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Using virtual worlds for patient and public engagement

Michael J. Taylor^{1,2}, Meerat Kaur², Uvarshi Sharma², Dave Taylor¹, Julie E. Reed², and Ara Darzi¹

¹Department of Surgery and Cancer, Imperial College London

²NIHR CLAHRC for Northwest London

Abstract

Patient and public involvement is fundamental in healthcare and many methods attempt to facilitate this engagement. The present study investigated use of computer-generated environments known as ‘virtual worlds’ (VW) as an involvement method.

The VW used in the present research was Second Life, which is 3-dimensional, publically accessible and internet-based. It is accessed using digital self-representations, or ‘avatars’, through which users navigate the virtual environment and communicate with one another.

Participants were patients with long-term conditions, frequently involved in shaping health research and care. Some had mobility and communication difficulties, potentially making involvement through traditional face-to-face modes of engagement challenging.

There were 2 stages to this study.

Stage-1: Participants were introduced to VWs and Second Life. This was followed by a face-to-face focus group discussion (FGD) in order to gain their views on use of SL.

Stage-2: An FGD attended by 8 people (4 patients, 3 researchers, 1 healthcare professional) was conducted in Second Life. Training and support on using Second Life had been provided for participants. The FGD took place successfully, although some technical and communication difficulties were experienced. Data was collected in the form of interviews and questionnaires from the patients about their experience of using the virtual world.

Participants recognised the potential of VWs as a platform for patient engagement, especially for those who suffer from chronic conditions that impact severely upon their mobility and communication. Participant feedback indicated that potential barriers include technical problems with VW programs and potential user inexperience of using VWs, which may be counteracted by ensuring provision of continuous training and support.

In conclusion, this study established the feasibility of using VWs for patient FGDs and indicates a potential of use of VWs for engagement in future, particularly for peer-led support and to engage people with particular long-term conditions.

Disclosure

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Background

The increasing availability of powerful computers and high-speed internet allow for more and more people to be able to communicate online in a variety of different ways. The present research explores the prospect of using 3-dimensional web-based computer-generated environments (virtual worlds) as a tool to facilitate the involvement of patients and members of the public in healthcare.

Patient and public involvement

Over the last decade, there have been concerted policy and legislative efforts in the United Kingdom (UK) to promote systematic involvement of patients and members of the public in shaping healthcare planning, delivery, evaluation and research (Boote, Telford, & Cooper, 2002; Department of Health, 1999, 2000, 2003; House of Commons Health Committee, 2003; Section 11 of the Health and Social Care Act, 2012; NHS Act 2006, section 242, 1B). This has been largely in response to a variety of systematic failings of patient care in the National Health Service (NHS), which led to the launch of investigative public inquiries and instigation of preventative measures (Francis, 2009, 2010; Kennedy, 2001; Redfern, 2001). These inquiries were indicative of a shift in the pervading culture of the NHS, from paternalistic “doctors know best” environments, towards one where healthcare professionals, patients and members of the public work together to plan, organize and deliver a responsive and patient-centered healthcare system:

“The notion of partnership between healthcare professional and the patient, whereby the patient and the professional meet as equals with different expertise, must be adopted by healthcare professionals in all parts of the NHS, including healthcare professionals in hospitals” (Kennedy, 2001)

This has led to an increase in regulations to encourage and promote patient and public involvement (PPI) in the National Health Service (NHS) in England. For the purposes of this article, PPI is defined as “Ways in which patients can draw on their experience and members of the public can apply their priorities to the evaluation, development, organization and delivery of health services” (Tritter, 2009). Their interest and motivation may be a result of their personal experiences of receiving care, or any other way that the healthcare service has affected them. Patient involvement goes beyond being involved in decisions about their individual care or participation as research subjects.

In order for PPI to have a meaningful impact on the health service, time and financial resources need to be committed. Previously this tended to come in the form of paid healthcare professionals with a PPI remit sitting within the NHS, supporting others to involve patients and members of the public while building relationships and connecting with community organizations and networks. However, recent healthcare reforms and cost-cutting across the NHS has dispersed many of these existing support structures and highlighted the overdependence on healthcare professionals for meaningful PPI. Gibson et al (2012) state current and past PPI systems downgrade the power of involvement volunteers, retaining traditional power structures with paid involvement professionals hanging on to authority. They maintain “there are a number of significant concerns about the ability of

current arrangements to deliver ‘genuine’ involvement and consequential improvements in quality and efficiency” (Gibson, Britten, & Lynch, 2012).

Traditional methods of PPI, especially for researchers, involve face-to-face interviews and focus groups (Elberse, Pittens, de Cock Buning, & Broerse; Martin & Larsen, 2012). However, these methods can continue to enforce the power structure between paid involvement professionals, patients and members of the public, as they are reliant on the availability of resources; such as money to pay for venues for focus groups or the equipment and skills to be able to carry out face-to-face interviews. There are those who propagate the value of PPI in research, exploring various ways patients and members of the public can be involved beyond the traditionally accepted to achieve meaningful involvement (Bastian, 1994). PPI is a complex process of engagement, constantly evolving, frequently changing and dependent on the time, context and culture of those involving or being involved. It therefore requires various involvement methods, and an acceptance that a collaborative approach leads to the diverse actors (including patients, members of the public and healthcare professionals) providing complementary knowledge and expertise (Tritter & McCallum, 2006).

Virtual worlds for enhancing patient involvement

Virtual reality has been used to enhance patient care in health settings previously for a range of purposes including treatments of psychological disorders (Rothbaum, 2010; Rothbaum, Hodges, & Smith, 1999) and for patient education (Boulos, Hetherington, & Wheeler, 2007; Hall, Conboy-Hill, & Taylor, 2011). Virtual worlds have been used to induce mood enhancement in metastatic cancer (R. Baños, et al., 2012) and elderly patients, (R. M. Baños, et al., 2012) finding specially designed therapeutic and relaxing virtual environments stimulated relaxation, encouraged positive emotions and reduced negative emotions. Individuals with medical conditions can experience a lack of a general ‘sense of control’ (Ward, 2013), and a therapeutic virtual environment where users can exercise control over their movements and interactions within this environment may help to alleviate such effects.

Virtual worlds can provide a variety of information-sharing options and offer an effective way of holding remote collaborative meetings (Kahai, Carroll, & Jestice, 2007; Montoya, Massey, & Lockwood, 2011). Second Life is a 3-dimensional, web-based virtual world. Users interact with one another and the environment through digital representations known as ‘avatars’. Particular virtual spaces within the virtual world of Second Life are represented as ‘islands’, which are dedicated to a variety of purposes, including health research and resources for patients (Boulos, et al., 2007).

This project investigated the feasibility of using publically accessible virtual environments as a way of providing a platform for patient and public involvement in healthcare. We specifically tested whether Second Life could be a tool to encourage diverse actors to get involved, as there is evidence that communicating remotely using computers can lead to traditional power structures being challenged or altered (Johnson and Cooper, 2009; Taylor et al, Submitted). There are multiple virtual worlds available, but we chose to use Second Life because at the time of testing it appeared to be the most user-friendly and easy to

access, and additionally had established popularity (Boulos et al., 2007) and efficacy as a platform for interpersonal collaboration (Montoya, Massey & Lockwood, 2011).

Methods

The study sample: Experts in involvement

The participants of this study were patients and healthcare professionals affiliated to The National Institute for Health Research (NIHR) Collaboration for Leadership in Applied Health Research and Care (CLAHRC) for Northwest London. This organization is one of nine 5 year pilot programs across the UK that aim to translate medical research into practice, with the Northwest London program emphasizing PPI as a fundamental tool to achieve this aim and improve the quality of healthcare services. The participants of this study were patients and members of healthcare staff who have taken part in PPI in affiliation with CLAHRC for NW London.

Study design

The project design evolved as the project progressed, being dependent on the results of discussions with participants as well as barriers related to using virtual worlds, therefore impacting the extent to which Second Life could be tested within a given timeframe with a small patient sample. Uses for virtual worlds for patient involvement have not previously been empirically demonstrated, so the design comprised of a feasibility study in which a patient involvement group meeting was held in a virtual world. Data collection took place in the form of in depth interviews, questionnaire results and content of a face-to-face focus group with the participants.

Recruitment of participants

Potential participants were targeted due to their previous engagement as patient advisors on NIHR CLAHRC for Northwest London improvement projects, or with PPI in their local region. In addition, one person had previously contacted a member of the project team regarding possible PPI work using virtual worlds. Invitations were e mailed to invite the potential participants to attend a focus group to explore the prospect of virtual worlds, and in particular Second Life, being used in healthcare.

Initial face-to-face focus group discussion session

Five patient advisors, one clinician and three researchers attended this focus group. At the start of the session, participants shared past experienced of being involved in care and evaluated the positive and negative aspects of these experiences. The session facilitator asked participants to share their methods and techniques for involvement, as well as their motivations and understanding of involvement. A presentation was then given on Second Life by a researcher, who also asked the group questions regarding the potential that they perceived there being in use of Second Life by patients. The participants of this meeting decided that it would be a good idea to try and conduct a group discussion session in Second Life to establish the feasibility of using this virtual world as a tool for engagement.

Training and support using the virtual worlds of Second Life

Regular training sessions were held virtually in Second Life to help participants familiarize themselves with the program. Only 3 of the 6 participants had access to equipment with the necessary system requirements to be able to access Second Life. Two of these participants attended several training sessions. Training was offered to the 3 who could not access Second Life on their own computers, and one of these participants attended a session at a hospital where they received an induction session.

Group discussion session in Second Life

Four patients and one clinician participated in the Second Life group discussion session, alongside three members of the research team. Two of the participants had not been able to use Second Life previously, two had used it multiple times, and one had used it once, during an induction session.

Interviews

In total, 7 in-depth interviews were carried out. Five were with individuals who had been involved with this project, additionally the Director of NIHR CLAHRC for NW London, and the Patient and Public Involvement Lead were interviewed, both of whom had previous experience with Second Life. The interviews were semi-structured and questions related to involvement techniques, perceptions of virtual worlds and Second Life, and the future of patient involvement (see Appendix A). The interviews took place 26/06/12 and 05/09/12 and lasted between 24:43 and 42:00 minutes ($M = 30:59$, $SD = 5:50$).

The 5 interviewees had attended the face-to-face focus group. Four attended the Second Life group discussion, with one unable to attend but having attended several practice sessions in Second Life. The median age was 66 (range 50-71, $SD = 8.29$). Apart from the 1 clinician, all interviewees had been diagnosed with chronic health conditions that had affected them for a number of years (at least 10). Participants had been diagnosed with a range of conditions including Chronic Obstructive Pulmonary Disease and types of Cancer. All were highly experienced in involvement techniques and many had communicated in a multitude of ways as part of PPI in healthcare. Involvement techniques that participants had undertaken included leading groups representing patients with certain conditions and undertaking reviewing duties of hospital facilities across the UK. This, along with their exposure to NIHR CLAHRC for NWL, mean that their assessment of potential of Virtual Worlds may be different than that of a generic sample.

Interviews were audiotaped, transcribed, and thematic analysis was conducted by MT and MK. Transcripts were read repeatedly to identify key themes and categories, which were then developed into a framework for coding the body of data. Multiple coding tested the acceptability and reliability of designated categories. Coding was conducted using Nvivo 9.0. Validity was ensured by identifying potentially deviant cases so that the body of data could be systematically and reliably coded in a cohesive manner.

Results

Feasibility of using Second Life for patient and public engagement

Feasibility was established, for using Second Life as a platform for patient group discussion sessions. All 6 attendees of the session were able to communicate with one another and navigate the virtual environment, to varying extents. Participants selected an assortment of avatars from Second Life's default list, which were mainly human, but one participant chose a robot and one researcher chose a yellow bus (see figure 3).

The session was hampered by technical problems; at one point in particular everyone was logged out of the Second Life and had to log in and re-convene in the virtual environment. The clinician logged in later than the other participants as an NHS firewall had prevented him from logging in from his computer at his work. At the beginning of the session, it took some time to ensure that everyone was using the correct settings to enable them to broadcast their speech and to hear the others talking. The aim was to begin the session by discussing patient involvement and reviewing the ideas discussed in the previous face-to-face focus group, with the aid of visual material within the virtual meeting room. This was achieved, but the disruptions due to the technical problems and audio set up meant that less time than planned was spent on this. The session also involved discussion regarding how it felt to use Second Life, how it could be used by patients in future and about participants' avatars.

Perspectives on virtual worlds for patient and public engagement: Key Findings from interviews and face-to-face focus group session

“Pleased to virtually meet you”: Interaction in a computer-generated environment:

“... as I said, the fact that you can express yourself. I think it's so important for a patient, since the patient is very much on the outside of the health organization, [but] it doesn't matter, the patient can really express himself or herself easily, either typing or speaking, or requesting the time to make an intervention, or posting documents, uploading these, amending something. In terms of freedom of expression, it provides more opportunities than other forms of communication.”

During the Second Life session, interview participants focused on the prospect of this virtual world providing a platform for interpersonal interactions rather than, for example, an educational tool. Interviewees supported the practical advantage of web-based virtual worlds for bringing together people who may not be able to communicate with one another due to impairments.

Should I speak or should I write?:

“One thing that people who don't have breathing problems do not realize is that, for some of us, on some days, we cannot talk. Don't call me; I will not answer my telephone because my lung function that day is very bad. The only thing I can do is sit on my chair and I can use my warm keyboard in my laptop, that's all I can do, I can't walk upstairs, I can't do anything else...”

An issue of some importance to the majority of participants was the impact of long-term conditions on communication and interaction with others. Two of the participants have chronic lung conditions and one has had their voice box removed due to cancer. Consequently, these participants have days when they cannot speak. The fact that Second Life allows for typing as well as verbal communication meant that these participants in particular saw the appeal of being able to use a medium where one could choose to communicate verbally if they felt up to it, or could opt to communicate by typing written messages. However, in the Second Life group session, while most communication was verbal, interactions could simultaneously be taking place through audio and typing, which some found to be confusing. In addition, the participant who was typing found it difficult to keep up with discussions, and actually started to disengage with the process. Overall, the diversity of ways in which one can express themselves in Second Life was recognized as a considerable advantage.

Human, robot or school-bus? : Communicating through avatars:

“Personally, I know people with laryngectomy... and some people withdraw into themselves and not just [those with] cancer, [but] other conditions as well.”

Some participants linked their long-term conditions with isolation, and believed Second Life could provide a social landscape that could overcome this, especially for those who do not wish to attend physical support groups. The anonymity that one can maintain due to communicating through an avatar was viewed as being a potential advantage for these people.

The participants did not tend to have strong opinions regarding the appearance of their avatars, but two felt quite strongly that the yellow bus should not have been used, and that more realistic avatars better suited the meeting environment. Participants also felt avatars that were more representative of the age of the group should have been readily available.

Engaging with patient networks:

“In my opinion it's very, very important to get involved because as far as I can see the clinical and scientific people are not aware of what it's like to live with [health conditions]. It's all very well treating it, but they're not aware of how it affects us and I think by going to things like this we are helping to put the patient's point of view across...”.

The participants who were patient advisors highlighted their roles in active patient groups, presenting them as informative, somewhat powerful and a multi-faceted dimension of involvement. It was the view of all those who were interviewed that patient involvement is crucial to improving healthcare services, in part due to the value of their experiences of being a patient and receiving care.

The majority of participants had used social media to connect with others as part of their involvement in healthcare. Successes varied and some mentioned limitations such as the lack of interaction, and therefore dialogue, offered by some modes such as blogs and websites. This need for increasingly effective ways of connecting with people, especially

patient groups, led to some respondents feeling that more should be done to strengthen interaction and dialogue in their own networks. The experience of communicating using Second Life caused them to suggest that virtual worlds could provide a viable solution to this. There was a general trend of individuals asserting the need to expand the user-base and get more patients involved in using virtual worlds, particularly those with long-term conditions who do not want to attend support groups.

Overall, the group was positive about the prospect of using novel communication technologies such as virtual worlds to support and strengthen their existing involvement responsibilities.

Information and Communication Technology:

“The easiest thing for me, of course, is an email. I use my computer all the time. I built computers. I’ve got my own built network. So email is the logical one because we are far away [from each other]”

Talking to patients, researchers and clinicians about using a virtual world to improve healthcare instigated numerous discussions relating to information and communication technology, which indicated a mixture of views from individuals in the group. One participant in particular had a large amount of experience in using computers and was very enthusiastic about computer-technologies and electronic communication. Others were less enthusiastic about the prospect of technological advancements, including trends in use of electronic communication, with one participant suggesting that use of email can actually hinder communication as it is difficult to manage ones emails people send and receive so many. This participant, however, did also comment that they felt Second Life was more open and better suited to interpersonal collaborative activity than alternative communication methods.

For some, the experience of using Second Life with text chat, audio communication and visual events all taking place at the same time was confusing, as they did not know what they should be focusing on at a particular time. This is a finding related to that of the synchronicity of text and audio communication being potentially challenging to work with.

The future of Patient and Public Involvement and modern communication tools:

“If you were going to say what could we do differently in the world and what would make Second Life even more appealing for us to do health in, ...what’s the next evolutionary step (and maybe that’s even something you could [discover] within Second Life); is what would make Second Life better in the healthcare environment...”

Participants, including the PPI lead for CLAHRC mentioned the importance of research organizations to be able to keep up to date with using modern technology so as to be able to communicate effectively with patients. There was a recognition that the way in which people interact with one another has evolved in the past few years, with the increasing use of text and emails and other web-based communication and that this was likely to continue into

the future. Everyone who was interviewed was in agreement that patient involvement would change in future as new technologies become available.

A related theme that emerged from interviews with both the staff and patients was the scope of untapped potential in using novel technologies such as the virtual worlds to help to enhance provision of health services and support mechanisms for patients.

Discussion

This research investigated how virtual worlds could be used to enhance patient involvement, by piloting a group discussion session in the virtual world of Second Life for patients experienced in PPI. In-depth interviews were conducted with participants of this session and healthcare staff who work with patients.

This study provides perspectives from those with experience of involvement on how virtual worlds could be used to enhance this activity. The implications from the data collection are summarized in Table 1.

Virtual worlds as a platform for patient and public involvement

This study established the feasibility of using the virtual world of Second Life for a patient involvement-related group session. Participants suggested that virtual worlds could be used as a way of connecting people and enhancing engagement with patients, particularly those who have communication and mobility difficulties, thereby strengthening patient-led support networks.

Participants who had been diagnosed with long-term conditions that impact severely upon their communication recognised the potential advantage in interacting using a format such as Second Life where users are easily able to switch between verbal and non-verbal communication.

Barriers for using virtual worlds for involvement

The barriers of using internet-based virtual worlds for engagement identified by participants were primarily related to the technical accessibility of Second Life. Half of the participants could not access Second Life from home, which puts into question the viability of disseminating virtual worlds with larger numbers of patients. Participants' views about the potential confusion caused by the various modes of communication used during the session, as well as everyone being logged out of the program during the Second Life session, leads to reservations about the feasibility of use of this virtual world in its current format for large numbers of patients without the provision of considerable training and support.

The fact that the clinician who attended the Second Life session was unable to log in from his work computer due to NHS firewall is indicative of a more general issue of lack of accessibility of virtual worlds from organizations that use firewalls. At present, firewalls make Second Life difficult to access from a hospital setting. It may be useful, for a further stage of testing use virtual worlds in PPI, for healthcare staff and patients to use Second Life

together. As things stand, this would be difficult to administer due to the operation of the above-mentioned firewalls.

The communication difficulties that were experienced during the Second Life session could be counteracted by the provision of continuous training and support for users. Technical problems experienced when using online programs such as Second Life, can be due to server problems that are outside of the user's control, but enhanced training and support could inform users on how best to deal with any technical difficulties that emerge. In terms of access to equipment with necessary system requirements, it is unfortunate that if patient services were made available through Second Life, that many would not be able to access them. In principle, it is possible that people would be able to gain access from internet-cafes, but if people with mobility problems are to be those who benefit most from using virtual worlds for engagement, then this is not a useful solution. If the ubiquity of computers and internet-technology continues to increase, then it may not be long before a far larger proportion of patients who get involved have access to system requirements necessary to access virtual worlds such as Second Life. Alternatively, more technically accessible virtual worlds could be created aimed at supporting particular groups of potential users. For now, it may be beneficial to work on developing a network of potential users for engagement in virtual worlds for people who currently have access to equipment with necessary system requirements, with a view that these networks may expand exponentially as access to technology increases.

The importance of patient networks

The eligibility criteria for patient participants for the present study were to have been diagnosed with a long-term condition and to have a large amount of involvement experience. This is because for pioneering investigative work such as this, such criteria provides a resilient group willing to test tools which could support improvements in healthcare, and who persevere through difficulties which may arise. It is the belief of the authors that the barriers experienced during the Second Life session are likely to be encountered by others, unless steps are taken to learn from testing with this sample and implement changes, before expanding this project to a larger, more general population. If the full potential of using virtual worlds for patient involvement is realised, then this will require further collaboration with healthcare professionals and patients.

Limitations

Participants in this study represented those with experience of involvement in healthcare, so the sample may be over-representative towards those who find it easier to engage in clinical care and research. This may have resulted in their being more receptive to innovations and the potential value they can bring to healthcare than a generic sample. The participants were from a variety of socio-demographic backgrounds and the patients who took part had been diagnosed with a diverse range of medical conditions, meaning that they had experienced care and involvement in a variety of healthcare sectors.

Attitudes to Second Life and potential future research projects

Attitudes regarding Second Life as a concept were generally very positive. Participants suggested ways of expanding the base of users through their patient networks so as to create new online user-groups. If such groups were formed then this could lead to a new, powerful mode of patient involvement that could connect and represent individuals in a way that has not been previously possible, without the reliance on paid spaces, such as meeting rooms.

Two participants in this study were particularly enthusiastic about use of Second Life by their patient groups, and one of these participants has considerable information and communication technology knowledge and experience. The involvement of such individuals as members of research teams in future, related projects would be invaluable to help to drive the future evolution of this work.

One factor not discussed in detail in the interviews was the potential in Second Life to host a permanent virtual space, and of the multitude of types of environment that can be created. The present research captured the early reactions to using Second Life by a sample of people who were mostly unfamiliar with novel communication technologies and virtual environments. It may be that if this population began to use Second Life more frequently, that they may be able to become active in helping to shape the environment.

A factor of major importance for patient participants of this study was that of communication. There is much potential for virtual worlds to be used to facilitate communication and support networks for patients with long term conditions and this could be investigated in future studies.

Conclusions

Patients with long-term conditions and experience of being involved in shaping the healthcare system reacted positively to the idea of using an internet-based virtual world to enhance patient involvement. A group discussion session was successfully held in Second Life, although technical problems were experienced and some found the Second Life program challenging to use.

Participants suggested that virtual worlds-based involvement could be particularly useful to those with communication or mobility problems. Barriers at present seem primarily concerned with accessibility of virtual worlds to those without experience of using computer technology and to those without equipment that adheres to necessary system requirements.

Patients and healthcare staff who work in PPI and who have experienced using Second Life expressed that there is much future potential in using virtual worlds as a mode of involvement.

Appendix A

Guide for interview questions (interviewer to fill out answers to 1 and 2)

1. 1. Age

2. Gender male/female
3. To which ethnic group do you feel you belong? (Please circle your answer)

British English	Caribbean	White & Black Caribbean	Indian
British Scottish	African	White & Black African	Pakistani
British Welsh	Any other Black Background	White & Asian	Bangladeshi
British other		Any other mixed background	Chinese
Irish			Any other Asian Background
Irish traveller			Any other ethnic group
White other			Prefer not to say

4. Do you consider yourself to have a long-term condition or disability? (if no, continue to Q6)
5. If yes, Please could you describe the condition(s) with which you have been diagnosed
 - a. Have you taken part in involvement regarding this condition?
6. Please describe your experience of being someone who gets involved in care and helps to shape the service/gets involved in the NHS
7. What method of engagement/involvement have you used before?
8. Why did you get involved in this Second Life project?
9. Was this your first experience of testing a novel mode of communication for involvement?
10. Which communication methods/technologies have you used before?
11. Why did you or do you use these methods?
12. What advantages did these communication methods have over alternative methods?
13. How would you describe your experience of communicating using a virtual world?
14. Participants of the Second Life engagement session had variable opportunities to practice using Second Life.
 - a. To what extent were you able to practice?
 - b. Did you feel you had enough practice to comfortably take part in the Second Life patient engagement session?
15. The virtual world that you used was 'Second Life'.
 - a. Which aspects of Second Life may make it useful for patient engagement?

b. In what ways could Second Life be more useful for patient engagement

16. Do you think patient engagement will change due to advances made in communication technology?

a. If so, how?

17. Would your perceptions be different if your avatar is/was customized according to you? Would this be a factor that might influence your decision to use SL as a method/platform of engagement?

18. Would you use Second Life again?

19. Do you have any suggestions for future directions for this research?

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Figure 1.
Two researchers and 2 participants attending a virtual world training session in Second Life



Figure 2.
The virtual room for the Second Life group discussion was filled material from the previous face-to-face meeting with the aim of helping the group to carry on discussions where they had left off.

Avatars of the researchers



Avatars of the participants



Figure 3.
Avatars of the participants and researchers involved in this study

Table 1
 Summary of drivers, barriers and possible actions and solutions regarding use of Virtual worlds (VWs) for PPE

	Results gathered from in-depth interviews	Possible actions/solution regarding results
Advantages of using VVs for PPE	<ul style="list-style-type: none"> Use of VVs could enhance patient engagement by connecting people VV use by patients could result in strengthening of patient-led support networks VV use can be cheaper than meeting face to face (less need for paid spaces and travel) VVs might be particularly useful for those with communication difficulties and it is possible to switch between verbal and non-verbal communication 	<ul style="list-style-type: none"> The prospect of using VVs could be disseminated among patient groups who traditionally less engaged with care, those who have limited monetary resources and those who have mobility and communication difficulties as these groups may benefit most VV facilities could be made available to patient-led groups with the aim of enabling the strengthening of these networks
Barriers to using VVs for PPE	<ul style="list-style-type: none"> Not everyone has home access to technology enabling use of VVs Synchronous use of verbal and written communication can be confusing for users Technical problems outside of users' control can occur. Firewalls can block use of VVs from some areas, including some hospital networks Non-human avatars can potentially make virtual worlds feel less 'real' 	<ul style="list-style-type: none"> Initially, further research could involve those who currently have access to VVs, with a view to expanding access to more users when technology needed for VV access is cheaper and more is known of how best to use VVs for PPE Rules could be established in certain regions so that only text-based communication is permitted at certain times, if people who are unable to speak are present at meetings Technical support would help users to know how to address issues such as firewalls and technical problems with software Rules could be established for meetings associated with certain user groups that attendees must have human avatars