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The role of social virtual world in increasing psychological resilience during the on-going COVID-19 pandemic

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ARTICLE INFO

Keywords:

Avatar
Social virtual world
COVID-19
Psychological resilience
Proteus effect

ABSTRACT

The 2020 COVID-19 pandemic has not only impacted the physical health of individuals but the fear and anxiety of contracting the disease has also contributed to psychological distress among people. The current research identifies a novel coping strategy to strengthen individuals' psychological resilience against the pandemic. Study 1 (N = 210) and Study 2 (N = 93) showed significant beneficial effect of representing oneself via avatar in social virtual world (SVW) on the psychological resilience towards contracting COVID-19. Study 2 also showed that this effect is explained by the disembodied (i.e., out-of-body) experience one encounters in the SVW by digitally representing oneself via an avatar, which enables SVW users to project themselves onto a character in a parallel world that is immune to the COVID-19 virus, thus alleviating the anxiety of contracting the virus themselves in the real world. Additionally, it ruled out alternate explanations like escapism and enjoyment. The findings extend the Proteus effect (i.e., individuals behaviorally conform with their avatar's visual/physical appearance) to a more innate feature of the avatar—its imperviousness from the human body's limitations. The results have important implications for health policy makers along with making a strong case for marketing computer-simulated games like SVWs as virtual therapy tools.

1. Introduction

In March 2020, the novel coronavirus disease known as COVID-19, was labeled a pandemic by the World Health Organization. By the end of May 2020, COVID-19 virus had affected 213 countries and territories around the world and had infected more than 6.29 million people worldwide. The fear and threat of contagion with COVID-19 is leading to enduring psychological problems among people which can be more detrimental in the long run than the virus itself (Depoux et al., 2020). As of April 2020, three in five Americans reported fearing they will contract the virus (Butchireddygar, 2020). Another poll reported that nearly half of Americans believe the coronavirus crisis is harming their mental health (Achenbach, 2020). Similarly, a federal emergency hotline for people in emotional distress registered an increase of more than 1000 % in April 2020 compared with the same time last year (Cunningham, 2020). The psychological impact of the pandemic caused by the fear of contracting COVID-19 and subsequently eminent death is causing elderly and other vulnerable population with mental illness, who are

already prone to depression and anxiety, to relapse at an increasing rate (Mehra et al., 2020). Not surprisingly, health experts are experiencing a rapidly growing consensus advocating immediate interventions and coping strategies to avoid a national mental health crisis (Kam, 2020).

Given this background, it is imperative that intervention tools are identified quickly to help assuage the psychological stress associated with the fear of contracting the disease. To this end, this research offers a potential intervention tool and proposes a novel yet simple coping strategy to mitigate anxiety and fear of contracting COVID-19: becoming members of social virtual worlds (SVWs) via avatars. SVWs are “computer-simulated, graphic-based, virtual environments having emergent structures that are created by users under minimum constraints” (Jung & Kang, 2010, p. 218) and an avatar is defined as “a perceptible digital representation whose behaviors reflect those executed, typically in real time, by a specific human being” (Bailenson & Blascovich, 2004, p. 65). Across two studies, we show that becoming a member of an SVW increases the psychological resilience towards the anxiety and fear of contracting COVID-19. Further, we show that the disembodied

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experience of digitally representing oneself in the SVW using an avatar explains this effect. This disembodied experience enables users of SVWs to project themselves onto a virtual world via a character that is immune to the COVID-19 virus. To do so, we build on the prior scholarship of Proteus Effect (Yee & Bailenson, 2007). Proteus effect refers to a phenomenon in which users make inferences about their expected dispositions from their avatar's appearance and then conform to the expected attitudes and behavior. Additionally, we rule out alternate explanations like escapism and distraction associated with engaging in SVWs.

In the following sections, we review relevant literature on SVW and Proteus Effect and develop a set of arguments linking engaging in SVW to increase in psychological resilience. We present two experimental investigations of our proposal and rule out alternate explanations. Finally, we close with a discussion of implications and limitations.

1.1. Social virtual world

SVWs (e.g., Second Life, The Sims) are computer-simulated, persistent spatial environments that support synchronous communication among multiple users (Jakobsson, 2006). They have emergent structures that offer their users an opportunity to determine their own experiences in the virtual world, under minimum constraints (Jung & Kang, 2010). SVWs provide users with a platform that is an extension of the real world rather than being purely fantastical. This setup allows users to lead a parallel but realistic and autonomous existence in such SVWs. Although SVWs share some common elements with other digital communities, like gaming virtual worlds (GVWs) and social media, they are also distinct in meaningful ways (Mäntymäki & Salo, 2011). GVWs are characterized by a predefined structure and quest-driven behaviors whereas SVWs have emergent structures that users develop under minimum constraints which allow them to determine their own experiences in the virtual world. Similarly, although both SVWs and social network platforms encourage interactions and communications between members, the presence of the 3D environment, the ability to construct an alternate identity, and the experience of being a part of an entirely virtual world are all unique to SVWs. The increasing acceptance of SVWs can be attributed to the evolution of society toward a postmodernist culture of simulation and the increasing popularity of hyperreality (Kaplan & Haenlein, 2009; Turkle, 1996). Hyperreality is the idea that reality is constructed, and therefore it is possible to construct things that are more real (Venkatesh, Sherry & Firat, 1993). People are increasingly comfortable with substituting the real with the representation of reality, including the representation of oneself and one's own body. The popularity of SVW is reflected in its number of users. As of 2018, Second Life, a popular virtual community where residents create and sell products and socialize with other Second Life residents, had about 5,000,000 active monthly users (Buscemi, 2020). Other SVWs, like Habbo, are also witnessing an increase in user visits, as much as 213 % a month, as an aftermath of the COVID-19 pandemic (Reuters, 2020).

Key to the popularity of hyperreality is the advancement of technology that now enables users to be represented in virtual worlds via their avatars. Avatars have emerged as one of the key elements of users' immersion experience in SVWs (Bessi re, Seay, & Kiesler, 2007; Garnier & Poncin, 2013; Van Looy, Courtois, De Vocht, & De Marez, 2012). Individuals use their avatars to introduce their body to the virtual world and make their engagements more veridical (Vicdan & Ulusoy, 2008). As our corporeal body roots us in the physical world and represents our physical existence, digital bodies or avatars are used by people as an embodiment of themselves in the virtual environment. This virtual, disembodied experience has been shown to enable individuals to be free of the physical constraints and the finite nature of the human body, rendering the process highly immersive (Turkle, 1996).

1.2. Disembodied experience and perspective taking

The potential for avatars to influence their users' behaviors and

attitudes both in mediated and actual (unmediated) contexts has gained significant attention in domain of virtual experience and media effects (Yee, Bailenson, Urbanek, Chang, & Merget, 2007). Prior work suggests that this immersive experience allows a user to directly envisage the perspective and the characteristics of the virtual world, including the physical characteristics of their avatars. For example, when college students represented themselves by an elderly avatar, the embodied perspective-taking increased their positive evaluations of the elderly (Yee & Bailenson, 2006). In another example, participants who wore sexualized avatars in an SVW environment internalized the avatar's appearance and self-objectified, reporting more body-related thoughts than those wearing non-sexualized avatars (Fox, Bailenson, & Tricase, 2013). Labeling this phenomenon as the Proteus effect, Yee and Bailenson (2007) argue that the embodiment of the avatar's characteristics leads to shifts in the user's self-perception, both online and offline. The avatar's physical characteristics influence the attitude of the user and subsequently results in behavioral conformity both during and after the avatar use. A plethora of research on this reliable phenomenon has ascertained that identification with the avatar characteristics affects numerous outcomes (Ratan, Beyea, Li, & Graciano, 2019), including negotiation aggressiveness (e.g., Yee & Bailenson, 2007), dating partner choices (e.g., Yee & Bailenson, 2009), antisocial behavior (e.g., Yoon & Vargas, 2014), food choice (Fox, Bailenson, & Binney, 2009), financial risk-taking (Hershfield et al., 2011), consumer choices (Ahn & Bailenson, 2011), and math performance (e.g., Lee, Nass, & Bailenson, 2014). To sum up, all the evidence converges on the point that avatars can have meaningful effect on the self-perception of their users.

Although researchers have considered the implications of the transformed digital self-representation on an individual's real self, they typically examined the impact of the physical attributes of the avatar (e.g., height, skin color, physique, and facial characteristic). In addition to the aforementioned external attributes, avatars in SVW environment share another critical, more innate feature: immunity and imperviousness from any limitations of the corporeal body (Turkle, 1996). To the best of our knowledge, the impact of this immune and impervious nature of the avatar on the real-life of the user remains unexplored in the extant literature. A related stream of literature on digital immortality examines the role of avatars in digitally immortalizing a deceased human (Huberman, 2018; Savin-Baden & Burden, 2019). According to this research, on account of being digital personas, avatars are eternal, and therefore can be used to represent their creators even after the latter's death. Similarly, we argue that the digital nature of an avatar exempts it from any limitations of the physical body. Specifically, in this case, the digital nature of the avatar and its presence in virtual, parallel world (i.e., SVW) leads to the perception that an avatar is immune to illness and other scourges that inhabit this earthly world. Therefore, the disembodied experience stimulated by transitioning to an avatar in an SVW enables the user to envision living in an immune body in a parallel life away from the constraints and limitations of the human body. Unlike the influence of physical characteristics studied in Proteus effect so far, merely representing oneself as an avatar in any online platform is not enough to have the disembodied experience. The combination of representing oneself as an avatar and being a part of an SVW together results in this experience. It is only when one makes a transition from one's corporeal body to an avatar in the parallel world (i.e., SVW) that a user experiences disembodiment and perceives himself or herself free from the limitations of the corporeal body.

In sum, we propose that the disembodied experience stimulated by being a member of an SVW via an avatar increases the psychological resilience towards the fear of contracting COVID-19. We further demonstrate that this effect is unique to users undergoing the disembodied experience by being members of SVWs and is not applicable to being represented by an avatar on any other online platform (e.g., social media). In the following sections, we test our prediction across two studies.

2. Method

2.1. Study 1: virtual identity versus work identity

Study 1 examined our main proposition that being members of SVW help individuals cope with their fear of contracting COVID-19 along with increasing their psychological resilience. The study presented a scenario that allowed participants to either adopt a new identity of an SVW member or a new work identity. Based on the arguments above, we predicted that the disembodied experience simulated by adopting a new virtual identity in an SVW (i.e., a parallel world free from earthly ailments) in the form of an avatar (i.e., an entity impervious to earthly ailments) would make participants less fearful about contracting COVID-19 and make them less anxious about the pandemic. However, we did not expect a similar effect when participants adopted a new work identity. Although participants would have the opportunity to transition into an alternate identity (i.e., the work identity), the identity would still be a representation of their corporeal self and hence not immune to the COVID-19 virus.

2.1.1. Participants and material

Participants ($N = 210$ US residents; $M_{\text{age}} = 34.32$ (18–88 years), 43.8 % female, ≥ 98 % MTurk approval rating) were recruited from Amazon Mechanical Turk in exchange for payment. Participants for both the studies were protected and ethical approval was obtained from the relevant Institutional Review Boards. Participants were randomly assigned to one of two conditions (new identity: SVW vs. work). Full details of all aspects of this study, including flow and the wording of the stimuli and measures appear in Web Appendix A in the supplementary material. First, all participants were asked to rate their affect on two positive and two negative items adopted from the Positive and Negative Affect Schedule (PANAS) measure (Watson, Clark, & Carey, 1988). Next, they were asked to provide basic demographic information. Then, they were presented with an article excerpt about COVID-19 to prime them with COVID-19-related thoughts. The excerpt highlighted the number of confirmed COVID-19 cases and deaths in the United States and across the world. They were asked to read the excerpt and answer a related question before continuing. After the priming task, the participants were introduced to the condition specific stimuli.

In the SVW condition, participants were asked to imagine they had decided to become a member of an online virtual world named Aionion. They were told that being a member of a virtual world would enable them to lead a life in a parallel world. To become a member of the virtual world, they first had to create an avatar to represent themselves in the SVW. Participants then encountered a multistep process for creating their customized avatar. They started by picking the gender of their avatar. For each gender, they were given a choice between four avatars. As part of the customization process, for female avatars, participants had the option to accessorize their avatars with a pair of earrings and a hat. Similarly, for male avatars, they had the option to accessorize them with a chain and a hat. Additionally, the participants were asked to indicate the name that would represent them in Aionion. Next, participants were exposed to a series of interactive questions to increase their sense of involvement with their new SVW. In the work condition, the participants were asked to imagine that they had taken a new job that required them to adopt a new identity. They were presented with two generic user-profile icons and were asked to pick one to represent themselves in the new company. Additionally, they were asked to indicate the alias they would use for their new identity. Next, similar to the SVW condition, participants in the work condition answered some questions related to their new (i.e., work) identity to enhance their involvement with this identity.

Following the interaction process, participants were asked to indicate their agreement to the four-item dependent-variable measure capturing their level of psychological resilience towards the fear of contracting COVID-19 and hence their confidence in coping with

COVID-19-related anxiety - 1) "I think I am immune to the COVID-19 infection", 2) "I feel powerful and strong to beat COVID-19", 3) "At this point of time, I feel invincible", and 4) "I am not anxious about the COVID-19 situation". All measures used 9-point, Likert-type scales (1 = strongly disagree, 9 = strongly agree).

2.1.2. Results

The two negative PANAS items ($\alpha = 0.90$) and the two positive PANAS items ($\alpha = 0.83$) were averaged to form two composite measures. Analysis of these composite measures revealed no significant difference between the pre-stimuli participant mood in both conditions (Negative PANAS: $M_{\text{SVW}} = 3.54$, $SD = 1.99$, $M_{\text{work}} = 3.59$, $SD = 1.73$; $t(208) = -0.199$, $p = .842$; Positive PANAS: $M_{\text{SVW}} = 4.49$, $SD = 1.72$, $M_{\text{work}} = 4.20$, $SD = 1.59$; $t(208) = 0.842$, $p = .401$).

For the main analysis, the four dependent measure items ($\alpha = 0.87$) were averaged to form a composite COVID-19 psychological resilience dependent variable. An ANCOVA with new identity as a categorical predictor, gender as a categorical covariate, and age as a continuous covariate revealed a significant main effect of gender ($F(1, 206) = 13.785$, $p < .001$), such that male participants indicated higher COVID-19 psychological resilience ($M_{\text{male}} = 5.48$, $SD = 2.19$) compared with female participants ($M_{\text{female}} = 4.26$, $SD = 2.33$). The effect of age was marginally significant ($F(1, 206) = 3.45$, $p = .065$). More importantly, a significant main effect of new identity revealed that the COVID-19 psychological resilience measure was influenced by the nature of the identity adopted by participants ($F(1, 206) = 4.10$, $p = .044$). Consistent with our prediction, participants felt greater psychological resilience regarding coping with COVID-19 when they adopted a new SVW member identity ($M_{\text{SVW}} = 5.27$, $SD = 2.26$) compared to when they adopted a new work identity ($M_{\text{work}} = 4.60$, $SD = 2.36$; see Fig. 1).

2.1.3. Discussion

Study 1 results provide initial support for our argument that being members of an SVW via an avatar can help individuals in alleviating the fear of contracting COVID-19 and reducing the anxiety about the pandemic. Contrasting the new virtual identity with another new, albeit corporal identity (i.e., a work identity), demonstrated the critical and necessary role played by SVWs in coping with COVID-19-related anxiety. Although participants could adopt new identities in both conditions, the disembodied experience and ability to exist in a parallel world was present only in the SVW condition. A new work identity, despite offering a new alternate identity, did not have a similar effect, as a work identity is still a physical (human) representation of oneself existing in the earthly realm and therefore lacks the disembodied experience.

Although the above results provided initial support for our predictions, one could argue that by merely representing oneself as an avatar without the context of SVWs might be enough to get the same benefits (i.e., disembodied experience). In other words, it might be

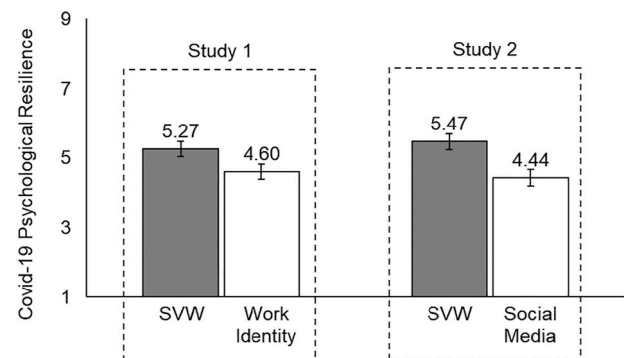


Fig. 1. Study 1 and 2: Being members of an SVW increases psychological resilience in coping with COVID-19. Note: Pooled standard errors are used for error bars.

possible to obtain a similar effect by giving participants a chance to represent themselves as avatars on other online platforms that are not SVWs, for example social media. Further, one might also argue that allowing participants to be users of SVWs might lead to a sense of escapism and be more entertaining in comparison to the work identity, which in turn, would drive an increase in psychological resilience. Accordingly, we conducted Study 2 to test the inferences.

2.2. Study 2: social virtual world versus social media platform

Study 2 pursued two main goals. First, it isolated the effect of SVW by contrasting it with another common online platform: social media. Participants were allowed to become members of either an SVW (similar to Study 1) or a social-media platform and create customized avatars to represent themselves. We predicted participants would have greater COVID-19 psychological resilience when they have the opportunity of being members of an SVW (vs. a social-media platform). As discussed earlier, although SVWs and social-media platforms share some similarities, only being members of the former enable people to simulate the disembodied experience by making a transition from their corporeal body to an avatar in a parallel world. In contrast, although social-media platforms may allow members to represent themselves through avatars, those avatars would only be a mere representation of their corporeal self in the physical world (vs. being avatars in a parallel world).

Second, the study used mediation-by-measurement design to directly investigate the role of disembodied transition as the mechanism underlying the above effect. We asked participants to report their perceptions of their disembodied transition along with measures of escapism (an individual's desire to escape unpleasant realities or to distract their attention from problems and pressures) and enjoyment as the result of engaging with the platforms (all measures adapted from Holsapple & Wu, 2007).

2.2.1. Method

Participants ($N = 93$ US residents; $M_{\text{age}} = 36.37$ (19–63 years), 44.1 % female, ≥ 98 % MTurk approval rating) were recruited from Amazon Mechanical Turk in exchange for payment. They were randomly assigned to one of two conditions (digital platform: SVW vs. social media). Full details of all aspects of this study, including flow and the wording of stimuli and measures appear in Web Appendix B in the supplementary materials. Similar to Study 1, participants in both conditions started by responding to affect, demographic, and COVID-19 priming measures and then proceeded to the condition-specific stimuli.

The SVW condition was identical to that in Study 1. In the social media condition, participants were asked to imagine they had decided to become a member of a social-media platform named ShareIT and create an avatar that would serve the function of a profile picture used to represent them on the platform. Participants then encountered a multistep process to create their customized avatar, identical to the SVW condition, followed by series of condition-specific involvement questions.

Following the interaction process, participants in both the conditions were exposed to the four COVID-19 psychological resilience items from Study 1. Afterward, they completed the process measures for disembodied transition ("Being a member of Aionion/ShareIT enables me to project myself into a parallel character that is immune to the COVID-19 virus" and "When I am accessing Aionion/ShareIT, I feel as if I am part of the other world"), escapism ("Being a member of Aionion/ShareIT helps me escape from problems and pressures" and "Being a member of Aionion/ShareIT helps me escape from things unpleasant and worrisome") and enjoyment ("I have fun while accessing Aionion/ShareIT" and "I enjoy accessing Aionion/ShareIT"). Each process measure had two items adapted from Holsapple and Wu (2007). All measures used 9-point Likert-type scales (1 = strongly disagree, 9 = strongly agree).

2.2.2. Results

The composite negative PANAS items ($\alpha = 0.89$) and the composite positive PANAS items ($\alpha = 0.87$) revealed no significant difference between the pre-stimuli participant mood in both conditions (Negative PANAS: $M_{\text{SVW}} = 3.18$, $SD = 1.88$, $M_{\text{socialmedia}} = 3.39$, $SD = 1.95$; $t(91) = -0.53$, $p = .601$; Positive PANAS: $M_{\text{SVW}} = 4.28$, $SD = 1.78$, $M_{\text{socialmedia}} = 3.76$, $SD = 1.72$; $t(91) = 1.45$, $p = .150$).

For the main analysis, an ANCOVA with composite COVID-19 psychological resilience measure ($\alpha = 0.91$) as the dependent variable, digital platform as a categorical predictor, gender as a categorical covariate, and age as a continuous covariate revealed a marginally significant main effect of gender ($F(1, 89) = 3.63$, $p = .06$), such that male participants indicated higher COVID-19 psychological resilience ($M_{\text{male}} = 5.38$, $SD = 2.31$) as compared to female participants ($M_{\text{female}} = 4.41$, $SD = 2.45$). The effect of age was not significant ($F(1, 89) = 1.43$, $p = .235$). More importantly, a significant main effect of digital platform revealed that the psychological resilience against COVID-19 experienced by users was influenced by the type of the digital platform ($F(1, 89) = 3.97$, $p = .049$). Consistent with our prediction, participants who became members of the SVW indicated higher COVID-19 psychological resilience ($M_{\text{SVW}} = 5.47$, $SD = 2.35$) than those who became members of the social-media platform ($M_{\text{socialmedia}} = 4.44$, $SD = 2.38$; see Fig. 1).

Further our conceptual model of mediation is represented by Fig. 2 in which the disembodied transition mediates the effects of the digital platform on COVID-19 psychological resilience.

We tested the conceptual model using Hayes (2017) PROCESS macro (Model 4; 95 % confidence interval; 5000 bootstrap samples). Consistent with the proposed model, the results revealed a significant overall mediation effect ($b = 1.48$, $SE = 0.37$, 95 % CI [0.82, 2.26]). The effect of digital platform on composite disembodied transition ($\alpha = 0.91$) was significant ($b = 2.84$, $SE = 0.52$, 95 % CI [1.81, 3.86]); the coefficients can be interpreted to mean that participants in the SVW condition experienced a greater degree of disembodied transition than those in the social media condition ($M_{\text{SVW}} = 6.87$, $SD = 2.17$, $M_{\text{socialmedia}} = 4.03$, $SD = 2.77$; $t(91) = 5.49$, $p < .001$). Controlling for digital platform, disembodied transition had a significant effect on COVID-19 psychological resilience ($b = 0.52$, $SE = 0.08$, 95 % CI [0.36, 0.69]); the coefficients can be interpreted to mean that participants experiencing a greater degree of disembodied transition felt more psychologically resilient towards COVID-19. Finally, the direct effect of digital platform on COVID-19 psychological resilience became nonsignificant after controlling for disembodied transition ($b = -0.44$, $SE = 0.48$, 95 % CI [-1.39, 0.50]).

A parallel mediation with escapism ($\alpha = 0.96$) and enjoyment ($\alpha = 0.95$) as additional mediators revealed that controlling for disembodied transition, escapism ($b = 0.06$, $SE = 0.17$, 95 % CI [-0.28, 0.40]) and enjoyment ($b = 0.02$, $SE = 0.15$, 95 % CI [-0.28, 0.32]) did not have a significant effect on COVID-19 psychological resilience. This outcome provided additional support for disembodied transition as the mechanism underlying the effect of the avatar and SVW in alleviating the fear of contracting COVID-19, over and above any effect of feelings of escapism or enjoyment.

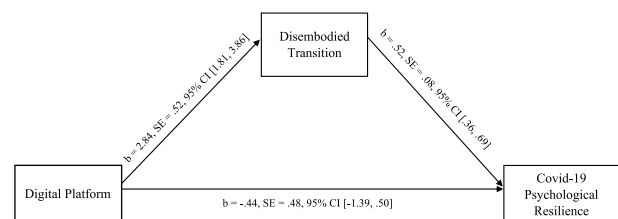


Fig. 2. Study 2: The effect of the Social Virtual World and avatar on COVID-19 psychological resilience is mediated by the perception of disembodied transition.

2.2.3. Discussion

Replicating and extending results from Study 1, Study 2 results provide additional support for the effect of SVW on coping with the fear of contracting COVID-19 and disembodied transition as the mechanism underlying the effect. Participants indicated higher COVID-19 psychological resilience when they became members of an SVW compared to when they became members of a social-media platform, and the effect appeared to be driven by disembodied experience stimulated by transitioning to an SVW.

3. General discussion

3.1. Summary

The objective of this research was to examine the use of SVWs as a potential coping mechanism to reduce the anxiety and stress associated with the COVID-19 pandemic. The pandemic is a threat to the population, not only for its risk to human life and ensuing economic distress, but also for its psychological impact. This rapidly spreading pandemic can be particularly tough for people with preexisting mental health conditions like anxiety or obsessive-compulsive disorder (Timsit, 2020). Across two studies, we found that becoming SVW members helped alleviating the fear of contracting COVID-19 and increasing psychological resilience towards the pandemic. The disembodied experience stimulated by transitioning into an avatar in an SVW enables the user to take the perspective of the imperviousness of the avatar and thus alleviates the anxiety of them contracting the virus in the real world. Multiple press reports suggest that membership of various SVWs have surged since the onset of the pandemic (Buscemi, 2020; Frank, 2020). Though prior works investigating the users' motivations for using social virtual worlds have highlighted several motives like seeking friendship, role-playing, and escapism (Hassouneh & Brengman, 2014), the current research identifies another unique benefit of using SVWs.

3.2. Theoretical contribution

The present research makes theoretical contributions to the literature on the Proteus effect phenomenon. The Proteus effect posits that, individuals conform in behavior and attitudes with the physical appearance of the avatar they use to represent themselves in a digital environment. Although this effect has been examined for more than a decade since Yee and Bailenson (2007)'s seminal article, to date, it had focused on the influence of the avatar's physical attributes like height (Yee, Bailenson, & Ducheneaut, 2009), age (Yee & Bailenson, 2006), and attractiveness (Fox, Bailenson, & Tricase, 2013). Extending this literature, the present research reveals the influence of a more innate feature of avatars on the user's self-representation—their imperviousness from the limitations of a corporeal body. Also, Proteus Effect has been shown to influence numerous behavioral and psychological outcomes like perspective taking (Yee & Bailenson, 2006), aggressiveness (Yee, Bailenson, & Ducheneaut 2009), and self-objectification (Fox, Bailenson, & Tricase, 2013). The current research identifies another novel outcome of the Proteus effect—the psychological resilience among the SVW members. By representing oneself as an avatar in a parallel world (i.e., SVW), the user is able to envision himself or herself as a similar entity that is immune to the limitations of the human body, specifically in this case, the COVID-19 virus.

Additionally, our process measure of disembodied transition also extends the Transportation Theory (Green & Brock, 2000). Transportation is "a convergent process, where all mental systems and capacities become focused on events occurring in the narrative" (Green & Brock, 2000, p. 701), therefore it occurs when an individual (for e.g., viewer, reader or player) is absorbed (or transported) into a narrative world (for e.g., story world, virtual world) by disengaging from the real world and devoting their cognitive abilities to processing the other world. Transportation Theory has been largely studied as means of

narrative-based persuasion or belief change (Breves, 2021; DeSmet et al., 2016; Ferchaud, Seibert, Sellers, & Escobar Salazar, 2020; Keum, Hearn, Agarwal, & Nguyen, 2021; Moyer-Gusé, 2008). The current paper identifies another unique consequence of transportation theory when SVW members experience disembodied transition via avatars—psychological resilience against COVID-19.

3.3. Policy implications

In addition to making theoretical contributions, this research also has valuable policy implications. The COVID-19 crisis has already caused huge impact on the mental health of people around the globe and scientists predict that the outbreak is likely to go on for two years (Taylor, 2020). While most people have started taking precautions to protect themselves against the virus, for many, the feeling of vulnerability and thoughts of contamination is leading to various psychotic symptoms such as clinical depression (Brown et al., 2020). This research offers a potential intervention tool to address this crisis that is relatively inexpensive and therefore, easily scalable. Prior research has demonstrated the relationship between people's online and offline experiences in which one's experience in the virtual environment affects their offline attitudes, perceptions and behaviors (Guitton, 2012; McLeod, Liu, & Axline, 2014; Wiederhold, Soomro, Riva, & Wiederhold, 2014). For instance, extant research has shown that individuals' experiences with the virtual world can activate personality traits which can lead to real life personality changes (McLeod et al., 2014; Tett & Guterman, 2000). Building on this stream of research, we propose that the imperviousness of their online avatars in the virtual world will translate into the SVW members' psychological resilience towards the COVID-19 in the real world. As a result, by encouraging individuals to become SVW members and engage with the avatar in the virtual world, policy-makers and healthcare providers can help the vulnerable build psychological resiliency towards the fear of contracting the virus. Therefore, we believe that SVWs, in conjunction with other possible interventions, can be implemented to respond to the unfolding mental-health crisis resulting from the pandemic and other similar mental health issues.

In doing so, this research thus extends the work in the realm of using computer technology as an intervention tool. A preliminary work has demonstrated how playing a video game as an avatar suffering from psychosis (a mental illness) can positively impact mental illness stigma and thus can function as an anti-stigma intervention tool (Ferchaud et al., 2020). Another work shows that a mind-body medical intervention delivered in a virtual world setting resulted in significant reduction in stress, depression, and anxiety and therefore, could be used as a feasible extension to face-to-face delivery systems (Hoch et al., 2012). Finally, Second Life, a popular SVWs, has been proposed as a potential tool to develop social and communicative skills within autistic people by providing them with a secure space to practice and navigate the space of social interactions (Fusar-Poli, Cortesi, Borgwardt, & Politi, 2008). Taken together, this stream of work presents strong evidence of both the widespread applicability and practical usage of computer-based technology as intervention tools. In a similar vein, our paper explores the benefit of engaging in a social virtual world through an avatar in building psychological resilience towards COVID-19 and therefore the possibility of utilizing it as a medical intervention tool to address the unfolding mental-health crisis. At this point, we would like to acknowledge that increased psychological resilience might seem to have a potential downside of making people more negligent in terms of following safety measures like wearing facemasks or practicing social distancing. However, there are many factors that determine the

adoption or disregard of such measures in addition to risk perceptions, for example individual characteristics, socio-political systems, trust in government and science.² Party affiliation is seen to be one of the strongest predictors of safety precautions being adopted by people in the United States.³ Therefore, we believe that the positive benefit of assuaging the psychological distress and anxiety that this intervention can provide, heavily outweighs the remote possibility that it might singlehandedly lead someone to act in a negligent manner.

3.4. Limitations and future research

This work also has certain limitations. First, in the interest of conducting rigorously controlled experiments, we chose to rely on studies that presented participants with less information and noise than would be common in the real-world. This may call into question the ecological validity of our results. However, our confidence in the generalizability is bolstered by the convergence of the results across studies. Additionally, we encourage policy experts and academics to test our theory in more real-world contexts. They can do so by replicating the experiments with real users of existing SVWs like Second Life, Minecraft, The Sims, etc., an approach used in some existing studies (McCreery, Vallet & Clark, 2015; Yokotani & Takano, 2021). Second, the current study examines the immediate influence of representing oneself as an avatar on the user's psychological resilience. Although the Proteus effect argues behavioral/attitudinal conformity both during and/or after the avatar use, we encourage policy makers and researchers to test the longitudinal influence of this factor.

Credit author statement

Iman Paul, Smaraki Mohanty, Rumela Sengupta: Conceptualization, Methodology, Data collection, Data analyses, Validation, Writing, Reviewing and Editing. Data for Studies 1 and 2 was collected in Summer 2020.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.chb.2021.107036>.

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³ <https://www.pewresearch.org/politics/2020/06/25/republicans-democrats-move-even-further-apart-in-coronavirus-concerns/>.

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