

Customizing Avatars and the Impact on One's In-Person Life and Communications

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Teaching or conducting medically-related telehealth over a Virtual World involves the use of an avatar as a representation of oneself. In health care, one outcome of interest is whether an avatar's physical similarity to the user impacts the user's attachment to the avatar and consequential changes in their personal life and behaviors. The answers to such queries remain in debate. This paper addresses the following questions: 1) Do participants customize their avatars' appearance, and if so, how much time do they spend and what aspects do they change? 2) Does personalizing one's avatar, or having the avatar physically resemble the user, impact attachment to the avatar and feelings that the avatar is an accurate self-representation?, and 3) Does avatar personalization, self-resemblance, attachment and accuracy of self-representation predict the impact of VW participation on volunteers' self-reported offline life and communications with friends and family? Results revealed that fifty percent of the volunteers altered their avatar, primarily their clothing. The physical similarity of one's avatar to oneself predicted a positive impact on their offline life, and one's level of attachment to his avatar predicted improved communications with friends and family. These results support findings that both physical similarity and attachment to one's avatar are helpful in promoting positive off-line behavioral change.

INTRODUCTION

Virtual Worlds (VW) are used for more than entertainment. University professors teach college courses, customers do their on-line shopping, and health care professionals are teaching wellness educational programs via virtual worlds. Approximately 13 million people have visited the VW of Second Life at least once, and 450,000 users are active online in a given week. In a virtual world, users are represented by avatars in a highly social and interactive environment that occurs in real time and is persistent (the same people/avatars and locations exist over time) (Rice, Tree, Boykin, Alfred, & Schroeder, 2018).

According to social response theory, individuals react to computer technology as if it were a social entity (Moon, 2003; Holzwarth, Janiszewski, & Neumann, 2006). When the technology exhibits humanlike behaviors, such as speaking or taking turns in conversation, users are more apt to personify the technology (Moon, 2000) and develop an emotional relationship with the technology (Moon, 2003). Therefore, use of an avatar and communicating with other avatars in real time, in a persistent state, should also elicit personification (attachment) with one's own avatar and with other participants' avatars.

Avatars are virtual characters used as personal representations of oneself during virtual world interactions. As virtual selves, they can serve as identification figures. Users can tailor their avatar's appearance by changing the height, size, shape, gender, skin tone, facial characteristics, head shape, hair, clothing and accessories. According to Loos (2003, p. 17), avatars are "a representation of the user as an animated character in virtual worlds". Again referring to the social response theory, it has been shown that relationships within virtual environments tend to occur more readily if human forms are used (Trogemann, 2003), such as avatars.

However, while avatars can take on human form, questions still remain, such as: How much do individuals participating in wellness-based virtual world group training customize their avatars? Does avatar customization, or having one's avatar look like one's self, impact one's attachment to the avatar and whether the user feels the avatar is an accurate self-representation? In turn, since users create their own avatars and use them in a social context, how might these self-representations impact participants' in-person life or change how they interact with others after participating in an online wellness program? The answers to such questions are informative to designers of telehealth programs who must decide if individual training on avatar personalization is needed, whether to pursue technologies to create more accurate physical representations of self, and what additional steps they can take to encourage post-training wellness and self-care behaviors of participants.

Prior research has shown that users experience in a virtual environment was associated with changes in offline behaviors (Rosenberg, Baughman, & Bailenson, 2013; Peña & Chen, 2017). Yee and Bailenson (2007) theorized that the embodiment of one's avatar through physical similarity or behavior leads to shifts in self-perceptions that impact both online and offline actions. This phenomenon is known as the Proteus Effect. Other findings have shown that regular game players reported feeling creatively rewarded when they customized the appearance and gestures of their avatar (Williams, Kennedy, & Moore, 2011), and Bailenson and colleagues (2008) suggest that details in the appearance of avatars (e.g., facial expressions) might impact how users communicate with one another. Nevertheless, additional research is needed to determine whether feeling creatively rewarded or changing one's interactions in a virtual world impact offline behaviors.

The purpose of this study was to examine avatar customization among U.S. military active duty and veteran research volunteers, while participating in a telehealth mindfulness meditation group-based training. We hypothesized that: 1) personalizing one's avatar (Avatar-personalize) and/or having the avatar physically resemble the user (Avatar-looklike) would predict a user's level of attachment to their avatar (Avatar-attachment) and their feeling that their avatar was an accurate self-representation (Avatar-representation), and 2) Avatar-personalize, looklike, attachment, and self-representation would predict the impact of the virtual world training on user's personal life and communications in the in-person world.

METHOD

Participants

U.S. military active duty service members and veterans ($n = 45$) were recruited as research volunteers. Volunteers were recruited for a larger study focusing on the effectiveness of Mindfulness Meditation Training on cognitive and emotional readiness (those results are not reported in this paper). The study was approved by an Institutional Review Board. Volunteers were not compensated for their participation.

Instruments

Demographics survey. The demographic survey included volunteers' age, race/ethnicity, gender, education, marital status, military status, and time on active duty (Table 1).

Avatar Survey. Volunteers answered nine dichotomous questions, and seven continuous questions about customizing their avatar (Tables 2 and 3). In particular, volunteers were asked to rate, on a scale of 1 to 100 four statements: *How much did you personalize your avatar (e.g. changing clothing, hair, appearance)* (Avatar-personalize); *How much does your avatar physically look like you* (Avatar-looklike); *How attached do you feel to your avatar?* (Avatar-attachment); and *I feel my avatar is an accurate representation of how I see myself* (Avatar-representation).

Life Impact Questions. Volunteers answered two questions about the impact of participating in mindfulness training in Second Life on their "in-person" life and on their communication with friends and family (Table 5). Responses were entered on a continuous scale between -10 and +10.

Procedure

Research volunteers read and completed an informed consent form prior to participation, after which they completed a demographic survey. They were given laptops so each participant would be working from the same configurations and staff could assist in troubleshooting technical issues. Participants were taught how to access Second Life, operationalize their avatars, and customize their avatars. They attended 8-weeks of mindfulness meditation training over the VW of Second Life (Figure 1). Classes consisted of eight 1½ hr. classes and one 3

hr. class over 9 weeks. Upon completing their training, volunteers completed the Avatar Survey and the Life Impact Questions, described above.



Figure 1. Research volunteers participating in mindfulness meditation training in the Virtual World of Second Life.

Analyses

Descriptive analyses were used to describe demographics. Chi-squares were used to examine dichotomous responses on the Avatar Survey. Pearson Correlation Coefficients were used to examine the relationship between Avatar-personalize and -looklike and Avatar-attachment and -representation. Forced-entry regressions were used to predict Avatar-attachment and Avatar-representation scores. Stepwise regressions were used to predict the impact of online Second Life participation on volunteers' in-person life and their in-person communication with friends and family, using Avatar-personalize, -looklike, -attachment, and -representation as predictors. Significance levels were defined as $p < .05$.

RESULTS

Volunteers' demographics are shown in Table 1. The majority of volunteers were male, Caucasian, married, and college educated. Volunteer's average reported age was 49.95 years (± 11.19) and the average reported time spent on active duty U.S. military service was 15.67 years (± 9.83).

Frequencies (number, percentage) and chi-square comparisons for yes/no response items on the avatar survey are shown in Table 2. The majority of volunteers (71.4%) reported they did not change the features of their avatar, however 50% reported changing their clothing. Of those who changed their avatar characteristics, the most frequently changes were hair, eyes, and body shape.

Means, standard deviations, and ranges for responses to continuously measured items on the avatar survey are shown in Table 3. Table 4 shows correlations between volunteers' responses to the Avatar Survey statements.

Using forced-entry regression methods to predict users' level of attachment to their avatar, using Avatar-personalize and Avatar-looklike as predictors, yielded an R^2 value of .23, with a standard error of the estimate (SE) = 22.20. The model was statistically significant ($p = .005$), generating the following regression equation:

$$\text{Avatar Attachment} = 7.3 + .375 (\text{Avatar-Personalize}) - .061 (\text{Avatar-Looklike})$$

Table 1. Frequencies (number, percentage) of responses on the demographic survey.

Demographic	#	%
Gender		
Male	25	59.5
Female	17	40.5
Race		
African-American	6	14.3
Native American	1	2.4
Caucasian	29	69.0
Hispanic	4	9.5
Asian	1	2.4
Other	1	2.4
Education		
High school/GED	3	7.1
Some college/AA	9	21.4
Bachelors	12	28.6
MA/Ph.D.	14	33.3
Other doctoral degree	4	9.5
Marital status		
Married	27	64.3
Divorced	7	16.7
Widowed	1	2.4
Single/separated	7	16.7
Military status		
Active duty	17	40.5
Veteran	25	59.5

Table 2. Frequencies and chi-square comparisons of responses to dichotomous response items on the avatar survey

Item	No		Yes		$\chi^2 (1)$	<i>p</i>
	#	%	#	%		
Clothing	21	50.0%	21	50.0%	.00	1.00
<i>Did you change the following features of your avatar?</i>						
Body shape	29	69.0%	13	31.0%	6.10	.01
Face shape	32	76.2%	10	23.8%	11.52	.001
Eyes	29	69.0%	13	31.0%	6.10	.01
Hair	28	66.7%	14	33.3%	4.67	.03
Skin	34	81.0%	8	19.0%	16.10	.0001
Entire shape	37	88.1%	5	11.9%	24.38	.0001
Accessories	30	71.4%	12	28.6%	7.71	.005

Table 3. Means, standard deviations, and ranges of responses to continuously measured items on the avatar survey.

Item	<i>M</i>	<i>SD</i>	<i>Range</i>
How long did it take you to select your avatar? (minutes)	7.34	10.50	0 - 60
How long did it take you to customize your avatar? (minutes)	14.72	21.55	0 - 120
How long did it take you to learn to manipulate your avatar? (minutes)	21.41	28.32	0 - 120
On a scale of 1 (none) to 100 (exactly alike), how much does your avatar physically look like you?	30.95	29.78	0 - 95
On a scale of 1 (none) to 100 (extreme amount), how much did you personalize your avatar (clothing, hair, appearance)?	30.36	32.71	0 - 95
On a scale of 1 (not at all) to 100 (extreme amount) how attached do you feel to your avatar?	17.74	25.09	0 - 90
On a scale of 1 (not at all) to 100 (extreme amount), I feel my avatar is an accurate representation of how I see myself.	38.57	39.45	0 - 90

Table 4. Bivariate correlations among avatar-related variables.

Item	<i>Lookalike</i>	<i>Attachment</i>	<i>Representation</i>
Personalize	.21	.46**	.50**
Lookalike	--	.02	.56**
Attachment		--	.45**

***p* < .01

Using forced-entry regression methods to predict users' level of feeling their avatar was an accurate representation of themselves (Avatar-representation), using Avatar-personalize and Avatar-looklike as predictors, yielding an R^2 value of .47, with SEE = 25.2. The model was statistically significant ($p < .001$), and yielded the following regression equation:

$$\text{Avatar-Representation} = 3.0 + .426 (\text{Avatar-Personalize}) + .543 (\text{Avatar-Looklike})$$

Means, standard deviations and ranges for responses to the life impact questions are shown in Table 5.

Table 5. Means, standard deviations and ranges for the life impact questions.

Item	<i>M</i>	<i>SD</i>	<i>Possible Range</i>
What type of impact has participating in Second Life had on your "in-person" life?	3.86	4.24	-10 - +10
What type of impact has participating in Second Life had on your communication with friends and family?	2.86	4.05	-10 - +10

Responses to the question, "What type of impact has participating in Second Life had on your "in-person" life?" were significantly positively correlated with responses on the following items on the Avatar Survey:

- Avatar-looklike: $r(42) = .40$, $p < .01$ (avatar looklike)
- Avatar-personalize: $r(42) = .33$, $p < .05$ (avatar-personalize)

Responses to the question, "What type of impact has participating in Second Life had on your communications with

friends and family?" were significantly positively correlated with responses with the following:

- Avatar-attachment: $r(42) = .32, p < .05$ (avatar-attachment).

No other items were significantly correlated, $p's > .05$.

Using Step-wise regression analysis methods to predict users' response to how VW Second Life participation impacted their in-person life, using Avatar-personalize, Avatar-looklike, Avatar-attachment, and Avatar-representation as predictors, yielded an R^2 value of .15, with $SE = 3.91$. The model dropped all predictors with the exception of Avatar-looklike and was statistically significant ($p=.01$), yielding the following regression equation:

$$\text{Impact on 'In-Person' life} = 2.05 + .054 (\text{Avatar-Looklike})$$

Using Step-wise regression analysis to predict users' responses to how Second Life participation impacted volunteers' communication in their everyday in-person life, using Avatar-personalize, Avatar-looklike, Avatar-attachment, and Avatar-representation as predictors, yielded an R^2 value of .11, with $SE = 3.82$. The minimum recommended effect size for practical significance for $R^2/\text{Adjusted } R^2$ was estimated by Ferguson (2009) as no less than .04 with a moderate effect of .25. The model dropped all predictors with the exception of Avatar-attachment in the model and was statistically significant ($p=.03$), and yielding the following regression equation:

$$\text{Impact on Communication in everyday life} = 1.83 + .052 (\text{Avatar-Attached})$$

DISCUSSION

While 50% of the volunteers changed their avatars clothing, only 28.6% changed their avatars personal characteristics (clothing was not considered a 'personal feature' of the avatar). The most frequent feature changes, in order of magnitude, were hair, body shape and eyes. It took longer for volunteers to learn to manipulate their avatar (travel [walk/fly/transport], speak, use emoticons) than to customize/personalize or select their avatar.

Volunteers personalized their avatar and felt their avatar looked like them at moderately low levels. They reported a low level-of-attachment to their avatar and a near-moderate level of avatar self-representation. Standard deviations were high for each measure.

Although the R^2 values were low, the study results upheld hypothesis 1, that personalizing ones avatar and having an avatar that physically resembled the user predicted the user's attachment to his (or her) avatar and predicted the self-report of their avatar being an accurate self-representation. These results support the supposition that the "mutability of our self-representations in online environments is a fundamental aspect of what it means to have a virtual identity (Yee & Bailenson, 2007, citing Turkle, 1995; Yee, Bailenson & Ducheneau, 2009).

The results also upheld part of hypothesis 2, that Avatar-looklike and Avatar-attachment would predict the impact of the virtual world training on user's personal life and communication in the in-person world. While the hypotheses regarding Avatar-personalize and Avatar-representation were not upheld, personalizing ones avatar predicted attachment and attachment predicted offline behaviors. Only Avatar-looklike predicted positive change in the volunteers' offline personal life, and solely Avatar-attachment predicted positive changes in volunteers' offline communications with friends and family. These findings uphold the theory of the Proteus effect, e.g. the tendency for people to be affected by their digital representations in terms of self-perception (and behaviors) both online and off line (Yee & Bailenson, 2007). In their studies, Yee and Bailenson (2007) found both avatar attractiveness and height impacted online behaviors and interactions, and the changes were persistent in participants' in-person behaviors. For example, individuals with taller avatars negotiated more aggressively online and in-person during face-to-face encounters (Yee & Bailenson, 2007).

While this study did not examine offline health-related behaviors, other research has shown that in-person eating behavior changed after watching one's avatar eat, differentially by gender (Fox, Bailenson, & Binney, 2009). Our findings that Avatar-attachment predicted an increase in positive communications with friends and family appears to support findings that self-presence in the virtual world has been linked to offline health (Behm-Morawitz, 2012). Additionally, our findings that Avatar-looklike predicted positive changes in volunteers' offline personal life appears to support findings showing the physical creation and appearance of one's avatar can positively affect health-related behaviors (Youjeong & Sundar, 2012).

Although the plasticity of our self-representations appears to be important to our online identities, Fong and Mar (2016) found that an individual's avatar accurately conveyed personality traits, without the avatar physically resembling the user. For example, avatars with eyes that are open more widely were understood by others to be more agreeable and friendly. Researchers have also found that people disclose more information to avatars that were low in form similarity (facial realism) (Bailenson, Yee, Merget & Schroeder, 2005). The authors suggest designing avatars with high behavioral similarity and low form similarity for increasing social interactions that entail self-disclosure. Although this study did not address high behavioral similarity, future research in telehealth applications might benefit from examining varying levels of physical and behavioral similarity, along with levels and types of online engagement.

Given both the literature review and these research findings, it appears that: 1) the creation and ultimate design of one's avatar are important to the user's self-perception and consequent behaviors, 2) users' attachment to their avatar when learning mindfulness meditation can impact their subsequent in-person communications with friends and family, 3) telehealth participants should be taught how to personalize their avatars in order to maximize the potential relationship between physical resemblance and avatar-attachment to initiate behavioral change, and 4) the design of one's avatar may

differentially impact behavioral outcomes (e.g., one avatar design may increase personal sharing, while another design may yield positive wellness-related behavioral change).

LIMITATIONS

This research was conducted with U.S. military service members and veterans which may limit the generalizability of the findings to other populations. Also, it should be noted that participants' avatar customizations were limited to those permitted by the Second Life software. Finally, the small *n* and self-report data and correlational statistics restrict causal inferences from the outcomes.

CONCLUSIONS

This study showed that participants changed their avatars clothing more than the personal features of their avatar. The most frequent changes, other than clothing, were altering hair, body shape, and eyes. This research also demonstrated that personalizing one's avatar and having it physically resemble oneself predicted volunteers' attachment to their avatar and their belief that the avatar was an accurate self-representation. Finally, this research is in agreement with the Proteus Effect, in which one's online persona and behavior can impact their offline self-perception and behavior. This research adds to the literature by showing that the similarity of one's avatar to oneself, as well as one's attachment to their avatar, can predict certain offline behaviors. As avatar design characteristics appear to differentially affect offline behaviors, additional research is warranted to determine which avatar design considerations will be most helpful in determining patient compliance and encouraging positive offline wellness behaviors in response to telehealth interventions.

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DISCLAIMER

The views expressed in this article are those of the authors and do not reflect the official policy or position of the Department of the Army, Department of Defense, or the U.S. Government.

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