MY AVATAR AND THE AFFIRMED SELF: PSYCHOLOGICAL AND PERSUASIVE IMPLICATIONS OF AVATAR CUSTOMIZATION

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Abstract

Avatars are now used widely across digital content and services, and creating one's own avatar through customization has become a common user activity on digital media. This study focuses on the process involved in avatar customization, which requires engaged self-reflection. We test whether avatar customization enhances persuasive effects through self-affirmation in three lab experiments. Study 1 (N = 126) finds that avatar customization meets the key criteria of the self-affirmation task—self-appraisal and self-awareness—equivalent to a widely-used self-affirmation method based on essay writing. The study also finds that avatar customization significantly enhances how participants feel about themselves. Study 2a (N = 102) and 2b (N = 76) further shows that avatar customization (vs. a matched control) improves persuasion by reducing defensive processing of self-threatening health information. The findings offer important insights for understanding the psychology of avatar customization and its potential utility in communications practice. (146 words)

Keywords: Avatar, customization, self-affirmation, persuasion, defensive processing

My Avatar and the Affirmed Self: Psychological and Persuasive Implications of Avatar Customization

Many digital media interfaces now allow users to create personal avatars and to interact in online spaces using those avatars, for uses ranging from social media and education to e-commerce. Avatars in digitally mediated spaces generally provide users a degree of flexibility in their self-presentation and identity expression, by allowing users to manipulate, control and embody a digital self-representation of the self (Nowak & Fox, 2018). Simply by clicking, touching or dragging the customizable options available in the avatar creation interface, users can alter various characteristics of their avatars, including body components, facial features, outfits etc., to create new versions of their own online self-representation.

In light of the closeness and connectedness between the self and avatars, communication researchers have attempted to examine the persuasive effects of avatars. Prior studies generally tested how interacting in a virtual space using avatars subsequently changes user perceptions and behaviors in desired directions (e.g., Kim & Sundar, 2012; Sah, Ratan, Tsai, Peng, & Sarinopoulos, 2017; Yee & Bailenson, 2007). However, the current study attempts to test and expand the potential utility of avatars in persuasion by focusing specifically on the process involved in avatar customization itself that triggers self-affirmation. Avatars generally reflect the key elements that their creators rely on to define a self-concept, such as important values and identity (e.g., Vasalou & Joinson, 2009). Therefore, customizing the avatar represents a deliberate process of defining and expressing the self, consequently bringing awareness of the self.

Thus, drawing on the self-affirmation theory (Steele, 1988), we propose that the avatar customization process constitutes a valid self-affirmation activity, with important implications for persuasion research and practice. Self-affirmation theory postulates that an individual's affirmation of their own self-worth can mitigate their defensive processing of self-threatening

persuasive messages (e.g., a message about the health risks of smoking for smokers; Steele, 1988) and thus, enhances the persuasive effects.

From a broader perspective, the key premise of the self-affirmation theory is that individuals have a basic need to view themselves as appropriate and worthy, which can be fulfilled by activities that remind and affirm self-integrity and self-worth. Under this premise, engaging in self-affirming activities in everyday life is important for mental well-being. Given this understanding, this study contributes to the self-affirmation literature by offering insights into how individuals may affirm their self-integrity through the everyday use of interactive media technology. Moreover, we believe that an exploration of self-affirmation tools based on activities commonly adopted in our everyday lives could enhance the applicability of self-affirmation in actual persuasion practices.

This study employs three lab experiments to test the proposition that the process of avatar customization itself is an effective outlet for self-affirmation, thus enhancing persuasion. In Study 1, we examined whether web-based avatar customization highlights positive aspects of the self and makes individuals feel valued (i.e., a self-affirming effect). In Studies 2a and 2b, we tested whether avatar customization improves persuasion by reducing defensive processing of health information in two different health contexts (Study 2a: caffeine; Study 2b: alcohol).

Literature Review

Self-Affirmation Theory

The core tenet of self-affirmation theory (Steele, 1988) is that people are motivated to maintain and protect their perceived self-integrity and self-worth (Sherman & Cohen, 2006). Various events can threaten our perceived self-integrity, including interpersonal conflict, negative feedback at work, etc. Researchers have found that messages designed to change individual's health-related behaviors can threaten their sense of being "good and appropriate" individuals and, thus, can trigger a need to protect their sense of integrity (Sherman & Cohen,

2006, p. 186). When faced with a self-threat, people tend to adopt various defensive strategies, such as downplaying, minimizing or avoiding health messages, and they often experience a reactance to restore their sense of integrity and freedom (Dillard & Shen, 2005).

Researchers have also suggested that the self-system is flexible and that threats to certain domains of the self can be compensated by affirming the self in different domains or by affirming the overall integrity of the self (Allport, 1961). Thus, self-affirmation offers an indirect psychological adaptation that enables both the restoration of self-integrity and adaptive behavior (Sherman & Cohen, 2006). Because the goal of a self-system is to maintain an overall sense of self-integrity, offering alternative self-resources via self-affirmation can assist individuals to realize that their self-worth does not hinge on the immediate threat presented (Sherman & Cohen, 2006). As a result, information, which would otherwise be self-threatening, loses its potency as a threat, thus enabling the individual to focus on the message's informational value and to respond in a more open-minded manner (Sherman & Cohen, 2006). Research has shown the efficacy of self-affirmation in reducing message derogation, negative emotional responses, and promoting behavioral change (e.g., Zhao & Nan, 2010). As a meta-analyses shows, the available evidence generally supports that self-affirmation improves message acceptance, behavioral intention, and the uptake of recommendations from health advisories (Sweeney & Moyer, 2015).

Self-affirmation is the process of defining and being aware of important aspects of one's self-concept that encompass one's personal values, goals, and cherished personal attributes (Toma & Hancock, 2013), leading to the affirmation of self-integrity. In an effort to demonstrate the effectiveness and flexibility of self-affirmation (Sherman & Cohen, 2006), previous studies have tested and adopted a variety of methods to induce self-affirmation (McQueen & Klein, 2006). Typically, these methods (tools) are designed to encourage participants to actively process important aspects of the self, in order to make the central qualities of self-identity salient. The

most common types of self-affirmation induction involve writing an essay about the positive aspects of the self (e.g., McQueen & Klein, 2006) or answering a series of questions about personal values and strengths (Napper et al., 2009).

Although the specific procedures involved in self-affirmation activities vary, they suggest some key criteria for self-affirmation. First, the product of a self-affirming activity should represent important self-domains, connected to the integrity of the self (Crocker & Wolfe, 2001). Second, the activity should encourage the targeted individuals to deliberately reflect on and express the positive aspects that define their self, thus enhances self-awareness. However, the state of self-awareness achieved through evaluating one's self and his/her own behaviors by comparing them with internal values (Duval & Wicklund, 1972) is not sufficient to induce self-affirmation. Through the active deliberation of the positive aspects of themselves connected to the important domains of self-integrity, individuals feel better about themselves through the affirmation of their self-worth (e.g., Sherman et al., 2000). In the next section, we describe how avatar customization is capable of fulfilling these key criteria for inducing self-affirmation.

Avatar Customization, a Deliberate Construction of the Digital Self

Avatar is generally defined as a representation of the self that serves as a visual embodiment of the user within the context of mediated interactions (e.g., Ahn, Fox, & Bailenson, 2012; Kim & Sundar, 2012). Avatars offer users opportunities to experiment with alternative selves in virtual spaces (e.g., Lin & Wang, 2014). However, studies on avatars have consistently demonstrated that individuals tend to create their avatars as reflections of various important aspects of their self. For instance, Vasalou and Joinson (2009) found that, in general, avatars drew on the creators' self-images, such that the creators perceived their avatars as sharing similarities with themselves, regardless of the settings of the avatar creation. Studies have also reported that users identify themselves with self-similar avatars on both psychological and

physiological levels (Ratan & Dawson, 2016), and become aware of themselves through avatar creation (Vasalou, Joinson, & Pitt, 2007).

Some scholars emphasize user agency or controllability as a key aspect behind the conceptualization of an avatar because avatar studies often examine the digital self in a virtual space (e.g., Lim & Reeves, 2010). In this sense, customization — i.e., user-initiated actions to actively change interfaces or features, using a set of available options (Wind & Rangaswamy, 2001) — serves as a pivotal element of avatar creation and use that builds the connection between oneself and one's own avatar. Specifically, the act of choosing behaviors, which involves "deliberation among options, deciding on a plan of action (i.e., making a choice), and implementing the chosen option" (Vohs et al., 2008; p. 892), constitutes the central aspect of customization. The choices made in the process of customizing one's avatar are closely related to the key aspects of self-conception, as these decisions help to embody the digital representation of the self. Therefore, this customization process encourages users to think deliberately about and to choose the various aspects that define their self-concepts, thus forming salient mental images of themselves (Kim & Sundar, 2012). As a result, the avatar customization process affords users a flexible and easy self-presentation in digital environments (Darville et al., 2018).

Because the avatar functions as their representation in virtual interfaces, and may influence how other users perceive them in the digital environment (Robinson, 2007; Yee & Bailenson, 2007), users are motivated to use care in creating their own avatars. Studies have also shown that individuals consistently seek to assess their own identity accurately (*self-evaluation motive*; e.g., Baumeister, 1998), however, they do this through favoring the positive aspects of self-construal (*self-enhancement motive*; e.g., Higgins, 1987). For this reason, the freedom of choice offered by the avatar creation process should encourage users to focus on the positive, rather than the negative, aspects of the self and to create avatars that reflect that positive self-image. This self-expressive aspect of customization is potentially important to our study, because

the expression of one's values is known to be "a small but significant act" of self-affirmation (Schmeichel & Vohs, 2009, p.770). Studies have supported the potential of avatar customization as a source of self-affirmation. Toma and Hancock (2013) have demonstrated that self-presentation through Facebook profiles enhanced users' state of self-esteem. In another study, customizing video game avatars helped adult males compensate for an impaired gender identity, which was prompted by a threat to their masculinity (Lee-Won, Tang, & Kibbe, 2017).

In sum, we propose that avatar customization represents an involved and controlled process of self-construction within a digital space, thus it is capable of inducing self-affirmation. Specifically, our perspective on avatar customization is largely analogous to the existing approaches that underpin self-affirmation induction methods: a careful deliberation of important aspects of the self, which leads to the affirmation of self-integrity.

Study 1

Study 1 tested whether avatar customization induces self-affirmation by comparing it with a matched control task. We also compared self-affirmation induced by avatar customization to the classic self-affirmation method involving essay writing (McGuire & McGuire, 1996). Participants in the avatar condition customized avatars to reflect themselves, while those in the matched control condition created the assigned avatars. The task for the self-affirming essay condition was to write an essay about the positive aspects of oneself, while those in the essay control condition wrote an essay irrelevant to the self. Thus, we propose the first hypothesis that:

H1: Self-affirmation ratings will differ significantly among the four conditions, such that: a) The avatar customization and b) the self-affirmation essay conditions will show significantly higher self-affirming effects than the matched control of each method.

Additionally, self-affirmation through an essay-writing task is not only cognitively demanding and requiring basic writing skills, but also limited to be applied to digitally mediated intervention programs. For these reasons, researchers have questioned the ecological validity and

applicability of such self-affirmation induction methods to real intervention programs (e.g., Napper et al., 2009), especially those implemented in online contexts. As avatar customization has the potential to address these limitations, it is a viable alternative to the existing self-affirmation induction methods. The sensory richness, interactivity, and navigability that users experience when interacting with the interface in the course of the customization process enhance intrinsic motivation, especially by enhancing the users' sense of autonomy (Sundar, 2008; Sundar, Bellur, & Jia, 2012). Peng et al. (2012) also have suggested that avatar customization is a significant autonomy-supportive feature in the video game context. In this study, game players who were able to choose how their avatars looked and functioned, displayed higher need satisfaction, leading to a greater enjoyment of the game. Thus, with greater intrinsic motivation associated with avatar customization, participants may find it more enjoyable to customize avatars than to write essays about themselves. At the same time, participants may perceive avatar customization as easier to perform than writing an essay, because of the intuitive, interactive and visual aspects of avatar customization. Therefore, we also hypothesize that:

H2: Customizing one's own avatar will be perceived as a) more enjoyable and b) easier to perform than writing a self-affirmation essay.

Method

Participants and procedure. A lab experiment was conducted at a large university using a between-subjects design with four conditions including: (1) avatar customization, (2) matched control for avatar customization, (3) self-affirmation essay writing, and (4) matched control for essay writing. In total, 126 undergraduate students (60.3% female, 91.3% ethnic Chinese, aged 18-25; $M = 21$; $SD = 1.54$) have participated in the study.

The experimental sessions (with a maximum of eight sign-ups) were carried out in a computer lab, where individual desks with desktop computers were screened off with partitions. Participants were randomly assigned to one of the four conditions (see Table 1 for the

experimental cell size). The desktop computers have been used for the questionnaire and essay writing task for the essay-writing conditions. Those in the avatar conditions were provided with tablet computers for the avatar creation task. After providing informed consent, the participants engaged in the randomly assigned manipulation task (either avatar customization or essay writing) for five minutes. Then, participants reported their levels of self-appraisal, self-awareness, and self-feeling as well as evaluation of the task, in terms of perceived fun and ease. As a manipulation check, participants were asked to report the degree to which the task's outcomes reflected their true representations of the self. We also measured the perceived resemblance between the participant and the created avatar (or character) in the avatar-affirmation and matched control conditions. Finally, the participants were given monetary incentives, equivalent to approximately USD 7.50, for their participation.

Avatar customization and matched control conditions. We developed an avatar customization and its matched control conditions using *Wonder World Creator*. This mobile application lets a user create their own cartoon-like avatars, called a 'Wee Mee', by choosing outfits, accessories, backgrounds, and objects from the options provided. Before beginning the task, participants first watched a short video instruction using headphones (90-seconds) on how to use the application. The video also included a brief description of the task, which varied by the conditions. Participants in both avatar conditions were provided with a 9.7-inch tablet (either an iPad or a Galaxy note), and they created a Wee Mee as directed for the next five minutes.

For the customization condition, participants were asked to customize their own avatar that reflected themselves. The video instruction for the avatar condition introduced Wee Mee as an "application that lets you create your avatar that reflects your own identity, personal interests and values." It also described the key features as a means to express one's own identity, personality and interests (e.g., "you can customize the face of your avatar to express your identity"). For the avatar-control condition, we screen-captured and color-printed on A4-paged

paper the images of the avatars created in the avatar-customization condition. The printed screenshots were then randomly handed out to the participants assigned to this condition. This was to make the avatar-control condition task as equal to the task for the self-affirmation condition as possible, without the active ingredient of self-affirmation. The instruction as well as the questionnaire used the term 'character' instead of 'avatar' in the control condition, to minimize the priming of 'self-related' schema (given the term 'avatar' implies a representation of the self). In the video instruction, Wee Mee was introduced as "a mobile application that lets you create an online character." Then, the participants were asked to create a character which was the same as the screenshot provided, using the tablet application. See Figure 1 for the screenshots of the avatar applications used in this study.

[Figure 1 here]

Essay-affirmation and matched control conditions. We adopted one of the most common self-affirmation induction methods involving essay writing (McGuire & McGuire, 1996), which has been validated by prior research (Napper et al., 2009). Participants in the affirmation condition wrote down as many of their positive characteristics as they could think of, whereas those assigned to the matching-control condition wrote down something unrelated to the self — i.e., the shops and buildings that they passed on a route that they travelled regularly (Napper et al., 2009). After five minutes of essay writing on the online survey page, they were automatically re-directed to the next page to fill out the questionnaire.

Measures. Derived from Napper et al. (2009), participants were asked to rate the degree to which the assigned task had allowed them to actively process important and positive aspects of the self (i.e., self-appraisal) and to be aware of the self and their own important values (i.e., self-awareness). Seven bipolar scales (on a scale of -3 to 3, midpoint 0) were used to assess *self-appraisal* (Cronbach's $\alpha = .87$; $M = .73$, $SD = 1.02$; e.g., "[Creating the avatar (or character) /writing the essay] made me think about negative aspects of myself/positive aspects of myself").

Two 5-point Likert scale items (1= *Strongly disagree*, 5 = *Strongly agree*) assessed whether the task enhanced *self-awareness,* "[Creating the avatar/writing the essay] made me aware of *my values (the principles and standards by which I try to live my life)*" and "…*who I am*" (r = .70, p < .001; M = 3.54, SD = .89). We also measured *self-feeling* with an item, "How do you feel about yourself at this current moment?" (1 = *Poorly* to 5= *Extremely positive*; M = 3.40, SD = .81; Napper et al., 2009; Sherman et al., 2000). Finally, we used a 5-point bipolar scale and asked participants to rate the degree to which they found the assigned task *fun* (1=*boring* to 5= *fun*; M = 3.71, SD = 1.05) and *easy* (1 = *difficult* to 5 = *easy*; M = 3.59, SD = 1.22).

As a manipulation check, of whether the customized avatars and self-affirmation essays reflected a higher degree of true representation of the self than the characters and essays produced in the matched control conditions, participants were asked to rate their agreement with the statement, "The [avatar (or character)/ essay] was a true representation of who I am" (M = 2.92; SD = 1.09). In addition, those in the avatar-customization and its matched control conditions reported their agreement with the statement, "the avatar (or character) I just created resembles me" (M = 2.85; SD = 1.11). Both items used 5-point Likert scales (1= *strongly disagree* to 5= *strongly agree*).

Results

ANOVA results for the manipulation check were significant, F (3, 122) = 10.44, p < .001, η^2 = .20. A post-hoc test using Tukey HSD revealed that the participants who customized their avatar were more likely to perceive that avatar as a true representation of who they are (M = 3.44, SD = .91), compared to those who made a character mimicking an avatar created by others (M = 2.30, SD = 1.05; p < .001). Similarly, those who wrote an essay about the self (M = 3.41, SD = .97) were more likely to perceive that the essay they wrote reflects a true representation of who they are than those who wrote an essay about the shops and buildings that they passed regularly (M = 2.65, SD = 1.09; p < .001). In addition, those in the avatar-customization

condition were more likely to perceive that the avatars they created resembled themselves (M = 3.50, SD = .84) than those in the matched-control condition (M = 2.21, SD = .96), F (1, 63) = 32.95, $p < .001$, $\eta^2 = .34$.

ANOVA results indicated significant main effects of manipulated conditions on all tested dependent variables: self-appraisal, self-awareness, and self-feeling. The post-hoc tests, using Tukey's HSD, showed that participants in both the avatar-customization and self-affirmation essay conditions rated significantly higher on self-appraisal (avatar customization vs. avatar control: $p < .001$; self-related essay vs. essay control: $p = .013$), and on self-awareness (avatar customization vs. avatar control: $p < .001$; self-related essay vs. essay control: $p = .001$), than those in the matched control conditions. In addition, the avatar customization condition showed significantly higher current feeling about the self than the avatar-control condition ($p = .013$). However, the self-affirmation essay condition did not differ from the essay-control condition on self-feeling ($p = .75$). Thus, H1a was supported but H1b was only partially supported.

Lastly, as concerned the task assessment; participants in the avatar-customization condition responded that the task was more fun ($p = .005$) and easier ($p = .002$) to perform, compared to those in the self-affirmation essay, thus supporting H2. Additionally, our results showed that the avatar-customization condition and its matched control condition did not differ in terms of fun ($p = .08$) and ease ($p = .41$). Table 1 reports the results of Study 1.

[Table 1 here]

Study 1 Discussion

Customization of an avatar led participants to think actively about the self, and they focused more on the positive, important, and valued aspects of themselves, compared to those who had no opportunity for self-expression when making digital characters. Moreover, participants in the avatar-customization task induced positive feelings about themselves to a greater degree than those in the matched-control condition. However, whereas the essay writing

manipulation method successfully led participants to think about the positive aspects of the self and brought self-awareness to those aspects, it failed to enhance how they felt about themselves. In addition, the participants' feedback indicated that customizing an avatar was more fun and easier to do than writing an essay about themselves. However, avatar customization did not differ from its matched control in terms of perceived fun and ease, thus ruling out those possibilities as alternative explanations for the self-affirmation effect of avatar customization. All in all, Study 1 lends strong support to our proposition that avatar customization induces self-affirmation with great potential to be adopted in both research and practice.

Study 2

Studies 2 examined whether avatar customization could help reduce defensive responses to threatening health information. The reduction of self-defense motives is one of the most commonly-examined positive effects of self-affirmation (Sherman & Cohen, 2006). Testing the efficacy of avatar customization at reducing defensive reactions would therefore constitute an important step towards testing its utility for research and practice.

In this study, we examine whether avatar customization enhances persuasive effects of health messages by reducing negative emotional responses and derogation of message values. Prior research has suggested that negative emotional response, such as aggressive and hostile feelings, is a major component of defensive reactions that deters persuasion (Dillard & Shen, 2005). In particular, anger, which is associated with attack or reject tendencies to remove perceived threat (Dillard & Peck, 2000), has often been examined to explain the persuasive effects of self-affirmation (e.g., Zhao & Nan, 2010). For example, Zhao and Nan (2010) showed that self-affirmation significantly reduced the degree of anger displayed by smokers who were exposed to loss-framed antismoking health information.

At the same time, studies have consistently documented the efficacy of self-affirmation at reducing message derogation (e.g., Jessop, Simmonds, & Sparks, 2009), a form of defensive

processing that downplays the content and informational value of health information (Witte, 1994). When the self-defense motive is activated by health messages, individuals make judgments of message attributes in a biased manner, such that the message is evaluated as exaggerated, overstated, or overblown (Witte, 1994). Thus, message derogation can serve as an explicit measure of defensive processing (Witte, 1992). For example, van Koningsbruggen and Das (2009) showed that self-affirmation decreased derogation of a health message about type 2 diabetes and promoted intentions to take online risk tests among at-risk participants.

In our study, caffeine (Study 2a) and alcohol (Study 2b) consumptions were chosen as the study contexts, in which prior research often examined the persuasive effects of self-affirmation (e.g., Harris & Napper, 2005; Sherman et al., 2000). In addition, prior research has suggested that self-affirmation is effective for those who have personal relevance to the health topic, due to their actual past unhealthy behaviors (van Koningsbruggen & Das, 2009; Harris & Napper, 2005; Sherman et al., 2000). We thus test the effectiveness of avatar customization as a self-affirmation method with those who have personal relevance to the message topics (i.e., coffee or tea drinkers for Study 2a; alcohol drinkers for Study 2b).

In light of the self-affirming effect of avatar customization shown in Study 1, avatar customization will reduce negative emotional response (i.e., anger) to and derogation of health messages, thus improving message acceptance (i.e., perceived risk association, and perceived importance and intention to reduce consumption). Thus, we hypothesize:

H3: Avatar customization (vs. control) will reduce a) anger and b) message derogation.

H4: a) Anger and b) message derogation will mediate the persuasive effects of avatar customization (vs. control).

Study 2 Method Overview

In both lab experiments, participants were told that they would be engaging in two separate studies. Participants were recruited from the same university as Study 1, but the

participants of Study 1 were screened out. In the first part, participants reported their consumption levels of coffee and caffeinated tea (Study 2a) and alcohol (Study 2b). To mask the real purpose of the study, filler items were included in the pre-questionnaire, including measures about the consumption of other beverages and other health issues, as well as questions about general technology use. The participants were then randomly assigned to either the avatar-customization condition or the avatar-control condition, as described in Study 1. In Study 2a and 2b, self-affirmation induction was not checked, because this can bring an awareness of being manipulated, which is known to moderate the impact of self-affirmation (Sherman & Cohen, 2006; Napper et al., 2009). After completing the avatar task, participants read health information on the negative impacts of caffeine (2a) or alcohol (2b) and then completed a post-message questionnaire, which included measures of anger, message derogation, perceived risk association, and perceived importance and intention of reducing caffeine (2a) or alcohol (2b) consumption. Participants received either extra course credits or a monetary incentive (approximately USD 7.5) for participating in the study.

Study 2a. Method

Participants and procedure. We chose caffeine consumption as the study context because prior research on self-affirmation has commonly examined within this context (e.g., Sherman et al., 2000). The responses from 102 participants who indicated drinking at least one cup of coffee or tea per day in the pre-questionnaire (73.5% female, 91.2% ethnic Chinese; age range: 19-27, M_{age} = 21.5, SD_{age} = 1.80) were entered in the data analyses. After random assignment, the avatar-customization condition had 55 participants, and the control condition had 47 participants. The average of coffee or caffeinated tea consumption was 1.77 cups a day (*SD* =1.00); 50 participants (49%) drink 1 or more and less than 2 cups, 36 (35.3%) drink 2 cups, and 16 (15.7%) drink 3 or more cups of coffee or tea containing caffeine per day.

Stimulus message. Participants read an article entitled, "*Health Bulletin: Spotlight on Caffeine*" (adopted from Block & Williams, 2002), which provided information about foods known to contain caffeine (e.g., coffee and tea) and the possible health consequences of high doses of caffeine consumption, such as insomnia, anxiety and a higher risk of cardiovascular disease. Although the original stimulus article included detailed suggestions for reducing caffeine consumption, we removed the section on solutions, so that the message would serve as a self-threatening health message (Witte, 1994).

Measures. To assess *message derogation*, participants rated the extent to which they found the story boring, overstated, exaggerated, distorted, untrue, overblown, manipulative, untruthful and exploiting (1 = *Strongly disagree*, 7 = *Strongly agree*; α = .87, *M* = 3.67, *SD* = 1.03; Witte, 1994). To assess the level of *anger*, participants rated the extent to which they felt angry, annoyed, irritated and aggravated while reading the story (1 = *Strongly disagree*, 7 = *Strongly agree*; α = .91, *M* = 3.29 *SD* = 1.28; Dillard & Peck, 2000; Dillard & Shen, 2005). Derived from Sherman et al. (2000), perceived association between caffeine consumption and health risk ("To what extent do you agree or disagree that there is an association between caffeine consumption and health risk?"; *M* = 5.30 *SD* = 1.17) and perceived importance of caffeine reduction ("How important do you think it is that people should reduce their caffeine intake in order to avoid health risk?"; *M* = 5.35 *SD* = 1.10) were measured using 7-point Likert scale (1 = *Strongly disagree*, 7 = *Strongly agree*). Lastly, three items assessed *intention to reduce caffeine consumption* (e.g., "How likely is it that you will be reducing caffeine consumption?"; 1 = *definitely will not do*, 7 = *definitely will do*; α = .90, *M* = 4.10, *SD* = 1.52).

Study 2a. Results

ANOVA results indicated that the avatar customization condition displayed a significantly lower level of message derogation (*M* = 3.51, *SD* = 1.14) than the control condition (*M* = 3.92, *SD* = .85), *F* (1, 100) = 4.05, *p* =.047, η^2 = .04. In addition, participants in the avatar

customization condition were less likely to feel anger towards the message (M = 3.14, SD = 1.25) than those in the control condition (M = 3.47, SD = 1.30); yet the difference was not statistically significant, F (1, 100) = 1.67, p =.199, η^2 = .02. Thus, H3a was not supported and H3b was supported in Study 2a. Figure 2 visually presents the results.

[Figure 2 here]

The PROCESS macro (Model 4; Hayes, 2013) was employed to test H4. The indirect effects of an avatar affirmation (vs. control condition) on the tested persuasive outcomes were all significant via message derogation. When participants customized their own avatars, they were more likely to associate caffeine consumption with health risk, to consider reducing caffeine intake is important, and to show a higher intention to reduce caffeine consumption in the future, mediated via reduced derogation of the message value. However, no significant direct effect was found. The mediating effect of anger was excluded from the indirect effect analysis, as avatar customization did not significantly reduce anger (H3a). Thus, in Study 2a, H4 was supported only via message derogation. Figure 3 presents the results.

[Figure 3 here]

Study 2b. Method

Participants and Procedure. Seventy-six alcohol drinkers (61.8% Female, 96.1% ethnic Chinese; Age range: 21-26, M = 22.78, SD = 1.30), who reported that they had at least one alcoholic drink in the past one month, participated in the study. The participants on average had 2.10 standard drinks (SD = 2.18) as the maximum number of drinks consumed on one drinking occasion in the past 2 weeks: 18 (23.68%) had 4 or more, 17 (22.37%) had 2 or more and less than 4, and 41 (53.95%) had less than 2 standard drinks. 35 and 41 participants were randomly assigned to the avatar-customization and control conditions, respectively.

Stimulus message. We developed a short health message (168 words) describing the risks of heavy alcohol drinking, based on health information posted on the websites of WebMD

(n.d.) and Rethinking Drinking, run by National Institute of Health (n.d.). The message listed a variety of negative consequences of heavy drinking, such as losing consciousness, choking on one's own vomit, and becoming a victim of fatal burn injuries or sexual assault. In addition, the message explained the major health risks associated with heavy alcohol drinking, such as liver disease, heart disease, depression, stroke, stomach bleeding, and cancer.

Measures. To assess the levels of *anger* and *message derogation*, we used the same measures as Study 2a (anger: α = .90, *M* = 3.06, *SD* = 1.05; message derogation: α = .81, *M* = 3.33, *SD* = .81). To measure *intentions to reduce alcohol consumption*, participants were asked how likely they would decrease the quantity, the frequency, and the peak amount of alcohol they consume, and how likely they would engage in at least one heavy-drinking episode (reverse-coded) in the next 2 weeks using 7-point Likert scale (1 = *Strongly disagree*, 7 = *Strongly agree*; α = .81, *M* = 4.23, *SD* = 1.52; Collins & Carey, 2007).

Results

Results indicated participants in the avatar customization (*M* = 2.76, *SD* = .83) displayed significantly less anger than those in the control condition (*M* = 3.31, *SD* = 1.16), *F* (1, 74) = 5.56, *p* =.02, η^2 = .07. Participants in the avatar condition were less likely to derogate the message values (*M* = 3.17, *SD* = .84) than those in the control condition (*M* = 3.46, *SD* = .78) as well. However, this difference was not statistically significant, *F* (1, 74) = 2.48, *p* = .12, η^2 = .03. Thus, H3a was supported, yet H3b was not supported. Figure 1 visually displays the results.

Using the PROCESS macro (Model 4; Hayes, 2013), indirect effects (H4) were tested with entering anger as a mediator. The results revealed that, via reducing anger toward the health message, avatar customization enhanced participants' perception that alcohol consumption is associated with health risks, and that it is important to reduce alcohol consumption. However, the indirect effect on intention to reduce alcohol consumption was not significant. In addition, none of the direct effects was significant. We did not test the mediating effect of message derogation

in H4 because avatar customization failed to significantly reduce message derogation (H3b). Thus, H4 was partially supported, only via anger. Figure 2 presents the results of the analyses.

Study 2 Discussion

The results from Studies 2 show that the avatar customization can be useful for reducing defensive responses to health information. The mediation analysis results demonstrated that avatar customization helped to enhance the acceptance of personally relevant health information, by reducing message derogation (Study 2a) and negative emotional responses toward the message (Study 2b). These results suggest that avatar customization improves persuasive effects among those who are likely to display defensive reactions to personally relevant health information

Although we observed the same pattern of avatar customization effects, the type of defensive reactions influenced by avatar customization differed by health topics. Avatar customization significantly reduced the derogation of a health message addressing the risks related to caffeine consumption, while it significantly subdued anger when the message topic addressed the risks associated with excessive alcohol consumption. This disparity might be caused by the different levels of certainty of the health implications of caffeine and alcohol consumptions. That is, caffeine consumption was found to be associated with both increasing and decreasing the risk of various health issues (e.g., Rodriguez et al., 2004), whereas alcohol drinking has been consistently linked to negative health outcomes. Thus, coffee drinkers might have questioned the value of health information than displaying negative emotional responses, like anger; in contrast, alcohol drinkers' responses are more directed toward a negative emotional response because the health implications of excessive alcohol consumption is difficult to refute.

In addition, avatar customization indirectly increased intention to reduce caffeine intake via reducing defensive reactions (Study 2a). However, avatar customization did not have a significant indirect effect on the intention to reduce alcohol consumption (Study 2b). One

possibility is that caffeine intake is more malleable by raising awareness about the health risks than alcohol consumption. This is because caffeine consumption is primarily determined by attitudinal components (Jas, 1998), which are guided by negative expectancies like increased health risks. Alcohol consumption, on the other hand, can be driven by various factors such as normative pressure (Prentice & Miller, 1993). Thus, raising awareness about the risk of alcohol consumption may not be sufficient to influence drinkers' intention to change their behavior.

General Discussion

The study demonstrated that avatar customization made salient the user's valued and positive aspects of the self (Study 1), thus enhancing persuasive effects of health messages (Study 2). These key findings offer important insights into understanding the psychology of avatar customization and its potential usage in persuasion practices in mediated environments.

The Psychology of Avatar Customization

According to the self-affirmation theory, self-affirmation occurs when an individual becomes aware of the important aspects of the self that define their self-concept, which can encompass many everyday activities (Toma & Hancock, 2013). The interactive nature of current media technologies provides individual users with ample opportunities to be active sources in the communication processes and allows them to express themselves actively through an online interface (Sundar, 2008). Thus, we can anticipate that the various self-expression or presentation activities, which are made possible through current interactive technologies, potentially offer users opportunities for self-affirmation. In a similar vein, Toma and Hancock (2013) showed that Facebook serves as an important venue for users to present and be reminded of important personal values and social connections, which constitute key aspects of self-concept. Thus, it functions as "an ecologically valid outlet" (p. 322) of self-affirmation. In contemporary society, individuals face a large number of small and large failures and self-threats, many of which occur through online interfaces. Given that avatar customization is conceptually and intuitively linked

to the self, and that it is widely available across a variety of online platforms, avatar customization can serve as another ecologically valid venue of self-affirmation, which may buffer those everyday threats to self-integrity.

The study results revealed that avatar customization successfully led participants to process and be aware of positive and important aspects of the self. Moreover, avatar customization led participants to feel better about themselves; thus, implying an affirmation of self-worth. It should be noted that the avatar creation program used in this study did not provide sophisticated visual elements and options. However, the manipulation check results showed that the participants in the avatar customization condition were more likely to view their created avatars as being true representations of themselves than those participants in the matched control condition. More importantly, our results with a rather simple avatar creation tool suggest that self-affirmation through avatar customization does not necessarily hinge on the visual quality of the avatars created per se, but rather on the positive mental image of the self that becomes salient and accessible in the user's mind through the act of avatar customization. In this respect, the process of choosing behaviors, which include active deliberation among options and decisions regarding the outcomes (Vohs et al., 2008), represents a core ingredient of self-affirmation through avatar customization.

Our study also extends the understanding of how interactive communication technology can be used for persuasion. Researchers have applied the self-determination theory (Ryan & Deci, 2000) to suggest that customization improves the persuasive effects of technology for health promotion, by enhancing the individual's intrinsic motivation and engagement with content (Sundar, Bellur, & Jia, 2012). Also, existing studies on the role of avatars in persuasion have focused on personal interactions using avatars in a context of digitally mediated communication, such as playing video games or interacting in virtual realities (e.g., Proteus effect; Yee & Bailenson, 2007). Alternatively, our current study addressed the psychological

benefits of *making (customizing)* avatars, which also has positive implications for persuasion, by applying the self-affirmation theory.

Expanding the Induction Methods for Self-Affirmation

Compared to the existing self-affirmation tools, avatar customization has a potentially greater applicability to research and practice, where self-affirmation induction is required. The manipulations of self-affirmation in prior research (e.g., writing an essay) were quite constricted. Although the essay-writing method requires participants to allocate their cognitive effort to the task voluntarily, people vary greatly in their motivation for adhering to the task as well as their literacy levels. This may partially explain the wide range of effect sizes reported in the self-affirmation effect across different studies (Sweeney & Moyer, 2015). Avatar customization could serve as a viable alternative because of its engaging nature — supported by the study result that participants found avatar customization to be more fun and easier to do than the essay-based affirmation task. Additionally, because customizing an avatar does not require literacy skills, health interventions using the avatar affirmation tool could reach broader populations, regardless of their literacy or education levels.

Hence, the avatar customization tool could be widely incorporated into web-based intervention programs in a more natural way than the existing methods currently being used. Our findings suggest that adding avatar customization features to those web-based intervention programs could help enhance the persuasive effects by reducing defensiveness among users. For example, with the rise of mHealth apps that monitor smokers or diabetic patients' progress towards their health goals, implementing avatars and periodically prompting users to create and revise them within the platform may help to reduce the users' defensive tendencies (via self-affirmation) when receiving tailored health information.

Limitations and Directions for Future Research

Because people tend to project important aspects of the self when creating their own avatars (e.g., Vasalou & Joinson, 2009), we asked participants to customize avatars reflecting their personal values and identity. However, the literature on avatars has also highlighted the fluid nature of online identity, such that people can use avatar creation in digital space as an opportunity to experiment with alternative or possible selves (e.g., Lin & Wang, 2014). For this reason, it would be valuable to explore whether avatar customization, which draws on different aspects of the self, such as the ideal or ought self (Higgins, 1987), would change the likelihood of self-affirmation.

We recruited only those who have personal relevancy to the health issues addressed in message conditions; however, our participants did not include a large number of heavy coffee and alcohol drinkers. Nearly fifty percent of the participants in Study 2a indicated drinking less than two cups of caffeinated coffee or tea per day. Also, about three-fourths of participants in Study 2b responded that they have had less than four standard drinks as the maximum number of drinks consumed on a drinking occasion in the past two weeks. Given that we had limited numbers of subjects who excessively consume caffeine or alcohol, the small effect sizes found in Studies 2a and 2b may be an underestimation of the true effect of self-affirmation based on avatar customization.

In addition, in real online-based interventions, users may not customize their own avatars on a regular basis. Future studies could explore effective ways of encouraging users to customize their own avatars more frequently. Providing new customizable options or allowing users to interact with their peer avatars may encourage users to re-embellish their own avatars, thus affording them more opportunities to self-affirm.

Conclusion

Avatar customization allows users to actively reflect on and express their core values and identity, which leads them to affirm the integrity of the self. As a result, users can be more open-

minded about potentially self-threatening health information, leading to an adoption of the recommendation. This study demonstrates that avatar customization can function as a source of self-affirmation in everyday online activities and can be used as a self-affirmation manipulation tool, which can be applied in both academic research and actual persuasion in practice.

References

Allport, G. W. (1961). Pattern and growth in personality. NewYork: Holt, Rinehart and Wonston.

Ahn, S. J., Fox, J., & Bailenson, J.N. (2012). Avatars. In Bainbridge, W. S. (Ed.*), Leadership in Science and Technology: A Reference Handbook.* SAGE Publications.

Baumeister, R. F. (1998). The self. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.*), Handbook of social psychology* (4th ed., pp. 680–740). New York: McGraw- Hill.

Block, L. G. and Williams, P. (2002). Undoing the effects of seizing and freezing: Decreasing defensive processing of personally relevant messages. *Journal of Applied Social Psychology, 32,* 803-830. https://doi.org/10.1111/j.1559-1816.2002.tb00243.x

Collins, S. E., & Carey, K. B. (2007). The theory of planned behavior as a model of heavy episodic drinking among college students. *Psychology of Addictive Behaviors, 21*(4), 498-507. doi:10.1037/0893-164X.21.4.498

Crocker, J., & Wolfe, C. T. (2001). Contingencies of self-worth. *Psychological Review, 108,* 593-623. https://doi.org/10.1037/0033-295X.108.3.593

Darville, G., Anderson – Lewis, C., Stellefson, M., Lee, Y.-H., MacInnes, J., Pigg, R. M., Thomas, S. (2018). Customization of Avatars in a HPV Digital Gaming Intervention for College-Age Males: An Experimental Study. *Simulation & Gaming*, *49*(5), 515–537.

Dillard, J. P., & Peck, E. (2000). Affect and persuasion: Emotional responses to public service announcements. *Communication Research, 27*, 461–495.

Dillard, J. P., & Shen, L. (2005). On the nature of reactance and its role in persuasive health communication. *Communication Monographs*, *72(*2), 144-168. https://doi.org/10.1080/03637750500111815

Duval, S. & Wicklund, R. A. (1972). A theory of objective self awareness *Academic Press.*

Harris, P. R. & Napper, L. (2005). Self-affirmation and the biased processing of threatening health-risk information. *Personality and Social Psychology Bulletin, 31*, 1250-1263.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis*. New York, NY: The Guilford Press.

Higgins, E. T. (1987). Self-discrepancy: A theory relating self and affect. *Psychological Review, 94*, 319–340. https://doi.org/10.1037/0033-295X.94.3.319

Jas, P. (1998). Aspects of food choice behaviour in adolescents. *Nutrition and Food Science, 98*(3), 163-165.

Jessop, D. C., Simmonds, L. V., & Sparks, P. (2009). Motivational and behavioural consequences of self-affirmation interventions: a study of sunscreen use among women. *Psychology & Health, 24*(5), 529-544. doi:10.1080/08870440801930320

Kim, Y., & Sundar, S. S. (2012). Visualizing ideal self vs. actual self through avatars: Impact on preventive health outcomes. *Computers in Human Behavior*, *28*, 1356–1364. https://doi.org/10.1016/j.chb.2012.02.021

Lee-Won, R. J., Tang, W. Y., & Kibbe, M. R. (2017). When virtual muscularity enhances physical endurance: masculinity threat and compensatory avatar customization among young male adults. *Cyberpsychology, Behavior, and Social Networking*, *20*, 10–16. https://doi.org/10.1089/cyber.2016.0418

Lim, S., & Reeves, B. (2010). Computer agents versus avatars: Responses to interactive game characters controlled by a computer or other player. *International Journal of Human-Computer Studies, 68*, 57-68. doi: 10.1080/03637750903074685

Lin, H., & Wang, H. (2014). Avatar creation in virtual worlds: Behaviors and motivations. *Computers in Human Behavior, 34*, 213-218. https://doi.org/10.1016/j.chb.2013.10.005

McGuire, W.J., & McGuire, C.V. (1996). Enhancing self-esteem by directed-thinking tasks: Cognitive and affective positivity asymmetries. *Journal of Personality and Social Psychology, 70*, 1117–1125. https://doi.org/10.1037/0022-3514.70.6.1117

McQueen, A. & Klein, W. M. (2006). Experimental manipulations of self-affirmation: A systematic review. *Self and Identity*, *5*, 289-354. https://doi.org/10.1080/15298860600805325

Napper, L., Harris, P. R., & Epton, T. (2009). Developing and testing a self-affirmation manipulation. *Self and Identity*, *8*, 45–62. https://doi.org/10.1080/15298860802079786

Nowak, K. L., & Fox, J. (2018) Avatars and computer-mediated communication: A review of the definitions, uses, and effects of digital representations. *Review of Communication Research. 6,* 30- 53, doi: 10.12840/issn.2255-4165.2018.06.01.015

Peng, W., Lin, J. H., Pfeiffer, K. A., & Winn, B. (2012). Need satisfaction supportive game features as motivational determinants: An experimental study of a self-determination theory guided exergame. *Media Psychology, 15*(2), 175-196.

Prentice, D. A., & Miller, D. T. (1993). Pluralistic ignorance and alcohol use on campus: some consequences of misperceiving the social norm. *Journal of Personality and Social Psychology, 64*, 243–256.

Ratan, R. A., & Dawson, M. (2016). When Mii is me: A psychophysiological examination of avatar self-relevance. *Communication Research*, *43*, 1065–1093. https://doi.org/10.1177/0093650215570652

Rethinking Drinking (n.d.). retrieved from https://www.rethinkingdrinking.niaaa.nih.gov/How-much-is-too-much/Whats-the-harm/What-Are-The-Risks.aspx

Robinson, L. (2007). The cyberself: the self-ing project goes online, symbolic interaction in the digital age. *New Media & Society 9*, 93–110. https://doi.org/10.1177/1461444807072216

Rodriguez, T., Rodriguez, T., Altieri, A., Chatenoud, L., Gallus, S., Bosetti, C., Negri, E., Franceschi, S., Levi, F., Talamini, R., & La Vecchia, C. (2004). Risk factors for oral and pharyngeal cancer in young adults. *Oral Oncology, 40* (2), 207–213.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*, 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Sah, Y. J., Ratan, R., Tsai, H. Y. S., Peng, W., & Sarinopoulos, I. (2017). Are you what your avatar eats? Health-behavior effects of avatar-manifested self-concept. *Media Psychology*, *20*, 632–657. https://doi.org/10.1080/15213269.2016.1234397

Schmeichel, B. J., & Vohs, K. (2009). Self-affirmation and self-control: Affirming core values counteracts ego depletion. *Journal of Personality and Social Psychology*, *96*, 770–782. https://doi.org/10.1037/a0014635

Sherman, D. K. & Cohen, G. L. (2006). The psychology of self-defense: Self-affirmation theory. *Advances in Experimental Social Psychology*, *38*, 183-241. https://doi.org/10.1016/S0065-2601(06)38004-5

Sherman, D. K., Nelson, L. D. & Steele, C. M. (2000). Do messages about health risks threaten the self? Increasing the acceptance of threatening health messages via self-affirmation. *Personality and Social Psychology Bulletin, 26*, 1046-1058.

Steele, C. M. (1988). The psychology of self-affirmation: Sustaining the integrity of the self. *Advances in Experimental Social Psychology*, *21*, 261-302. https://doi.org/10.1016/S0065-2601(08)60229-4

Sundar, S. S. (2008). Self as source: Agency and customization in interactive media. In E. A. Konijn, S. Utz, M. Tanis, & S. B. Barnes (Eds.), *Mediated interpersonal communication* (pp. 58–74). New York, NY: Routledge.

Sundar, S. S., Bellur, S., & Jia, H. (2012). Motivational technologies: A theoretical framework for designing preventive health applications. In M. Bang & E. L. Ragnemalm (Eds.),

Proceedings of the 7th International Conference on Persuasive Technology (PERSUASIVE 2012), LNCS 7284 (pp. 112–122). Berlin, Germany: Springer.

Sweeney, A. M., & Moyer, A. (2015). Self-affirmation and responses to health messages: A meta-analysis on intentions and behavior. *Health Psychology*, *34*, 149-159.

Toma, C. L., & Hancock, J. T. (2013). Self-affirmation underlies Facebook use. *Personality & Social Psychology Bulletin*, *39*, 321–31. https://doi.org/10.1177/0146167212474694

Vasalou, A., & Joinson, A. N. (2009). Me, myself and I: The role of interactional context on self-presentation through avatars. *Computers in Human Behavior*, *25*, 510–520. https://doi.org/10.1016/j.chb.2008.11.007

Vasalou, A., Joinson, A. N., & Pitt, J. (2007). Constructing my online self: avatars that increase self-focused attention. *Proceedings of ACM CHI 2007 Conference on Human Factors in Computing Systems*, *1*(December 2013), 445–448. doi:10.1145/1240624.1240696

van Koningsbruggen, G. M., & Das, E. (2009). Don't derogate this message! self-affirmation promotes online type 2 diabetes risk test taking. *Psychology and Health, 24*(6), 635–649.

Vohs, K. D, Schmeichel, B. J., Nelson, N. M., Baumeister, R. F., Twenge, J. M., & Tice, D. M. (2008). Making choices impairs subsequent self-control: A limited-resource account of decision-making, self-regulation, and active initiative. *Journal of Personality and Social Psychology*, *94*, 883-898. https://doi.org/10.1037/0022-3514.94.5.883

WebMD (n.d.), 12 Health Risks of Chronic Heavy Drinking, Retrived from: https://www.webmd.com/mental-health/addiction/features/12-health-risks-of-chronic-heavy-drinking#1

Wind, J., & Rangaswamy, A. (2001). Customerization: The next revolution in mass customization. *Journal of Interactive Marketing*, *15*, 13–32.

Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs, 59,* 329–349.

Witte, K. (1994). Fear control and danger control: A test of the extended parallel process model (EPPM), *Communication Monographs, 61*, 113-134. https://doi.org/10.1080/03637759409376328

Yee, N., & Bailenson, J. (2007). The proteus effect: The effect of transformed self-representation on behavior. *Human Communication Research, 33*, 271–290. https://doi.org/10.1177/0093650208330254

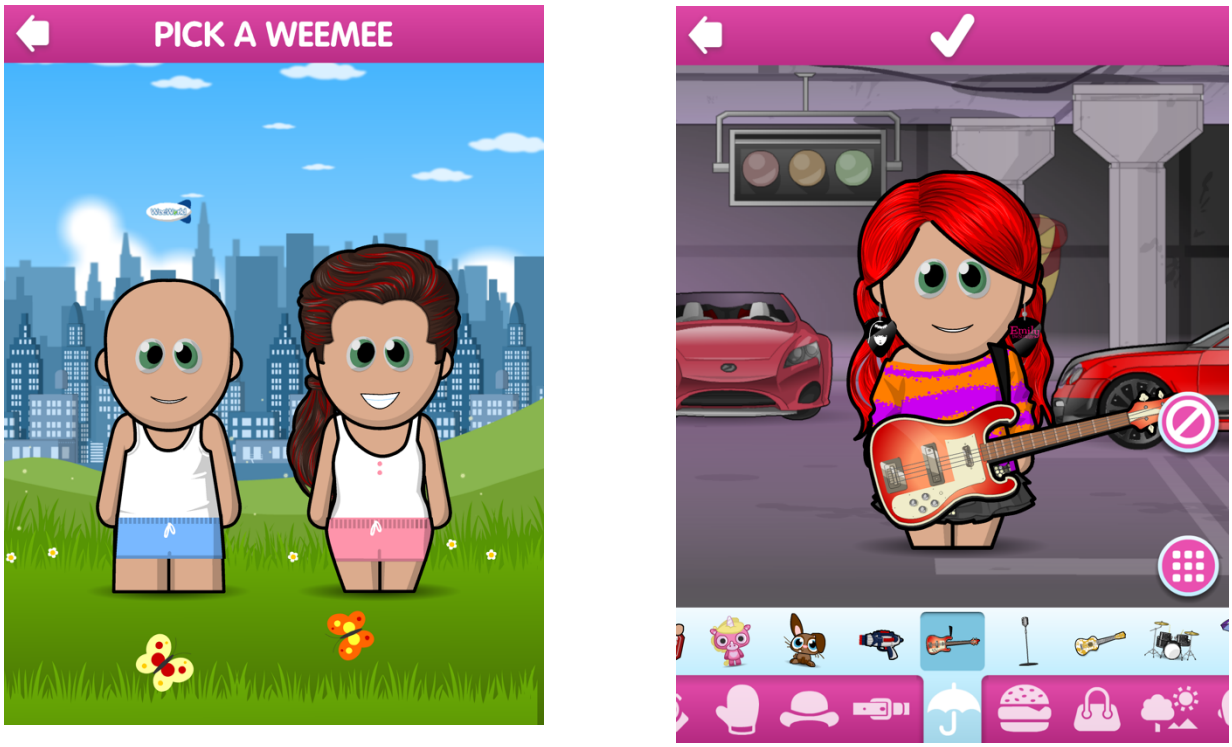
Zhao, X., & Nan, X. (2010). Influence of self-affirmation on responses to gain- versus loss-framed antismoking messages. *Human Communication Research, 36*(4), 493-511. doi:10.1111/j.1468-2958.2010.01385.x

Table and Figures

Table 1. Responses to the main outcomes across conditions (Study 1; $N = 126$)

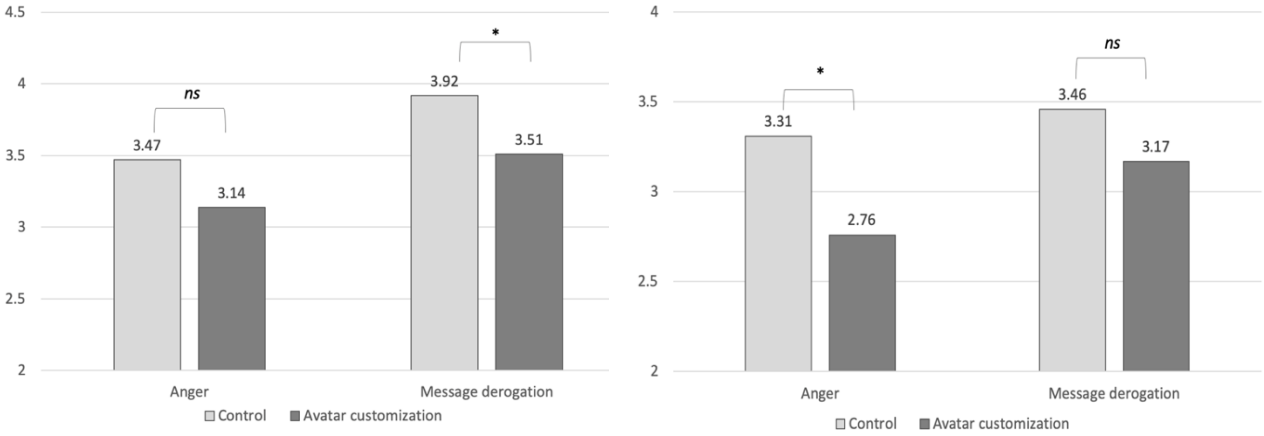
Dependent Variables	Self-affirmation		Control		F (3,122), p-value; effect size
	Avatar ($n = 32$)	Essay ($n = 27$)	Avatar ($n = 33$)	Essay ($n = 34$)	
Self-appraisal	1.20 $_{a}$ (1.05)	1.18 $_{a}$ (1.18)	.19 $_{b}$ (.59)	.44 $_{b}$ (.79)	$F = 9.59$, $p < .001$; $\eta^2 = .19$
Self-awareness	4.02$_{a}$ (.68)	4.07$_{a}$ (.57)	2.88 $_{b}$ (.82)	3.31 $_{b}$ (.78)	$F = 18.76$, $p < .001$; $\eta^2 = .32$
Self-feeling	3.81 $_{a}$ (.59)	3.41 $_{ab}$ (.80)	3.21 $_{b}$ (.96)	3.21 $_{b}$ (.73)	$F = 4.31$, $p = .004$; $\eta^2 = .10$
Fun	4.28 $_{a}$ (.772)	3.56 $_{b}$ (1.01)	3.85 $_{a}$ (1.03)	3.18 $_{b}$ (1.06)	$F = 7.48$, $p < .001$; $\eta^2 = .16$
Easy	3.94 $_{a}$ (1.27)	2.96 $_{b}$ (1.16)	3.70 $_{a}$ (1.02)	3.65 $_{a}$ (1.25)	$F = 3.59$, $p = .02$; $\eta^2 = .08$

Note. Mean (SD), Means sharing subscripts do not differ significantly at 95% confidence level on post hoc tests (Tukey's HSD)



Note. Wonder World Creator; Left: default avatars- participants could start to customize the avatar by choosing the gender of the character; Right: interface screenshot of WeeMee customization

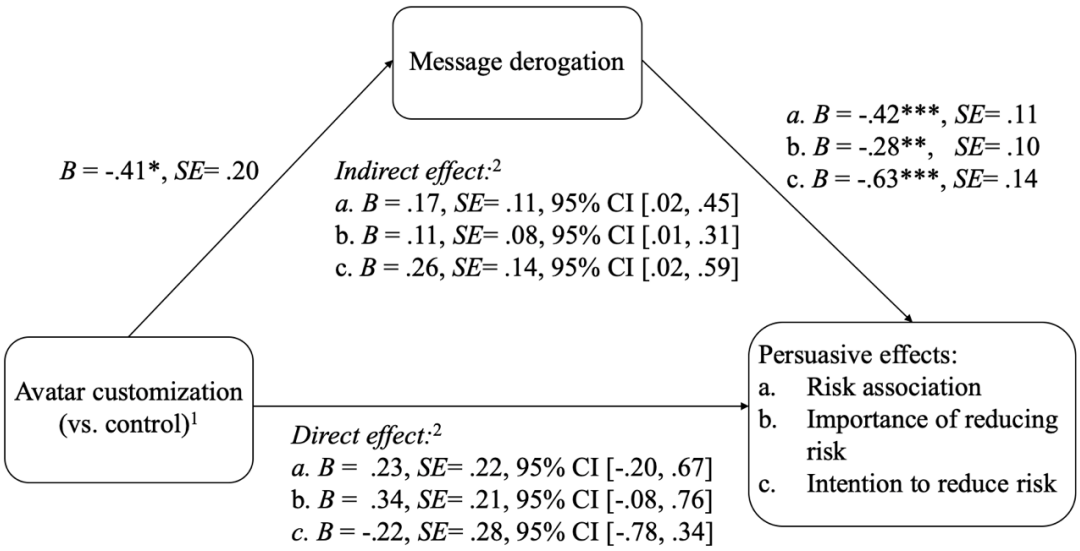
Figure 1. Screenshots of the avatar (‘WeeMee’) customization application



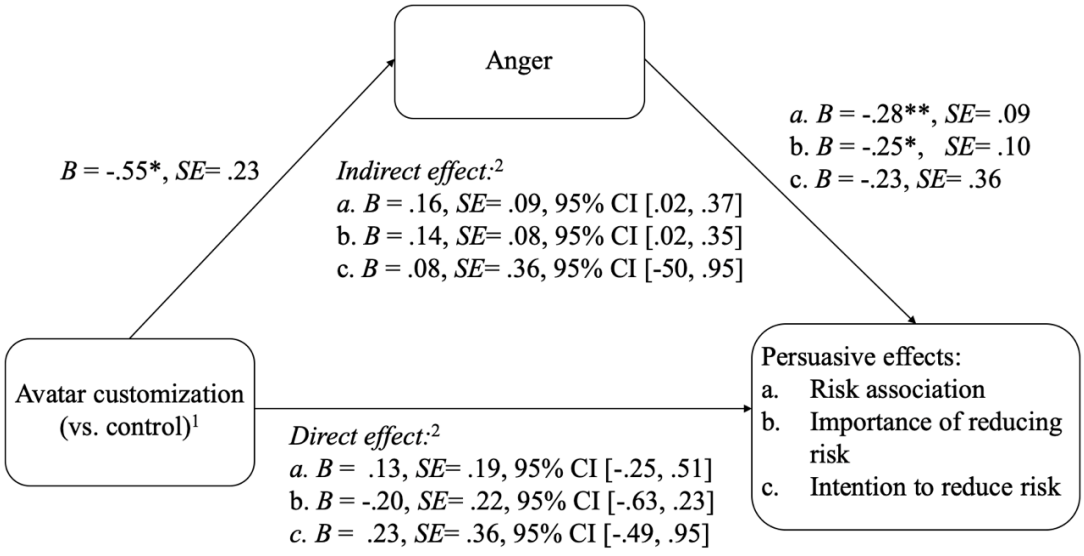
a) Study 2a. Caffeine message ($N = 102$) b) Study 2b. Alcohol message ($N = 76$)

Note: mean; *ns* $p > .05$, * $p < .05$

Figure 2. Effects of Avatar Customization on Anger and Message Derogation



a) Study 2a. Caffeine message (*N*= 102)



b) Study 2b. Alcohol message (*N*= 76)

Note: [1] Control condition =0, Avatar customization condition =1;
[2] Bootstrapped results using 5,000 resamples;
* p <.05, ** p < .01, *** p < .001

Figure 3. Test of Indirect Effects of Avatar Customization