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A perspective on potential psychological risks and solutions of using virtual reality in palliative care

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Initial evidence suggests that virtual reality (VR) can effectively reduce palliative symptoms. While such findings shed a positive light on the ability of VR exposure to improve patients' physical and emotional symptoms, VR could have downsides with adverse effects. As most of the reported adverse effects are related to physical risks or technical challenges, there is a scarcity of reports on possible psychological risks posed by VR exposure in palliative care settings, an area with considerable concerns. This is an area that is likely to have a significant impact on the future of clinical practice and research on the use of VR in palliative care. Based on the clinical experience of a registered clinical psychologist who has delivered VR in a palliative care unit for 3 years, we put forward a perspective on the potential psychological complications of using VR in palliative care. Our clinical experiences show that exposure to a desirable virtual environment that is beneficial to patients might not always align with realistic expectations, and that should the use of VR be considered, special precautions are needed to minimize possible psychological harms. This perspective article further proposes three approaches aiming to minimize possible psychological hazards: incorporation of psychological assessment prior to VR administration, psychological interventions right after VR, and professional training of the VR facilitators. We hope that our personally witnessed concerns and perspectives can alert future VR facilitators to the potential psychological hazards of using VR for patients receiving palliative care and inspire future research to minimize psychological harms.

KEYWORDS

virtual reality, palliative care, psychological risks, solutions, FLOW-VRT

1 Introduction

Initial evidence suggests that Virtual Reality (VR) can effectively reduce palliative symptoms. [Niki et al. \(2019\)](#) used VR technology in a pilot study to fulfill patients' dying wishes of traveling and reported a significant reduction in palliative symptoms after virtual travel, notably pain, tiredness, drowsiness, shortness of breath, depression, and anxiety. [Johnson et al. \(2020\)](#), in a feasibility study, advocated the unlimited potential of VR as a novel treatment modality that not only offered quality-of-life benefits to patients receiving palliative care but also reduced their dependency on pharmacological treatment. [Lloyd and Haraldsdottir \(2021\)](#) reported on participants' positive experiences of VR intervention, including joy and happiness and being lifted out of their current situation, which "were able to offer people the capacity for respite from emotional suffering as participants found their experiences to be joyful and calming" (p. 349). Other studies also reported converging feedback from participants on the sense of being away

from their current situation, which may relieve their physical and psychological symptoms (Weingarten et al., 2019; Brungardt et al., 2021; Lloyd and Haraldsdottir, 2021). Another pilot study by Wright et al. (2019) similarly demonstrated VR to be a beneficial and effective means of providing immersion and distraction therapy, which enhances patients' emotional coping when they struggle with their incurable diseases.

While such findings shed positive light on the ability of VR to improve patients' physical and emotional symptoms, VR could have downsides with potential adverse effects. Adverse effects were defined as those perceived as unpleasant or harmful by the patient, clinician, or family, including symptomatic deterioration (Klatte et al., 2018), delusions manifesting related to VR use (Park K. et al., 2019), strong negative emotional responses (Lavoie et al., 2021), recall of upsetting memories (McIntosh, 2022), and negative wellbeing (Lee et al., 2021). The most common reported risks referred to in the literature include "cybersickness", i.e., VR-induced symptoms and effects including nausea, dizziness, disorientation, postural instability, and fatigue (Weech et al., 2019). However, adverse effects are not confined to the physical realm, psychological adverse effects should also be acknowledged and addressed. A recent systematic review (Lundin et al., 2023) highlighted that adverse effects of VR and augmented reality in mental health studies include "traditional vestibular-related side effects, physical experiences, and psychological impacts, which will all need to be considered" (p. 5). To our knowledge, there is no report on the possible psychological risks of VR use in palliative care settings. In other words, the psychological risks posed by VR exposure among patients under palliative care have not been well explored or investigated.

Since existing literature mostly reports on physical risks, barriers, or technical difficulties (Carmon and McIlfatrick, 2022), we put forward a perspective on the potential psychological complications of using VR in palliative care. The analysis is based on the clinical experience of a registered clinical psychologist, i.e., the first author of the current paper (Woo), who is also a certified thanatologist with more than 3 years of clinical experience administering VR in a palliative care setting. A novel VR psychological intervention, referred to as Flourishing-Life-Of-Wish Virtual Reality Therapy (FLOW-VRT[®]), has been developed, researched, and practiced (Woo and Lee, 2023a; Woo and Lee, 2023b). It is a brief, structured, manualized, and individualized psychological intervention with theoretical foundations based on flow theory (Csikszentmihalyi, 1975), stress coping theory (Lazarus and Folkman, 1984), self-determination theory (Deci and Ryan, 2000), and attention restoration theory (Kaplan, 1995; 2001). FLOW-VRT with a focus on relaxation (FLOW-VRT-Relaxation) allows patients to choose their preferred VR relaxation experience, which aims to improve their palliative symptoms by addressing their unmet physical and psychological needs. Our case report (Woo and Lee, 2023c) provided encouraging initial support for its feasibility, acceptability, and therapeutic potential as a cost-effective, scalable, and personalized VR relaxation for patients under palliative care. Our randomized controlled trial on 128 patients receiving palliative care showed that FLOW-VRT-Relaxation was associated with significantly greater reductions in overall palliative symptoms, total physical symptoms, and total emotional symptoms when compared with conventional face-to-face relaxation (Woo and Lee, 2023a). Based on our clinical studies and observations, this perspective article highlights three possible psychological risks and proposes three approaches aiming to minimize possible psychological hazards when delivering VR to this vulnerable population.

2 Potential psychological risks

First, we observed that VR exposure may pose psychological risks, including additional emotional distress, to patients under palliative care if maladaptive cognitions triggered by the virtual experience are not appropriately processed. Under the principle of cognitive-behavioral therapy, psychological problems are based on maladaptive or unhelpful ways of thinking. As VR provides an immersive experience with a sense of presence (McCreery et al., 2013), such VR exposure can easily trigger patients' underlying maladaptive cognitions, which, if not well processed or addressed, can cause emotional turbulence. One clinical example of VR refers to a lady who burst into tears during a VR experience, which triggered her underlying cognitions: "Why do I cry when watching VR content that is supposed to make me happy? Am I crazy? Am I an abnormal person?". Further probing revealed that she was previously invalidated by others for crying and also labeled as a mad and crazy person. Immediate cognitive interventions, including emotional validation and normalization, were delivered, which were followed by further processing of her maladaptive thinking. We also foresee that VR exposure may trigger possible maladaptive cognitions related to regret or hopelessness when recognizing that one might never be able to have such an experience in real life but only in a virtual context. Without timely psychological debriefing or interventions (e.g., acceptance and commitment therapy), we are highly concerned that such VR exposure brings along potential risks of leaving patients in an even more vulnerable emotional state. In short, the VR facilitators' professional ability to recognize patients' maladaptive cognitions triggered by VR exposure and their professional competency to deliver immediate psychological interventions right after VR exposure are of crucial importance.

Second, we observed that the lack of a smooth transition from the virtual environment to reality may lead to additional emotional distress. Clinical examples of mood and symptom improvement after VR exposure include those who reported a preferred shift from their sick role to a favorable role through VR exposure when escaping virtually to any activities they had longed for. We had experiences delivering VR to a paraplegic patient who chose to virtually hike in the Amazon Forest as an energetic traveler and a painful patient who enjoyed Japan's Sakura as a painless visitor. However, an unfavorable transition from the ideal identity in the virtual context to the patient role in reality, which is clinically observed to be related to the degree of acceptance of one's current physical status, may result in significant emotional disturbances. In other words, those patients who are not able to accept their current palliative status or physical limitations prior to VR exposure may encounter further difficulties in accepting the identity shift after immersing themselves in the VR environment with a favorable identity. We therefore propose a thorough psychological assessment before VR delivery to assess one's degree of acceptance and his or her psychological readiness for VR exposure, such that the risk of an unfavorable transition from the virtual world to reality can be minimized. In addition to subjective rating scales, objective changes can be captured as well through physiological responses such as pulse rate (Gershon et al., 2004) and galvanic skin response (van't Wout et al., 2017) during or/and right after VR, such that any possible stress responses can be detected for timely psychological interventions.

Lastly, we observed that the lack of readiness for VR experiences that may relate to past memories may pose additional psychological risks as well. Although life review interventions have been empirically supported for their therapeutic benefit in improving quality of life and psychological

wellbeing during patients' end stages of life (O' Philbin et al., 2018; Park M. J. et al., 2019), not all patients under palliative care are observed to be psychologically ready to process their past experiences. As coping styles vary (Lazarus and Folkman, 1984), individual readiness for VR experiences that may touch on or trigger past experiences differs. We would therefore like to highlight the importance of assessing in advance one's psychological readiness for VR exposure that might trigger unwanted emotions related to past experiences in such immersive experiences. Our clinical observations locate the following factors that may pose difficulties for patients to access past experiences: avoidant coping, low sense of acceptance towards palliative status, worries about possible negative emotions when accessing past experiences, unfavorable prior VR experiences, as well as anticipatory anxiety towards a smooth transition from the virtual past to the real-life present. We therefore propose a prior psychological assessment of the patient's readiness to access past experiences to minimize possible psychological risks.

Despite psychological assessments, there remains a possibility that a portion of patients who are initially assessed to be ready for VR exposure are later found to respond poorly after VR exposure. We also suggest timely intervention by well-trained VR facilitators to locate the possible causes of emotional distress (if any), and deliver appropriate interventions, e.g., psychoeducation on the consequences of avoidant coping, facilitation of acceptance, emotional and cognitive processing, and anxiety management. Again, we advocate that VR facilitators' clinical sensitivity to recognize patients' emotional disturbances triggered by VR exposure and their professional competency to provide immediate psychological interventions are important.

3 Discussions

Our clinical experience shows that exposure to a desirable virtual environment that is beneficial to patients is potentially promising but might not always be true and might even carry possible psychological risks. We speculate that the underlying reason relates to the fact that the same virtual experience may lead to different cognitive appraisals. A too realistic simulation of a neutral event may be able to trigger maladaptive thinking or unprocessed emotions among patients with emotional vulnerability. Should the use of VR be considered, we suggest VR facilitators conduct prior psychological assessments and deliver interventions right after to attenuate the negative effect of the temporary escape from current existential suffering and maximize the gains from VR exposure. This seems to be a more secure and effective strategy than only exposing vulnerable patients to an ideal virtual environment. From a positive perspective, we learned that the VR experience can indeed act as a helpful tool to trigger a patient's core belief or maladaptive thinking that is otherwise uneasy to identify without the VR exposure. In other words, the VR experience can provide a precious platform for conventional psychological treatment (e.g., psychoeducation, emotional, and cognitive processing) to intervene if patients' emotional distress can be well managed and resolved by the VR facilitators. Such a perspective is consistent with the special highlight from Oberdörfer et al. (2023) that "even with positive intentions (of VR applications), negative emotions can arise, but that negative effects of virtual environment design can be useful in therapeutic contexts (p. 2). Based on the insights gained from Rizzo et al.'s (2010) studies on VR exposure therapy for posttraumatic stress disorders, VR intervention is not advised to be in a "self-help" format

but as a treatment option for possible therapeutic benefits, delivered by trained facilitators. Although patients under palliative care may not suffer from clinical mood problems, their psychological fragility in the face of existential challenges may pose heightened risks in a virtual environment if professional psychological support is not provided.

Echoing the literature findings, we advocate the crucial need for well-trained VR facilitators to ensure the quality of VR delivery with minimal risks. It was deemed important to "consider the purpose of the activity, to identify how content is developed, and to define how (and by whom) it is delivered" (Nwosu et al., 2021). As the professional discipline of psychology has been recognized for its essential role in the development and advancement of quality VR systems for any purpose (Rizzo et al., 2021), the knowledge and skills of a well-trained VR facilitator with a professional background in palliative care, counseling, or psychology are considered essential for the safe and quality delivery of VR interventions. Not only would the well-trained VR facilitators be sensitive to the individual needs of the patients in palliative care, but their psychological assessment and interventions right before and after the VR exposure are considered crucial to minimize any possible psychological risks, if not enhance therapeutic benefit.

This perspective article contributes to the literature examining the potential of VR to improve the symptoms of patients under palliative care, the literature exploring potential psychological risks of using VR in palliative care, and the literature on feasible solutions to minimize the psychological risks of VR exposure among such a vulnerable population. In summary, it supports the growing literature on the intersection of psychological, technological, and palliative care. It is hoped that our perspective will alert future VR facilitators to the potential psychological hazards of using VR in palliative care and inspire future research to minimize possible psychological harms. The insights from our studies should inform both VR facilitators, public policymakers, and ultimately patients under palliative care.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

OW: Conceptualization, Investigation, Writing—original draft. AL: Supervision, Writing—review and editing, Conceptualization.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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