

# Experiences with the Use of Video Bikes and Virtual Reality in Nursing Homes – a Qualitative Study

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**Purpose:** The aim of the study was to explore how health personnel experience use of video bikes and VR (Virtual Reality) in nursing homes.

**Methodology:** The study had an explorative design with a qualitative approach.

**Results:** Nine individual interviews were conducted with health personnel. Analysis of the data yielded four categories: 1. the activity promoted engagement and well-being; 2. the activity promoted a sense of community; 3. the activity contributed to person-centred practice by being proactive and adaptive to the resident's preferences and needs; 4. the activity was promoted and hindered by several factors.

**Conclusion:** This study illuminates that activity with video bikes and VR promoted moments of engagement, and a sense of well-being and community between the nursing home resident and the staff member. It seems reasonable to assert that the activity resembles person-centred processes and yielded person-centred outcomes. However, it is essential to have the right personnel in place and effectively allocate responsibilities.

**Keywords:** nursing home resident, engagement, well-being, sense of community, environmental care in nursing homes

## Introduction

Older adults often develop a strong attachment to their home and living in their own place can strengthen a sense of identity.<sup>1</sup> Home also entails belonging in a social sense.<sup>2</sup> Moving into a care institution, may represent a discontinuity of social relations and place attachment and challenge the feeling of self and cause distress and grief.<sup>3</sup> Moreover, being dependent on help from carers often results in feeling less significant and being no more than one of a group.<sup>2</sup> Being a nursing home resident often implies having less social contact and meaningful activity.<sup>4</sup> The Norwegian government emphasises that the older adult should be offered activity based on their own preferences in their daily life. This activity should provide good moments, stimulate the senses and memories, and encourage movement and participation in their social community.<sup>5</sup> This accords with the concept of person-centred practice, which puts the nursing home resident at the centre of care.<sup>6</sup> Person-centred practice aims to maintain the personhood of the person being cared for, taking care of what really matters to that person. Person-centred practice entails being in a friendly and balanced relationship with those who provide care, existing within a social context, being at home (ie living somewhere that connects the person to their history), and being oneself (ie the person is recognised as an individual).<sup>7</sup> The outcome of person-centred practice is a healthful culture and a feeling of well-being.<sup>6,7</sup> Notwithstanding, person-centred practice requires both organisational and professional qualities. Activities aimed at achieving person-centred practice are likely to fail if the prerequisites are absent.<sup>6</sup>

Person-centred practice may be strengthened by activities that promote belonging in a social and physical sense. Video biking is an activity that uses exercise bikes in front of a screen displaying a video.<sup>8</sup> Virtual Reality (VR) is commonly understood as a device that offers immersive virtual reality by viewing “a stereoscopic virtual environment

through a motion-tracked head-mounted display".<sup>9</sup> The user of the device gets an illusory experience of being somewhere else and can investigate the place by looking around.<sup>9</sup>

Nursing home residents are frequently older adults with physical and cognitive impairment and/or visual deficits. Consequently, it could be difficult for them to participate in an intervention involving a video bike or VR. Furthermore, they may not be familiar with VR technology.<sup>9</sup> Notwithstanding, VR has the potential to increase engagement and activity among older adults with cognitive impairment.<sup>10</sup>

In this study, video bikes and VR glasses were used to increase engagement and social activity, with the aim of contributing to person-centred practice and yielding person-centred outcomes, at three different nursing homes. The video content used for the video bike and VR reminded the nursing home residents of their former life (eg including the surroundings of their home, places where they had travelled, or their former occupation). Both the hardware (VR glasses and exercise bikes) and software (subscription of video content for the video bike and VR) are very costly and were financed through extraordinary funding.

Research is scant about how health personnel experience activity with video bikes and VR, and how these activities contribute to person-centred practice in the context of nursing homes. Consequently, this study aimed to explore this.

## Methods

### Design

The study had an explorative design with a qualitative approach.<sup>11</sup>

### Data Collection

The study was conducted in nursing homes in South-East Norway. The sampling of participants was purposeful. For inclusion, participants had to be health personnel with experience in assisting residents in using the video bikes and/or VR equipment.

Individual interviews were used to collect data. The interviews were conducted by the first author using a semi-structured interview guide based on scientific literature and elaborated in discussion between consultants at the Centre for Development of Institutional and Home Care Services and the authors. There was not established a relationship with the participants prior to the study, nor did the participants receive any information about the interviewer. The face to face interviews took place at the participants' work place. We asked how activity with the video bike and VR contributed to person-centred practice. We also specifically asked about experiences associated with: 1. the selection of individually adapted 360° video, and video connected to the video bikes; 2. helping nursing home residents to watch 360° videos with VR glasses and video bikes; 3. the reactions of nursing home residents to wearing VR glasses to watch 360° videos and using video bikes. The interviews lasted from 23 to 56 minutes.

A total of nine participants were included in the study: two with a degree in social educator training, three auxiliary nurses (one of which was retired), one with a degree in nursing, one physiotherapist and two auxiliary nurse pupils. Both genders were represented. The participants' experience with technology varied. Due to the limited number of individuals with the requisite experience in VR and video bikes, we conducted interviews with as many eligible candidates as possible, except one person who refused to participate without giving a reason. The last interview we conducted did not contribute to new data. The study was conducted between November 2022 and February 2023.

### Data Analysis

After transcribing the audiotaped interview material, the data were analysed via systematic text condensation.<sup>12</sup> The encoded data material provided the basis for writing analytical texts that, in turn, resulted in meaningful descriptions of the different categories. The first and second authors conducted the initial analysis and discussed it with the third author.

Firstly, the transcribed text was read many times, and presumptions were tentatively set aside. A total of eight provisional themes emerged from the data. Secondly, the text elements were examined thoroughly for elements that could help to answer the aim of the study. The authors (HJ and BH) sorted which meaningful units were to be placed into different categories. If the interpretations regarding the categorization differed, we explored the basis for this, working

through the material logically and consistently. Through discussions and reflections, the categories were nuanced, and additional categories identified.

The eight provisional themes were refined. Overall, four categories were categorized. The meaning units were categorized within these four categories.

Clearly distinctive phenomena were categorized into different categories, and facets of the same phenomenon were categorized into the same category. Resemblances and differences across and within the categories were reflected over and discussed. When meaning units did not fit into the four categories, these were questioned, and decisions were made about changing categorization throughout the analysis. Thirdly, the text was decontextualized, and new texts were written with text elements that belonged to the same category (text condensation). Fourthly, the text was recontextualized into a comprehensive text that reflected the meanings of the participants. This was done by writing an analytical text based on the text condensations (HJ, BH and AKH). To ensure that the analytical text reflected the meanings of the participants, the original transcription was examined for meaning units that could challenge the analytical text.

In the results section, the concept “staff members” is used when participants describe their colleagues. [Table 1](#)

**Table 1** Example of Systematic Text Condensation

Transcribed text	Identifying and sorting meaning units. «The activity promoted a sense of community».	Condensation	Analytical text
I find it interesting (discussing urban environments), so I include it in conversations with those who live here. Many of them can express themselves verbally and talk about where they have worked, around the city, for example xxxxx (name of place) and what it was like there in the old days. They can tell me about this and that store, and we can walk around the streets (with video bike), and then I learn a lot. They like to tell their own stories, they have memories they want to share, it's that feeling of being heard, of still having something to say, and feeling important.	Many of them can verbally express themselves and talk about where they have worked around the city, and what it was like there in the old days. They can tell me about this and that store's location. We can walk around the streets, and then I learn a lot. They like to tell their own stories, they have memories they want to share, it's that feeling of being heard, of still having something to say, and feeling important.	Many of them can verbally express themselves and like to tell their own stories. We can walk around the streets, and then I learn a lot. It's that feeling of being heard, of still having something to say, and feeling important.	The participants spoke of the significance of truly getting to know the residents as individuals. The activity promoted a sense of community.

## Results

Nine individual interviews were conducted with health personnel. Analysis of the data yielded four categories. [Table 2](#).

**Table 2** Results

1	The activity promoted engagement and well-being
2	The activity promoted a sense of community
3	The activity contributed to person-centred practice by being proactive and adaptive to the resident's preferences and needs
4	The activity was promoted and hindered by several factors

### The Activity Promoted Engagement and Well-Being

The participants experienced that the activity with video bikes, VR and music contributed to the residents' sense of happiness and emotional well-being and could also prevent the residents experiencing boredom. Furthermore, they reflected about the possibility that the activity might divert the residents' feelings of loneliness and pain.

The participants found that the residents could derive enjoyment from experiencing virtual destinations they had not yet visited in reality. The participants conveyed the residents' preferences for VR content featuring dynamic elements

such as living animals, waves, or a gently sailing boat, as opposed to static scenes. They also perceived that the residents found immersive experiences with sounds like birdsong to be enjoyable:

It hit the patient and she almost danced and sang and was all high. She tends to be a bit more down in body and mind. Participant<sup>6</sup> (about a VR activity).

The participants emphasized the importance of physical activity for the physical health of residents who tended to be inactive throughout the day. They noted that video bikes were convenient as they provided activity for legs as well as for arms if the resident's legs were paralysed. Moreover, the physical activity made the residents livelier and motivated for more activity:

I have noticed that some have been more physically active after having cycled. Participant<sup>4</sup>

The participants found that residents engaging in the activity with video bikes and VR received both visual and auditory stimuli. Participants said that other staff members had conducted mapping of the resident's life history and interests, music preferences, and the locations where the residents had lived and worked, in order to make choices for familiar VR and video content. Familiar content aroused the residents' memories of their past life and often prompted conversations about those memories.

The participants perceived that residents sometimes described themselves as incompetent because of their memory loss and limited ability to explain. The staff member often helped the conversation along. If a resident became aware of their memory loss, the staff member could redirect the conversation to a different topic. By listening to the residents' narratives, staff members gained more insight into their lives and could help as memory loss progressed. The participants experienced that by sharing narratives of their lives, the residents became visible as competent individuals.

## The Activity Promoted a Sense of Community

The participants found that in a group activity with video bikes, when some rode and others just watched the video, conversations about familiar places occurred among the residents. The group activity stimulated a sense of involvement, including for those not biking or participating in the conversation. According to the participants, the conversation could evolve into something more personal. Consequently, the residents had the opportunity to get to know each other. When the residents met up later at the ward, it was easier to start a conversation as they had more topics to talk about beyond just seasons and weather. Notwithstanding, many residents had a severe memory deficit and although conversation took place at the time of the video bike or VR activity, it stopped when the activity stopped.

The participants found that when younger health personnel assisted the residents, it sparked curiosity and created an opportunity for mutual learning:

They like to tell their own stories, they have memories they want to share, it's that feeling of being heard, of still having something to say, and feeling important. Participant<sup>8</sup>

The participants spoke of the significance of truly getting to know the residents as individuals. When a staff member and a resident shared familiarity with a specific place or experience, the ensuing conversation evolved into more of a dialogue rather than a series of questions and answers. The participants also found that the other staff members became amused and curious when the residents shared their narratives and knowledge of the past, as well as how daily life has changed. Consequently, the activity encouraged a sense of community between the resident and the staff member:

I believe that you will be a bit more equal if you are two individuals doing something, not necessarily a patient and a nurse. Participant<sup>7</sup>

## The Activity Contributed to Person-Centred Practice by Being Proactive and Adaptive to the Resident's Preferences and Needs

Staff members helped residents in getting started on the video bike, such as sitting safely and comfortably on it and adjusting the video bike's foot straps and resistance or motor assistance. The participants emphasized the importance of allowing the resident to choose adjustments themselves whenever possible to promote participation and independence.

The participants highlighted the need to pay attention to residents' preferences for conversation or riding the video bike in solitude. Some residents wanted to ride alone, while others enjoyed participating in a group. There were also residents who preferred to just sit and listen to music. Staff members selected appropriate music based on the situation, such as fast rhythms for exercise or slow rhythms to ease restlessness. Alternatively, they might opt for no music if the residents wanted to have a conversation.

Initially, participants found that residents might hesitate, but once they started riding they could continue for a few minutes to half an hour. If a resident declined, their decision was respected, and they were offered the chance to try later. The staff members were attentive to the residents' well-being during the activity to ensure a positive experience.

In addition, the participants found it beneficial for residents to have the opportunity to use the video bike whenever they desired.

If staff members noticed that the resident became uncomfortable with VR, they initiated a break or end the activity. Some participants mentioned that staff members might attempt the activity again later. Furthermore, if a resident appeared to enjoy the VR experience, prolonged viewing could lead to exhaustion. Some residents were hesitant to try the VR headset due to anxiety or unfamiliarity with immersive technology. The participants stressed the importance of respecting residents' choices if they did not wish to try VR, thereby ensuring that the resident felt acknowledged and validated.

The participants emphasized the importance of flexibility in allowing residents to use the VR headset at suitable moments, such as when the resident was restless. Moreover, participants told residents that they could hold the VR headset in front of their faces instead of using the head straps, offering a more convenient option. The participants also noted that residents' interest in VR increased when they had the choice to pick up the equipment themselves, rather than having it put on for them:

It is more tempting if something is put in front of you and you get the opportunity to do it yourself and use your initiative.  
Participant <sup>8</sup>

The participants perceived that, through conversations with residents, the staff members gained insights into the residents preferred and sensitive topics. This awareness allowed them to identify subjects that the residents were comfortable discussing and those that they preferred to avoid.

The participants spoke of the significance of trying to understand the resident and tune into their way of communicating, so that the residents could feel that they were among people who knew them and had enough time for them. This sense of confidence helped residents avoid feeling like a burden, according to the participants:

It's a part of our job to show that we know them, that they feel secure in their current location, that they are with people that know them. Participant <sup>3</sup>

## The Activity Was Promoted and Hindered by Several Factors

The participants found that the video in the activity with the video bike made a significant difference compared to just riding the bike without watching the video. However, they found that both staff members and residents were unfamiliar with the VR technology, and that this hindered their use of it. Furthermore, the staff members received minimal training in advance and minimal information about the potential benefits of VR. A significant factor was the placement of the VR headsets and video bikes. If the equipment was visible and easily accessible it promoted the use of it. Consequently, the participants found that it was easy to forget about the VR headset, where it was, and how useful VR could be.

Furthermore, the participants experienced technical difficulties such as weak internet connection in some parts of the buildings, problems with connecting the VR headset to the tablet or the VR headset and tablet not being charged:

When things don't work, it further reinforces my belief that this isn't my forte. Participant <sup>6</sup>

Consequently, the participants stated that the staff members at the nursing home had not developed an interest in the technology and were not able to use it independently.

The participants found that some of the residents were sceptical about the VR headset because of its size and design. Furthermore, they were not comfortable using the VR headset strapped to their head, having the screen attached close to their eyes and not being able to see anything but the VR content. The participants reflected that this might be frightening for some of the residents. The participants found that some of the other residents became curious about the equipment because it was new, up-to-date technology. The younger staff members were more confident and patient when it came to learning how to use the modern technology than the older ones. Consequently, when the younger and older staff members cooperated and helped one another to use the VR, it promoted its use.

The participants perceived that the activity was promoted if one or two people had responsibility for the equipment and followed up. The participants found that a high workload hindered the use of the video bike and VR. Furthermore, it also depended on the staff member's ability to initiate and maintain a conversation during the activity. The participants found that it was easier to get funding for new equipment than the necessary human resources and time to make use of it.

## Discussion

The aim of the study was to explore how health personnel experience use of video bike and VR (Virtual Reality) in nursing homes.

The results make clear that activities with video bikes and VR glasses promoted the engagement and well-being of the residents, as well as a sense of community between the staff members and the residents. The results also show that staff members had to be proactive by adapting the activity to the resident's preferences and needs, and that various factors promoted or hindered the activity.

The participants reported that residents participating in activities with the video bike and VR showed signs of happiness and emotional well-being. The activity with the video bike comprises both physical activity and music. Lin et al <sup>13</sup> reported that the combination of music and a fitness programme improved depressive mood in older adults living in long-term care facilities. On the other hand, Barrett et al <sup>14</sup> reported, in their systematic review, that physical activities might not affect psychological outcomes such as quality of life, depression or mood. Notwithstanding, the authors suggest that this lack of effect might be caused by problems regarding the measuring of psychological outcomes among patients with dementia that reside in nursing homes. We suggest that happiness and well-being are easily observed by staff members at the time of the video bike/VR activity but may be difficult to observe or measure after the activity. A reasonable reflection could be to question whether good moments following the activity of video bike and VR, can contribute to residents' emotional well-being in the long run.

The results showed that staff members mapped the resident's life history and preferences, and that this made it possible to make personalised choices of VR and video content. Getting to know the individual resident is a prerequisite for person-centred practice.<sup>6</sup> Data showed that staff members got to know more about the resident's former life and values by asking them questions and following up cues in the video bike and VR activity. This sparked a dialogue, leading to a sense of community for both resident and staff member. Furthermore, the data showed that by redirecting the conversation when memory failed, the staff member could help the resident to remember and consequently utilize inherent resources.

It seems reasonable to suggest that contributing to a sense of community positively affects how the resident experiences social well-being. Consequently, it may protect the individuality of the resident.<sup>15</sup> Furthermore, when the relationship between the resident and the staff member evolves into a sense of community it seems reasonable to suggest that the resident experiences being valued as a person, which is a distinctive feature of person-centred practice.<sup>6</sup> Moreover, it seems reasonable to suggest that video bike and VR activities, and the conversations that follow, nurture



meaningful relationships between residents and staff members. Both self-esteem and meaningful relationships are essential outcomes of person-centred practice.<sup>6</sup>

The results showed that the activity gave the resident an opportunity to narrate their life history. By telling their story, the resident became present as a person.<sup>6</sup> The data also indicated that helping the resident to tell their life story depended on the staff member's ability to foster a conversation. The extent to which the activity becomes person-centred is dependent on the ability of each staff member to engage in person-centred processes like «being sympathetically present», «engaging authentically» and «working with the person's beliefs and values».<sup>6</sup>

The results indicated that riding a video bike had positive physical, cognitive, and social effects on the residents. Portegijs et al<sup>16</sup> reported that residents with dementia in long-term care spend most of their awake time inactive. Physical activity is a fundamental human need,<sup>17</sup> and in the context of nursing homes, Barrett et al<sup>14</sup> reported, in their systematic review, positive effects from physical exercise like improved walking speed and balance. Moreover, Gunst et al<sup>18</sup> reported that “exergame” (a combination of exercise and playing video games) contributed to the nursing home resident's mental well-being.

The data also indicated that video bike and VR activities contributed to engaging in conversation with both staff members and other residents. This aligns with Aze<sup>19</sup> who reported that meaningful daily activity and interpersonal relationships contributed most to quality of life among nursing home residents. It seems reasonable to suggest that engaging in conversations and building relationships contributes to making the resident's days meaningful.

Person-centred processes consist of providing holistic care, which includes physical, psychological, social, and existential care. An outcome of person-centred practice is the creation of a healthful culture, which comprises positive emotions, engagement, relationship and meaning.<sup>6</sup> Consequently, when the activity contributes to engagement, well-being, and a sense of community, it resembles person-centred processes.

The results made visible the significance of having the opportunity to use the video bikes whenever the resident desired. Easy access to physical activity and necessary staff resources are premises «to live their lives to the fullest» for residents in long-term care facilities.<sup>20</sup> D'Cunha et al<sup>8</sup> reported that video bike riding promotes well-being, but that it produces no differences in mood between a group with residents riding a video bike and a control group with residents participating in their usual physical activity.

According to the data in this study, the visual aspect of riding a video bike seemed to help counteract the physical exertion. This aligns with Narsakka et al,<sup>20</sup> who reported that variation in visual experiences fosters walking in the corridors of the nursing home. Furthermore, our data showed that activity with the video bike promoted reminiscing and was usually performed as a social activity. Narsakka et al<sup>20</sup> also reported that social support remedies physical activity. The study indicated that it was easier to get funding for equipment for activities than for staff resources to make use of the equipment. Considering that video bike activity is costly, it seems reasonable to consider whether there are sufficient staff resources to make use of this expensive equipment. Furthermore, considering implementing activities with ordinary physical activity before investing in costly exercise bikes and expensive subscriptions to video content seems reasonable. An example of low-cost physical activity for nursing home residents is reported by Chen et al.<sup>21</sup> Their research showed good outcomes from elastic band exercises in older adults in wheelchairs living in nursing homes. A similar kind of low-cost physical activity in a Norwegian context is reported by Rykkje & Engevik<sup>22</sup> where the combination of elastic band exercise and music yielded good outcomes for engagement and well-being. Furthermore, the music was often associated with memories and sparked reminiscence.<sup>22</sup> Consequently, performing physical activity at a nursing home as a part of person-centred practice may be possible at a low cost, when it comes to use of equipment's, but not necessarily when it comes to personnel resources.

Bhattacharyya et al<sup>23</sup> has identified a wide range of engagement activities that are offered in nursing homes. The researchers further argues that the person-centred aspect linked to the activities can potentially result in increased quality of life, but the prerequisite for a person-centred approach is, among other things, sufficient staff resources. In line with our study, lack of personnel resources are also identified as an inhibiting factor for using the activities. In this study, we identified some person-centred processes, however Bhattacharyya et al 2021 points out that activities offered in nursing homes are rarely tailored to individuals and not integrated into personalized care plans.

Nursing home residents are a heterogeneous population<sup>24</sup> and, due to diseases and functional impairments, each of them has varying abilities for physical activity. The results indicated that knowledge of each individual resident guided the video bike activity. Staff members might underestimate the wish and will of residents to take part in physical activity. In contrast, staff members might be too eager to promote physical activity for the frail, older person. Hence, it is essential to utilize individual preferences, experiment, evaluate and make necessary adjustments to activity for each individual resident. This highlights the need for staff competence and reflective practice, which are core elements of person-centred practice.<sup>6</sup> Furthermore, taking into consideration the strengths and inherent resources of each individual resident implies handing over control of the activity from staff members to the resident, empowering the resident, as was indicated by the data. Shared decision making is one of the central person-centred processes.<sup>6</sup> Consequently, this way of conducting video bike activity can promote person-centred practice.

## Strengths and Limitations of the Study

The study had a small number of participants and some of the participants had limited experience in helping with both VR glasses and video-biking. The data produced however thick descriptions of the health personnel experiences. The participants have differing health-related backgrounds and worked at different institutions, which we believe strengthens the study. Furthermore, the information power is considered as sufficient due to firstly a precisely defined and sufficient narrow aim of the study. Secondly the three authors theoretical and experiential knowledge of the topic has informed the interview guide, and lastly through a dialogue-based interview.<sup>25</sup>

## Conclusion

This study illuminates that activity with video bikes and VR promoted moments of engagement, and a sense of well-being and community between the nursing home resident and the staff member. Furthermore, the staff member acted proactive and accommodated the activity to the resident's preferences and needs. Consequently, it seems reasonable to assert that the activity resembles person-centred processes and yielded person-centred outcomes. Notwithstanding, there is a need for availability of personnel resources, and dedicated individuals with responsibility for the activity to achieve success in creating person-centred practice.

Further research could explore the patients' perspective also to achieve a deeper understanding of how activity with video bike and VR promote person-centred practice.

## Abbreviations

VR, virtual reality.

## Acknowledgments

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## Ethics Approval and Consent to Participate

All methods were performed in accordance with the Declaration of Helsinki.<sup>26</sup> The study was approved by Norwegian Agency for Shared Services in Education and Research (SIKT). Permission was obtained from the nursing home managers before the study commenced. The participants were informed verbally and given written information about the study purpose, confidentiality and voluntariness. The participants were informed that anonymized quotes could be published. The participants were informed that it was possible to withdraw consent to participate. Informed consent was given by all participants.

## Disclosure

The authors report no conflicts of interest in this work.

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