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Virtual Reality Gaming in Occupational Rehabilitation - User Experiences and Perceptions

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Background: In Norway, individuals who struggle to participate in the workforce can take part in rehabilitation programmes to improve their work ability. The goal is to return to work by working with cognitive, physical, and environmental processes. Virtual Reality (VR) technology has become a popular and common tool in many healthcare and rehabilitation services but has not yet been systematically applied in occupational rehabilitation.

Purpose: This study aimed to investigate the experiences of participants who engaged in a game-based, immersive VR activity as part of an occupational rehabilitation program.

Material and Methods: Semi-structured interviews were conducted with individuals on long-term sick leave. In total, 12 women and three men (median age 45 years) from three rehabilitation centres (five individuals from each centre) were interviewed before and after discharge from the inpatient stay. The transcripts were analysed using Systematic Text Condensation.

Results: When analysing the data material, four themes were consistent. The first and the second theme contained information about how the VR headset and the game influenced the participants. The headset forced them to pay full attention and gave a feeling of protection from external stimuli. The game brought joy, energy, and endurance with its music and rhythm. The third and fourth themes provided information about how the gaming activity influenced the participants. They experienced that it provided a free space and symptom relief. In addition, they got carried away, broke barriers, and challenged themselves.

Conclusion: The study results indicated that a gamified VR activity in occupational rehabilitation may be a new and powerful experience, substantially different from other rehabilitation modalities. VR training can facilitate a here-and-now feeling distracted from the outside world. More knowledge is needed on possible synergies between VR and other components of occupational rehabilitation and on how it may influence return to work for individuals on long-term sick leave.

Keywords: virtual reality, gaming, occupational rehabilitation, patient experience, qualitative study

Introduction

Work disability is a burden to the individual and costly for the workplace and society.[1] Norway has a high proportion of people on sick leave and disability pension[2] but has also a high employment rate.[3] Inpatient, multimodal, occupational rehabilitation is a health service aiming to facilitate work resumption for employees on long-term sick leave.[4] The rehabilitation programmes typically last from 3–6 weeks and are delivered by interdisciplinary teams. The target group is individuals who struggle to participate in the workforce, are on long-term sick leave, or are on disability benefits. These individuals often struggle with complex and comorbid musculoskeletal and mental health conditions.[5] Occupational rehabilitation is delivered within a biopsychosocial understanding of health and disability, where the workplace is an important stakeholder.[5,6] The core components of the rehabilitation programmes are guided physical exercises, cognitive

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approach, psychoeducation, and interaction with the workplace.[7] Various activities, such as climbing, riding, and kayaking, are offered to increase the participants' motivation and coping experiences during the rehabilitation stay. The rehabilitation programmes aim to improve the participants' work[8] and return to work.[9]

Virtual Reality (VR) technology has become a popular and common tool in many healthcare and rehabilitation services[10] but has not yet been systematically applied in occupational rehabilitation in Norway. VR is an immersive technology that blurs the lines between the physical world and the virtual environment. VR enhances the realism of virtual experiences and creates a sense of presence for the gamer. Rose et al[10] graded the total immersion of VR technologies from non-immersive (using monitors or computer screens) to fully immersive VR using head mounted displays. Immersive VR implies that the virtual environment and stimuli are extensive and rich, excluding the physical surroundings. Thus, immersive VR has the potential to generate a strong feeling of presence in the activity.[10] Activities that use VR technology will often comprise an element of gamification, defined as:

> Application of game mechanics to non-game contexts to engage audiences and to inject some entertainment into mundane activities besides generating motivational and cognitive benefits.[11]

Healthcare researchers are increasingly examining the use of VR across different patient groups in rehabilitation. VR activity works well in rehabilitation due to its engaging nature and its positive influence on physical and cognitive function.[12] Studies have shown that VR in rehabilitation is a promising tool for many health purposes, such as distracting patients from pain[13] and improving activities of daily living among patients with stroke.[14] VR may increase self-efficacy in cancer patients with anxiety and depression.[15] Furthermore, VR has been used as an emotion-focused distraction method and has been shown to reduce symptoms of anxiety, depression, and fatigue.[16] In this sense, VR gaming is also a form of cognitive training that can improve attention and memory.[17]

By introducing VR in occupational rehabilitation, we examine whether this technology could benefit individuals on long-term sick leave and disability benefits. Qualitative studies are needed to get in-depth information about patient experiences in a new setting. The present study investigates how VR is experienced and perceived among patients in occupational rehabilitation. The purpose was to explore patient experiences using a gamified VR activity and whether it is feasible in a work-related rehabilitation setting.

Materials and Methods

This qualitative study was part of a larger multicentre intervention study on digital occupational rehabilitation in Norway.

Setting, Participants, and Procedures

Norway is a Scandinavian welfare state with universal health coverage funded by the tax system. Around the country, public, non-profit, and private actors run rehabilitation centres in the specialist health care service in agreement with the regional health authorities. Patients on long-term sick leave are referred by general practitioners and are offered comprehensive rehabilitation as inpatients or outpatients.[9] Three inpatient and non-profit rehabilitation centres took part in this multicentre study. Two of these, the Red Cross Haugland Rehabilitation Centre (RCHRC) and Muritunet, are located in the western part of Norway while the Rehabilitation Centre AiR (AiR) is located in the eastern part.

Inpatients at the three centres were eligible for inclusion. In total, 129 patients on long-term sick leave were recruited for the intervention study between January 2022 and November 2022. The main reasons for referral were decreased work ability due to musculoskeletal and/or mental health conditions, eg, back pain and symptoms of anxiety and depression. Due to local differences, the recruitment procedure varied somewhat between the three centres. At RCHRC, group-based inpatient stays lasted for three weeks. Every second group of patients was eligible as an intervention group, and every second was defined as a control group. Upon arrival, eligible patients were informed about the study. A maximum of eight patients per group could consent to participation, and lots were drawn if more than eight volunteered. At AiR and Muritunet, group-based inpatient stays lasted four weeks. A maximum of eight patients per group at AiR and four patients at Muritunet could consent to participation as intervention and control groups, respectively. Lots were drawn if too many volunteered. At all three centres, the control group had the same rehabilitation team and programme as the intervention group.

The rehabilitation programmes at the three centres had an interdisciplinary approach; thus, the clinicians had complementary roles and collaborated in the follow-up of patients. The main components of the programmes included work-focused cognitive approaches, indoor and outdoor physical activity, collaboration with employers, and the development of a return-to-work plan. Most of the activities were group-based, with individual adjustments. Each patient developed a plan with goals for activities and strengthening of coping strategies for the rehabilitation period. The components of the rehabilitation programme aimed to increase self-efficacy, physical, mental, emotional, and cognitive capacity, social functioning, and work ability, supporting the overall aim of return to work.[9,18]

VR Intervention

The VR activity used in the intervention was an add-on activity that did not replace any other activities in the programme. The off-the-shelf product Beat Saber (Beat Games, Prague, The Czech Republic) was our study's VR game of choice. Beat Saber is a VR rhythm game that combines original music with lightsaber slashing using controllers in both hands. In the VR headset, the player is exposed to a stream of oncoming small cubes, vertical walls, and bombs. The player must divide each cube in the direction indicated by an arrow and simultaneously avoid the walls and bombs as they appear from different locations, all in time with the rhythm of the music. The Beat Saber programme contains many pieces of music without lyrics, among which participants choose the preferred song. Each song has five levels, increasing complexity and speed, and many opportunities for additional modifications.[19] At RCHRC and Muritunet, the intervention group participated in seven sessions of 15–20 minutes of gaming, whereas the intervention consisted of eight sessions of 20–25 minutes at AiR. Clinicians gave instructions and supervised the activity.

Data Collection

We enrolled a sample of 15 individuals from the intervention group – five from each centre. In two centres, we used purposive sampling and recruited participants whom clinicians expected to represent a rich variation of experiences. None of these individuals rejected participation. In the third centre, the researcher randomly contacted participants who had completed the rehabilitation programme. One-third declined participation. The sample size was guided by an assessment of information power,[20] which in this study was considered to be impacted by the following factors: The specificity of the study aim (narrow), the specificity of the experiences studied (including participants holding characteristics that were highly relevant for the study aim), and having a sample that included individuals with experiences not being studied in the current setting before.

The current study used baseline data collected prior to the multicentre intervention study, except for age, which was recorded at the time of the interview.

Interviews

Data were collected through individual interviews between November 2022 and February 2023. A semi-structured interview guide was used to ensure that key topics were covered as a minimum.[21] One researcher per centre completed the interviews. The participants were encouraged to share positive and negative experiences with the VR gaming activity, related to eg, progression and enjoyment, requirements of attention, concentration, and memory, and physical capacity and symptoms during gaming. They were also questioned about VR their general health and work ability, and whether they considered the experience with VR gaming relevant to other life areas.

Sociodemographic Information

Gender and educational level were obtained from the patients' records at the rehabilitation centres. Educational level was divided into three categories: (1) elementary school, ≤ 10 years; (2) high school, ≤ 13 years; and (3) college/university education, > 14 years. Work participation and referral diagnoses were obtained from the application form to the centre. The diagnoses were grouped according to the International Classification of Primary Care (ICPC-2).

Work Ability Score

Work ability score (WAS) involves self-assessment of perceived mental and physical capacity and work demands.[22] Self-rated work ability was assessed using a single-item question to determine the WAS; this question was published by Gould et al[23] as

part of the full work ability index (WAI).[24] The question to measure WAS used in this study ("current work ability compared with your lifetime best") used a scale of 0 to 10 (0 = "completely unable to work" and 10 = "work ability at its best"). The measurement classification from Gould et al[23] was used: poor (0 to 5), moderate (6 to 7), good (8 to 9), and excellent (10).

Return-to-Work Expectation

Return-to-Work Expectation was measured with a single question: "If you expect to return to work (RTW) (full or part-time) after rehabilitation, how long will it take you to RTW?" (translated by the authors). Participants were asked to select one of nine categories: 1) immediately, 2) less than 1 month; 3) less than 2 months, 4) less than 3 months, 5) less than 6 months, 6) less than 12 months, 7) 12 months or more, 8) never, 9) I do not know.

Data Analysis

The interviews were audio-recorded and transcribed verbatim by one person. The transcribed interviews were analysed using Systematic Text Condensation (STC) by Malterud.[25] This explorative, thematic cross-case method for qualitative data analysis follows an inductive, descriptive, and stepwise approach.[25] The method originates from Giorgis' phenomenological analysis, which searches for the essence of the phenomenon while looking at objects from the perspective of how they are experienced.[26,27] The current analysis focused on participants' experiences with participating in the VR activity and how this contributed to the overall benefit of the rehabilitation. The analysis was conducted in four separate steps following Malterud's systematic text condensation:[25] The first step, *general impression – from chaos to themes*: In this step, all authors read the transcript to get an overall impression of the data, looking for preliminary themes. They met to share their general impression and agreed on the following four preliminary themes: i) an uninhibited space ii) activity and health iii) coping, and iiii) implications. The second step, *identifying meaning – from themes to codes*: In this step, four authors went through the transcript again, line by line, to identify meaning units under the preliminary themes. This was a non-linear comprehensive process where the researchers discussed and reflected on how the different meaning units should be understood and under which codes they belonged. This process started with two temporary themes: I) Locked focus – related to the VR headset, and II) Flow – related to the VR game. Step three, *condensation – from code to meaning*: In this step, four themes were developed, and the belonging meaning units were condensed and rewritten into a first-person narrative intended to represent the participants' stories in the data. The last step, *synthesising – from condensation to descriptions and concepts* involves condensation to an analytic text, representing the most striking content and meaning under each theme. This was done in the third-person format. The analytic text constituted the results section and included a category heading for a brief and expressive sentence to declare the topic. Finally, the results were illustrated by relevant and rich quotations. Quotes from the participants emphasise the findings and give them a platform to voice their experiences, demonstrating the accuracy of the analysis.[28]

Sociodemographic and work-related variables were analysed with descriptive statistics using median and range for continuous variables and numbers and valid percentages for categorical variables. Data were analysed using SPSS, version 27 (Armonk, NY: IBM Corp).

Preconceptions in the Research Team

From the beginning of the present project, the research team was influenced by the overall purpose of the intervention study, ie, an examination of potential changes in cognitive functioning following the use of a gamified VR activity in occupational rehabilitation. Therefore, we were interested in the participants' experiences of the VR activity, their reflections on how it contributed to the overall benefit of occupational rehabilitation, and whether participants experienced general improvements in cognitive functions. We were also interested in whether the VR activity could have relevance and implications for other areas of life. After reading the transcripts, the researchers discussed these preconceptions to bracket them during the data analysis.[25]

Results

The study sample consisted of 12 women and three men aged 31–61 years (median age 45 years). The participants were referred to the programme due to musculoskeletal diseases (53%) or mental health symptoms (47%). Twelve were employed, and three were unemployed. The majority reported work absence between nine weeks up to 12 months, and

none of the participants had a "Good" or "Excellent" work ability score. About 40% of the participants did not know when they expected to return to work (Table 1).

Six participants were interviewed before discharge; thus, their VR activity experience was fresh in mind. For the nine participants interviewed online or by phone, the time from discharge ranged from one to six months. The interviews lasted between 10 and 60 minutes.

During the interviews, the participants predominantly talked about the here-and-now experiences of VR gaming and less about long-term aspects and possible implications for other areas of life. When analysing the data material, four themes were prominent. The first and second themes contained information about how the VR headset and the Beat Saber game influenced the participants. The third and fourth themes provided information about how the gaming activity influenced the participants physically and mentally.

The VR Headset Forced Me to Pay Full Attention, Which Gave Me a Feeling of Protection

Most participants had never tried VR before and were very surprised by the new experience. They described that the moment the VR headset was on, and the game had begun, they got a strange feeling of entering another world from which everything else was locked out. One of the participants described it as being a pawn in the game.

Table 1 Characteristics of the Participants

Variable	Numbers	Percent
Gender, n (%)		
Female	12	(80)
Male	3	(20)
Age, median	45	(31–61)
Educational level, n (%)		
College/university education (> 14 years)	6	(40)
High school (≤ 13 years)	5	(33,33)
Elementary school (≤ 10 years)	2	(13,33)
Not completed elementary school	2	(13,33)
Work absence within the last 12 months, n (%)		
Not work absence	2	(13,33)
Less than two weeks	1	(6,67)
Two to eight weeks	1	(6,67)
Nine weeks to six months	3	(20)
Seven to 12 months	6	(40)
Missing	2	(13)
Work ability score, n (%)		
Poor (0 to 5)	10	(66,67)
Moderate (6 to 7)	5	(33,33)
Good (8 to 9)	0	
Excellent (10)	0	
Return to work expectancy, n (%)		
Immediately or within 3 months	2	(13,33)
Less than 1 month	0	
Less than 2 months	1	(6,67)
Less than 3 months	1	(6,67)
Less than 6 months	2	(13,33)
Less than 12 months	0	
12 months or more	3	(20)
Never	0	
Do not know	6	(40)

> What surprised me the most was that you get totally engaged in it, you concentrate only on yourself, and you don't hear or see anything outside – nothing at all. You must make a real effort to comprehend that you exist anywhere other than inside the headset room.

Many respondents reported how they stopped caring about the gaze of others. Usually, they feel foolish or insecure when others watch them during activities, but the whole focus demanded by the headset makes such worries disappear. Some experienced that the total absorption and concentration created by the headset brought a feeling of relief and calmness. Therefore, several participants wished to buy a VR headset for use at home. However, for some, it was too expensive and therefore unrealistic.

The Music and the Rhythm Brought Joy, Energy, and Endurance

Many participants described how they were captivated by the Beat Saber game's music and rhythm. Moving from side to side and up and down to avoid the incoming walls and bombs felt like a dance that engaged the entire body. The heart was pounding, the body got warm, and energy was spent and achieved very positively. Paying attention, coordinating, and memorising the game gave a sense of flow. One respondent explained how playing the game excited her and that the day improved when she was happy. When her day got better, everything that day became more accessible to deal with.

> VR has had a huge effect on me, or at least on how my situation was. It sounds a bit silly to say, but it is as if I was able to feel joy over something again.

The Game Provided the Participants with a Free Space Where They Could Experience Relief from Symptoms

Most participants were surprised that VR gaming was very different from other experiences. It gave them a break, where they could relax and get relief from health complaints. Many participants described this sense of relief as holistic, encompassing mental and physical aspects. The experience was characterised by intensity, eagerness, and enjoyment that enabled participants to forget the pain many were struggling with. Some participants described this experience as playing a trick to the brain and getting back the body. However, one participant anticipated that the nervous system would eventually realise this and give a reminder that the activity was meant to be painful.

> You are really paying attention and are using all your senses, and afterwards, you can feel the good endorphins and get such a good feeling, because you have been in activity. So, mentally, it matters. I remember how I walked out of the room being in a better mood than when I came.

Most participants said that VR gaming led to a feeling of satisfaction and mastery. Many described struggling with brain fog, which disappeared during the game. Afterwards, their heads could be boiling, but still, they felt better, and many reported that the activity made them more cognitively sharp and mentally focused. Still, a few participants described the effect of gaming in more modest terms as something that at least did not make things worse.

Several participants described how their bodies became cooperative during gaming despite their physical problems. One example was a participant who struggled with poor balance, but during gaming, the balance improved. A few participants felt dizzy and nauseous after the game, but it did not stop them from participating in the VR activity again.

> The hugest benefit was that – there and then – I managed to make a difficult period a little easier. I got a little break.

The Participants Got Carried Away, Broke Barriers, and Challenged Themselves

The participants described getting so absorbed in gaming that they lost track of time and physical surroundings. They experienced that gaming was highly immersive. Many of them forgot that the game was an illusion, especially when dealing with challenges like avoiding virtual objects and interacting physically with the gaming universe. Most of them mentioned using their whole body, including their heart and the brain, while playing the game.

Several participants had never thought they should try VR gaming, and some had low expectations about their mastery. However, they experienced the satisfaction of concentrating, memorising, and practising. The first time they tried the game, it felt too fast and tricky. Sometimes, attempts to advance to the next level were successful; other times, they were not. Achieving a high score felt like "fireworks"- A mix of joy, optimism, and mastery. Step-by-step, the patients improved and advanced from one level of the game to the next.

> Feeling stupid is one of the things I struggle with, but during gaming, I kind of settled with: "No, it's only me, and I just want to have fun and keep on doing this, and if it goes wrong, then be it". But it was also fun to compete a little bit with myself, just trying to manage it and to get a little bit more speed in my hands. it's like, you can lower the expectations towards yourself and just have a little competition with yourself.

For some, their improvements resulted in a new understanding that overcoming difficulties was possible. Outside the game, they became more open to new experiences and paid closer attention to details in their surroundings. Some reported processing information more quickly than they used to. Others only described the immediate benefits of VR without connecting it to their daily lives. Several participants regretted not trying VR long ago as they found it highly beneficial.

> And you – kind of – manage to feel your own body and experience that you can achieve your goals with the body you have. And, of course, when you manage it, then you get a very good feeling inside, and that gives you a good mental feeling of mastery.

Discussion

The results of this study revealed four themes related to VR gaming activity. The VR headset allowed the participants to maintain a "locked focus", and engaging in the VR introduced a feeling of "flow". The results demonstrated how the VR headset compelled the participants to fully concentrate, providing a sense of protection from the surroundings. This sensation was highlighted by the rhythm of the music, which also evoked feelings of joy, energy, and endurance. Participants found that gaming provided a liberating space and relief from symptoms. They became engrossed, overcame obstacles, and challenged themselves.

The study findings indicate that using a gamified VR activity in occupational rehabilitation offers a new and powerful experience distinct from other modalities of occupational rehabilitation. VR is an individual activity that takes place while wearing the VR headset. It provides a significant disconnection from the outside world and occurs in the present moment. This contrasts with the traditional approach in occupational rehabilitation, which often involves group activities and interaction with clinicians and other patients, encompassing physical, mental, and social training.[9]

In the following discussion, we explore how these results and the potential integration can be interpreted and whether a gamified VR activity has the potential to be integrated into the occupational rehabilitation programme.

The participants experienced symptom relief while playing VR games, such as relief from pain, unpleasant body sensations, and mental symptoms described as brain fog. VR gaming has been recognised as a promising way to relieve pain reported both for acute and chronic pain conditions such as headaches and fibromyalgia.[13] Similar pain relief experiences have been reported during and after VR training among patients with stroke[14] and chronic low back pain.[29]

Brain fog, which is a form of cognitive impairment, is often observed among patients undergoing occupational rehabilitation. It can affect executive functions, memory, and attention.[18,30] Work disability is frequently caused by job demands that exceed the individual's ability to handle work-related stress.[30] Chronic stress can also derive from chronic pain and lead to the deterioration of the individual's working memory.[31] Cognitive symptoms typically involve issues with memory and attention,[30,32] which can also be associated with emotional function.[18] VR gaming may enhance positive emotions and decrease negative emotions in participants.[33]

The therapeutic mechanisms behind symptom relief are still unclear, but they may involve interactions between exposure, distraction, and neuropsychological changes.[13,29] The study participants described VR gaming as a distracting activity that made them lose track of time and their physical surroundings. They reported feeling like they were entering another world and experiencing total absorption and concentration.

Several possible explanations exist for how the distraction component may work in VR. Primarily, pain distraction is thought to work by shifting attention from pain to a competitive stimulus, which is more engaging and enjoyable.[34] This stimulus can be visual, auditory, or tactile and is believed to decrease the individual's cognitive capacity to process pain.[29] Studies on attentional distraction have shown promising results but have been criticised for mainly being conducted in experimental environments.[35] A meta-analysis on attentional distraction in patients with chronic pain found no evidence to support using attentional strategies in chronic conditions.[36] However, a later randomised control trial found that participating in a VR distraction activity reduced pain among patients with chronic nonspecific low back pain, both during and immediately after the activity. This effect was independent of baseline pain intensity, pain-related fear, or pain catastrophising, which supports the patient experience in our study.[35]

The enjoyment and flow generated by playing Beat Saber were consistently mentioned in all the interviews. Beat Saber is a commercial game designed for entertainment, but it has also been effectively used for rehabilitation purposes. Studies have shown that Beat Saber is well tolerated and preferred over other VR games due to its captivating nature and the ability to adjust its complexity.[14,19] Participants explained that combining rhythm, movement, and regular game practice brought joy and a sense of flow. Similarly, other studies have found that deeply immersive VR experiences led to enjoyment, which was a crucial factor in engaging in the activity.[10] In line with our findings, Gustavsson et al[14] found that experiencing fun and getting into a state of flow enhanced endurance and extended engagement among patients using VR in stroke rehabilitation. Feelings of enjoyment and a sense of flow are closely linked, according to Csikszentmihalyi.[37] He also described elements that promote flow, such as clear goals, immediate feedback, balance between challenges and skills, and exclusion of distractions. All of these elements are present in fully immersive VR gaming and align with the experiences described by the participants in our study.

Participants in the study expressed that VR gaming provided a welcome escape from their struggles with low self-esteem and fear of negative judgement from others. They found it to be a pleasant change from their usual discomfort in social situations. Being alone in the virtual reality environment of VR was different from the group-based activities typically found in comprehensive occupational rehabilitation,[9] and it provided the patients with positive experiences and hope that their low self-esteem issues were not permanent and could be overcome.[38] A lack of social interaction during long-term sick leave is expected to lead to feelings of uncertainty and vulnerability in social settings.[38] According to Csikszentmihalyi,[37] escaping worries of failure and breaking free from excessive self-awareness during activity can lead to a state of "flow", as experienced by participants in this study.

We wanted to examine whether patients believed VR could enhance learning and improve self-efficacy, potentially benefiting other areas of life. Some participants reflected on how VR gaming had impacted them beyond the immediate experience. They explained that positive experiences with VR had resulted in improved attention to detail in their surroundings and faster information processing. Additionally, they felt more confident in their ability to tackle future challenges and attributed this to their VR gaming experiences. These improvements could lead to increased self-esteem and motivation for this type of training. The positive experiences with VR gaming may increase motivation to continue with the activity and influence other areas of daily life.[39] VR has been associated with positive emotions such as pleasure, fun, happiness, confidence, and hope.[40] In rehabilitation, some individuals lack the motivation to engage in exercise therapy independently and may find motivation through the engagement and joy of VR gaming.[39] However, several barriers may exist to the long-term use of gamified VR activities. Patients in our study mentioned that the equipment may be too expensive for private purchase. Additionally, concerns about adherence to VR activity after discharge have been raised, although researchers have reported a high adherence rate to VR-based rehabilitation at home for neurological patients.[41]

Individuals admitted to inpatient rehabilitation in Norway are often on long-term sick leave and face challenges in various aspects of their lives, including health and work.[38] Through an interdisciplinary and biopsychosocial approach, rehabilitation components (eg, educational, cognitive behavioural, and physical) help the patients build mastery experiences and work ability.[9] It is essential for rehabilitation programmes to be designed in ways that allow the different components to complement each other.[5] In the current study, VR training was used as an add-on activity and was not fully integrated into the rest of the rehabilitation programme. In occupational rehabilitation, cognitive approaches are typically used in synergy with other activities to enhance self-efficacy and work ability and facilitate return to work.[18]

Strengths and Limitations

To our knowledge, this is the first study to target VR gaming in specific occupational rehabilitation. VR training has been offered in various health settings across diagnoses for years, often with positive results.[11,12,16] Using a qualitative design can be beneficial when exploring experiences in a new population and setting. The recruitment of participants from various rehabilitation centres may have strengthened the results since different supervisors oversaw the VR activity. We obtained comprehensive data containing detailed information and personal experiences with VR gaming. The patients in our study knew they were engaging in a new activity, which may have influenced them positively by making them feel selected.

The time of the interview may have contributed to the richness of the data, as some participants had the experience fresh in mind before discharge from rehabilitation. In contrast, others had already left the rehabilitation centre and may have had some time to reflect on the activity, which could be an advantage.

One limitation of our study might be that the recruited participants were more optimistic about the VR activity than the non-recruited. This could mean that the experiences of some patients were not fully represented. Additionally, it is essential to note that the participants in our study were inexperienced with using VR. Therefore, their experiences may not represent younger patients who may be more familiar with digital tools.

Implications

Further research is needed to determine whether VR should be incorporated into occupational rehabilitation. Based on the positive experiences reported in this study, it is tempting to suggest potential implications. The experiences reported in this study are considered beneficial for the participants. This suggests that there is a potential to utilise these effects further. In addition to providing a positive immediate experience and promoting full attention to the game, VR gaming may have untapped potential. For example, VR could be used as a tool for exposure or as a motivator in combination with the cognitive approach in occupational rehabilitation. Another area to explore is how VR gaming can positively impact cognitive functions such as attention, memory, and executive function. However, pursuing these possibilities would require staffing, premises, and technology resources.

Conclusion

Our findings suggest that using gamified VR activities in occupational rehabilitation provides a new and effective experience. The immersive nature of VR technology blurs the boundaries between the physical and virtual worlds, creating a strong sense of presence and flow. Participants described the VR environment as a space where they felt joy and relief from symptoms. Engaging in gamified VR required full attention, was challenging, and provided a distraction from symptoms. VR gaming could be a beneficial activity, helping individuals to focus on the present moment and to reduce symptoms. Further research is needed to understand how VR gaming could be integrated with other components in occupational rehabilitation and its potential impact on individuals' return to work and cognitive function after long-term sick leave.

Abbreviations

VR, virtual reality; RTW, return to work; RCHRC, Red Cross Haugland Rehabilitation Centre; AiR, Rehabilitation Centre AiR; WAS, Work ability score; WAI, work ability index; STC, Systematic Text Condensation; CASP, Critical Appraisal Skills Programme.

Data Sharing Statement

The authors do not wish to share the data, due to further publications plans based on the data material. Technical information about the study is found on Clinical Trials NCT03286374.

Ethics Approval and Informed Consent

This article follows the Critical Appraisal Skills Programme (CASP) checklist for qualitative research.[42] The study was approved by the Norwegian Regional Committee for Medical and Health Research Ethics Central Norway (254368) and the Norwegian Agency for Shared Services in Education and Research (611871). In addition, it is registered in Clinical

Trials NCT06410794. The participants' informed consent included publishing anonymised responses and direct quotes. Consents were obtained in accordance with the Helsinki Declaration, and data storage followed Norwegian legislation and guidelines.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

All authors have agreed to ensure that issues related to the accuracy or integrity of any part of the work, even those in which they were not personally involved, are investigated, resolved, and the resolution properly documented.

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Disclosure

All authors declare that they have no conflicts of interest in this study.

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