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Virtually Ostracized: Studying Ostracism in Immersive Virtual Environments

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Abstract

Electronic-based communication (such as Immersive Virtual Environments; IVEs) may offer new ways of satisfying the need for social connection, but they also provide ways this need can be thwarted. Ostracism, being ignored and excluded, is a common social experience that threatens fundamental human needs (i.e., belonging, control, self-esteem, and meaningful existence). Previous ostracism research has made use of a variety of paradigms, including minimal electronic-based interactions (e.g., Cyberball) and communication (e.g., chatrooms and Short Message Services). These paradigms, however, lack the mundane realism that many IVEs now offer. Further, IVE paradigms designed to measure ostracism may allow researchers to test more nuanced hypotheses about the effects of ostracism. We created an IVE in which ostracism could be manipulated experimentally, emulating a previously validated minimal ostracism paradigm. We found that participants who were ostracized in this IVE experienced the same negative effects demonstrated in other ostracism paradigms, providing, to our knowledge, the first evidence of the negative effects of ostracism in virtual environments. Though further research directly exploring these effects in online virtual environments is needed, this research suggests that individuals encountering ostracism in other virtual environments (such as massively multiplayer online role playing games; MMORPGs) may experience negative effects similar to those of being ostracized in real life. This possibility may have serious implications for individuals who are marginalized in their real life and turn to IVEs to satisfy their need for social connection.

HUMANS HAVE A STRONG NEED for belonging and regular social interactions.[1,2] Traditionally this need has been satisfied in face-to-face interactions, but as technology evolves humans obtain new methods for interacting with one another. Many of these methods involve communication via electronic media, such as cell phones and the Internet, which can transcend temporal and geographical constraints.[3,4] These methods of communication have become a boon for individuals who are often inhibited by social anxiety, loneliness, or lack of social skills in traditional face-to-face interactions.[3–9] Other research has found that electronic forms of communication can help stigmatized individuals satisfy their need to belong and be more confident presenting their "true selves" to family and friends.[10]

Much of the research thus far has focused on text-based communication (e.g., e-mail, cell phone texting, Internet chat groups). An increasingly popular form of online media involves real-time interactions in Immersive Virtual Environments (IVEs) via avatars—digital representations of the human users. These environments are often rich in sensory information, providing the ability to see, hear, and speak to the other avatars. Social psychologists have begun to utilize IVEs to study various interpersonal processes because these environments afford them a strong degree of experimental control, but also allow for more mundane realism than the typical laboratory experiment.[11] Research thus far using both laboratory IVEs and online social worlds, such as massively multiplayer online role playing games (MMORPGs), demonstrates that individuals in virtual environments often behave similarly to how they would in real-world social interactions. For example, participants gave other avatars interpersonal distance that would be considered appropriate in face-to-face encounters, especially if they thought the avatar was controlled by another human.[12–14] Further, the characteristics and behavior of avatars can also influence participants' perceptions[15] and even their responsiveness to social influence tactics.[16]

Studying Threats to Belonging

As access to virtual environments has become more readily available, their role as a social buffer has become more common. Research suggests that MMORPG use is motivated by socializing and escape motives—individuals enrolled in

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MMORPGs report doing so as a means to escape their physical and social environments and forge new social relationships in a digital world.[17,18] Social support from MMORPGs may not, however, be as readily available as some users would hope. Dupuis and Ramsey[19] found that MMORPG use is not associated with an increase in perceived social support, and that lower perceived social support within MMORPG communities is associated with depression. This suggests that, while electronic-based communication (such as MMORPGs and IVEs) may offer new ways of satisfying the need to belong, they also provide ways this need can be thwarted. Parents, educators, and researchers alike have been troubled by the increasing amount of bullying occurring via electronic-based communication.[20] Social ostracism (being ignored and excluded) is another aversive interpersonal phenomenon that occurs both in face-to-face and electronic-based interactions. Ostracism not only threatens the human need to belong, but also threatens need for control, self-esteem, and meaningful existence.[21] Ostracism has been studied in various paradigms, from face-to-face encounters[22] to cell phone texting[23] and chatrooms.[24]

The first approach to studying ostracism employed a face-to-face ball-tossing paradigm, where two confederates interacted with a naïve participant.[22] Naïve participants sat in a waiting room with the two confederates and waited for the ostensible experiment to begin. While the experimenter left to prepare the study, the confederates began playing with a ball that was in a box full of props supposedly for a different study. The confederates also tossed the ball to the participant. In the *inclusion* condition, the confederates shared the ball equally among all members of the group. In the *ostracism* condition, however, confederates allocated one toss each to the participant and then never threw to the participant again. These confederates were trained to ignore anything the participant might say, and not even give them eye contact. After the game, the experimenter returned and administered the dependent measures to the participant.

Creating a cyber-ostracism paradigm

The face-to-face paradigm is a powerful demonstration of ostracism's consequences, but unfortunately it requires two trained confederates and only one participant can be run at a time, which limits the ability to conduct an exhaustive program of research.[25] Subsequent ostracism research used a computerized version of the ball-tossing paradigm called Cyberball,[26] with similarly strong effects. This paradigm had participants play an online game of ball-toss with two other players (in reality, computer-programmed virtual confederates). The confederates were programmed to either include or ostracize the participant in the same manner as the face-to-face paradigm. This paradigm is useful because it can be used to study ostracism in group interactions without the use of live confederates and can be used to collect large samples over the Internet.[25,26]

Cyberball was created purposefully to be a minimal paradigm, devoid of most social information so that the power of ostracism could be demonstrated.[21] Other research has modified Cyberball to include other social information to test various hypotheses about how the characteristics of both the sources (i.e., out-group status[27,28]) and targets (i.e., stigmatized status[29,30]) influenced ostracism's harm. Each of these paradigms manipulated this information creatively but still utilized a two-dimensional representation of the participant and the other players.

Current research

These paradigms lack the mundane realism that many virtual environments now offer, and an IVE paradigm designed to measure ostracism could allow researchers to test more nuanced hypotheses about the effects of ostracism.[31] Further, an IVE ostracism paradigm would also offer experimental evidence that being ignored and excluded in a virtual world can hurt just as it does in real-life interactions. We created an IVE paradigm based on the original ostracism ball-tossing paradigm. We hypothesized that participants who were ostracized in this IVE, compared to included participants, would manifest the negative consequences found in other ostracism paradigms (i.e., threatened need satisfaction and increased negative mood).

Method

Participants and design

Forty-nine undergraduates (33 females; 82% Caucasian; $M_{age} = 20.82$ years, $SD = 1.27$) participated for partial course credit. Participants were randomly assigned to either an ostracism or an inclusion condition.

Equipment

The study was conducted using an immersive virtual ball-toss program. Each participant wore a head-mounted display (HMD), through which the virtual environment was displayed (see Fig. 1). The HMD was produced by Virtual Systems, Inc. (Model VR1280; Bellevue, WA), and was equipped with InertiaCube2 motion tracking system. We programmed and rendered the virtual environment using Vizard 3.0 software, which was designed to run on a PC with a high-quality graphics card, and used Bluetooth-enabled Wiimotes to track ball tosses. Participants used a motion-sensing wireless controller to control their ball tosses during the game.

Procedure

Participants entered the virtual reality lab for a study entitled "Mental Visualization in a Virtual Environment." Participants were informed that the study was designed to

FIG. 1. Virtual environment.

quantify the effects of mental visualization on the subjective experience of virtual environments. The experiment instructions stated participants would engage in an interaction in a rendered virtual world, and would answer questions about the experience both during and after the task. This task was modeled on similar computer-based and face-to-face ostracism paradigms.[21] Participants were also given specific mental visualization instructions:

> In order to answer these questions thoroughly and correctly, you must pay very close attention to the virtual environment. Take note of the landscape: What color is the grass? What is the weather like? Is it sunny or cloudy? Try to mentally visualize actually being in this environment. Also, pay very close attention to the other individuals in the virtual world. While you are playing the game, try to mentally visualize their behaviors as if they were real people. What do they look like? What are they doing? Are they happy or sad? Are they having fun? Are they bored?

Participants were told that two computer-controlled agents would be present in the environment, and would be engaged in a ball-toss game. Participants were instructed to press one of two keys on a wireless controller to throw the ball if the ball came to them during the interaction. Participants then put on the HMD and began the ball-toss program. Participants were randomly assigned to be included or ostracized by the agents during the ball-toss game.[a] All participants received one ball toss at the beginning of the program from one of the two agents (chosen randomly). Subsequently, ostracized participants received no ball tosses, while fully included participants received 30% of the ball tosses.

Dependent measures

After completing the virtual ball-toss program, all participants completed the Basic Needs Scale,[21] assessing satisfaction of their four basic needs: belonging ("I felt disconnected"; "I felt rejected"; "I felt like an outsider"; $\alpha = 0.87$), control ("I felt powerful"; "I felt I had control over the course of the game"; "I felt superior"; $\alpha = 0.84$), meaningful existence ("I felt invisible"; "I felt meaningless"; "I felt non-existent"; $\alpha = 0.85$), and self-esteem ("I felt good about myself"; "My self-esteem was high"; "I felt liked"; $\alpha = 0.87$). Mood was assessed using adjective markers. Participants were asked to rate the extent to which they felt good, bad, angry, sad, friendly, unfriendly, and relaxed. Responses were combined to create a single mood score ($\alpha = 0.88$), with higher scores reflecting more positive mood. Participants also completed three manipulation checks. Two items assessed the subjective perception of ostracism ("I felt ignored"; "I felt excluded"). These two items were combined to create a single score for perceived ostracism ($\alpha = 0.97$), with higher scores reflecting higher levels of perceived ostracism. Participants were then asked to estimate the percentage of ball tosses they received (fully included participants received 30%).

Results

Manipulation checks

Participants in the ostracism condition reported higher levels of perceived ostracism ($M = 4.48$, $SD = 0.53$) than those in the inclusion condition ($M = 2.04$, $SD = 0.98$), $t(47) = 10.92$, $p < 0.001$, $d = 3.10$. Participants in the ostracism condition also reported receiving a lower percentage of ball tosses ($M = 3.36$, $SD = 3.05$) than those in the inclusion condition, ($M = 33.58$, $SD = 9.82$), $t(47) = -14.68$, $p < 0.001$, $d = 4.15$. All analyses were conducted using t tests, with $\alpha = 0.05$.

Table 1. Descriptive and Inferential Statistics for Basic Needs by Condition

	Inclusion		*Ostracism*		*Inferential Statistics*		
	M	*SD*	*M*	*SD*	*T*	*p*	*d*
Belonging	3.97	1.05	2.01	0.75	−7.51	0.001	2.15
Meaningful existence	4.06	1.04	2.14	0.86	−7.08	0.001	2.01
Self-esteem	3.42	0.82	2.11	0.76	−5.83	0.001	1.67
Control	2.79	1.10	1.32	0.90	−5.13	0.001	1.46

Need satisfaction and mood

Ostracized participants reported lower levels of need satisfaction for belonging, self-esteem, meaningful existence, and control compared to included participants, $ps < .001$ (see Table 1 for means, standard deviations, and inferential statistics). Ostracized participants reported less positive moods ($M = 2.78$, $SD = 0.74$) than included participants ($M = 3.99$, $SD = 0.59$), $p < 0.001$, $d = 1.81$.

Meta-analytic comparison of ostracism effects

We only manipulated ostracism using one paradigm (IVE), but we conducted post hoc meta-analyses[32,33] to compare the size of our effects to those found in other ostracism paradigms. Specifically, we compared our IVE paradigm to a face-to-face paradigm,[34] a cyber-ostracism paradigm (i.e., Cyberball[24]), and an online chatroom paradigm.[23] Because these studies did not use the same measures, we chose to focus on the manipulation checks in each study, which assessed how ostracized or included participants felt in each of the four paradigms. We calculated the effect sizes using r, which is the suggested metric for meta-analytic comparisons between studies.[32,33] Our IVE paradigm's effect on participants' feelings of ostracism ($r = 0.84$) was greater than the face-to-face paradigm ($r = 0.47$), $Z = 03.22$, $p < 0.01$. Our IVE paradigm's effect size was not significantly different from the effect sizes of the Cyberball paradigm ($r = 0.83$; $Z = 0.20$, $p = 0.84$) or the online chatroom paradigm ($r = 0.80$; $Z = 0.53$, $p = 0.60$).

General Discussion

Our data indicate that ostracism in an Immersive Virtual Environment threatens four basic fundamental needs (i.e., belonging, control, self-esteem, and meaningful existence) and also has a negative impact on affect. These data replicate previous findings in studies using other ostracism paradigms.[21] At this point, ostracism has been manipulated experimentally in various ways, from face-to-face group interactions to minimal electronic-based interactions. This study presents the first evidence, to our knowledge, of ostracism in virtual environments. Our data suggest that not only does ostracism in this environment have the same negative effects as in other environments, but these effects are powerful; the effect sizes were medium to large in magnitude.

Additionally, this new paradigm offers experimenters the ability to manipulate aspects of the social environment absent from previous ostracism paradigms, such as social distance and non-verbal communication.

We are uncertain as to why all of the cyber paradigms have larger effect sizes than the face-to-face paradigm. Perhaps a face-to-face environment offers more potential sources of ambiguity for the ostracism behavior, or face-saving thoughts and activities reduce the impact once the measures are asked. The cyber paradigms also have the advantage of standardized experimenter control, whereas a face-to-face paradigm requires trained confederates that are more difficult to standardize across participants.[25] Regardless, our data suggest that IVEs are useful paradigms for studying ostracism experimentally. IVEs not only offer the systematic control afforded by other cyber paradigms, but they also offer the additional flexibility to manipulate more diverse social information about the computer agents or confederates' avatars and their behavior.[31] This information may have interesting implications for how well individuals recover from ostracism,[21] and potentially how quickly individuals are affected by non-verbal information conveying ostracism (e.g., acknowledgement via eye-gaze or being looked through as if one were invisible).[35–38]

Future directions for studying ostracism in virtual environments

This research suggests the possibility that individuals who use virtual environments (e.g., MMORPGs) may have everyday experiences with ostracism in these environments. Yee et al.[39] conducted an observational study with individuals using MMORPGs and found that many interpersonal behaviors, such as eye-gaze, mimic normative behavior in the real world. Given the experiments that demonstrate the power of eye-gaze to communicate ostracism in other contexts,[35–38] it is possible that individuals use averted eye-gaze to communicate ostracism in virtual environments as well. Our data are limited to laboratory IVEs, restricting our ability to make inferences to non-laboratory virtual environments. Future research should explore the impact of ostracism in online virtual environments, such as MMORPGs.

Recent research demonstrates that the social behavior of many individuals in MMORPGs mimic stereotypical gender-appropriate behavior in real life.[40] Though we found no effects for gender in this study, this research also has interesting implications for understanding gender differences in ostracism, because women are more likely to ostracize other people if they expect to be ostracized themselves.[41] If ostracism occurs regularly in virtual environments, researchers may find a gender difference in how frequently it is employed by female versus male users.

Finally, research should investigate the deleterious effects of ostracism on individuals who use virtual environments as their last bastion of social inclusion.[42] Several studies have suggested that lonely, shy, and socially anxious individuals often use the Internet and other virtual interactions to satisfy their need to belong.[3–8] If individuals who are ostracized chronically in their real lives also experience ostracism in these virtual interactions, then they lose their last vestiges of social interaction and may develop severe physical and psychological problems.[21,43] Our data, taken together with the previous research on IVEs, suggest that interactions in virtual environments can not only be a medium where people fulfill the need for social interaction but also serve as a situation where this need can be threatened.

Notes

a. This study also contained a pilot manipulation as an attempt to parse out the potential additive effects of ignoring versus excluding. Specifically, we programmed the confederates to give participants eye contact (or not) during the ball-tossing game, regardless of the ball-toss manipulation. This eye-contact manipulation did not have a significant main effect or interaction with the ball-tossing manipulation on our manipulation checks, Fs < 1.00, ps > 0.40; thus we will not discuss this variable further in this article.

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