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Time travel of older people through virtual reality: a qualitative study

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Abstract

Background Innovative technologies such as virtual reality may improve physical and cognitive functions in older people. While there are some experimental studies on virtual reality, qualitative studies related to the virtual reality experiences of older people are limited in the literature. This study aims to describe older people's perceptions about their experiences regarding virtual reality.

Methods The study has qualitative descriptive design. The data were collected through semi-structured individual interviews with older people ($n=37$). The interviews were conducted during a two-months period, from February to March 2022. Thematic and descriptive analysis was used to analyse data. The Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist was used to report the study.

Results Four themes and 15 sub-themes were identified from the interviews. The themes were (a) time travel through virtual reality, (b) comparing the past and present through virtual reality, (c) benefits of virtual reality, and (d) the meaning of virtual reality.

Conclusions This study provides in-depth information about the views of older people regarding the virtual reality experience. The study revealed that older people had positive experiences with virtual reality and showed that it has the potential to be useful in elderly care. In the study, virtual reality also enabled older people to have a time-traveling experience. It is recommended that virtual reality should be integrated into the care of older people by nurses and healthcare professionals.

Keywords Individual interviews, Older people, Nursing, Virtual reality, Qualitative study

Background

The number of older people worldwide is growing daily, and the proportion of the population aged 65 and over is also increasing. Whilst the number of people aged 65 and over was 703 million in 2019, it is estimated that this number will double to 1.5 billion by 2050 [1]. In Türkiye, the older people, considered as individuals aged 65 and over, reached 7,953,555 in 2020 [2].

The aging process has hallmarks such as increasing accumulation of cell damage, progressive loss of function, and increased vulnerability to illnesses [3]. The changes may cause major pathologies such as cardiovascular, musculoskeletal, metabolic, cerebrovascular disorders,

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and cognitive decline [3]. These disorders and decreases in cognitive functions affect older people's daily living activities, work, and social life and may reduce their quality of life [4–6]. It is important to consider the use of technology to facilitate meaningful activities to improve the health and quality of life of older adults [6]. For this purpose, new technological methods such as video games, augmented reality, mixed reality, and virtual reality (VR) applications may be used [7–9]. VR development for older adults should enhance healthy aging and quality of life [10]. New technologies such as VR offer exciting opportunities to support healthy ageing and enhance the lives of older people. As people age, they often face challenges such as cognitive decline, limited mobility and increased risk of chronic diseases, which can affect their independence and quality of life. By engaging older people in immersive activities, VR can help them stay active, mentally sharp and socially connected. Therefore, VR is a powerful tool to promote wellbeing in later years.

Virtual reality is a potential tool to promote the health and well-being of aged people [11]. VR applications consist of technologies that provide sensory information to the user through visual, auditory, and tactile displays [12]. VR applications are beneficial for improving physical and cognitive functions such as learning, memory, attention, and speaking ability [13, 14]. For these reasons, VR holds great potential for encouraging older people's physical activity and cognitive functions while removing age-related obstacles [15]. It is also known that VR may enhance improved engagement and social connection as well as reduced social isolation in later life [16, 17]. It is clear that VR can serve as a powerful tool for enhancing both the mental and physical health of older adults, while also providing opportunities for meaningful social engagement in later life.

Several experimental studies have evaluated the impact of VR applications on older adults, revealing that VR can enhance physical and cognitive functions, as well as quality of life [9, 14, 18–20]. Assessments of VR's effectiveness in older populations stated that VR can significantly help reduce fall risks and enhance the social and emotional well-being of elderly individuals [21]. In one study, participants started many physical movements, such as moving their limbs, reaching out, and walking around, in response to VR activity [17]. A study demonstrated that a VR application designed for older adults with mild cognitive impairment yielded positive effects on both physical and cognitive training while achieving high levels of acceptance and satisfaction among participants [22]. Other study determined that VR applications are quite promising for cognitive training in older adults [23]. In a mixed-methods study, it was noted that older adults with various cognitive and physical impairments experienced increases in positive emotional levels (such as feeling relaxed and satisfied) and decreases in negative emotional levels (such as feeling sad or anxious) after using the VR application. Additionally, it was stated that the VR application is feasible and safe [24]. VR technology is a valuable tool for older adults to not only increase their physical and cognitive abilities, but also to improve their emotional well-being and overall quality of life.

Although there are experimental studies on VR applications for older people, qualitative studies in this field are limited [12, 25]. On the other hand, there is little evidence that VR is widely used as a useful tool or activity for older people [16]. Further research on the effects of VR technology and the experiences of older adults would be interesting [26], and digital technologies need to provide better support for older people [25]. Understanding the experiences of older people is critical for the effective use of new technologies in the field of elderly care. These experiences will help VR technology find a greater place in elderly care and develop user-friendly applications. VR applications can reduce the feeling of loneliness and improve the quality of life of older people by increasing their social participation. With VR, older people can take part in virtual environments and play games that develop their mental skills. In addition, strengthening their relationship with technology can support their independence. As a result, considering the experiences of older people will play an important role in the future of technology-supported elderly care.

Methods

Aim of the study

This study aims to describe older people's perceptions about their experiences regarding VR.

Design

This study has a qualitative design conducted with a descriptive phenomenological approach rooted in Husserl's philosophical perspective [27]. The COREQ checklist was used to report the study [28].

Study setting and recruitment

The participants were recruited by researches (LM, ZK) from a free, municipality-run public cafe that allows older people to socialize and is used only by retirees, in Antalya from Türkiye. Volunteer older people who met the inclusion criteria and could use the VR application were included in the study by using purposive sampling.

Inclusion and exclusion criteria

Participants were included in the study according to the following criteria: (a) older people aged 65 years and above, (b) being able to communicate in Turkish, (c) self-reported absence of diagnosed visual or hearing impairments (cataract, glaucoma, etc.), (d) self-reported

Table 1 Socio-demographic characteristics of the participants

Characteristics	Number (*n*)	Percent (%)
Age		
Average age ± (Min:65 -Max:75)		68.84 (SD = 3.24)
Sex		
Female	13	35.1
Male	24	64.9
Education status		
Primary school	11	29.7
High school	10	27.0
University	16	43.2
Marital status		
Married	25	67.6
Unmarried	12	32.4
Family income situation		
Income more than expenditure	8	21.6
Income equal to expenditure	21	56.8
Income less than expenditure	8	21.6

Table 2 Semi-structured interview form

Questions
1. How would you describe your experience of VR application?
2. What do you think about the VR application you watched?
3. How did the VR application you watched make you feel?
4. What are your perceptions about this VR application you watched?

absence of diagnosed cognitive disability and (e) being place-and time oriented. Participants were excluded if they had dementia or were otherwise unable to consent.

Participants

There was a total of 37 participants with a mean age of 68.84 (SD = 3.24), who were mostly male (64.9%), married (67.6%) and graduated from university (43.2%) (Table 1). All participants were home-dwelling older people. None of the participants were receiving any form of home care at the time the study was conducted. A detailed description of the participants is shown in Table 1.

Data collection

A Personal Information Form and a semi-structured interview guide was used for data collection. The Personal Information Form was created by reviewing the literature and includes 10 questions about the sociodemographic characteristics of participants [29–32]. The semi-structured interview guide was developed by authors (Table 2). A pilot interview was conducted with one older person to evaluate the appropriateness of the interview questions.

In-depth interviews were conducted as one-on-one and face-to-face with the participants who came to the coffee house between February and March 2022 and agreed to participate in the study ($n = 37$). Five participants declined to participate in the study since they did not have enough time. Before starting the interviews, the place-and time orientation of the participants was evaluated. After the researchers informed the potential participants about the purpose of the study and data collection, written informed consent was obtained. The participants were informed about the use of the VR application and glasses before the interviews. The participants were shown anonymous photographs, music, and videos of their historical/cultural heritage. The VR application was downloaded to the mobile phone. With the help of researchers, the participants used the VR application using VR glasses (Oculus Go) that provide three-dimensional vision.

Interviews were conducted in a separate room to ensure a comfortable and quiet environment and by following COVID-19 guidelines, i.e., wearing masks, checking body temperatures and disinfecting hands. The researchers were calm, careful, and empathic and used therapeutic communication during the interviews. Each interview lasted between 20 and 45 min and responses were audio recorded. No interviews were excluded or repeated.

Data analysis

The data obtained from the interviews were transcribed by two researchers (LM, ZK) with a background in elderly care and qualitative research experience after completion. A total of 62-page transcript was obtained. The transcribed data were analyzed following the thematic analysis steps as described by Sundler et al. [27]. Data analysis was performed in three steps: (a) achieving familiarity with the data through open minded reading, (b) searching for meanings and themes, and (c) organizing themes into a meaningful wholeness [27].

The data analysis began with repeated readings keeping an open mind and being mindful of potential preunderstanding to gain a general sense of the integrity of the data (LM, ZK, EA, ZO). After repeated readings, focused readings were carried out and the meanings that responded to the purpose were highlighted. The identified meanings were compared in terms of similarities and differences. The controversies resolved by repeated readings and discussions. The meanings that were related to each other were grouped into preliminary themes. Then, the meanings of these themes were then reviewed and defined. The themes were then clustered and categorized, thus creating a coding tree by ensuring conceptual density. The researchers reviewed, discussed and developed all the themes that emerged during the analysis. Finally, the analysis resulted in four themes and 15 sub-themes that described the meanings of participants' experiences with the VR application. Participants' quotes were used to highlight the meanings and themes. To protect the participants' identities, the quotes were anonymised.

When no new themes were identified, it was decided that saturation had been reached and the interviews were stopped [33].

The themes derived from the analysis are data driven. No themes were identified in advance, and themes were derived from the data. Study participants were not involved in data transcription or analysis. The report was translated into English language by an expert fluent in both the Turkish and English languages and familiar with the local culture. The themes and sub-themes in the Turkish and English languages were then compared by the researchers. Participants' quotes were used to highlight the meanings and support the suggested themes. The NVivo 12 program was used to manage data and development of coding tree. An example of the analysis process is shown in Table 3.

Ethical considerations

The ethics committee approval for the study was obtained from the Clinical Research Ethics Committee of the Akdeniz University, Faculty of Medicine (Decision no: KAEK-958 Date: 22.12.2021) and permission to conduct the study was obtained from the relevant municipality. The study was conducted in accordance with the principles of good and ethical practices in scientific research informed by Declaration of Helsinki [34]: informed consent, consequences and confidentiality. Written and verbal consent was obtained from the participants before the data were collected. The participants were informed about the purpose and procedure of the study and the necessity of voice recording. The researchers informed the participants that their identities and their voice recordings would be kept confidential and that their subjective data would be used only for scientific purposes. Participants were informed that they had the right to withdraw at any time up to the point of data analysis.

Rigor of the study

In the study, rigor and quality standards were applied to minimize the risk of bias and to maximize the accuracy and reliability of the research results. These criteria are reflexivity, credibility, and transferability [27]. The interviews with the participants were conducted by two researchers who have experience in qualitative studies. Throughout the whole research process, a reflective attitude was employed, particularly when analyzing data and developing themes. During the interviews, bracketing which means a process of setting aside personal beliefs, refraining from personal judgments, and remaining open-minded while the findings unfold was ensured. The researchers performed the interview without preconceptions to obtain data. Before and after each interview, the researchers took notes to accurately document the interaction between researcher and participants. This effort allowed the researchers to bracket any biases or assumptions that emerged during the interviews.

To ensure rigor in this research, research triangulation was used during data analysis. Multiple researchers were involved in the analysis process and discussed whether the themes accurately represent participants' VR-related experiences and continued the analytical process until they reached a consensus. This process allowed the researchers to question the findings instead of taking them for granted. The reader and the researcher are both responsible for evaluating research, and rigor can be assessed based on how the research is presented. For credibility, we described the analysis process in detail and with transparency. We also present our findings logically and understandably with quotes from the participants [27].

Transferability is concerned with relevance and usefulness, whether texts are understandable and related to other texts [27]. Strategies to increase transferability in this study included a detailed description of the large number participants' demographics and the study method.

Results

Themes

Qualitative data were analyzed and four themes and 15 sub-themes reflecting the participants' perceptions on their experiences of the VR application. Their descriptions of using VR application were thematised in the following themes: (a) time travel through virtual reality, (b) comparing the past and present through virtual reality, (c) benefits of virtual reality, (d) the meaning of virtual reality (Table 3).

Time travel through virtual reality

This theme covered the participants' experiences with the VR application, memories of the past, and feelings and longings for those memories. Participants stated that the VR application's photos, songs, and videos reminded them of their past lives, and they had a time travel. The theme of the time travel through virtual reality consisted of three sub-themes: "feeling the past", "missing the past" and "ambivalent emotions related to past".

Feeling the past

After the VR experience of the participants, they highlight their unique perspectives on the history of their own aging processes. Most of the participants stated that they remembered and had feelings about, their past lives and they had a time travel.

> *"It is good to remember. I went back to the past, I liked it. It reminded us of our youth. Playing those*

Table 3 Themes and sub-themes of study

Themes	Sub-themes	Participants' quotes
Time travel through virtual reality	Feeling the past	"I remembered my youth from music. That is, I thought I went to 1970s or something, I felt it" (P32-Male).
	Missing the past	"I remembered my school years, my childhood and my youth. When I saw it, I said 'oh, my youth'. I felt that I missed the past" (P29-Male).
	Watching the past	"I've never tried it before. It is like watching my past. Like watching the past…" (P22-Female).
	Ambivalent emotions related to past	"I remembered those days. I remembered my sad days as well as my happy days" (P6-Male).
Comparing the past and present through virtual reality		"When I saw the VR, I realized what we have lost, as human beings, as a society, we have lost a lot. Of course, I am sad, we have lost our own culture" (P16-Female).
Benefits of virtual reality	Keeping the memory alive	It's actually nice for preserving memory somewhere. I used to make my children play similar games, for example, memory games (P26-Male).
	Aging well	"Thanks to experiences like this, I can always keep my brain active. I like these things to keep my brain fit, not age, and to be healthy" (P21-Male).
	Creating positive emotions	"It's like a fantasy world. I liked it. I really liked the pictures and videos. Thank you for introducing me to such a device" (P20-Male).
	Refreshing the memory	"I think this application refreshes our memory. We went back to the old days; we went back to the days when we lived well" (P22-Female).
Meaning of virtual reality	Feeling like [being] there	"The first feeling is a past that took me back many years, the current technology is a strange thing, they built rooms from the past and I felt like we saw them, too" (P5-Female).
	Life	"It reminded me of my childhood, I couldn't compare it to an object. The past swam before my eyes" (P11-Male).
	Living creature	"Because everything depends on them. We used to learn what we wanted to learn from our relatives and friends. Now everything is virtual, and we are dependent on them" (P29-Male).
	Painting dreams	"Like the creation of something, like the creation of an event. It is like painting dreams" (P16-Female).
	Little button	A participant used the metaphor of a small button and said, "I don't know much, but the most suitable program has been made for memory control. We can call it an object or a program in which we can do many things with a small button in the space age" (P21-Male).
	Adventure	"A good practice to remember the past when we focus completely. It reminded us of some moments we were about to forget" (P30-Male).
	Cinema	"I liken it to the cinema because you reminded me of our whole life, from seven to seventy" (P2-Male).

drums during the Ramadan Festival reminded us of the singing of many songs in our childhood. It was nice to visit the past, I enjoyed it" (P17-Female).

Missing the past

While remembering their past lives, all participants also expressed their feelings of nostalgia. In addition, most of the participants stated that they missed the past.

"The folk dances reminded me a lot of holidays in past. I remembered the good old days. That is, there was a taste of the old days. I miss them" (P15-Female).

"I remembered my school years, my childhood and my youth. When I saw it, I said 'oh, my youth'. I felt that I missed the past" (P29-Male).

Ambivalent emotions related to past

Participants became emotional and felt sad when they remembered their past lives. Participants stated that the VR experience created an ambivalent emotion by experiencing two opposite emotions at the same time. These feelings were revealed in quotes from the participants:

"I remembered those days. I remembered my sad days as well as my happy days" (P6-Male).
"You can't think of anything else at that moment. When you listen to old songs, you go back to the old days… My childhood days were bad. I have been working since I was 7 years old… It made me a little sad when I remembered those days. Actually, I do not want to go back" (P7-Male).

Comparing the past and present through virtual reality

This theme includes opinions and feelings of the participants comparing the past and present through virtual reality. Participants expressed that the past days were better than these days.

"The old days were good. Now the unpleasantness and unrest have also increased. People have become very conscious, but evil has increased" (P15-Female).
"When I saw the VR, I realized what we have lost, as human beings, as a society, we have lost a lot. Of course, I am sad, we have lost our own culture" (P16-Female).

Benefits of virtual reality

This theme includes participants' perceptions of the benefits of virtual reality. It includes positive views of participants that VR can contribute to their future cognitive health by keeping their memories alive. In addition, some participants found it fun. Moreover, all participants stated that they were happy with this experience. Depending on this theme, sub-themes of "keeping the memory alive", "aging well", "Creating positive emotions" and "Refreshing the memory" emerged. *Keeping the memory alive*.

Participants stated that VR could be used to keep their memories alive.

"It felt like I was playing a game on the computer. It caught my attention; I like games like that. I play similar games on the phone or computer. It might help keep my memory. Looks good to me (P17-Female).
It's actually nice for preserving memory somewhere. I used to make my children play similar games, for example, memory games (P26-Male).

Aging well

Participants discussed their perceptions of VR to avoid memory problems and negative situations from old age.

"I think that activities performed using VR at certain hours might be beneficial in delaying cognitive aging" (F13-Male).

Participants expressed that various activities and VR might be beneficial for cognitive decline and memory enhancements.

"In the past, I did search and rescue mountaineering as a profession; in this way, I always kept my brain active. The videos I watch, the songs I listen to and the photos I see in the VR might help keep my brain active and age healthy" (F21-Male).

Creating positive emotions

The VR application attracted the attention of all participants. Participants were impressed by the VR and stated that they found VR enjoyable and interesting. Most of the participants stated that they found VR useful.

"It's like a fantasy world. I liked it. I really liked the pictures and videos. Thank you for introducing me to such a device" (P20-Male).

"A useful app to revive memory" (P22-Female).

"It was a nice application, and I got so excited. I entered the room and the television at the same time. It was a good feeling" (P9-Female).

Refreshing the memory

Most of the participants reported positive opinions and feelings about their VR experiences and stated that their memory was refreshed.

> *"I think this application refreshes our memory. We went back to the old days; we went back to the days when we lived well" (P22-Female).*
> *"It is a very nice application; it seems it refreshes people's souls and brains" (P27-Male).*
> *"Good in some ways, bad in some ways, for example, while listening to it, I forgot the name of some songs and artists. It made me remember" (P30-Male).*

The meaning of virtual reality

This theme includes what it felt like for the participants to experience VR and how they perceived it. Participants described how VR had an impact on them in a variety of ways. While some participants said that they found it interesting, others described the meaning of VR from their own perspective with different abstract and concrete concepts. This theme consists of the subthemes "Feeling like [being] there", "Picturing dreams", "Little button", "Life", "Living creature", "Adventure" and "Cinema".

Feeling like [being] there

The participants stated that they were isolated from their surroundings, using the VR glasses during the VR experience. In this sub-theme, the deep feelings of participants emerged in the comments on the VR experience. Because the participants stated that they felt like they were there.

> *"Although it was only for a short time, it was enough to tear me away from where I am. A big painting of a happy picture I took in the past and hung on the wall, I felt like a reflection of the happy moment I had with my lost friends on the wall" (P24-Female).*
> *"The first feeling is a past that took me back many years, the current technology is a strange thing, they built rooms from the past and I felt like we saw them, too" (P5-Female).*

Painting dreams

One participant tried to explain the meaning of the VR experience from a deeper perspective by explaining it with abstract concepts. The participant stated as follows.

> *"Like the creation of something, like the creation of an event. It is like painting dreams" (P16-Female).*

Small button

One participant described VR by comparing it to a small object, like a small button.

> *"I don't know much, but the most suitable program has been made for memory control. We can call it an object or a program in which we can do many things with a small button in the space age" (P21-Male).*

Life

A few participants expressed their thoughts about the life process of a person after the VR experience. A participant stated:

> *"It reminded me of my childhood, I couldn't compare it to anything. My whole life swam before my eyes" (P11-Male).*

Another got excited and said:

> *"I've never tried it before. It's like watching my past. It's like watching the past…" (P22-Female).*

Living creature

One of the participants expressed the VR experience as a living entity that takes over us. Because, according to him, he was trying to understand VR, which has a complex system, by associating it with the term living entity and emphasizing the nature of the system. The participant explained:

> *"Because everything depends on them. We used to learn what we wanted to learn from our relatives. Now everything is virtual, and we are dependent on them" (P29-Male).*

Adventure

One participant explained the VR experience as an adventure. He defined this experience as life, discovery, journey or adventure and expressed it as follows:

> *"A good practice to remember the past when we focus completely. It reminded us of some moments we were about to forget" (P30-Male).*

Cinema

One participant also described the VR experience as cinema. After this experience, he evaluated the events, characters or certain experiences in his life from a cinematic perspective in the form of a story flow. The participant explained:

> *"I compare it to cinema because you reminded me of our entire life from seven to seventy" (P2-Male).*

Discussion

The study aimed to describe older people's perceptions about their experiences regarding VR. The analysis revealed four themes and 15 sub-themes. Overall, the study showed that older people enjoyed time traveling through VR. These findings revealed that older people had positive experiences with VR and showed that it has the potential to be useful in elderly care.

The first theme of the study was perceived as time travel through VR. For human beings, the past is extremely special as we think of the past as defining where we belong, who our friends are, what our social status is, and what kind of person we are [35]. Photos, songs and videos through VR enabled older people to have time travel and experience emotions such as happiness, joy and sadness. Similar to our study findings, findings from a previous study show that the participants were thrilled to return to locations they had visited before since it reminded them of those experiences, and they reminisced about them [17]. Moreover, our findings are similar to findings from another study [25], that describe participants reviewing their lives and gaining social, interpersonal and cultural experiences.

VR technology was found to be safe and acceptable for older people [9]. This suggests that VR has significant potential to create deep emotions in older people [36], which may lead to the idea that VR may be important to integrate as a meaningful activity into elderly care to enable older people to experience lifelong memories. Furthermore, the integration of VR into the field of aged care offers a significant opportunity to enhance the emotional well-being of older people [37]. VR enables older people to revisit precious memories and places from the past, evoking feelings of joy and nostalgia; this strengthens their identity and sense of belonging, while also strengthening their interaction with their personal history and social connections [13, 15, 17]. In this context, the adoption of VR technology in aged care settings is considered not only a technological advancement, but also a vital step to preserve the dignity and emotional richness of the older people. We belive that, because memories are thought of as the threads that make up the fabric of our existence, preserving these threads is our social responsibility.

The second theme was identified as "comparing the past and present through VR". In this theme, the photographs, music and videos presented to the older people were not related to their personal biographies, but were related to their social, historical and cultural heritage. Older people compared the past and the present after the VR experience and the majority of them stated that the old days were better. However, a previous study [25] found that some of the participants did not want to remember the past because of separations and losses they had experienced, findings that were different to our findings. While Weber et al. [25] used memories of people's past, the use of social, historical and cultural heritage memories in our study may be the reason for this difference. This suggests that the content in the virtual environment plays an important role in the impact of VR on users [38]. Therefore, it is important to carefully select the content of VR experiences for older individuals, as this can significantly impact their emotional responses and overall well-being. Ultimately, this choice can strengthen their connection to their personal history and the broader social, historical and cultural contexts that shape their identities.

The third theme of this study was identified as the "benefits of VR". The participants stated that VR may be useful to keep their memories alive and to delay the problems brought on by cognitive old age. Similarly, in a study examining the views of older people on aging well [39], the participants stated that they did activities such as reading books, watching television, playing mind games, and learning new skills in order to keep their memories alive and age well. Another study [17] concludes that the VR experience was found to be a source of remembrance for the participants. In this context, VR is a promising technology for memory-related assessments and interventions [40]; therefore, incorporating VR into older adults' daily lives can provide a meaningful way to not only recall memories but also actively engage with them. This can play a significant role in increasing their cognitive resilience and emotional well-being and ultimately, improve their quality of life.

The fourth theme of this study was identified as "the meaning of VR technology". Since today's society includes and embraces several new technologies, older people should have the opportunity to use and learn from these technologies [26]. As an emerging technology, one of the VR's advantage is enabling users to view and change their movements in real-time and to perform tasks that can be very difficult in the real world [41]. In this study, participants were impressed by the VR application. They stated that VR was interesting and useful. In a previous study [12], older people reported that they were surprised by both their increased comfort level with technology and the ease of use of VR equipment. Similarly, another study that examined patients' experiences of an upper extremity training program with VR technology after stroke, reported that most of the participants stated that they enjoyed using the program and found it "very interesting" and "easy to use" [41]. Moreover, Chaze et al. [17], found out that the majority of the participants in their study, reported feeling happy during the VR experience and were at ease throughout it. These results are compatible with "creating positive emotions", one of the subthemes of this study. Although it is commonly believed

that older people are not active in using technology, this study's findings and those from previous literature [12, 17, 41]. suggest that they are motivated to use new technology such as VR. In addition, VR technology challenges the belief that older people are reluctant to new technologies, and participants in the present study reported that they were willing to embrace this technology as a tool to improve their quality of life. The positive emotions they felt during the experience demonstrate VR's capacity to increase engagement and happiness. Integrating VR into older people's lives enriches their experiences and supports their ability to adapt to the digital world.

In this study, the participants mostly connected the VR application they experienced to the past life. They also explained the meaning of the VR experience using abstract concepts and concrete objects. Moreover, the majority of the participants expressed positive views about the meaning of VR. Similarly, a study showed that the VR application improved the mood of 77.8% of the participants, entertained them and motivated them to perform their daily activities [35]. Therefore, it can be suggested that older people mostly have positive experiences about VR applications, can adapt to VR and benefit from these applications. Participants used the technology to help them understand themselves, with reporting improved mood and motivation for participating in activities after their VR experience. This demonstrates VR's potential as a valuable resource for emotional well-being and cognitive stimulation. With the right support, older people can learn using and adapt to new technologies which may improve the quality of their daily life. It should also be noted that the adoption of VR for older people in care settings may have some barriers such as technology adaptability, video quality, or personal barriers such as eyeglasses or hearing aids [42]. Therefore, it is recommended to take these barriers into consideration when designing VR applications for older people.

Strengths and limitations

One strength of this study is that it was an in-depth qualitative study that provided a unique opportunity for older people to meet and capture their experiences with the VR application, a technological product used in many fields in recent years. Since the sample group was large enough, we gain similar but also different perceptions, which contributed to enrich the empirical data.

This study has some limitations that need to be mentioned. This study was conducted in Antalya. The socioeconomic status of older people living in this part of the country may be higher than those living in underdeveloped regions of Türkiye. Findings are based on data collected by researchers conducting individual interviews, but data collection was carried out in only one geographic region in Türkiye. Therefore, the restricted geographical area where the study was conducted may affect the generalizability of our results. Moreover, our findings are limited to home-dwelling older people and cannot be transferred to individuals receiving institutional or home-based care.

Future research should explore VR experiences in different healthcare contexts and whether differ between older home-dwelling individuals from low socioeconomic status families and those with low education. We suggest the development of prospective quantitative studies to investigate the factors affecting older people using VR applications.

Conclusion

In light of today's breakthrough technological advancements, it is crucial to investigate how technologies like VR are experienced and whether they are acceptable for older adults. This study provides in-depth information about home-dwelling older individuals' perceptions regarding using VR application and highlights how older people view VR as a means of time travel, comparing their past and present lives, and shares their opinions on the meaning and benefits of VR. It is understood that VR applications help older people travel back in time, a phenomeneon that may contribute to older people to age well and keep their memories alive and refreshed, serving as an entertaining tool from their perspective. The study has shown that VR creates a positive feeling in older people and improve their quality of their daily life. We believe that findings of this qualitative study will assist nurses and other healthcare professionals in conducting VR interventions and care planning for the older people.

Abbreviations

COREQ	The Consolidated Criteria for Reporting Qualitative Research
VR	Virtual Reality

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Author contributions

LM, ZK, EA, RB, ZO made substantial contributions to the conception and design, or acquisition of data, or analysis and interpretation of data; LM, ZK recruited participants and conducted all interviews; LM, ZK, EA, ZO coded all interviews; LM, ZK, EA, RB, ZO involved in drafting the manuscript or revising it critically for important intellectual content. All authors read and approved the final manuscript.

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Data availability

The datasets are available from the corresponding author upon reasonable request for research purposes.

Declarations

Ethics approval and consent to participate

This study was performed according to the principles of the Declaration of Helsinki. Ethics committee approval for the study was obtained from the Clinical Research Ethics Committee of the Akdeniz University, Faculty of Medicine (Decision no: KAEK-958 Date: 22.12.2021) and permission to conduct the study was obtained from the relevant municipality. Written and verbal consent was obtained from the participants before the data were collected.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Clinical trial number

Not applicable.

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