

Overall N = 23 (100%)	
Age Range	
25-34	16 (70%)
35-44	4 (17%)
18-24	3 (13%)
Gender	
Female	18 (78%)
Male	5 (22%)
Ethnicity	
Sinhalese	22 (96%)
Sri Lankan Tamil	1 (4%)
Religion	
Buddhist	15 (65%)
Roman Catholic	7 (30%)
Hindu	1 (4%)
Residency Status	
Temporary or Work visa	20 (87%)
Permanent	3 (13%)
Residence Length in New Zealand	
0 - 3 years	21 (91%)
4 - 6 years	2 (9%)

grant adults?”. Following the question, the primary goal of this specific study was to explore the effectiveness of a culturally immersive VR experience in alleviating the root causes of migrant loneliness, specifically cultural and social disconnection. The study intended to explore whether the VR experience produced emotional improvements among the migrant participants, by improving their cultural identity expression, encouraging self reflection, and creating a sense of presence. Triggers of action-oriented responses beyond the virtual environment was also explored.

3.2 Participants

Inclusion criteria: First generation Sri Lankan migrant adults (18+ aged) living in New Zealand, regardless of their migration category (e.g. international students, work visa holders, residents) were considered for this study. Participants had to self-identify as feeling lonely or culturally disconnected. Participants had to be able to understand instructions in either English or Sinhala. Participants had to express no contraindications for VR usage and should be willing to engage with the experience. This information was communicated through the recruitment document and confirmed through a pre-screening questionnaire. Exclusion criteria: Participants with history of severe motion sickness, neurological or medical conditions incompatible with VR usage were excluded or discouraged of participation. Participants unable to provide informed consent was also excluded. This state was confirmed through the pre-screening questionnaire. To avoid learning or familiarity effects affecting the validity of results, participants who previously completed the pilot study were also excluded.

Participants were recruited by community outreach through community groups and university clubs, social media and online forums related to Sri Lankan communities, word-of-mouth and snowball sampling. Recruitment involved an email, posters displayed on university notice boards and social media posts.

A total of 23 first-generation Sri Lankan migrant adults participated in the study. The demographic data of the participants are shown in Tab. 1.

All participants were based in Wellington - Wairarapa region in New Zealand and all participants’ country of origin was Sri Lanka. Participants’ cultural background and digital experience data before the study is shown in Tab. 2.

Of the 23 transcripts, 15 were 100% English transcripts while 8 were Sinhala transcripts with some amount of English included.

Table 2: Participant Background and Experience Data.

Overall N = 23 (100%)	
Perceived Disconnection from Cultural Roots	
Sometimes	59%
Often	32%
Rarely	9%
Cultural Activity Participation	
Rarely	38%
Sometimes	33%
Never	29%
Gaming Platform Usage	
Mobile Games	71%
PC Games	21%
Console Games	7%
Familiarity with VR	
Slightly Familiar	59%
Not Familiar at all	23%
Moderately Familiar	9%
Very Familiar	9%

3.3 Study Design

This study adopted a within-subjects experimental design to examine whether exposure to a culturally immersive VR environment produces emotional improvements and motivates migrant users toward real-world actions. A within-subjects approach was selected to allow each participant to experience the intervention directly and to compare pre- and post-experience measures within the same individual, thereby reducing inter-participant variability. The study focused specifically on first-generation Sri Lankan migrant adults. This defined as individuals who were born in their home country (Sri Lanka) and have relocated to a new country (New Zealand). All participants were aged 18 years or older. This population was selected due to the strong cultural significance of traditional rituals, festivals, and domestic spaces within the specific ethnic communities, and the known impact of cultural disconnection on migrant wellbeing. Data was collected through self-reported psychometric scales, semi-structured surveys, recorded interaction choices in the VR environment, and natural language responses given by participants while in the VR environment. A mixed-methods descriptive analysis was conducted to capture measurable change and emotional depth. Because the study investigated subjective meaning-making, autobiographical memory, and emotional resonance, qualitative methods were prioritized over purely performance-based metrics.

3.3.1 Psychometric Data

Psychometric data was collected through semi structured questionnaires prior and after the experience. The pre-experience questions collected data related to participant demographics, loneliness levels, belongingness levels, cultural connection and event participation regularity, game and VR experience and familiarity. The post experience questions measured general experience of the application, sensed cultural connection and belonging, reflection levels, impact on loneliness, user experience assessment, technical usability feedback and recommendations. Loneliness levels were measured using UCLA 6 item Loneliness Scale (RULS-6) [25]. General sense of belonging was measured using the 12 item General Belongingness Scale (GBS) [30], and the level of reflection supported by the system was measured using the Technology-Supported Reflection Inventory (TSRI) scale adjusted to 5 items [7]. Cronbach’s alpha value of these scales were considered to have high reliability, consistency and applicability ($\alpha > 0.7$).

3.3.2 Observational Data

During the VR sessions, detailed observational data were collected. This included identifying objects, activities, and spaces in which participants were interested in. The number of interactions and verbal mentions, the time spent on each interaction and storytelling, verbal and facial expressions during interaction, significant interactions performed were observed. This data was captured using transcribed audio and video recordings done during the studies.

3.4 Apparatus and Procedure

An onboarding activity was provided for participants who were unfamiliar or slightly familiar with VR. This contextual tutorial session allowed participants to practise and become comfortable with the core VR interactions in the VR experience. Specifically, participants were guided through essential gestures and actions, including teleporting, grabbing and moving objects, identifying no-teleport zones, and following directional cues. To support this familiarisation process, the default VR template provided by Unreal Engine was used, as it offers a stable and standardised environment for learning basic VR interactions before engaging with the main experience. Participants were then boarded into iBelongVR after they've indicated that they were ready to do so.

Within the virtual environment, participants were asked to freely roam and do what is comfortable for them. Objects were randomly placed in the virtual living room, encouraging participants to arrange the premises. Participants had the freedom to interact with objects and spaces and perform activities that conveyed day to day living styles and Sri Lankan New Year symbolism. They were encouraged to respond to reflective prompts that popped up when some of the virtual objects were grabbed. Participants also had the freedom to perform traditional games and familiar rituals when and if they felt comfortable.

The experience encouraged free exploration, and participants were allowed to engage with the environment at their own pace. A think-aloud method was encouraged throughout the experience, enabling participants to verbally express thoughts, emotions, and memories as they interacted in the VR space. Meta Quest 2 head-mounted display (HMD) was used for the VR experience in the study.

3.4.1 Qualitative Analysis Procedure

Qualitative data was analysed using reflexive thematic analysis [11]. Audio recordings and think-aloud responses were transcribed and imported into NVivo 14 qualitative data analysis (QDA) software. Given the bilingual nature of the dataset, English and Sinhala transcripts were initially analysed separately to preserve cultural and linguistic nuances. Sinhala transcripts were initially coded in the original language to preserve culturally specific meanings and expressions. Theme development was conducted independently within each language dataset before cross-comparison. Representative excerpts selected for reporting were translated into English by the researcher while maintaining contextual meaning and cultural intent. As a first-generation migrant from Sri Lanka, the researcher possessed contextual knowledge that supported interpretation of culturally specific references and practices. An inductive coding approach was adopted. Initial open coding was performed across all transcripts to identify recurring concepts. Codes were iteratively reviewed and grouped into candidate themes. Themes were subsequently refined through multiple rounds of comparison across participants and between the two language datasets. The final themes were developed through repeated examination of coded excerpts, ensuring that each theme captured a coherent pattern of meaning while remaining grounded in participant narratives. Analysis continued until recurring patterns were consistently observed across participants and no new conceptual categories emerged dur-

Table 3: Thematic Framework Table.

Raw Data (Verbatim)	Code/Category	Theme
"Reminds me of New Year"	Cultural Familiarity	Cultural Experience and Meaning Making
"I should start crafting again"	Future Oriented Reflection	Psychological, emotional and Reflective Impact
"Would like to show this to people from other countries"	Identity Preservation	Cultural Experience and Meaning Making

ing later coding stages. Tab. 3 explains how participant verbatim responses and observations informed to create codes and then themes.

3.5 Ethics and Anonymity

Human Ethics clearance was obtained through the university's Ethics Committee. Information sheets were shared with and consent was obtained from participants before study session commenced. Pre-screening questionnaire data and psychometric data input by participants were directly stored online using the university's Qualtrics Experience Management (XM) platform.

4 FINDINGS

4.1 Quantitative Findings

Prior to the experience, the RUSL-6 scale results indicated moderate to high levels of loneliness among participants with average score of 18.91 (SD = 2.25) out of range 6 - 24. The GBS scale results indicated participants having a moderate level of belonging leaning slightly towards the lower end of the spectrum with average belongingness score of 52.3 (SD = 10.46) out of range 12-84. There were 6 participants showing an elevated perceived social exclusion where their Acceptance/Inclusion level was lower than Rejection/Exclusion level. Each participant spent an average time of 28.6 minutes experiencing iBelongVR. There was no strong relationship between time spent and loneliness or acceptance/rejection level of a participant. Post to the experience, the TSRI 5 item scale indicated high levels of reflection supported by the system toward participants, with an average score of 29 (SD = 3.62) out of range 5 - 35. Responses show a strong tendency to agree with items (4) and (5) which are related to cultural exploration and gaining an overview of personal emotions related to missing culture. Responses also show a moderate tendency towards agreement to items (1) and (3) which are related to the system leading to a wake up call and ideas to overcome cultural disconnection and loneliness (See Fig. 4). Participants expressed a high sense of connection to their home culture after the experience with average level of 4.3 out of range 1 - 5 (see Fig. 5).

4.2 Qualitative Findings

Qualitative data analysis results revealed that both theme sets derived from Sinhala and English language transcripts could be merged into five main themes. However, some subthemes were significantly formed with relation to transcripts of one specific language.

4.2.1 Identified Themes

1. Cultural experience and meaning making.
2. Psychological, emotional and reflective impact.
3. Presence, immersion, and realism in VR.
4. Practical value – substitution and accessibility.
5. Constraints and future development.

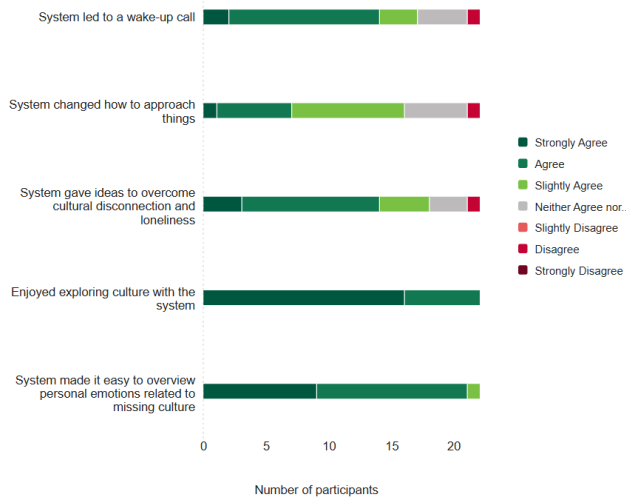


Figure 4: Responses to reflective and cultural experience statements through TSRI

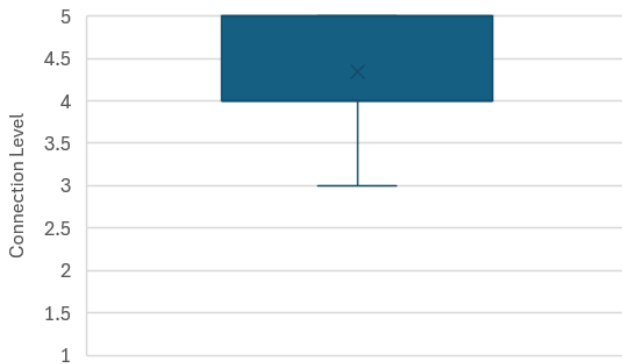


Figure 5: Participants expressing sense of connection to their home culture after the experience

Cultural experience and meaning making: This theme signifies how participants recognized, engaged with, and interpreted culturally familiar elements within the VR environment, allowing them to construct personal and shared meanings related to identity and cultural belonging. Three sub-themes were identified as (1) Cultural Familiarity and Recognition, (2) Cultural Engagement and Embodied Interaction, and (3) Identity Preservation, Social Connection, and Intercultural Exchange. Cultural Familiarity and Recognition captured how participants recognized and expressed familiarity with culturally meaningful objects, activities, and spaces within the environment. Strong familiarity was shown towards objects from the home country, particularly food items, kitchen utensils, and entertainment elements. Notably, outdoor foods, which are rarely encountered in the host country, elicited a heightened interest (e.g. King Coconuts, Jackfruit). Kitchen items such as the hearth, clay pots, and food covers were frequently recognized, alongside firecrackers, certain flora, and oil lamps. Notably, these items were not part of participants' everyday lifestyles in the host country, but had been regularly used in their daily lives when living in their home country. Participants also expressed familiarity towards cultural symbols and practices, where 48% of them mentioned that lighting fire crackers being the aspect of the experience they enjoyed the most and 35% mentioned that doing so increased their cultural connectedness and belonging.

"It felt like the Awurudu season is here because of the objects that were around. Felt closer to home."-P8.

Environmental sounds and music emerged significantly across 91% (21 out of 23) participants. Particularly a distinctive sound commonly heard everyday in Sri Lanka (e.g. 14 positive mentions of *Choon Pan* vendor sound) and a characteristic bird call traditionally associated with the festive season (e.g. 3 positive mentions of *koha bird* sound) were mentioned the most.

"The best part is the music and sounds."-P23.

Familiarity extended to the village-home setting and household architecture, with participants describing the space as distinctly depicting their home country.

"Also, the trees in the garden along with king coconuts felt like I'm in a village home garden."-P6.

The subtheme Cultural Engagement and Embodied Interaction reflected active, embodied participation, primarily observed during interaction. Participants frequently engaged in guided interactions. It was specifically noted that interactions driven by perceptual affordances, environmental cues, and physics-based hints were favoured over in-game UI panels. Responses towards reflective prompts varied, with participants answering verbally, mentally, both, or selectively. Intuitive, unguided interactions were also prominent where plucking, piling, stacking and arranging objects were observed repeatedly. Observations included ritualised gestures such as prayer gestures after lighting the oil lamp. When participant navigation pathways were observed, it was highlighted that the living room, kitchen and outer left yard acted as central activity hubs and the backyard of the home setup acted as a reflective exploration place. It was significant that even though the backyard did not offer any interactive elements, 30% of the participants described it as the most meaningful place in the experience. It was also observed that some participants took their time exploring outdoor surroundings, specifically staring at the back yard for a significant time.

"This backyard looks so much like my home country. I think this is the best place. So calm and mind refreshing"-P23.

The subtheme Identity Preservation, Social Connection, and Intercultural Exchange highlighted the role of the VR experience as a social and intercultural bridge with 91% of participant expressions.

"I think other migrants might feeling the same distance we feel in a different country and this could bring closeness to their culture"-P5.

Participants noted intergenerational value, suggesting the experience could support second-generation migrants and children of first-generation migrants. Social aspirations and cultural sharing with people from other cultures were prominent among 48% of participants.

"Sharing a plate would be interesting, specially to see their faces when eating with spicy lunumiris. Have to try next time"-P20.

"I enjoy drawing. Maybe I can start drawing traditional art. Then I can share and talk with other people who like our type of art"-P20.

22% of participants also highlighted cross-cultural exchange, viewing the experience as an effective way to represent own culture to others.

"I think this can be given to people from other countries as well... many people think Sri Lanka is a part of another country and they think the cultures in both countries are exactly the same"-P21.

Psychological, emotional and reflective impact: Two sub-themes were identified as (1) Emotional and Psychological Responses and (2) Nostalgia, Memory, and Personal Reflection. Emotional and Psychological Responses captured the immediate affective impact of the VR experience. 67% of the emotions were predominantly positive or signified cultural connection. Next to happiness and joy, a strong sense of fulfilment emerged as the most prominent emotional response among 26% of participants. This

sense was associated with feelings of pride, calmness, pleasantness, and accomplishment. Expressive utterances conveying positive emotion rather than information were frequently observed among participants. It was notable that these utterances were expressed in Sinhala language, which is their mother tongue, repeatedly during interaction. Participants enthusiastically engaged in experiences that felt unattainable in real life (e.g. lighting firecrackers), which, when performed in VR, enhanced their sense of accomplishment.

"This is something I can never do in real life. So I am lighting them all"-P21.

Cultural connection played a key role in these responses, with participants noting that the experience allowed them to reconnect with culture and feel satisfaction and pride. 35% of participants reported that the experience reminded them of cultural practices they had forgotten and created an urge to re-engage in cultural activities.

"I used to do traditional crafting in my home country. Maybe I should start something like that here again"-P1.

"After migrating, a huge cultural distance is created. By these kind of experiences, migrants can easily experience their culture and create a sense of satisfaction and pride"-P20.

Although less frequent, negative and mixed emotions were also expressed. These included feelings of loss related with sense of missing and sadness particularly when encountering familiar objects.

"I miss the warm beds. Beds are cold here"-P14.

Others expressed feelings of loneliness due to unavailability of other people in the environment or discomfort when the experience ended.

"After removing the VR, I was so upset because I felt that I came back away from my culture"-P11.

"Interacting with them made me happy and sad at the same time because I cannot have them in real life"-P2.

Initial uncertainty or nervousness was observed among few participants when some objects in the VR environment differed from their real-life memories and some activities were not used to be performed by the participant alone before. However, these feelings often transitioned into confidence and happiness during interactions, culminating in a sense of accomplishment. Overall, 78% of participants reported wellbeing-related effects, describing the experience as a "wake-up call" in their busy lives, a way to refresh the mind, reduce stress and anxiety, reconnect with forgotten culture, and overcome self-doubt while living in the host country. This was mainly influenced by answering the prompts.

"I avoid making Kiribath here [host country] due to differences in ingredients and taste, but this experience today made me want to try cooking it here"-P5.

"This will be helpful to reduce their anxiety and stress after a days of work by being in the place they love and feel the sense of belonging again"-P9.

The subtheme Nostalgia, Memory, and Personal Reflection represented the experience's role in triggering autobiographical memory and reflective meaning-making. 75% of participants frequently recalled childhood and family memories, particularly around celebrating their New Year. Reminiscence was strongly tied to the New Year season, with all participants describing festive vibes at home, and collective family experiences. Memories related to traditional cooking was prominent. Participants most frequently expressed feelings of nostalgia when speaking in the Sinhala language. Participants connected visuals in VR environment with festive preparations and habits back home.

"House looks newly painted and colour washed, which reminds of the typical preparations done before New Year"-P5.

Storytelling emerged as a dominant mode of expression, with 57% participants revealing personal characteristics, family rituals and habits, lived experiences related to cultural discontinuity due to migration. Observations indicated that specific objects often

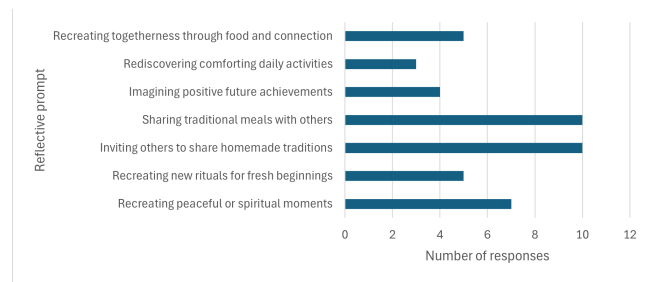


Figure 6: Prompt response number by participants

triggered storytelling. Participants significantly engaged in self-reflection, expressing intentions for real-world action. Restarting cultural practices, resuming art and crafting, continuing rituals, recreating comfortable atmospheres at home, sharing food and culture, planting herbs, and preparing for future celebrations were dominant. This was mainly influenced by answering prompts. Participants responded most actively to prompts that encouraged reflecting on past cultural practices and consider possibilities for recreating or sharing those traditions with others in their current environment (See Fig. 6).

"Sharing food. Doesn't have to be too traditional. I think the way of preparing the same dish in a different manner adds a different flavour and perspective"-P3.

Presence, immersion, and realism in VR: This theme reflects the strength of the immersive experience. Three sub-themes were identified as (1) Sense of Presence, (2) Sensory Illusion, and (3) Engagement Quality. 100% of the participants mentioned the sense of Presence captured their feelings of being physically and emotionally present within the virtual environment. Participants frequently described the experience as realistic, often performing culturally meaningful gestures without explicit instruction.

"The household and all the stuff in it were very realistic to me."-P5.

"I felt like I went back to my home country in April to attend our the festival."-P19.

Observational data further supported these perceptions, with participants spontaneously performing prayer gestures after lighting the oil lamp and physically kicking a fallen coconut, indicating a strong embodied sense of presence. Sensory Illusion reflected participants' multisensory engagement with the environment. Participants reported experiencing imagined sensory responses, such as smell and taste, triggered by familiar objects.

"I can feel the smell and taste when I see Waraka (Jackfruit). I love Waraka."-P5.

Some described affective responses to the environment.

"The atmosphere was very warm"-P4. "Sometimes just listening to the environmental sounds and music increased warm feelings."-P20.

Traditional games and activities were described as interesting, realistic, easy to perform, and enjoyable.

Practical value – substitution and accessibility: Participants highlighted the role of the VR experience as an alternative access tool. Two subthemes identified as (1) Replacement for Physical Travel and (2) Accessibility Benefits. 53% of participants viewed the VR experience as a substitute for physically travelling to their home country, particularly for cultural engagement. Participants noted that the environment enabled them to experience their own culture remotely, which was especially valuable given the financial and logistical barriers to frequent travel. This was seen as particularly relevant for students migrated from the specific country, who often miss cultural events due to the high cost of travel.

"This can make them feel less lonely and help to bring back happy memories."-P14.

Accessibility Benefits captured how the experience provided access to culturally meaningful elements that are difficult to find in the host country. Participants expressed that the VR environment could serve as a substitute for missing cultural arrangements, spaces, and activities, enabling engagement with familiar cultural elements that are otherwise inaccessible in their everyday lives.

Constraints and future development: Two sub-themes were identified under this theme as (1) Technology Use and Usability Challenges and (2) Design Expectations. Technology Use and Usability Challenges represent the limitations and usability constraints identified by participants. Although issues were minimal, some participants reported minor technical glitches, teleporting difficulties, lag, or briefly seeing outside environment boundaries. These issues were often attributed to participants' unfamiliarity with VR rather than the system itself and were generally reported as not significantly affecting the overall experience. Participants also noted design-related limitations, such as certain objects appearing unfamiliar and some aspects of the environment not fully aligning with the village-home concept. Design Expectations reflect participants' suggestions for future development and user-driven design evolution. A strong desire was expressed towards connecting other people, particularly fellow people from same ethnicities or family members. Participants suggested activities, highlighting shared-user experiences that enable engagement toward a common goal. Enhancements to VR environment through the inclusion of non-player characters such as animals and children, more environmental sounds and songs, native-language conversations, and additional games was also suggested. Participants also highlighted the importance of acknowledging intra-cultural diversity, noting that while the current environment reflected a village home, some users may feel more connected to urban settings. Further suggestions included incorporating religiously diverse spaces and adapting the experience to different ethnic and cultural contexts.

5 DISCUSSION

Key findings from both quantitative and qualitative analyses demonstrate that culturally immersive VR experiences can evoke strong emotional, reflective, and identity-based responses among first-generation migrant adults from a specific ethnic group. Rather than positioning VR solely as a medium for entertainment or simulation, this work illustrates its potential as a culturally situated medium that supports autobiographical reflection, emotional resonance, and a sense of cultural continuity. Importantly, our findings suggest that the effectiveness of such experiences is influenced not only by immersive technology itself but also by the careful integration of culturally familiar environmental cues, everyday interactions, and opportunities for personal reflection. From an XR perspective, the proposed design guidelines extend beyond this specific application by offering practical principles for designing culturally meaningful immersive experiences. Existing VR design often prioritises visual fidelity, interaction techniques, or task performance. However, our findings indicate that cultural authenticity, multisensory familiarity, and personally meaningful interactions are equally important in shaping presence and emotional engagement. Participants consistently responded not only to recognisable objects and spaces, but also to culturally significant sounds, rituals, and activities that triggered autobiographical memories and encouraged reflection on identity and belonging. This suggests that presence in culturally situated XR emerges through meaningful contextual familiarity rather than graphical realism alone.

The proposed design guidelines therefore contribute to the broader XR community by providing a framework for designing immersive environments that intentionally incorporate cultural context as a core design dimension. Rather than treating culture as

decorative content, the guidelines encourage designers to consider how culturally familiar spaces, multisensory cues, symbolic interactions, and reflective prompts can be combined to support emotionally engaging and personally meaningful experiences. While this study focused on Sri Lankan migrants, the underlying design principles are transferable to other cultural communities and may inform future applications in migrant wellbeing, cultural heritage, education, social VR, and therapeutic XR.

6 LIMITATIONS

When conducting qualitative analysis, although themes were reviewed iteratively, coding was primarily conducted by a single researcher. Therefore, interpretations should be understood as reflexive and contextually situated rather than objective representations of participant experience. It should also be noted that the study lacked a control condition and had a modest sample size, limiting causal claims. Outcomes were short-term and measured immediately post-session. Given the subjectivity of culture and loneliness towards specific community groups/people, the intent was to deeply investigate into culturally situated immersive experiences within a specific migrant context. Therefore this study is exploratory, phenomenological and community specific.

7 DESIGN IMPLICATIONS / RECOMMENDATIONS

The findings of this study have several implications for immersive technology design practice, HCI and VR research, and policy development related to migrant wellbeing, cultural continuity, and digital inclusion. From a design and deployment perspective, the results suggest that culturally grounded VR experiences can function not merely as entertainment systems, but as reflective environments that support identity preservation, emotional regulation, and intercultural dialogue among migrant adult communities.

Implications for VR Design Practice: Findings demonstrate that cultural familiarity is a powerful driver of presence, identity construction, meaning-making, and emotional impact specifically for migrant adult communities. Recognition of culturally specific objects (e.g. food, kitchen items, firecrackers, oil lamps), environmental sounds, and spatial layouts triggered strong affective and autobiographical responses. Importantly, immersion was not solely dependent on high interactivity or task density; rather, the authenticity and recognizability of culturally meaningful cues played a central role. This suggests that designers of culturally oriented VR systems should prioritize contextual authenticity, symbolic accuracy, and sensory cues over excessive gamification.

The findings highlight that storytelling narratives functioned as reflective tools rather than objective descriptions. Participants' recollections of childhood, New Year rituals, migration journeys, and habitual family practices were not simple reports of memory but active processes of meaning reconstruction. This indicates that VR environments can be intentionally designed as memory-evoking spaces, where environmental triggers (objects, sounds, spatial arrangements and activities) facilitate autobiographical reflection. Designing for narrative emergence—rather than scripted storytelling—may be especially valuable in migrant-focused wellbeing applications.

The findings also challenge the assumption that more interaction equals better engagement. Although participants enjoyed embodied activities (e.g. engaging in traditional rituals and games), some of the most meaningful moments occurred in calm spaces such as the backyard of the house, where participants paused, explored slowly, and reflected. Observations of prolonged gazing and spontaneous comments such as feeling reminded of "*evenings back home*" suggest that calm, low-stimulation spaces support emotional grounding. Loading users with continuous activities is not always the solution; providing contemplative environments enables users to momentarily step out of the "chaotic" pace of migrant life and

attend to internal reflection. This has important implications for wellbeing-oriented VR design depicting restorative presence may be as important as active engagement.

Reflective prompts played a critical role. Participants who engaged with guided questions demonstrated deeper introspection, future-oriented thinking, and motivation for real-world cultural action (e.g. restarting traditional crafting, cooking, planting herbs, preparing for future celebrations). Prompts appeared to help users open their minds and reframe their experiences positively. This suggests that light-touch reflective scaffolding, embedded within immersive environments, can enhance psychological benefits without disrupting presence.

Findings on perceptual affordances reveal that participants were more likely to engage with interactions suggested through environmental cues and physics-based hints rather than through explicit UI panels. This reinforces HCI principles that embodied affordances and environmental storytelling are more intuitive and culturally resonant than instructional overlays, particularly for users with limited VR familiarity.

Implications for VR and Migration Research: From a research perspective, the findings contribute to growing work on VR as a tool for social connection and cultural preservation. The strong emotional responses—ranging from sense of accomplishment and pride to nostalgia and mixed feelings of loss—demonstrate that immersive cultural experiences can operate as emotionally complex spaces, not merely positive-distraction tools.

The emergence of expressive Sinhala utterances (e.g. spontaneous affective exclamations) suggests that when participants became emotionally engaged, they felt comfortable expressing themselves naturally within the VR environment. Future research should examine how native-language processing within VR influences affective intensity and identity affirmation.

The findings also suggest that VR may function as a substitutional cultural bridge, particularly for migrants unable to travel due to financial or logistical constraints. While VR cannot replace physical travel or community gatherings, participants framed it as an accessible alternative that reduces feelings of disconnection. This opens research pathways into VR as a complementary tool for diasporic wellbeing, rather than a replacement for real world community.

Importantly, the study demonstrates that immersive environments can stimulate future-oriented behavioural intentions, such as restarting cultural practices or sharing traditions with people from other cultures. This suggests that VR may serve as a catalyst for offline cultural engagement. This is a finding that creates a requirement for longitudinal investigation.

Implications for Policy and Community Wellbeing: At a policy level, these findings indicate that culturally grounded VR systems could support migrant wellbeing initiatives, especially in countries with significant diasporic populations. Institutions supporting migrant integration may consider immersive cultural technologies as preventative mental wellbeing tools, particularly during culturally significant seasons when homesickness may intensify. This is a finding that creates a requirement for an investigation within specific festive seasons.

Participants identified VR as beneficial for those unable to travel or access cultural resources. Supporting community-based VR access (e.g. through libraries, universities, high commissions and cultural centres) could help democratize cultural reconnection.

However, policy frameworks must also account for intra-cultural diversity. Participants highlighted rural–urban variation, religious and ethnic diversity within the country’s identity. Future development and funding should avoid homogenizing culture and instead support modular, pluralistic representations.

8 CONCLUSION AND FUTURE WORK

The current user study evaluated the immediate experiential impact of a culturally immersive VR environment, focusing on emotional engagement, autobiographical reflection, identity construction, cultural connectedness, and user perceptions of the experience. The findings indicate short-term reflective, affective, and culturally connective impacts, rather than demonstrating causal reductions in loneliness. Accordingly, this work should be viewed as foundational exploratory evidence that informs the design of future culturally situated XR interventions. Given the exploratory nature of the study and the absence of a control condition, causal effects cannot be isolated from factors such as immersion novelty or general VR engagement.

The insights gained from this evaluation will directly inform the development of Stage 2 of the prototype, iBelongVR, which will integrate Social VR capabilities to support multi-user interaction. This will enable collaborative cultural rituals, shared activities, and real-time social connection within the virtual environment. Future evaluations will investigate whether these socially interactive and culturally contextualised experiences can contribute to sustained emotional wellbeing, perceived belonging, and social connectedness. Long-term wellbeing outcomes, including loneliness reduction, are therefore framed as hypotheses for future investigation.

Future work should adopt more rigorous experimental methodologies to strengthen causal interpretation. Comparative studies evaluating culturally tailored VR against alternatives such as 360° video, non-tailored VR environments, and conventional experiences will help disentangle the contribution of cultural tailoring from the effects of immersion itself. Furthermore, the current prototype intentionally employed a minimal avatar representation to prioritise environmental interaction. Future iterations should systematically investigate the influence of embodiment, body ownership, and culturally representative avatar design on presence, emotional engagement, identity expression, and overall wellbeing outcomes.

This study intentionally focused on participants’ immediate responses following a single immersive experience. We plan to conduct longitudinal studies during culturally significant periods, such as the Sri Lankan New Year, enabling investigation of how sustained engagement with culturally familiar virtual environments influences emotional wellbeing, social integration, and cultural connectedness over time. These studies will incorporate follow-up surveys and interviews, repeated wellbeing measures, and assessments of social participation to better understand sustained individual and community impacts.

Finally, this work should be interpreted within its intended scope. The study was designed as an in-depth qualitative investigation of culturally situated immersive experiences among first-generation Sri Lankan migrants in New Zealand, rather than a statistically generalisable evaluation across all migrant communities. Given the subjective and culturally specific nature of loneliness and cultural identity, focusing on a single community enabled a richer understanding of lived experiences and culturally grounded design considerations. We acknowledge the modest sample size as a limitation. However, our participant cohort ($N = 23$) exceeds the median sample size commonly reported in CHI user studies. We therefore view the findings as providing transferable design insights for culturally situated XR experiences while recognising that broader validation across diverse cultural groups remains an important direction for future research.

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