Caritas et veritas

Virtual Reality as a Possible Means to Meet the Psycho-spiritual Needs of Older Adults in Nursing Homes*

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Abstract
This article presents how virtual reality can contribute to meeting the needs of residents in nursing homes. As part of the VIREAS project, we conducted a qualitative study in January 2021 in a South Bohemian nursing home. The research sample consisted of 12 residents aged 63 to 100 with different cognitive and sensory-motor levels. Our results show that a properly designed virtual experience can support the fulfilment of self-esteem and value, meaning and continuity of life story, the need to be part of a community, and the need to transcend everyday life. To meet these needs, several factors are important: high-quality content; user-friendly form; proper time for the virtual experience; sufficiently educated activity workers; appropriate communication with older persons before, during, and after the virtual experience; and the opportunity to share their virtual experience with others. We also define some factors that may limit the use of this method in nursing homes.

Keywords:
Virtual reality, Nursing homes, Older adults, Activity workers, Needs, Technology

Introduction

Use of virtual reality (VR) applications has grown during the last decade and they have become almost standard tools in many areas. They have moved from the gaming industry to real-life applications in industry, education, health, and social care. In recent years, many virtual reality (VR) applications have been developed directly for older adults. The use of VR to improve the quality of life in old age is the focus of a number of projects, for example, Rendever, Aged Care Virtual Reality, Adventures with VR, Kaleido, or Virtual Reality in Keeping the Elderly Active (VIREAS). These projects use VR as a tool to help older adults reduce the sense of isolation from the outside world, avoid depressive states, or stimulate their mental and physical activity. The importance of using new technologies for these purposes increased during the COVID-19

pandemic and the related increased loneliness of older adults, especially those in long-term care.[1] The benefits of using VR in keeping older adults active stem from the key features of this technology: immersiveness (the user feels almost physically present in the virtual world) and interactivity (the user can actively influence the storyline). In addition, connecting a headset to a computer or tablet allows an individual (e.g., an activity worker) to track and accompany the user in VR. When considering the suitability of this method in keeping older adults active, we can rely on the conclusions of current studies with older adults. Schiza et al.[2] presented an overview of VR applications in neurorehabilitation which reported a positive influence of VR use on cognitive stimulation. Studies focused on cognition demonstrated a positive effect from motor training in VR in improving cognitive functions.[3] Saredakis et al.[4] show a positive effect of VR reminiscence therapy on phonemic and semantic fluency, decreasing level of apathy, and other mood changes. Studies focused on the use of VR in therapy show the great potential of this method in the prevention of mental disorders or the reduction of negative emotional state or pain.[5] Appel et al.[6] and similar other studies[7] presented that VR can positively affect emotional state and the feeling of satisfaction, and reduce feelings of social isolation and depression.

Despite the mentioned benefits, there are possible risks or limits associated with the use of VR by older users. Longer stays in a virtual environment might cause feelings of nausea or dizziness.[8] A lack of time to adapt to the way of controlling movement or a too complicated way of control in VR might be a source of discomfort or embarrassment.[9]

Researchers basically agree that nature sceneries or travel are the areas and topics that older adults prefer during their time in virtual reality.[10] To some extent, VR can replace experiences that older

1 Chelsea B. Smith et al., 'Exploring experiences of loneliness among Canadian long-term care residents during the COVID-19 pandemic: A qualitative study', *International Journal of Older People Nursing* 18, no. 1 (2022), https://doi.org/10.1111/opn.12509; Avelie Stuart et al., 'Loneliness in older people and COVID-19: Applying the social identity approach to digital intervention design', *Computers in Human Behavior Reports*, no. 6 (2022), https://doi.org/10.1016/j.chbr.2022.100179.

2 Eirini Schiza et al., 'Virtual Reality Applications for Neurological Disease: A Review', *Frontiers in robotics and AI*, no. 6 (2019), https://doi.org/10.3389/frobt.2019.00100.

3 Lars Donath, Ronald Rössler, and Oliver Faude, 'Effects of Virtual Reality Training (Exergaming) Compared to Alternative Exercise Training and Passive Control on Standing Balance and Functional Mobility in Healthy Community-Dwelling Seniors: A Meta-Analytical Review', *Sports Medicine* 46, no. 9 (2016): 1293-1309, https://doi.org/10.1007/s40279-016-0485-1; Eggenberger Patrick et al., 'Does multicomponent physical exercise with simultaneous cognitive training boost cognitive performance in older adults? A 6-month randomized controlled trial with a 1-year follow-up', *Clinical interventions in aging,* no. 10 (2015): 1335-1349, https://doi.org/10.2147/CIA.S87732.

4 Dimitrios Saredakis et al., 'Using Virtual Reality to Improve Apathy in Residential Aged Care: Mixed Methods Study', *Journal of Medical Internet Research* 22, no. 6 (2020): e17632, https://doi.org/10.2196/17632; Dimitrios Saredakis et al., 'The Effect of Reminiscence Therapy Using Virtual Reality on Apathy in Residential Aged Care: Multisite Nonrandomized Controlled Trial', *Journal of Medical Internet Research* 23, no. 9 (2021): e29210, https://doi.org/10.2196/29210.

5 For example, Steven Baker et al., 'Exploring the Design of Social VR Experiences with Older Adults', *Proceedings of the 2019 on Designing Interactive Systems Conference*, (2019), https://doi.org/10.1145/3322276.3322361; Meneses Fernández et al., 'Using Communication and Visualization Technologies with Senior Citizens to Facilitate Cultural Access and Self-Improvement', *Computers in Human Behavior*, (2017): 329–44, https://doi.org/10.1016/j.chb.2016.10.001.

6 Lora Appel et al., 'Older Adults With Cognitive and/or Physical Impairments Can Benefit From Immersive Virtual Reality Experiences: A Feasibility Study', *Frontiers in Medicine*, no. 6 (2020), https://doi.org/10.3389/fmed.2019.00329.

7 Li Na Lee, Mi Jeong Kim, and Won Ju Hwang, 'Potential of Augmented Reality and Virtual Reality Technologies to Promote Wellbeing in Older Adults', *Applied Sciences* 9, no. 17 (2019): 3556, https://doi.org/10.3390/app9173556; Charles X. Lin et al., 'Impact of Virtual Reality (VR) Experience on Older Adults' Well-Being', *Human Aspects of IT for the Aged Population. Applications in Health, Assistance, and Entertainment*, (2018): 89-100, https://doi.org/10.1007/978-3-319-92037-5_8; Amy R. Roberts et al., 'Older Adults' Experiences with Audiovisual Virtual Reality: Perceived Usefulness and Other Factors Influencing Technology Acceptance', *Clinical Gerontologist* 42, no. 1 (2018): 27-33, https://doi.org/10.1080/07317115.2018.1442380.

8 Andrej Somrak et al., 'Estimating VR Sickness and user experience using different HMD technologies: An evaluation study', *Future Generations Computer Systems*, no. 94 (2019): 302-316, https://doi.org/10.1016/j.future.2018.11.041.

9 Věra Suchomelová, Lenka Lhotská, and Jan Husák, 'Virtual reality as a tool for keeping the elderly active', *Ageing 2021: Proceedings of the 5th Gerontological Interdisciplinary Conference,* (2021): 160-167, https://www.konferencestarnuti.cz/files/Starnuti_2021_sbornik.pdf.

10 For example, Baker et al., 'Exploring the design'; Věra Suchomelová and Karolína Diallo, 'Virtuální realita jako způsob aktivizace v domovech pro seniory', *Geriatrie a Gerontologie* 8, no. 3. (2019): 5–18.

adults lack in real life. In a study among North German nursing homes, Erichsen and Büssing[11] found the need to 'immerse oneself again in the beauty of nature' to be the strongest spiritual need of residents. Lifshitz[12] mentions a potential of an immersive VR as a space to gain spiritual experience, for example, by immersing oneself in the beauty of nature in VR.

With this in mind, we can consider the potential of VR to support some psycho-spiritual needs of older adults, involving topics such as dignity, the meaning of life, gratitude, relationships, and transcendence.[13]

These considerations formed the basis of the Virtual Reality in Keeping the Elderly Active (VIREAS) project, within which the following qualitative study was carried out. The aims of the project were the development of VR software, respecting the specifics and psycho-spiritual needs of older adults, and a conceptual manual instructing activity workers (staff coordinating and providing the activities) on how to work with VR meaningfully.

In the following qualitative study, we address three key research questions: what psycho-spiritual needs of residents can be met through a virtual experience, in what ways, and what aspects of the VR session are essential for meeting those needs.

Material and Methods

The qualitative study was carried out as a part of testing the pre-final version of the software in January 2021. To introduce the readers to the methodological context of this qualitative study, we briefly summarise the conclusions of the previous research phases of the VIREAS project.

In the first phase (March to May 2019), based on a survey among 140 nursing home clients, we defined the three most suitable areas for further development: 'Forest', 'Travel', and 'City Centre'. The content, form, and degree of interactivity were continuously improved on the basis of user testing in a nursing home. Also, activity workers (AW) tested the VR experiences themselves and proposed modifications. In the pilot study (September 2020) we defined three factors increasing the attractiveness of the virtual experience: the realistic depiction of the scene, elements of life and movement in the scene, and an easy way of controlling the movement in VR.[14] Based on those findings, the version of the set of virtual experiences for the qualitative study was completed. Table 1 characterises this version.

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11 Nora-Beata Erichsen and Arndt Büssing, 'Spiritual Needs of Elderly Living in Residential/Nursing Homes', *Evidence-Based Complementary and Alternative Medicine*, (2013): 1-10, https://doi.org/10.1155/2013/913247.

12 Michael Lifshitz, Michiel van Elk and T.M Luhrmann, 'Absorption and Spiritual Experience: A Review of Evidence and Potential Mechanisms', *Consciousness and Cognition*, (2019), https://doi.org/10.1016/j.concog.2019.05.008.

13 Arndt Büssing, 'Spiritual Needs Questionnaire', (2009), https://www.spiritualneeds.net; Harold G. Koenig, *Aging and God: Spiritual Pathways to Mental Health in Midlife and Later Years*, (New York: Haworth Pastoral Press, 1994); Věra Suchomelová, 'Senioři a spiritualita: duchovní potřeby v každodenním životě', *Cesta domů*, (2016).

14 Suchomelová, Lhotská, and Husák, 'Virtual reality as a tool', 160-167.

Table 1

The set of virtual experiences, January 2021

	Scene characteristics	Elements of interactivity	Elements of reality	Elements of movement	Elements of surprise
Walk through the Forest	A walk through a typical central European forest; fully animated scene; free movement in selected sections	Free movement around the scene with signposts allowing users to choose the shortcut within the walk	Typical fauna and flora; realistic sounds	Flying birds, running water; floating fish; a swarming anthill	Foreign objects in the scene (a palm tree among pine trees, a statue)
Walk through the City Centre	A walk through the centre of Prague or České Budějovice; a scene composed of 360° images	Signposts for moving to other scenes; possibility to enter selected objects	360° images depicting reality; realistic sounds	People (waving children), a shopping centre with people; means of transport and a train station	Unusual locations (the town hall roof, nooks, passage-ways)
Travel	Trips around Czechia and Europe; the scene contains an animated part (train station), which acts as a signpost; thematically arranged 360° image galleries	Choice of destination from the timetable; free movement around the object	A train station (flowers in boxes, benches); 360° images capturing reality; realistic sounds	Sound of a train horn; people in 360° images	Attractive locations

Sample

The research sample consisted of 12 older adults (8 women and 4 men) aged 63 to 100 from a nursing home in South Bohemia (Czechia). Participants were selected by the local AW according to the following criteria: an expressed interest in trying VR (as something new), an absence of severe cognitive or sensory impairment and disorder, and a proportional representation of men and women in the group including both fully mobile residents and those with mobility issues (crutches, wheelchair). To obtain a picture of the participants' health status, the AW, together with the participants, completed the *Preselection of Suitable Subjects Questionnaire* before testing.

This sample was a compromise between the original research intention and the real possibilities when the nursing home was inaccessible due to COVID-19 pandemic restrictions. Originally, we intended to include 24 residents without significant cognitive or sensory impairments and with VR experience from previous tests. However, due to restrictions, the break between testing was longer than we expected, and some of the selected persons had died or were unable to participate for other reasons. The nursing home management allowed us to test only one group of participants instead of the planned two. Therefore, the final research sample consisted of fewer

participants, and included seniors both inexperienced with VR and those who had been previously tested. Finally, two of the originally selected participants became ill on the day of testing and were replaced by two women with early-stage dementia. In consideration of studies mentioning the tolerance of VR by elderly people with mild cognitive impairment, we decided to include these people in the sample.[15] Also, the assessing of the particular residents' situation by the AW, who knew their history well, was crucial for us.

The research team paid close attention to the ethical aspects of study. The study design was assessed and approved by the University of South Bohemia Institutional Review Board. All participants were briefed about the research and its aims and their roles during testing. They clearly expressed their consent to participate in the study and agreed to the use of audio-visual recordings for the purpose of the research and its promotion and confirmed their consent by signing. They were informed that they could withdraw their consent at any time during testing.

The testing was carried out in rooms that the participants knew well and were comfortable with. The researchers paid close attention to physical or other manifestations that would signal participants' discomfort, and were ready to reduce it by taking immediate action including stopping the experiment. They paid special attention to the participants with balance system or cognitive disorder. All testing was done seated according to the participant's preference (in a wheelchair or swivel chair).

Finally, the testing was conceived both as a 'collaboration of residents on research' and as a pleasant activity supporting participants' self-confidence and dignity, which they enjoyed. The researchers emphasised the expression of respect and interest in the life stories of the participants during testing. Table 2 characterises the anonymised research sample in terms of factors with a possible impact on user comfort and experience.

Table 2

Research sample of the qualitative study, January 2021

Pseudonym Age	Experience Experience with VR Yes/No	Mobility	Health condition according to the Preselection of Selected Subjects Questionnaire (potential risks)
Bohuslava 91	Town Y	mobile	Problems with gross motor skills (coordination of movements), balance system disorder, cognitive impairment, altitude vertigo, she uses psychopharmaceuticals
Jakub 90	Travel Y	mobile	Problems with right-hand mobility (right-handed) after a stroke
Nada 77	Travel Y	immobile	Presbyopia (correction with glasses), glaucoma, hearing impairment, she uses hypnotics

15   Lora Appel et al., 'Older Adults'; James Hodge et al., 'Exploring the Design of Tailored Virtual Reality Experiences for People with Dementia'. *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems,* no. 514 (2018): 1–13; Jinlong Wu, Yudan Ma, and Zhanbing Ren, 'Rehabilitative Effects of Virtual Reality Technology for Mild Cognitive Impairment: A Systematic Review With Meta-Analysis'. *Frontiers in Psychology,* no. 11 (2020): 1811, https://doi.org/10.3389/fpsyg.2020.01811.

Pseudonym Age	Experience Experience with VR Yes/ No	Mobility	Health condition according to the Preselection of Selected Subjects Questionnaire (potential risks)
Olina 87	Forest Y	mobile	Presbyopia (correction with glasses), problems with coordination of movements after a stroke, disturbance of the balance system, vertigo
Pavlina 89	Forest Y	mobile (walker)	She uses hypnotics
Simona 75	Travel Y	immobile	Eye defect (near and far glasses correction), hearing impairment, vertigo, disturbance of the balance system, Parkinson's disease: coordination problems, limb tremor
Roman 73	Town N	mobile	Altitude vertigo, problems with balance
Vaclav 72	Travel N	mobile (walker)	Small problems with gross motor skills
Mirek 88	Town Y	in a wheelchair	No specific health problems other than movement difficulties were expressed
Karolina 100	Forest N	mobile (walker)	Coordination problems, altitude vertigo, disturbance of the balance system, she uses psychopharmaceuticals
Barbora 63	Forest N	in a wheelchair	Coordination problems after a stroke, cognitive impairment

Data collection

Data collection took place in January 2021 in the nursing home. Given the nature of the research problem, we used methods that lead to deep data: the non-participatory observation method, and a semi-structured interview conducted with each participant immediately after the VR experience and then two days later. In the first research phase, each participant completed a twenty-minute virtual experience in one of three environments (see Table 1). The experience in VR took place under the supervision of technical support. It was filmed using two cameras with the consent of each participant. During the experience, we focused on the behaviour and emotional expressions of the participants. As the pilot study showed, the personal knowledge of the interviewer significantly supported the openness and sharing of the interviewed older person (in the pilot study, the researchers conducted interviews). Thus, participants were accompanied through the experience by an AW they know well. The AW also conducted the follow-up interviews. The AWs were informed in detail about the meaning of the research and were trained in the technology before testing. They took turns while conducting the interviews so that the same person did not speak to the senior within two days and did not tend to 'prompt'.

The interviews were aimed at capturing personal experiences before, during, and after the VR session, with flexibility to include personal contributions and digressions. The first interview included questions typified below:

- About ideas (e.g., 'What was going through your mind at the beginning/end?');
- About emotions (e.g., 'Is there anything that surprised (upset, disappointed) you? What, why?');
- Stimulating the narrative (e.g., 'Did the experience remind you of anything you have experienced before? A place you have been?');
- Focusing on the overlap of experience in VR (e.g., 'If you were a virtual reality developer, is there anything you would suggest differently? Do you think virtual reality could be of any use to people in nursing homes?').

The recapitulation of the experience after two days was used to discover which of the topics broached during the first interview tended to endure, which were reduced in importance, whether the experience had a temporal and territorial overlap, or what effect time had on the evaluation of VR (i.e., whether the subjective importance of the experience is sufficient to be shared by participants in a different place or at a different time).

To increase the validity of the data, we used the principle of triangulation, in which two experts from the team with different theory backgrounds were engaged in every phase of the research, gathering data across multiple interviews and observations. The data sources captured observations of VR participants, and also included interview transcripts, relevant texts, and analysis of video records. Video recordings captured salient elements in behaviour and emotional experience, which were then analysed comparatively with interview content.

We analysed the data using thematic analysis using coding procedures of grounded theory.[16] Using open, axial, and selective coding, the basic themes were identified: needs, emotions, memories, attitudes towards VR. In consolidating the project purpose, overlapping applications, and the interrelationship of themes, we focused on the overarching area of psycho-spiritual needs mentioned in known typologies,[17] the fulfilment of which can be supported through VR experience. Finally, we defined four basic types of participants' needs covering the sub-categories and codes, closely related and intertwined with one another. Table 3 characterises the coding process.

Table 3

The diagram of the coding process

Category	Subcategory	Codes
The need for awareness of dignity and self-value	I can do it	Choice of experience; Control; Interactivity; Satisfaction
	That's my life, that's me	I know it well; I remember it differently
	It didn't feel good	Insecurity; Incompetence, Embarrassment; Fear
The need for meaning and continuity in the life story	Places I remember	Childhood and adulthood; Reality versus VR; Before and now; That's my life
	Places I couldn't go to	Politics; Finance; Family obstacles
	Places I know well	To this, I can add that

16   Anselm Strauss and Juliet Corbin. *Základy kvalitativního výzkumu: postupy a techniky metody zakotvené teorie*. (Sdružení Podané ruce, 1999).

17   Erichsen and Büssing, 'Spiritual Needs of Elderly Living', 1-10; Koenig, *Aging and God*; Suchomelová, 'Seniors and spirituality'.

Category	Subcategory	Codes
The need to be part of the community	The need to be among people	Interacting with AW; Interacting with people in VR; It's empty here; I used to do it with…; I shared it with…
	The need to be in contact with the outside world	I didn't know it; I've never done it; That's changed here! What a technology!
The need for transcendence of everyday life	Strong positive feelings	Happiness, astonishment, amazement, joy
	Meeting beauty	Preoccupation with details; Wow!
	Gratitude	I could see the place again; Such a beautiful world; Gratitude to VR developers
	Overlap	An escape from reality; Topics with an overlap

Results

The Need for an Awareness of One's Own Dignity and Value

The awareness of one's own dignity and value fundamentally influences the way older adults experience and value their daily lives. They need to know and experience that despite possible difficulties and limited autonomy, they are still worthy of respect and esteem.[18] Our data showed several aspects of virtual experience supporting one's awareness of dignity, value, and self-esteem. The very possibility of choosing an experience is itself a significant factor supporting self-worth and dignity. Otherwise, as the data showed, people may feel manipulated and obliged to 'enjoy' the activity, for example, to please the AW. The dignity is undoubtedly supported by security and safety in a familiar environment, albeit in a virtual one. Participants who had a choice, between the familiar environment of South Bohemia and a place abroad, never chose the exotic destination initially. In the familiar environment, the user might be the one who 'accompanies' the AW, knows more, and adds information. On the other hand, appropriate support by AWs helps users to overcome fear or shame, which can positively affect their self-esteem. This is how Roman (73), encouraged by the AW, overcame his fear of heights.

AW: '*Well, I see, you don't mind being up on the tower at all, do you? You can look around without any trouble.*'

Roman (73): '*Oh, yes, yes!!*' (He indicates that he is fine.)

The way reality is portrayed in VR is also important. If the animated scene represented real life (e.g., a virtual forest), participants expected the scene to be as close as possible to what they could remember. In the pilot study, Simona (76), a woman with broad horizons and a rich travel history, commented on the first, more stylised version of the virtual forest: '*I would say that was meant for children or maybe even older people than me.*'

Additionally, an adequate level of interactivity and easy control are essential. Participants positively

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18   Harvey Max Chochinov, *Dignity therapy: Final words for final days* (Oxford University Press, 2012); Suchomelová, 'Seniors and spirituality'.

valued the opportunity to 'look' anywhere they wanted, focus on the important details, and stay in specific places as long as they wanted. Easy movement in the scene can compensate for limited autonomy and mobility in everyday life. On the contrary, difficulties with autonomy in VR can evoke a lingering feeling of shame. Jakub (90), a man with admirable cultural-political horizons and technical knowledge, evaluated immediately after the experience: '*I liked it, I was just having some trouble with… you know I have a little reduced weight feel or touch in my right hand after a brain stroke (…) with the stick to shift the pictures, you know, the handle.*' The feeling of 'failure' persisted even after two days.

Finally, the proper time for virtual experience is important to support one's dignity and self-confidence during this activity. During testing, two cases of participants' discomfort were caused by inappropriate timing. Karolina (100) was used to sleeping at that time of day, therefore, she started the experience already tired. Simona (75), living with Parkinson's disease, started the experience later than she had expected when her medications reducing uncontrolled motion were less effective.

The Need for Meaning and Continuity of Life Story

Defining and redefining one's own life story is one of the key tasks of old age.[19] The participants of our study expressed the need to share their life stories and work on them with others. VR evoked forgotten stories. During the virtual experience and in subsequent interviews, participants expressed joy and enthusiasm when they found places in VR that resonated with their life stories. Through the places they saw or visited in VR, they shared events from their lives.

The associations evoked by these places seem to be of three types: places directly connected with childhood or productive life evoke meaning with the original and later family and family events, and leisure activities in the past and now with the older person's values. Participants add information, and compare the image of a location in memories and in VR as Simona (76) did:

AW: '*So, did any memories come up?*'

Simona: '*Yes, all of them, all of them, that was Hosín and there was Hluboká, right, Bezdrev, everything. That's all my memories. I walked around those areas plenty times.*'

Places that could not be visited evoke connections with the restrictions of the previous regime, work position, attitudes towards the regime as, for example, Jakub (90) did: '*I haven't been there, I wasn't for the comrades so...*'

Places associated with a specific interest or profession support the older man's ability to add information, 'guiding' the AW, as, for example, Vaclav (72):

Vaclav: '*The red cattle, this here, it's not normal, it's new now.*'

AW: '*It's now red like this or, on the contrary, I often see white ones as well.*'

Vaclav: '*These are the ones that are used to the cold.*'

Although the data did not explicitly show a relation, in accordance with the principles of reminiscence therapy[20] we can assume that also some neutral places in VR (e.g., the interior of a transport vehicle) might play a role to trigger memories and associate former unspecific activities.

The Need to Be Part of a Community

Moving into a nursing home causes a change of lifestyle, daily routine, and neighbourhood, together

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19   Erik H. Erikson and Joan M. Erikson, *Životní cyklus rozšířený a dokončený: doplněné vydání o devátém stupni vývoje od Joan M. Eriksonové*, (Nakladatelství Lidové noviny, 1999); Suchomelová, 'Seniors and spirituality'.

20   Hana Janečková and Marie Vacková, *Reminiscence: využití vzpomínek při práci se seniory* (Portál, 2010).

with reduced autonomy, and close experience with illness and dying can generate feelings of isolation and helplessness. Despite constant contact with fellow residents or staff, older persons might feel a lack of opportunity to share their feelings and experiences with another person. This may contribute to a feeling of loneliness.[21] The need to be part of a community includes the need for social contact but also the need to be in contact with the outside world.[22] The need to be with people and among people was already evident from the quantitative study among residents of several nursing homes in the first stage of the VIREAS project.[23] In an open question the participants expressed their current wishes. In addition to their own health, wishes related to other people – family, friends, or people in general – clearly prevailed (e.g., wishing all people love, peace, and happiness, etc.) This finding led to the definition of the 'Town Centre' experience as a place where people meet and gather.

The Need to Be among People

The virtual experience recalls the memory of important relationships and social group inclusion in the past. Olina (87) states: '*I was married to a gamekeeper, that is why I like it* [a forest in the VR] *a lot. He would too.*' Roman (73) reminds himself of the moment of his life when '*…I and other residents – were celebrating 700 years of that town.*'

As in the pilot study, participants spontaneously responded to the presence of people in the virtual scene. The immersiveness of VR evoked the almost physical presence of people around them. Although it was not a video but a static image, the participants waved at the waving people, smiled at the laughing people, they perceived life. The feeling of being, or, conversely, not being with people persisted longer, as Simona's (76) statement two days after the experience shows: '*It was nice when I was here at the square in Budějce and there was a little tree and a family with two children came and waved, so it was so nice.*'

During her experience, Stana (83) repeatedly expressed the hope of seeing someone she knew. In an interview after the experience, she returned to it: '*Yeah, I kept looking for someone there… if I see someone familiar.*' The unfulfilled desire persisted even after two days: '*Some friends used to go there, they used to always go there on Thursdays like we did and I would at least say hello.*' She was no longer interested in VR: '*If only I could really meet someone there, those whom I know, meet someone else, but not to be alone.*' Some buildings and places, such as ceremonial halls or shops, reminded participants of experiences associated with specific people.

VR can be beneficial in arousing or reminding the significant sense of belonging. Nada (77) shared her VR experience '*with my daughter…and then with my friends here, although they did not know what I was talking about.*'

Wherever possible in VR, participants asked for the presence of people or animals. It seems that a virtual stay in empty streets intensifies their feeling of closedness, isolation. Vaclav (72), a former farmer, was interested in the details during the experience (tractors, hay wagon, muddy roads, cowshed), however, two days after the VR experience he evaluated it as a '*bit of a shady deal*' that he would no longer be interested in. He explained while saying so:

'*Well, it was supposed to be the village life, but there weren't people there at all, and the cowshed where they housed the stock wasn't there at all, it was not real enough.*'

AW: '*So you would make it livelier, right?*'

21 Luis M. García Rondón, *Loneliness in Older Adults* (Elsevier, 2022), https://doi.org/10.1016/C2020-0-04203-9.
22 Nancy Cantor and Catherine A. Sanderson, 'Life task participation and well-being: The importance of taking part in daily life', in *Well-Being: The foundations of hedonic psychology*, eds. D. Kahneman, E. Diener, and N. Schwarz (Russell Sage Foundation, 1999), 230–243.
23 Suchomelová and Diallo, 'Virtual reality as a way', 115-118.

'*Well, I mean show life as it is in nature (…) Well, at least there was a kindergarten.*'
Also, interaction with the AW during a VR session, friendly communication or touch, fulfils the need for contact with another person.

The Need to Be in Contact with the Outside World, to Be 'Involved'

VR evokes a renewed interest in the surrounding world. The users see places they knew but that have changed, which evokes question and comparison. Participants wanted to know what had changed in the world, and they commented about new buildings, shops, or architecture, like Roman (73): '*I was surprised when I saw the square, the arcade, I don't know now, it has changed a lot, hasn't it?*' They kept asking when they didn't recognise a certain detail.
Participants suggested when asked, or even spontaneously, what else they would like to see in VR. They clearly preferred the opportunity to see the real world and life. In this respect, experiences based on a 360° image gallery (City Centre and Travel) brought more positive emotions than a virtual forest. Even after two days, Pavlina (89) drew attention to a certain 'artificiality' of the virtual forest and focused on the discrepancies between the animated and the real nature she uncovered. When asked what she would like to see next, she summed up: '*I would like to see the countryside, I like all the animals, because we actually grew up with them (…). Yes, ordinary life.*'

The Need to Transcend 'Here and Now'

According to several authors, the need to transcend everyday situations is one of the important psycho-spiritual needs in old age.[24] The older person needs to transcend life's challenging moments and see the higher context of his life story, needs to experience beauty, hope and gratitude, to experience feelings that deviate from the everyday routine and that go beyond everyday reality 'here and now'. The participants' reaction to some moments in VR was amazement and even astonishment. Karolina (100), who usually seemed rather resigned and did not comment on what she saw, was amazed by the size of the pines in the virtual forest. Some participants commented on the scenes with expressions such as 'miracle', 'beauty', 'beautiful'. It included an appreciation of the technology and its possibilities as Jakub's (90) statement during the interview immediately after the experience shows: '*Well, these are shots that you don't even notice when watching live in Prague. So I would somehow rate this as a novelty, it's such a miracle of technology that I was pleasantly surprised by the possibilities it offers nowadays.*' The feeling of amazement and gratitude persisted in Jakub even after two days. Other participants appreciated the possibility of visiting the sacral buildings which evoked associations related to their own faiths as well as memories of religious holidays and rituals they remembered from their childhoods.
Positive emotions, joy, and gratitude were also intensely expressed by Bohuslava (91), a woman living with a noticeable cognitive disorder. The degree of fulfilment can be illustrated by Bohuslava's comment during the experience: '*It's beautiful, I'll take this to my grave, the experience!*' In the interview immediately after the experience, she could not quite distinguish between her actual feelings and those she had experienced in the virtual world moments before, and the setting of the sunroom in which the interview took place blended with her experiences in the virtual world. After two days, she no longer remembered having had the experience. However, cognitive impairment did not di-

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24 Büssing, 'Spiritual Needs Questionnaire'; Erikson and Erikson, *Životní cyklus*; Koenig, *Aging and God*; Suchomelová, 'Seniors and spirituality'.

minish the positive emotional mood the virtual experience had evoked at that moment.

VR provides the possibility to rise above the current distressing situation (for example, monotony, pain, or sadness): '*Well, we are not just closed here, we can have a look at pictures that will be different from those we see here all the time*', said Vaclav (72). In addition, an intense experience brings rich material for thinking and processing in the following days.

Discussion

Our findings are in line with the findings of the studies mentioned in the introduction of the article: stimuli presented in VR, if used adequately, can significantly trigger positive emotions and effectively support cognitive and sensory-motor skills. Additionally, it seems that virtual experience can be an effective way to meet several needs of older adults mentioned by Büssing,[25] Koenig,[26] or Suchomelová.[27] The need for an awareness **of one's own dignity and value** is undoubtedly essential. Therefore, both the content and the form of the virtual experience must correspond to the interest, sensory, cognitive, and motor levels of the particular person.[28] An infantilising or confusing scenario or overly complicated controls can make an older user feel ashamed and discourage confidence in VR. The role of AW is also crucial. The AW should be both a trusted and attentive guide in VR and also the 'guided one', when the older person knows some facts or places better, comments on the image of reality in the virtual world, or adds other information. This aspect is especially important in an environment where the older person is predominantly the object of help and care in real life. A familiar 'safe' virtual scene certainly supports one's self-confidence. However, respectful AW support can encourage openness to leave the 'comfort zone', learn or try new things, and boost one's self-esteem. A virtual experience can help residents perceive the **continuity and uniqueness of their own life story** by virtually returning to places connected with childhood, work, and family life, or places that, on the contrary, they could not visit for financial or political reasons. The level of satisfaction in VR corresponds to the degree of personalisation of the experience. We agree with Saredakis and colleagues[29] that the stimuli in VR can awaken older users' memories in an especially intense way, which makes this method especially suitable for individual or group reminiscence. Thanks to the immersiveness, the feeling of physical presence can evoke both memories and new contexts of the life story. On the other hand, it is necessary to mention the possible negative effect of immersivity if the content of the virtual experience, although not explicitly inappropriate or threatening, evokes negative memories or associations. Although this was not the case in our study, this possibility should be considered in the practical use of VR with older adults.

The virtual experience can meet the need **to be part of a community** in both ways mentioned by Cantor and Sanderson:[30] the need to be with people and to be in contact with the surrounding world. This happens through people present in the virtual scene, through sharing the virtual experience with others and a one-to-one relationship with the AW during the VR session. The VR experience might also recall one's inclusion in past relations and social groups. Through VR the resident can see changes and progress in the surrounding world — including the incredible

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25   Büssing, 'Spiritual Needs Questionnaire'.

26   Koenig, *Aging and God*.

27   Suchomelová, 'Seniors and spirituality'.

28   Lenka Lhotská et al., 'Role of virtual reality in the life of ageing population', *Neural Network World* 32, no. 5 (2022): 253-267, https://doi.org/10.14311/NNW.2022.32.015; Věra Suchomelová, Karolína Diallo, and Michal Vavrečka. 'Virtual reality as a means to meet the specific needs of seniors', *Sociální práce/Sociálna práca* 21, no. 6 (2021): 5-18.

29   Saredakis et al., 'Using Virtual Reality'; Saredakis et al., 'The Effect of Reminiscence Therapy'.

30   Cantor and Sanderson, 'Life task participation', 230-243.

possibilities of technology itself — and can compare the old and the new and can learn new things. The last category we have identified is the need **to transcend everyday life**. In VR, the user is literally immersed in the beauty of nature or human work. Our data correspond to the opinion of Lifshitz and colleagues,[31] that the stimulus in VR can be a spiritual experience, especially through the beauty of nature (in this sense, participants valued images of real nature more than the computer-animated forest scene). The positive emotions, joy, astonishment, and amazement in VR might awaken gratitude and openness to see the new connection in one's life story. Also, the virtual experience allows older persons to rise above the current situation, at least for a while, and brought them topics that they later thought about and to which they returned.

Despite the benefits mentioned above, the user's acceptance of VR may be negatively affected by several factors. These include a limited choice of the type of experience (including the level of interactivity), non-personalised content, a lack of time to acclimatise to VR, inappropriate time of day for virtual experience, or a prolonged interval between the virtual experience and the follow-up activity. The emotions of the study participants were expressed more weakly after 48 hours and were difficult to recover, and the motivation to return to the experience decreased proportionally.

Also, as we found in our previous study,[32] unexpected situations of concern in the virtual scene like a view from a great height without natural barriers (e.g., a railing) or generally poor quality of 360° may cause the discomfort mentioned by Somrak et al.[33] During all testing, we always paid close attention to any expression of discomfort. However, we were surprised by the great tolerance of VR even from participants with balance disorder. VR was well tolerated even by the participants who reported motion sickness or balance disorder in the *Preselection of Suitable Subjects Questionnaire*. This fact cannot be generalised, however, during the three-year phase of testing in nursing homes there were only four residents who felt uncomfortable in VR. They verbalised their feelings immediately and simply stopped this activity before the discomfort increased. In this sense, the role of an empathetic AW trained in evaluating possible risks or limits and how to respond is essential, especially during the first session.

This qualitative study was realised during the strongest COVID-19 pandemic; therefore, not all researchers' intentions were fulfilled. The study is undoubtedly limited by the very small sample size. The data might be also affected by participants' limited opportunity to choose the experiences according to their preference. Some participants were motivated to choose by the AW so that all three types of experiences were represented even in such a small sample.

Including two persons with early-stage dementia in the sample helped us to understand the possible way these people can enjoy VR, however, we did not go into the reasons in depth. Although some studies describe the positive effect of VR on some aspects of the well-being of older adults with cognitive impairment,[34] this topic needs to be explored in more detail.

Conclusion

In this study, we investigated what psycho-spiritual needs of older adults in nursing homes can be met through a virtual experience and what aspects of the VR session are important for meeting those needs. We focused on the needs mentioned by known typologies.[35] Study participants tested

31　Lifshitz, Elk and Luhrmann, 'Absorption and Spiritual Experience'.
32　Suchomelová, Diallo, and Vavrečka, 'Virtual reality as a means to meet the specific needs of seniors', 5-18.
33　Somrak et al., 'Estimating VR Sickness', 302-316.
34　Appel et al., 'Older Adults'; Hodge et al., 'Exploring the Design', 1-13; Wu, Ma, and Ren. 'Rehabilitative Effects'.
35　Büssing, 'Spiritual Needs Questionnaire'; Koenig, *Aging and God*; Suchomelová, 'Seniors and spirituality'.

three types of virtual experiences: an interactive walk through a fully animated forest, an interactive walk through a real city, and traveling to various places.

It appears that a properly designed virtual experience can meet several psycho-spiritual needs of residents: the need for dignity and self-value, the need for meaning and continuity of life story, the need to be a part of community, to be among people and in contact with the surrounding world, and the need for transcendence. For meeting these needs through VR sessions, the following factors are important: personalised content of virtual experience, a user-friendly form including easy control, high quality of 360° pictures, a proper time for the virtual session respecting the older person's health and mental state, and daily routine. The AW accompanying the older user in VR should be trained in appropriate communication and the technical background of VR. It is also essential to give the residents enough space and time to share their experience in VR with others, for example, through activities following the VR session. When there is no possibility to share comments, ideas, and connection with their actual or previous life, older people might feel 'locked up' in a virtual world instead of included in the community.

We can summarise that if certain conditions are met, VR can be successfully used for keeping some residents active and socially included. Our findings however indicate that further research is needed. It is necessary to investigate VR as a tool that might enhance social and emotional behaviour among older people with physical impairment and dementia. Likewise, the mutual influence of VR on sensory, motor, and cognitive abilities should be further studied, including coordination of reaction to visual, audio, or haptic stimuli.

This study provided important insights for a conceptual manual for AW as one of the outcomes of the VIREAS project. We believe that this paper also contributes to the scholarly discussion on this topic and may inspire further research focus.

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