Real relationships in a virtual world: Social engagement among older adults in Second Life

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C.J. O'Brien, J.L. Smith, D.E. Beck. Real relationships in a virtual world: Social engagement among older adults in Second Life. Gerontechnology 2016;15(3):171-179; doi:10.4017/gt.2016.15.3.006.00 **Background** This study examined Second Life (SL), a 3D immersive environment, as an opportunity for older adults to create new social relationships. **Method** A total of 39 adults aged 60 and older (86.8% female, 13.2% male) completed the study. Outside of the weekly, two-hour formal instruction time, they spent a minimum of 20 hours in SL over the course of two weeks. Semi-structured in-person interviews were conducted with each participant to explore their attitudes toward and perceptions of online relationships; their experiences interacting with others in SL and the degree to which they formed relationships; and the challenges they encountered in creating these relationships. **Results & discussion** We found that older adults were largely receptive to the possibility of creating online relationships, but only a minority of them were successful in establishing them. A number of challenges to creating these relationships are discussed. This study suggests that SL may offer social benefits to a subset of older adults; however, simpler platforms should be explored to reduce challenges in navigating online environments.

Keywords: aging, immersive environment, interpersonal relationships, technology

The connection between social isolation and health has been well established in the research literature. Individuals who experience social isolation often experience a higher risk of health problems and utilize more health care resources than those who are not socially isolated[1]. Research on social network size has revealed that possessing a small social network[2,3], infrequent contact with others in that network[4], and a lack of social network diversity[5], leads to adverse health outcomes. A number of studies have also shown positive correlations between factors such as social isolation and mental illness (e.g., distress, depression, dementia, etc.)[6-10]. Other research has shown correlations between social isolation and suicide[11]. Social isolation has a major impact on physical and mental health, and constitutes a public health problem along the magnitudes of excessive alcohol consumption and smoking[12].

While isolation and loneliness are problems for many older adults, women are particularly vulnerable for several reasons. Due to greater longevity, women are more likely to experience the death of a spouse during their lifetime than men. At the same time, women are much less likely than men to remarry or become involved in a new relationship once widowed[13]. In sum, older women often experience multiple social and emotional losses that have the potential to negatively impact their health and well-being. Along the same lines, because women live longer, they also have more years of declining health compared to men. Thus, women are at higher risk of nursing home placement as well. Social isolation can contribute to this risk. All that said, online environments, and virtual worlds in particular, may offer individuals opportunities for needed social interactions that they are not able to find elsewhere.

The present study explored Second Life (SL), a three-dimensional (3D) immersive environment, as a tool for increasing social engagement among older adults. The goal of this study was to examine the experiences of adults aged 60+ as they were introduced to the 3D virtual world known as SL. In doing so, the study sought to both provide participants with a smooth transition as beginners using SL, while simultaneously evaluating the efficacy of SL participation as a tool for improved psychosocial function. What follows is an examination of the experiences of older adults who interacted with others in SL and the factors that influenced participants' ability to form meaningful relationships in this virtual world.

Second Life (SL)

SL is an online virtual world that was developed by Linden Lab in 2003[14]. By 2013, close to one million users had signed on. Users of SL create 3D representations of themselves, also known as avatars, which they manipulate in order to navigate the virtual environment and interact with other users. SL is not a game in that is does not have a

specified end point, singular goal, or primary objective for all users. Instead, individuals explore, create, and interact to immerse themselves within elements of the virtual world of their choosing. For example, users can choose to socialize with others, dance, visit comedy clubs, travel to other virtual countries, build themselves a car using SL coding language, shop for items that others have created in virtual stores using virtual currency, and a myriad of other activities. The virtual world is almost entirely user-generated. Individual users have created companies, and corporations, such as Dell and Coca-Cola, have at some point established a virtual presence within SL for their real world organization. Like these for-profit companies, some notable universities, such as Harvard and Cornell, offer classes within SL.

Internet use and social support

The research on various types of Internet use and social support among an older adult population is limited. For those over 50, general Internet use is significantly and positively associated with frequency and satisfaction of contact with friends and family, a greater sense of community[15], and attendance at social gatherings[16]. Also, it is apparent that overall satisfaction with the quality of their online social interactions is highly correlated with a higher frequency of Internet use[17].

It is possible to improve psychosocial outcomes among the older adult population with Internet-based interventions. Research has shown that increased Internet use has a positive effect on quality of life, depression, social support, and self-efficacy for adults 60 and older with diabetes[18]. Also, older adults who are homebound and disabled who participated in an online community designed for their needs showed a significant increase in their satisfaction with their amount of social contact[19]. Likewise, physically frail elders who participated in an Internet-based intervention to help them monitor self-care needs reported feeling more connected to friends and family and less socially isolated as a result of their computer use[20]. Lastly, there is evidence that Internet-based interventions can improve social well-being even among those in poor health with limited or no computer experience[21].

Few studies, however, have examined the impact of SL in particular on social engagement. A noteworthy exception is found in a study by Gilbert and colleagues[22], which demonstrated that people with disabilities had significant improvements in psychosocial outcomes, including satisfaction with life, depressive symptoms, and loneliness, after spending time in SL. Also, a large majority of participants (85%) said that they had more interactions with others because of their involvement in SL and over 60% reported increased self-efficacy.

In SL, older adults are afforded a certain amount of anonymity by taking the form of an avatar, which they create to represent themselves. This is crucial due to the fact that a number of studies suggest that self-disclosure is an important element of relationship building[23,24]. The SL platform makes this issue moot as any perceived risks of self-disclosure are at least dampened due to a lack of face-to-face contact. McKenna and Bargh[25] argue that interactions initiated on the Internet, an environment supporting self-disclosure, lead to greater liking among individuals taking part in the interaction compared to interactions originating offline. Based on these suggestions that online interactions may be conducive to relationship formation, we sought to explore the potential for older adults provided with guidance and support to overcome the technical challenges of SL, to develop new relationships online. We examined the following research questions:
(i) What is the openness of older adults toward developing online relationships within SL?
(ii) What obstacles exist for older adults as they attempt to develop these relationships?

Methods

Participants

The sample we defined for the current study was adults aged 60 and older who were members at the Arkansas Area Agencies on Aging in Little Rock, Fayetteville, and Springdale, Arkansas, a division of Division of Aging and Adult Services centered in Little Rock, Arkansas. Area Agencies on Aging (AAAs) are local aging programs that provide older adults and caregivers with a range of information and services, including recreational, continuing education, and nutritional and medical support. Notices soliciting participation in the study were posted at senior centers in the area. The notice informed potential participants that they would be committing to 12 weeks of participation as well as 20 additional outside hours and would receive a US$100 stipend at the end of the study. This study received Institutional Review Board approval and informed consent was obtained from all study participants at the time of enrollment.

In total, 51 individuals registered as participants and 39 of them finished the study—resulting in a 76.4% completion rate. Participants were predominantly female (87%) and White / Caucasian (84%). Approximately half of participants were married (47%) and two-thirds attained some education beyond high school (66%). All participants had a computer in their home, and 89% of participants also had home internet access. Participants without internet access were able to log into SL at their local AAA. *Table 1* shows additional demographic information.

Study procedure
The study consisted of four stages:

Stage1: Project preparation
During the training stage, the principal investigators trained AAA staff how to install SL viewers on computers, create accounts and avatars, and interact with the user interface and others in SL. The AAA staff also received hands-on training in moving and interacting in SL and online safety from Virtual Ability International (VAI), a non-profit corporation with the mission to enable people with a wide range of disabilities by providing a supporting environment for them to enter and thrive in online virtual worlds like SL.

Stage 2: Onboarding (2 weeks)
To overcome significant technical hurdles to accessing SL, a bridge between the physical world and SL was created to assist participants. On one end of the bridge, AAA staff and undergraduate interns in the physical world were available to assist older adults to create an account, an avatar, and learn the basics of navigating the interface, interacting with other avatars, visiting other areas in-world, and using tools to build. At the other end of the bridge, VAI staff was available to greet people in SL, assist them through the VAI orientation, and provide information about safety in SL.

Stage 3: SL Events (8 weeks)
The principle investigators, AAA staff, and VAI staff planned tours and group events in SL to be attended by participants. There were eight events and eight tours over a two-week period. Events included visiting health information regions on SL, as well as social and/or cultural events. A final event focused on assisting participants to find and visit a SL region that reflects each participant's own individual interests, so that participants would become independent users of SL by the end of Stage 3.

Stage 4: Independent Use (2 weeks)
Participants logged on to SL with little direction from AAA or VAI staff and kept track of time spent on SL. They completed a minimum of 10 hours per week for two weeks, for a total of 20 hours. For Stages 2-4, participants were given specific objectives (e.g., initiating a conversation with another avatar, joining a group), to complete before moving to the next stage.

Table 1. Sociodemographic characteristics of Interviewees (n = 39, demographics missing for one participant)

Parameter		n	%
Gender	Female	33	86.8
	Male	5	13.2
Age	61-65	9	23.6
	66-70	13	34.2
	71-75	8	21.1
	76+	8	21.1
Race / Ethnicity	White / Caucasian	32	84.2
	Black / African American	5	13.2
	Other	1	2.6
Marital Status	Married	18	47.4
	Widowed	10	26.3
	Divorced / Separated	7	18.4
	Never married	3	7.9
Education	≤ High school grad	13	34.2
	Associates / Some college	11	29.0
	≥ College degree	14	36.9
Computer at home	Yes	38	100.0
	No	0	0.0
Internet at home	Yes	34	89.5
	No	4	10.5

Interview protocol
The purpose of this study was to better understand the extent to which older adults are receptive and capable of forming relationships in SL. Another related goal was to elucidate the barriers that may prevent these virtual relationships from forming at all. These areas of interest were assessed via one-on-one interviews of approximately thirty minutes in length. The semi-structured interviews were conducted in-person at the centers where the study occurred after all participants had completed their independent use of SL. The Recorder Plus iPad app was used to record the interviews. The interview questions were based on items from the following quantitative instruments: Game Engagement Questionnaire[26], Social Presence Questionnaire[27], SWLS[28], UCLA Loneliness Scale[29], Social Connectedness Scale[30], MSPSS[31], Achievement Goal Orientation Survey[32]. Examples of questions include: "*Describe your interactions with other avatars in SL?*", "*Did you begin any new friendships/relationships?*", "*Are relationships in SL more / less / equal in importance to face-to-face relationships?*", and "*What do you like the best / worst about SL?*" The questions were provided to participants prior to the interview.

Data analysis
First, the in-person interviews were transcribed. After this, the researchers reviewed each transcript for accuracy. The constant comparative method[33-35] was used to code the transcripts. The analysis goal was to reach categorical saturation, a technique suggested by Lincoln and Guba[36]. This was accomplished by first creating a codebook, which included (a) each code, (b) a definition of the code, and (c) some directions for how to use each code. *Table 2* shows the codes used in the analysis.

Then, the researchers conducted four phases of coding as a confirmatory analysis. Each researcher coded six of the eighteen interview transcripts during the first phase. Researchers reviewed different

transcripts that were coded by another researcher in the prior phase during the 2nd, 3rd, and 4th phases. With each phase of coding, researchers could add, agree, delete, or change codes made by a previous researcher during an earlier phase. Thus, all four of the researchers coded and confirmed each transcript (*Table 3*). After transcripts were fully coded, the researchers examined quotations relating to each code for themes among responses.

Results

The study revealed several main findings in relation to the potential for SL to serve as a tool to facilitate formation of relationships that enhance socio-emotional well-being of older adults.

Theme 1: Receptiveness to online relationships

Interviews with participants established that many older adults are both open to and optimistic about the possibility of forming relationships in the virtual world, SL. Participants expressed beliefs that relationships could be formed without any prior knowledge of a person outside of this environment. For example, one interviewee remarked: *"I don't think that you have to see them personally to have a meaningful relationship because there's more to life than that personal thing. Because I have been friends with people on Facebook for a long, long, long time that I have never laid eyes on except maybe their profile picture or something and I never see them personally..."*.

Supporting our hypothesis regarding self-disclosure and anonymity, some participants felt that the absence of a face-to-face connection could be an asset to forming relationships: *"In fact, I think it's probably better because, you know, I know none of us look like our avatars, you know. And that doesn't mean anything. But it's just -- you can communicate really well with them. And you get a connection with them and you feel it's good. It's a good thing"*.

Similarly, one person believed that people may be more forthcoming during interactions in the virtual world. Other participants reported similar perceived advantages of online relationships: *"They know they don't know you and they know immediately if they want to you can push a button and you are out of their life, you can delete you from their friendships and for that reason they are much more likely to be honest"*.
And also, *"If you said, '[name redacted] what do you really think of me?' I'm probably going to pull my punches regardless if I thought you were being honest … whereas in SL you are much more likely to get to a closer truth"*.

Theme 2: Potential for close relationships

The participants' experiences further demonstrated that it is possible for older adults to develop meaningful relationships that begin in a virtual space and evolve into the 'real world'. For example, one participant talked about how she developed relationships with an avatar that then moved offline: "*I've talked to her today and then on the phone and she's a nice African American lady, so now I'm her sister and now we are sisters. We were exchanging emails and stuff. …She sent me pictures of her daughter. Today she had just picked out her wedding dress…So I get to virtually go to the wedding…"*.

In contrast, we found that participants expressed more negative opinions of SL when they perceived that it interfered with their ability to pursue relationships in real life. An emergent pattern was that a portion of participants believed that real life existing relationships are superior to virtually-based relationships (including keeping up with people they knew on Facebook). Viewing our findings from this perspective, it is not surprising that the most enjoyable and meaningful relationships formed by participants seemed to be those they formed with others in the study group. *"Yeah. Just casually...Yeah, I can't say, um, I went out and made a best friend on SL. Uh, I will say that the people that were within our group, uh, you know, a lot of those were people that I run into down at the,*

Table 2. Codes utilized in analysis; SL=Second Life

Code	Description
Belonging	Sense of being a part of something larger than oneself, whether a group, community, locale, concept, or other
Importance_of_real_life_knowledge	Relationship building based on real life knowledge
Important_relationships	Specific relationships and their importance in general
SL_Meaningful_Relationships	Specific relationships in SL and their importance or potential for meaningful relationships
Interactions_with_people_SL	Any effect that one person has on another within SL
Interactions_with_people_SL_positive	Positive interactions
Interactions_with_people_SL_negative	Negative interactions
Interactions_with_people_study_group	Study group interactions
Misc_Opportunity_cost	SL takes time away from other meaningful activities when chosen

Table 3. Codes agreement for each phase of coding

Phase of coding	Number of codes				Agreement, %
	Total	Added	Deleted	Changed	
First	2955	-	-	-	-
Second	3087	132	0	5	95.7
Third	3134	47	0	0	98.5
Fourth	3154	20	0	0	99.3

uh, Hayes Center all the time anyway. And as a result of SL, I think we all feel a little closer to one another and communicate better".

Along these lines, a few participants noted that while they felt meaningful relationships were possible; they would not have the depth of real-life relationships. For example, one person felt that a relationship in SL would not constitute *"a real serious friendship, but an acquaintanceship"*. Another participant stated: "*I do think it's possible to have meaningful relationships if you understand it, when I say meaningful relationship I'm not talking about in depth…I have a best friend. I have a wife. Those are meaningful relationships but they span years, 40 years in both cases".*

Theme 3: Obstacles to relationship formation

We also found that while such experiences occurred in SL, more commonly, older adults were not able to develop online relationships during the time of the study. Analysis of interview responses suggested a number of obstacles to forming relationships in this environment.

Subtheme 1: Personality

Although many of those interviewed were optimistic about the potential for relationships in SL even if they did not form any themselves, a smaller subset of interviewees did not believe meaningful relationships were possible in the virtual world. Although not directly addressed by many interviewees, a number of their comments suggested that they attributed this inability to form relationships not to the nature of the online environment, but to their own personality, and specifically, their discomfort in initiating conversations. They reported this is what prevented them from having the kind of relationships they believed was possible for others. For example, one participant stated, *"I don't know, if you are really outgoing and everything you might interact with people more but like I said I'm just kind of stand off-ish".*

Other participants seemed more likely to feel afraid of others in SL and of SL in general. This seemed to come from a feeling of being out of control of their encounters in SL. As one interviewee explained, "*I found SL was very confusing for me, actually almost scary when I got into certain…I felt out of control that's the most thing".* The following comments illustrate this point in more detail: *"I've always felt I can do pretty well with strangers face-to-face but I felt like being on the computer I had no control so when these people approached me I just wanted to get out immediately. If they talked to me I finally realized that I could say, 'I'm sorry I don't know you. I feel uncomfortable'".*

"And there was some scary people out there too. Some scary looking people. There was one great huge dude that didn't say anything, he just wandered around in the distance. Just big old guy that I don't really like his looks at all. I don't know who it was".

Subtheme 2: Rejection by other avatars

In contrast, other interviewees described experiences of rejection when they tried to interact with avatars in SL. Often this rejection was passive, experienced as a result of other avatars ignoring their presence or not responding to their comments. There was the perception that some of the avatars in SL did not want to extend beyond their 'cliques'. One participant expressed her frustration and surprise with this exclusion in the following way: "*There would be times when you could go to a site, there might be...especially in the dancing sites, you know, um, 15 more people there. And you go, like into group chat, and you could say, 'Hello, everyone' , and not get any responses. And I mean...yeah. You could... you could see they were communicating with each other but I never would...you know, they would never communicate with the newcomers…That was a little bit frustrating".*

Other interviewees mentioned more direct forms of rejection or exclusion when they tried to engage with avatars that they did not know. As a couple of the interviewees noted, accidentally traveling to another avatars' 'property' was met with a strong request to leave. Furthermore, attempts to get to know others were not always welcome. For example, one participant recounted the following experience: "*I asked her where she was from and she said, 'You don't need to be prying into my private business', Well, I wouldn't. I just wondered what country she was from. And she was from Sweden or Denmark. She had that accent. I said, 'Okay'. So I just left that site and went into another one. I mean…you have to go with the flow dear".*

However, the majority of interviewees who spoke of negative interactions attributed them to rudeness of others in SL. This perceived rudeness generally took the form of verbal rejection or hostility. For example, one participant reported: "*I said maybe and I made a comment. One*

of the ladies I had a great conversation with and turned out to be a good friend in SL. So I said something the next time, and she said 'before we start let me go into I'm not interested'. She was rather blunt, and I said 'me neither'".

Subtheme 3: Difficulty locating avatars
Some areas of SL required membership and participants were usually unable to access them. Participants found it difficult to continue a relationship with avatars that they met when the avatar went into these private spaces. One interviewee described an in-depth conversation that she had in SL and her inability to continue this interaction: "*...and we talked about him writing a book. He's written one but he's not published it. He was going to...he was going to start another one in November and I was going to check with him but I never could find him again… He's in the site that we can't really get in".*

Even outside of these spaces, study participants often found it difficult to reunite with avatars with whom they had interacted previously. Some interviewees reported that they were unable to find the avatars again because they were not in SL at the same time. Other interviewees had trouble finding locations where there were any avatars to interact with at all.

Subtheme 4: Language differences
The global nature of SL was both a benefit and a drawback. Several interviewees mentioned that they observed other groups of avatars, but they were unable to join the group and communicate due to language barriers. For example: *"A couple of places you'd hear chats. I'll just go to it and they'll be 4-5 people having a picnic and they'd be talking in another language. You really could not join in even if you wanted to".*

Subtheme 5: Lack of face-to-face interaction
One interviewee expressed that the lack of a real life connection was a barrier to meaningful relationships. She said: "*But if I was to go on Facebook and meet somebody and I didn't really know him, like in SL, like they live—I'll say Fort Smith or somewhere like that, I would know more about them on Facebook, to be a friend of theirs, than I would on SL because on Facebook, you have pictures, real pictures, of yourself and your friends and your children, what you're doing and all of these. And then you build on that, but in SL, it doesn't give you the opportunity to have that bond".*

Subtheme 6: Discomfort with sexual connotations
Finally, a number of interviewees had interactions that they felt were inappropriately sexual in their intent. For example, one reported that they accidentally encountered a place that was 'kind of x-rated'. Another reported encountering sexual advances on the dance floor. The following experience was reported by a woman uncomfortable with what she perceived as sexually aggressive interactions: "*One fellow asked me to go to his private island...well, no, I'm not going to go to your private island to listen to the music that I was hearing here. Why would I do that? I mean, not that he could do anything but just why would I do that? To me, that's not very respectful if you don't want to know a person, and if, you know that's different".*

Discussion

Results from this study suggest that older adults are both open to and optimistic about the possibility of forming relationships online. This is an important finding given that older adults, and especially older women, are still widely perceived as resistant to technology. Instead, resistance may actually be a reflection of uncertainty or lack of knowledge, which also inhibits older adults' computer use in general[37]. Thus, older adults may be reluctant to independently explore SL without support.

Older adults who were already socially active, reported opportunity costs as a reason for not forming friendships. These individuals had strong relationships in 'real life' and were also less likely to make an effort to form new relationships. Older adults tend to be more motivated to maintain and deepen existing relationships rather than to extend their social network[38-39]. This suggests that SL, or possibly another online environment, may be more useful for individuals who are more isolated, and who report a neutral or positive attitude toward the prospect of online relationships[22]. An alternative interpretation of these findings is that participants who perceived opportunity costs associated with SL relationships may not have been fully 'present' in the virtual world. Previous research has found that presence (i.e., perceived physical and psychological immersion in the virtual world) influences the extent to which experiences in the virtual world impact real life[40]. For instance, in a sample of existing SL users, people who reported higher self-presence were more likely to indicate that their avatar influenced their health behaviors[40]. In addition, for people who were socially motivated to use SL, higher self-presence was related to greater influences of the avatar on the person's real-life self[40].

Although it was not the norm for participants in our study, a subset was able to develop meaningful relationships initiated in this virtual space. Our hypothesis regarding the advantage of anonymity was at least partially confirmed in the experience of several participants who reported

that they were less inhibited due to the ability to conceal their true identities. Similarly, previous research has found that college students with high shyness reported lower communication apprehension after participating in a focus group in SL compared to real life[41]. However, for the majority of participants in the current study, the benefits of anonymity did not outweigh the challenges identified by this research. Findings relative to personality suggest that interventions should be targeted to certain groups of participants who are likely to be receptive. For example, some older adults viewed online relationships as inferior to off-line relationships, making them less inclined to initiate online interactions that could lead to friendships.

This study also highlighted several barriers to social engagement in virtual worlds, including personality characteristics, negative interactions with other SL users (i.e., rejection and inappropriate content), navigational and communication challenges, as well as lack of face to face interactions. It seems that while some older adults may benefit from social interactions in SL, the SL platform itself may not be the most appropriate mechanism for this population. However, older adults' user experience may be improved by addressing these barriers within virtual worlds. As discussed above, some of the participants were intimidated by various aspects of the program such as an inability to effectively navigate to find other avatars.

Perceived ease of use impacts evaluations of a virtual world's usefulness and entertainment level, which in turn, impacts overall attitudes toward SL[42]. The challenges identified suggest that platforms may be more appealing to older adults if they contain certain features, such as an easy-to-navigate interface. Simplified user interfaces and in-world support could help older adults overcome technical difficulties of interacting in virtual worlds[43-44]. In addition to challenges with the technology, the participants' reaction to other avatars (e.g., fear, rejection, intimidation) suggests that an age-specific environment may be a better option for older adults. Furthermore, content blockers could be implemented to limit exposure to rude or offensive information[45].

Limitations and future directions

The main limitation of this study was a relatively small sample size. Although the sample was largely women, there were not enough participants to draw conclusions as to the way in which gender affected participants' experiences. In addition, participants were drawn from a population that was already in some sense connected with aging services through area agencies on aging or senior centers. This means that, as a group, they were likely to be less socially isolated than older adults without such connections. This may have made them more likely to view time online as an opportunity cost relative to their existing relationships and made them less inclined to invest in online interactions and in working to overcome challenges they encountered. The lack of inclusion of socially isolated older adults means that the results are not generalizable to that population. In addition, the high level of technological support provided to participants at the senior center may be difficult and likely more labor intensive to implement in the home.

It is likely that participants entered the study with different levels of openness to SL, and online technologies more broadly. It is unclear from the current study to what extent participants continued to use SL after the research ended, as the study did not include an additional follow up point of contact. Previous research has found that older adults' perceptions of technology improved gradually as their knowledge of and comfort with the technology increased[46]. One area for future research is to examine older adults' experiences in virtual worlds over a longer period of time and to identify factors that contribute to greater social engagement and acceptance of SL.

Another avenue for future research is to examine how different modes of communication in SL impact levels of social engagement and satisfaction. Previous research has examined associations between modes of online communication and social support among older adults[47]. Specifically, voice chatrooms were better for companionship compared to other modes of online communication, such as online forums. Older adults who are equipped with headphones with microphones may have a more emotionally satisfying experience interaction in SL.

Furthermore, future research should examine the impact of participating in SL on the health and psychological well-being of socially isolated older adults. As a means of reducing loneliness and isolation, virtual worlds could potentially contribute to decreases in risk factors of mortality[48]. It also points to a need to go beyond navigating technology-related hurdles to addressing cultural norms within virtual environments. Additional exploration of the conditions under which virtual environments may be made to be inviting and non-threatening to older adults could contribute toward making them accessible and palatable to a larger number of individuals. Lastly, because of the larger number of older isolated women, particular attention should be paid to the gender-specific needs and interests of this group.

Conclusions

Counter to stereotypes about technology use, older adults were open to social interactions in the virtual world. However, participants expressed the belief that virtual interactions should not occur at the expense of real world interactions. As virtual worlds become more widespread, it will be increasingly important to address barriers to older adults' ability to participate and interact with others in those worlds. Ultimately, this study suggests that the virtual world does hold potential for a subset of older adults who may be isolated and are open to alternative routes to friendship and community.

Acknowledgment

The authors gratefully acknowledge the support of Dr. Timothy Killian, Associate Professor at the University of Arkansas; LuAnn Phillips, Virtual World Specialist at eXtension; Alice Krueger, C.E.O of Virtual Ability; and Todd Price and Angie Dunlap of the Arkansas Area Agencies on Aging. Funding was provided by Mather LifeWays.

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