Does social presence matter in a VR apparel store? A nonlinear relationship among human crowdedness, social presence, store image, and satisfaction

Ziyou Jiang, Ryan Fernandez, Yujun Lin, University of Georgia

Heejin Lim, University of Tennessee

Jewon Lyu, University of Georgia

Keywords: Virtual reality (VR), human crowdedness, store image, social presence, satisfaction

Introduction. Human crowding has been extensively researched as an important atmospheric cue in physical retail stores (Bandyopadhyay, 2020; Coskun et al., 2019; Machlet et al., 2000), with studies showing that a high level of human crowding can have both positive and negative effects on consumers' shopping experience. On the one hand, when a store is too crowded, negative emotions such as stress and frustration may arise, leading to low customer satisfaction (Coskun et al., 2019; Machlet et al., 2000). On the other hand, a high level of human crowding can increase excitement with a sense of social presence, resulting in positive behavioral outcomes (Blut, 2020; Kim et al., 2015).

With the emergence of the Covid-19 pandemic, fashion brands have been exploring new ways to replicate the physical shopping experience in the online environment to offer a safe and convenient alternative for consumers, allowing them to shop in a virtual space without any concerns about physical distancing or infection. However, prior research has shown that the absence of other individuals in a store makes customers feel that the store is empty and uninviting, lacking social cues (Söderlund, 2011). In this regard, prior studies have explored various ways of creating a sense of social presence (i.e., "sense of being with another": Biocca et al., 2002, p.10, Jiang et al., 2019), focusing on "mediated social interactions," such as emails, emoticons, and robots (Biocca et al., 2002, p.5). In this study, we extend this research stream by examining the effects of human crowding and social presence in the virtual reality (VR) store that enables the simulation of a genuine environment, providing customers with the sensation of full immersion (Serrano et al., 2013). While researchers have addressed the importance of social presence in the VR store environment (Schnack et al., 2021; Zhao et al., 2021), empirical evidence is limited. Thus, this study aims to investigate how perceived human crowding, the number of other individuals in a graphic form, influences consumers' perceptions and shopping satisfaction in the VR store environment.

Hypotheses development. Human crowding refers to the number of people in a physical environment and their level of social interaction (Bandyopadhyay, 2020). The Social Presence Theory (Short et al., 1976) suggests that the level of human presence affects the degree to which consumers feel present in that environment. An appropriate level of human presence enhances consumers' social presence and their sense of being there (Animesh et al., 2011). However, in a virtual environment such as Second Life, too many avatars in a particular virtual space can cause sensory overload, leading to unwanted social interactions and decreasing the sense of social

presence (Animesh et al., 2011). Conversely, too few or no humans can result in the sense of isolation and disconnection, also decreasing the sense of social presence. Thus, we propose an inverted U-shaped relationship between human crowdedness and consumers' sense of social presence in the VR apparel store (H1a).

The Inference Theory (Ludwig, 1996) suggests that consumers form inferences about a product or retail space based on environmental cues. A store with a low level of human crowdedness may signal that it is not popular or successful, while a store with a high level of human crowdedness may be associated with low-end or discount stores (Mehta et al., 2013). However, when a store has a moderate level of human crowdedness, consumers may infer that the store is popular and desirable, resulting in s a more favorable sense of store image and satisfaction. Therefore, we propose an inverted U-shaped relationship between human crowdedness and perceived store image and satisfaction with the VR apparel store (H1b-c).

Furthermore, previous studies demonstrated that a high level of social presence in a store leads to a positive shopping experience and high satisfaction with the store (Kwon et al., 2016), and a positive store image increases satisfaction with this store (Thomas, 2013). Hence, we propose that consumers' sense of social presence in the VR apparel store and VR apparel store image will positively influence their satisfaction with the VR apparel store (H2-H3).

Method. This study conducted a between-subject experiment with three conditions of human crowdedness (high, moderate, and low). A total of 55 undergraduate and graduate students from a southeastern university were recruited to participate in this experimental study. Using SketchUp, three VR apparel stores were created with varying levels of human crowdedness for study stimuli. A one-way ANOVA was performed to test the manipulation of human crowdedness. The results confirmed that there is a significant difference ($F(2, 54) = 174.40$, $\eta^2 = 0.870$, $p < 0.001$) between a pair of conditions. Bonferroni's post hoc test revealed significant differences among three conditions at $p = 0.05$ ($M_{high} = 5.26$, $SD_{high} = 0.58$ vs. $M_{low} = 2.88$, $SD_{low} = 0.80$ vs. $M_{no} = 2.32$, $SD_{low} = 0.31$). After confirming the successful manipulation of the stimuli, the main experiment was conducted. Participants ($N = 55$) were randomly assigned to one of three conditions. Following the completion of a pre-survey, they were asked to wear a VR headset and freely explore a virtual apparel store. Then, the participants completed a post-survey online.

Results. To test the suggested relationship, a curvilinear regression analysis using SPSS was conducted to test the suggested hypotheses. The analysis used human crowdedness in a continuous form as an independent variable rather than using the level of human crowdedness as a categorical variable. The results supported an inverted U-shaped relationship between human crowdedness, consumers' sense of social presence and VR apparel store image, and satisfaction (H1a: $F(2, 54) = 3.932$, $R^2 = 0.131$, $p < 0.05$; H1b: $F(2, 54) = 3.315$, $R^2 = 0.113$, $p < 0.05$; H1c: H1a: $F(2, 54) = 3.315$, $R^2 = 0.120$, $p < 0.05$). In addition, the linear regression results supported H2 and H3, indicating that consumers' sense of social presence and VR apparel store image

increased their satisfaction with the VR apparel store (H2: $F(1, 54) = 8.038$, $R^2 = 0.132$, $p < 0.01$; H3: $F(1, 54) = 32.641$, $R^2 = 0.381$, $p < 0.001$).

Discussions. The findings of this study contribute to the existing literature by expanding the applications of Social Presence Theory and Inference Theory to the VR shopping environment. Our findings demonstrated a significant inverted U-shape relationship among human crowdedness, consumers' sense of social presence and VR apparel store image, and satisfaction with the VR apparel store. Specifically, the findings suggest that consumers' sense of social presence and VR apparel store image and satisfaction with the VR apparel store increase until a moderate level of human crowdedness is reached. Beyond this point, as perceived human crowdedness increases, consumers' sense of social presence, VR apparel store image, and satisfaction were found to decrease. Our findings also suggest that consumers are more likely to be satisfied with the VR store if they perceive an increased social presence within a range where they do not feel overwhelmed by the presence of computer-generated avatars. The findings offer valuable insights for apparel brands to optimize the VR shopping experience. To do so, it is recommended that VR stores should be designed with a moderate number of avatars to elicit consumers' positive perceptions and satisfaction with VR stores.

References

Animesh, A., Pinsonneault, A., Yang, S., & Oh, W. (2011b). An Odyssey into Virtual Worlds: Exploring the Impacts of Technological and Spatial Environments on Intention to Purchase Virtual Products. *Management Information Systems Quarterly*, *35*(3), 789. https://doi.org/10.2307/23042809

Bandyopadhyay, N. (2020). Human Crowding or Spatial Crowding? The Impact of Perceived Crowding on In-store Impulse Purchase. *American Business Review*, *23*(1), 94–105. https://doi.org/10.37625/abr.23.1.94-105

Biocca, F., & Harms, C. (2002). Defining and measuring social presence: Contribution to the networked minds theory and measure. Proceedings of PRESENCE, 2002, 7-36.

Blut, M., & Iyer, G. R. (2019). Consequences of Perceived Crowding: A Meta-Analytical Perspective. *Journal of Retailing*, *96*(3), 362–382. https://doi.org/10.1016/j.jretai.2019.11.007

Coskun, M., Gupta, S., & Burnaz, S. (2019). Human crowding and store messiness: Drivers of retail shopper confusion and behavioral intentions. *Journal of Consumer Behaviour*, *18*(4), 313–331. https://doi.org/10.1002/cb.1772

Jiang, C., Rashid, R. M., & Wang, J. (2019). Investigating the role of social presence dimensions and information support on consumers' trust and shopping intentions. *Journal of Retailing and Consumer Services, 51*, 263-270.

Kim, D., Lee, C. K., & Sirgy, M. J. (2015). Examining the Differential Impact of Human Crowding Versus Spatial Crowding on Visitor Satisfaction at a Festival. *Journal of Travel &Amp; Tourism Marketing*, *33*(3), 293–312. https://doi.org/10.1080/10548408.2015.1024914

Kwon, H., Ha, S., & Im, H. (2016). The impact of perceived similarity to other customers on shopping mall satisfaction. *Journal of Retailing and Consumer Services*, *28*, 304–309. https://doi.org/10.1016/j.jretconser.2015.01.004

Ludwig, K. (1996). Explaining why things look the way they do. In K. Akins (Ed.), *Perception,* pp. 18-60. Oxford, UK: Oxford University Press.

Mehta, R., Sharma, N., & Swami, S. (2013). The impact of perceived crowding on consumers' store patronage intentions: Role of optimal stimulation level and shopping motivation. *Journal of Marketing Management*, *29*(7–8), 812–835. https://doi.org/10.1080/0267257x.2012.729075

Schnack, A., Wright, M. J., & Elms, J. (2021). Investigating the impact of shopper personality on behaviour in immersive Virtual Reality store environments. *Journal of Retailing and Consumer Services, 61*, 102581.

Serrano, B., Botella, C., Baños, R. M., & Alcañiz, M. (2013). Using virtual reality and mood-induction procedures to test products with consumers of ceramic tiles. *Computers in Human Behavior, 29*(3), 648-653.

Short, J. R., Williams, E., & Christie, B. (1976). The social psychology of telecommunications. *The Social Psychology of Telecommunications*, *19*(4), 451–484.

Söderlund, M. (2011). Other customers in the retail environment and their impact on the customer's evaluations of the retailer. *Journal of Retailing and Consumer Services*, *18*(3), 174–182. https://doi.org/10.1016/j.jretconser.2010.09.006

Thomas, S. (2013). Linking customer loyalty to customer satisfaction and store image: a structural model for retail stores. *Decision*, *40*(1–2), 15–25. https://doi.org/10.1007/s40622-013-0007-z