

How do the perspectives of clinicians with and without virtual reality/active video game experience differ about its use in practice?

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ABSTRACT

Little is known about clinicians' perspectives on the use of virtual reality (VR) and active video games (AVGs) in rehabilitation. We undertook an online survey of VR/AVG experience and learning needs in a sample of 1068 physical therapists and occupational therapists practicing in Canada. Nearly half (47%) had clinical experience with at least one system. While both therapist groups identified challenges and barriers, experienced therapists highlighted VR/AVGs' potential to increase patient motivation and engagement. Respondents without experience identified new potential avenues for VR/AVG use. Findings from this study will inform the content of open-access knowledge translation resources hosted at www.vr4rehab.com.

1. INTRODUCTION

Virtual reality (VR) and active video games (AVGs) are increasingly popular treatment interventions in a variety of rehabilitation practice settings and populations. Despite a growing evidence base (e.g., Finestone and Kumbhare, 2016), little is known about how clinicians perceive VR/AVGs as a tool for clinical practice. Gaining this knowledge is essential for both clinical knowledge translation (KT) and VR industry development. Understanding the perspectives of clinicians without VR/AVG experience can inform KT supports designed to enhance uptake. Information from clinicians with VR/AVG experience can further elucidate barriers and facilitators to VR/AVG use as well as identify clinical applications of this technology that can be evaluated in subsequent research. Perspectives from both groups can help the VR/AVG industry tailor their system packages and orientation to address therapist concerns and move the industry forward by designing games that meet therapeutic needs.

Current knowledge regarding clinicians' perspectives comes from small studies focused on specific VR/AVG systems, practice settings or patient populations. Previously identified barriers to VR/AVG adoption include lack of time to set up the technology and learn about its use, lack of funds to purchase systems or games, lack of space to deliver the interventions, and difficulty matching VR/AVG interventions with client goals (Glegg et al., 2014, Levac and Miller, 2013). Facilitators to VR/AVG integration include client motivation, clinician training and enhancing patients' social interaction with peers (Glegg et al., 2014, Levac and Miller, 2013, Tatla et al., 2015). To the best of our knowledge, no study has compared the perspectives about VR of clinicians with and without VR/AVG experience or surveyed clinicians from a wide range of practice settings.

2. METHODS

We undertook an online survey between February and August 2015 of physiotherapists and occupational therapists practicing in Canada who were members of one of 26 professional colleges or associations. The survey explored therapists' VR/AVG experience and learning needs with respect to integrating VR/AVGs into clinical practice. Quantitative findings related to the predictors of VR/AVG adoption, as well as to specific learning needs and preferences will be reported in a subsequent publication. The focus of this paper is on the results of an open-ended question that asked respondents for their perspectives on VR/AVG integration within rehabilitation. Respondents were divided into 'yes' or 'no' VR/AVG clinical experience. Two investigators (DL and PM) used conventional qualitative content analysis (Hsieh & Shannon, 2005) to code individual responses and create categories, illustrated with representative quotes, which were grouped within themes. Researchers approach conventional content analysis without preconceived categories; a full description of the method can be found in Hsieh & Shannon (2005).

3. RESULTS

3.1 Participant demographics

With an estimated 20% survey response rate, the sample consisted of 506 physical therapists and 562 occupational therapists, with 47% having VR/AVG experience in a clinical setting and 54% having no VR/AVG clinical experience. Respondents worked in rehabilitation hospitals (26%), acute care hospitals (25%), and other settings, including residential or home care (14%), out-patient clinics (11%), community health centers (9%), and schools (5.5%). Most participants had experience with the Nintendo Wii and/or Wii Fit (73%), while only 7% had experience with the Microsoft Kinect; less than 3% of respondents had experience with other rehabilitation-specific systems (e.g. GestureTek, Jintronix, Timocco, CAREN, etc.). A VR/AVG system was available for use at work for 62.5% of participants.

3.2 Themes and categories

Seventy-six % of respondents with VR/AVG experience and 72% of participants without VR/AVG experience responded to the open-ended question. A subset of the full qualitative analysis is presented here. Three themes related to perceptions on VR/AVG use in clinical practice: Seeing Value, Seeing Challenges, and Seeing Potential. **Table 1** summarizes the categories within the qualitative analysis and the frequency counts for each group.

3.3 Differences in perspectives between clinicians with and without VR/AVG experience

Therapists with VR/AVG experience were more likely to comment that VR/AVG use provided benefits for patient motivation and engagement and supported use of motor learning principles. With respect to increasing engagement, one therapist stated: *"I believe using VR games is a meaningful, dynamic means of engaging clients in rehabilitation. Geriatric clients are often unable to continue engaging in physical activities previously enjoyed such as golf and bowling, with virtual reality they are able to engage in these activities in a different way that is still enjoyable."* With respect to accordance with motor learning principles, one therapist commented on the feedback provided by the Wii Fit AVG: *"I use the Wii Fit balance board to provide people with visual feedback related to where their body is and the weight bearing status. I feel that it is an accurate way for them to be more familiar with their body postures and positioning."* Respondents also reported that using VR/AVGs could increase therapeutic practice duration: *"When used for certain activities (i.e. balance), clients are able to stay engaged for longer periods of time than when using other modalities (i.e. wobble boards)."*

While respondents without VR/AVG experience were more likely to express challenges related to lack of training and access to VR/AVG systems, respondents with VR/AVG experience commented more specifically on issues related to its use in practice, such as the need for therapist supervision in guiding appropriate movement patterns, and the need for more accessible rehabilitation-specific games. For example, one therapist stated: *"...the overt sensitivity of some of the controllers allowed them to "cheat" on occasion and not use the full ROM I was looking for, which required diligence on my part."* Another therapist stated: *"I would use VR/video games more if the challenges within the game could be graded more easily. It is difficult to match a client's ability with the game pre-set levels. Basic levels of games are often more advanced than clients are able to manage."* More respondents with VR/AVG experience identified problematic issues related to logistics and practicalities, including technology issues: *"Technology is a great medium for treatment as long as it works well. I know when I am planning to use technology for treatment sessions I am quite frustrated if it malfunctions and I cannot get it to work correctly."*

Table 1. Qualitative analysis results presented as counts.

Themes	Categories	YES experience (N)	NO experience (N)
Seeing Value	Enhancing patient fun and motivation	54	30
	Current/potential effective treatment for many therapeutic goals	42	24
	Enhancing patient engagement	20	24
	Promoting motor learning	13	3
	Enhancing therapist/patient relationship	2	0
Seeing Challenges	Inappropriate patients/setting	24	51
	Lack of time to set up or learn to use	21	20
	Lack of funds	13	10
	Need for therapist guidance to promote quality movement	13	0
	Need for more accessible, rehabilitation-specific games	12	0
	Lack of space	10	14
	Lack of knowledge	8	37
	VR should not replace real world experiences	6	5
	VR/AVG systems lack transportability	5	4
	Lack of evidence	3	7
	Concerns regarding lack of transfer to real world	3	6
	Screen time should be minimized	2	12
Seeing Potential	Use with lesser explored/potential populations (e.g. <i>mental health, chronic disease management, injury prevention</i>)	8	12

With respect to the theme of ‘seeing potential’, therapists without VR/AVG experience were more likely to identify creative potential new uses for this medium. For example, therapists stated “*It would be great to have a system for graded motor imagery when we are looking to break up chronic pain pathways and retrain the pre-motor cortex, visual centers etc. prior to retraining the motor cortex*” and “*I would love to have a VR teaching ‘room’ set up in order to help the patients I work with understand and apply principles of energy conservation in everyday activities. I think this would be a really unique and exciting way for people to learn and apply chronic disease management strategies and principles in a safe and controlled environment.*”

3.4 Similarities in perspectives between clinicians with and without VR/AVG experience

The greatest similarity in perspectives between groups was seen in identified challenges, such as cost, time, space, learning needs, characteristics of patients not being appropriate for VR/AVGs [e.g. young children, the elderly], and inappropriate settings [e.g. schools, homes]. Interestingly, lack of evidence to support VR/AVG use in practice was not mentioned frequently as a barrier in either group. Therapists in both groups mentioned concerns regarding lack of transfer from VR practice to real world skills. For example, one therapist without VR/AVG experience stated: “...*However, the question will/would be – how well does playing the video game translate to real world real life? Using VR or games for treatment is interesting, but I would currently have a lot of trouble tying the use of that to a client’s specific goals and determining if it is helping to achieve those goals.*”

4. DISCUSSION

As the first study to survey therapists with and without VR/AVG experience across a wide range of clinical practice settings and populations, our findings add to the existing knowledge about barriers and facilitators to VR/AVG use in practice, while confirming findings of previous small-scale studies. Our results also reinforce that similar issues exist in different settings, which provides rationale for larger scale KT implementation interventions that could be applicable across contexts. This study provides new knowledge about the perspectives of clinicians without VR/AVG experience, which can inform technology implementation efforts. Interestingly, more therapists without experience identified creative ways that they would like to see VR/AVG applied. These findings can inform VR/AVG developers looking for new populations or goals to target with games. Indeed, while developers may be focused on client end-users, therapists are the gatekeepers who decide whether or not games will be used, and systems need to suit both populations for optimal potential to enhance health outcomes.

Study respondents in both groups emphasized that VR/AVG use can enhance patient motivation and engagement, which is frequently presented as a rationale for VR/AVG use in the literature (e.g. Levac et al., 2012). This finding reinforces the need to measure motivation and engagement in clinical practice and the

importance of research to investigate the characteristics supporting the learner's affective state as key 'active ingredients' of successful VR/AVG interventions.

Several respondents with and without VR/AVG experience were concerned about the 'virtual' aspect of these interventions and were clear that they preferred real life functional activities. However, other respondents identified that this medium allowed patients to practice skills that they could not otherwise accomplish in real life. Both of these issues - lack of ecological validity or transfer and opportunities to practice real life skills in safe and enjoyable environments – are important to further explore in VR/AVG research and development. Asking clinicians what they want and need and engaging current non-users in the development of new technologies is key and can support more tangible links between VR-based skills and real-world skills.

Study limitations include reliance on a single non-specific open-ended question. However, our findings – and those based on the survey as a whole – are informing the development of KT resources to be available on our website (www.vr4rehab.com). This website will be home to a range of online resources that are being designed to assist clinicians in keeping current with emerging research evidence on VR/AVGs in rehabilitation, in developing new knowledge and skills in applying VR/AVGs to practice, and in accessing networking and learning opportunities in the field. Interactive features will enable information exchange, and will help to build a community of practice for clinicians incorporating VR/AVGs as a treatment approach with clients across the lifespan in a variety of practice settings. We will soon administer the survey to therapists working in the US to further inform resource development and gain insight into the generalizability of the Canadian results to other health care contexts. Analyses will explore the relationship between employment setting and learning needs.

5. CONCLUSIONS

Physical and occupational therapists both with and without VR/AVG experience were able to identify challenges and barriers to use in practice, but those with experience were more nuanced about specific factors. The potential to increase patient motivation and engagement was highlighted by experienced therapists, as were specific challenges as to the therapist's role; however, respondents without experience shared potential new avenues for VR/AVG use. Study findings will inform development of resources designed to increase evidence-informed uptake of VR/AVG use in practice by therapists interested in integrating the technology and will target the challenges and facilitators to the technologies' use in rehabilitation that resonate with both novice and experienced users.

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6. REFERENCES

- Finestone, HM, Kumbhare, D, (2016), Second-Order Peer Reviews of Clinically Relevant Articles for the Physiatrist: Rehabilitation that Incorporates Virtual Reality Is More Effective than Standard Rehabilitation for Improving Walking Speed, Balance, and Mobility After Stroke: A Systematic Review, *Am J Phys Med Rehabil*, [Epub ahead of print].
- Hsieh, HF, Shannon, SE, (2005), Three approaches to qualitative content analysis, *Qual Health Res*, **15**, 9, pp. 1277-88.
- Glegg, SM, Holsti, L, Stanton, S, Hanna, S, Velikonja, D, Ansley, B, Sartor, D, Brum, C, (2014), Using virtual reality in clinical practice: A multi-site exploratory study, *NeuroRehabil*, **35**, 3, pp. 563-77.
- Levac, D, Miller P, (2013), Integrating virtual reality video games into therapy: clinician's experiences. *Physiother Theory Pract*, **29**, 7, pp. 504-12.
- Tatla, SK, Shirzad, N, Lohse, KR, Virji-Babul, N, Hoens, AM, Holsti, L, Li, LC, Miller, KJ, Lam, MY, Van der Loos, HF, (2015), Therapists' perceptions of social media and video game technologies in upper limb rehabilitation, *JMIR Serious Games*, **10**, 3(1):e2. doi: 10.2196/games.3401