Psychological discomfort during the brand experience in VR-based metaverses: The role of brand attitude ex ante

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Abstract

The high immersion perceived during virtual reality (VR)-based metaverse experiences can boost psychological discomfort in consumers, who currently seem wary of this context. Considering that several brands are investing in developing immersive brand experiences, it is relevant to investigate the possible causes of negative attitudes toward VR-based metaverses. Accordingly, the present study aims to test a model on the negative impact of psychological discomfort on VR-based metaverse attitude during an immersive brand experience, as well as the moderating role of brand attitude ex ante. The dataset was collected through a survey involving 280 Italian Gen Z consumers who responded after enjoying a specific brand experience in Roblox's metaverse. LISREL 8.80 and SPSS software were used for data analysis. The results revealed a significant negative relationship between psychological discomfort and attitudes toward VR-based metaverses. Moreover, the model reveals the moderating role of brand attitude, whereby when brand attitude ex ante is higher, the negative effect of psychological discomfort on attitude toward the VR-based metaverse is reduced until it disappears altogether. The study contributes to the academic literature related to marketing in the metaverse and cyberpsychology. In addition, fruitful managerial implications are offered.

Keywords: *metaverse; VR-based metaverse attitude; psychological discomfort; brand attitude ex ante; moderation analysis.* **TRACK: Consumer Behavior and Marketing Research**

1) Introduction

Metaverse is defined as "an online collaborative shared space built of 3D environments that leverage high consumer immersion" (Yoo et al., 2023, p. 174). Although metaverses can be based on different extended reality technology solutions, i.e., virtual reality (VR), augmented reality (AR), and mixed reality (MR), the current most popular platforms (e.g., Roblox, Decentraland, Spatial) are related to virtual reality technology. Virtual reality can simulate three-dimensional experiences that imitate the real environment (Dincelli & Yayla, 2022), accessible through low-immersive devices (i.e., desktops) or high-immersive devices (i.e., head mounted display-HMD) (Kaplan-Rakowski & Gruber, 2019). VR-based metaverses are particularly worthy of attention, as they enable brands to create engaging brand experiences (Yoo et al., 2023) due to the increased immersiveness provided by VR technology (Dincelli & Yayla, 2022). For example, Nike is one of the brands that has created its own brand experience in the Roblox metaverse, which contributes to exploring "new ways to tell stories and create relationships by removing the barriers and limitations of the physical product", according to Ron Faris, General Manager of Nike Virtual Studios (Sandonnini, 2023). Platforms such as Roblox currently boast access to approximately 210 million monthly active users, with approximately 59 million active daily users (Osservatorio Metaverso, 2023). Although marketing and branding opportunities in the immersive context have been proposed in the emerging strand of academic literature (e.g., Dwivedi et al., 2022; Vernuccio et al., 2023), an inherent perspective on consumers' perceived risks in the metaverse is also arising, specifically in terms of ethical issues, data privacy, and cyber-syndrome (Sriram, 2022). In particular, the risks of cyber-syndrome or social, physical, and psychological discomfort due to heavy internet use (Riva & Wiederhold, 2022; Sriram, 2022) may be emphasized by the deep immersion allowed by metaverses (Ning et al., 2023). For instance, 53% of Italian users are afraid that frequenting metaverses will reduce their ability to interact and socialize with others or lead to the onset of anxiety or phobias; 49% are concerned about the

possibility of incurring mental illnesses such as depression or addiction (Ponti & Andreani, 2023). In this regard, previous studies claim that psychological discomfort may decrease user attitudes toward the technology and the correlated experiences (e.g., Liu et al., 2020), although without focusing on the VR-based metaverse context. The danger of perceived discomfort related to immersive experiences could drive consumers away from the VR-based metaverse context, rendering brands' investment in the innovative virtual environment ineffective. However, previous marketing studies have found that during an uncomfortable marketing experience, the presence of a brand toward which one has a positive attitude may reduce the negative effects on consumer responses (e.g., Chattopadhyay & Basu, 1990). Nevertheless, in the context of VR-based metaverses, it has not yet been investigated whether brand attitude ex ante can moderate the negative impact of users' psychological discomfort during a brand experience on the attitude toward the immersive context. Therefore, this study aims to understand whether psychological discomfort experienced in VR-based metaverse branded environments may affect attitudes toward the context. Furthermore, we aim to understand whether brand attitude ex ante may play a role in moderating the relationship between the two abovementioned variables.

2) Theoretical background and research hypothesis

Psychological discomfort refers to the "unpleasant emotions a person may experience", related mainly to feelings such as anxiety, fear, depression, embarrassment, isolation, and vulnerability caused by an individual's specific situation (Ashkenazy et al., 2019, p. 558). In the academic literature on psychology and mental health, there are several studies that have identified new technologies as possible sources of psychological discomfort in users (e.g., Palmer et al., 2014; Seabrook et al., 2016). In particular, VR technologies are likely to induce psychological discomfort in users, such as feelings of embarrassment (Scavarelli et al., 2019), anxiety (Tai et al., 2022), and a sense of loss of control (Blut & Wang, 2020), due to the deep immersion enabled.

Considering that an individual's natural response to psychological discomfort is to reduce and avoid the source of distress (Ashkenazy et al., 2019), negative feelings developed in technology-based contexts can reduce positive attitudes toward them, leading to avoidance (Blut & Wang; 2020; Liu et al., 2020).

Attitude toward VR-based metaverses is identified as the predisposition with which the user summarizes his or her evaluation of this context (Manis & Choi, 2019). Attitude toward the experiential context is a variable worthy of attention, as it unconsciously guides users' thinking and direct behaviors (Manis & Choi, 2019) and impacts consumer responses to the brand (Roett & Terlutter, 2018). The literature has shown that an experience of discomfort with technology (e.g., anxiety and fear) can both negatively affect attitudes toward the access device (Devine et al., 2019) and reduce users' approach to the technology-based context (Brosnan, 1998). Specifically, Conrad and Munro (2008) highlighted how users with greater computer anxiety demonstrate a more negative attitude toward computer-based environments, while Gilbert and colleagues (2003) found that fear and anxiety regarding mobile internet technologies mitigate attitudes toward mobile experiences on the internet.

In light of the above considerations, we propose the first hypothesis of our study.

H1: Psychological discomfort negatively affects attitudes toward the VR-based metaverse context during an immersive brand experience.

Brand attitude (BA) ex ante is defined as a preexisting "relative enduring, unidimensional summary evaluation of the brand that presumably energizes behavior" (Spears & Singh 2004, p. 56). Previous academic marketing literature has identified the role of prior BA in altering consumers' responses, as it "serves to bias the evaluative directionality of an individual's cognitive elaborations in the direction of the prior evaluation" (Chattopadhyay & Basu, 1990, p. 468).

In particular, Vanwesenbeeck and colleagues (2017) highlighted the role of prior brand attitude in the

advergame environment involving children aged 10 to 12 years (Vanwesenbeeck et al., 2017). Specifically, respondents who played an advertising game that included a brand toward which they had a previous positive attitude (e.g., Apple) experienced higher levels of brand attitude change (Vanwesenbeeck et al., 2017). Considering digital environments, such as social media, Jahng and Hong (2017) argued that prior brand attitude can play a relevant role during crisis communication situations in altering the effect of branded communication on users' evaluative responses. In particular, BA ex ante moderates the relationships between crisis response strategies (i.e., defensive vs. apologetic tweets) and brand reputation. For apology tweets, participants with a high previous brand attitude expressed significantly greater brand reputation than those with a low brand attitude ex ante. Furthermore, prior brand attitude can positively moderate the relationship between negative cognitive variables (i.e., perceived risk) and attitudinal outcomes (i.e., attitude toward online shopping) (Bhatti et al., 2018). In particular, the findings showed that in the case of positive prior attitudes, the negative effect of risk perceptions on online shopping attitudes decreased. In contrast, when ex ante attitude is low, perceived risk has a greater negative influence on online shopping.

Therefore, we propose the second hypothesis of our study below.

H2: Brand attitude ex ante positively moderates the negative effect of psychological discomfort on attitude toward VR-based metaverses, such that when brand attitude ex ante is lower (higher), the effect is more negative (less negative).

3) Methodology

To test our research hypotheses, we conducted a survey of Gen Z users (i.e., 18-27 years old). Specifically, this segment shows the highest rate of VR usage among other generational classes (Jayaraman, 2022), and younger users represent more than 50% of the virtual metaverse population (ADC Group Data Center, 2022). To select the specific VR-based experience and collect primary data, we collaborated with a market research agency that works for a fashion brand (i.e., Brand X)[1], popular among Generation Z users, which has developed a highly immersive brand experience on Roblox.

Respondents aged between 18 and 27 years old were recruited in Italy via email. A total of 292 respondents agreed to take part in the study (62% response rate), of whom 12 were disqualified because they did not know Brand X (screening question – "Are you aware of Brand X?"), resulting in a final sample of 280 respondents (gender: 60.4% female; M_{age} = 23.1, SD_{age} = 1.77).

To obtain vivid responses, each participant was invited to enter the selected brand experience wearing the Meta Quest 2 headset. In particular, a dedicated room of the research agency was used for filling out the questionnaire and joining the brand experience.

The questionnaire was composed of three sections. The first section was administered before the VR experience to record the brand attitude ex ante toward Brand X. After the immersive experience in the selected VR-based metaverse, respondents were asked to rate their attitude toward the VR-based metaverse and the discomfort they felt (second section). Finally, the third section measured sociodemographic data (i.e., gender and age). The respondents took approximately 10 minutes to complete the questionnaire, while the immersive experience lasted approximately 15 minutes.

We measured brand attitude ex ante by adopting Bruner II et al.'s (2005) three-item, 7-point Likert scale (e.g., "Brand X is an attractive brand") and attitude toward VR-based metaverses by adapting Lee and Cho's (2020) three-item, 7-point Likert scale (e.g., "The VR-based metaverse context is attractive"). Finally, we adapted Ashkenazy and Ganz's (2010) eight-item, 7-point Likert scale to measure psychological discomfort (e.g., "During my experience in the VR-based metaverse, I felt vulnerable").

4) Data analysis and results

[1] For reasons of confidentiality, the brand name cannot be disclosed.

4.1 Consistency and validity checks

First, we validated the three-factor measurement model by performing a confirmatory factor analysis (CFA) using LISREL 8.80 software (Jöreskog and Sörbom, 2006). The findings demonstrate a good model fit. Specifically, $\chi^2(74)$ was 137.128, and the $\chi^{2/}df$ ratio was lower than 3. Moreover, the root mean square error of approximation (RMSEA) was .06 and significantly lower than 0.8 with a 90 percent confidence interval for RMSEA = [.0445; .0728]. The square root mean residual (SRMR) was .04, which was lower than .08. The confirmatory fit index (CFI) was .98, the normed fit index was .96, and the nonnormed fit index (NNFI) was .97; thus, all were greater than .95 (Bagozzi and Yi, 1988).

All standardized item loadings significantly loaded onto their indented constructs ($p < .001$), and the factor loadings were substantially greater than .50, ranging from .543 to .831 for psychological discomfort, from .608 to .906 for attitude toward VR-based metaverses and from .541 to .940 for brand attitude ex ante (Bagozzi and Yi, 1988).

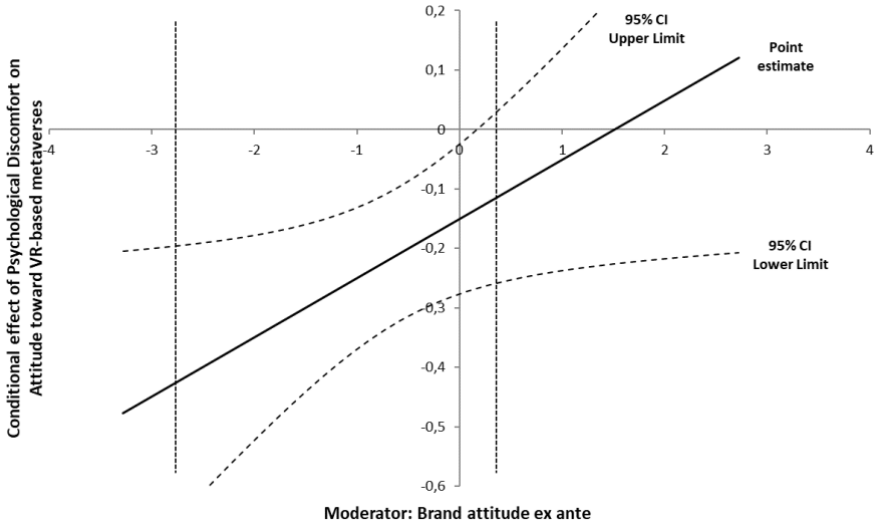
Furthermore, we can show how the Cronbach's alpha (α) values were all greater than .70 (α_{PD} = .92; α_{VRA} = .83; α_{BAEA} = .71), the composite reliability (CR) was greater than .70 (CR_{PD} = .90; CR_{VRA} = .85; CR_{BAEA} = .74), and the average variance extracted (AVE) for each variable was greater than .50 (AVE_{PD} = .54; AVE_{VRA} = .66; AVE_{BAEA} = .50). The correlation values among the variables ranged from -.30 to .22 ($\varphi_{PD\text{-}VRA}$ = -.30; $\varphi_{PD\text{-}BAEA}$ = -.12; $\varphi_{VRA\text{-}BAEA}$ = .22). Finally, the shared variance between pairs of factors was less than the corresponding AVE; consequently, we met the discriminant validity (Fornell and Larcker, 1981).

4.2 Findings

To estimate the relationships postulated in our conceptual model, we adopted Hayes's (2017) PROCESS routine (version 4.2) for SPSS (version 28.0). We employed Model 1, specifying psychological discomfort (PD) as the key independent variable, attitude toward VR-based metaverses (VRA) as the dependent variable, and brand attitude ex ante as the moderator.

The analysis of H1 tested the effect of DP on VRA. Consistent with our prediction, psychological discomfort negatively affects attitude toward VR-based metaverses (b = - .15, $p < .05$, CI: [- .28, - .02]). Moreover, we tested the moderating role of brand attitude ex ante in altering the relationship between psychological discomfort and attitude toward VR-based metaverses (H2). As hypothesized, we observed a significant interaction between psychological discomfort and brand attitude ex ante (b = .10, $p < .05$, CI: [.01, .19]); overall, the negative effect of psychological discomfort on attitude toward VR-based metaverses decreases as brand attitude ex ante increases. This pattern is indeed confirmed by simple slope analysis, which shows how the negative effect of psychological discomfort on VR attitude is higher when the intensity of the brand attitude ex ante is low (b = - .29, $p < .001$, CI: [- .41, - .15]), it decreases at the average level of brand attitude ex ante (b = - .15, $p < .05$, CI: [- .28, - .02]), and it is very close to zero and not significant when the moderator is high (b = - .01, p = .89, CI: [- .23, .20]) (Figure 1).

Figure 1: Slope plot



Source: Authors' elaboration

The standardized regression coefficients and the simple slope analysis are reported in Table 1.

Table 1: Model estimation

	H	Brand attitude ex ante	β	*p*
Hypothesized paths				
Psychological discomfort → Attitude toward VR-based metaverses	H1		- .15	.0195
Interaction term				
Brand attitude ex ante × Psychological discomfort → Attitude toward VR-based metaverses	H2		.10	.0352
Conditional effect				
Psychological discomfort → Attitude toward VR-based metaverses		Low (–1 SD)	- .29	.0000
		Medium (M)	- .15	.0195
		High (+1 SD)	- .01	.8969

Source: Authors' elaboration

5) Conclusion

This study contributes to the emerging strand of studies on marketing in metaverses (e.g., Dwivedi et al., 2022; Yoo et al., 2023), as well as to the literature on cyberpsychology (e.g., Lee et al., 2019; Liu et al., 2020), with particular reference to VR technology and metaverses (e.g., Riva & Wiederhold, 2022). Indeed, a first model has been proposed to investigate the effect of consumer psychological discomfort during a brand experience on attitudes toward VR-based metaverses while also considering the moderating role of brand attitude ex ante. Specifically, our results show that when users feel psychological discomfort, their attitude toward the VR-based metaverse decreases (H1). However, when the consumer exhibits a positive preexisting brand attitude, the negative effect of psychological discomfort on attitudes toward the context diminishes to the point of disappearing (H2). Therefore, our results contribute to the literature in different ways. With reference to the marketing strand in metaverses, the study first empirically highlights the role of psychological discomfort during the brand experience in decreasing positive attitudes toward VR-based metaverses. In particular, the results help shed light on some open questions related to consumers' risk perception in metaverses, on which current research is still in its infancy and is mainly conceptual (e.g., Dwivedi et al., 2023). Furthermore, our findings contribute to advancing knowledge about the key role that brand attitude

ex ante plays in moderating consumers' responses to marketing activities, which is indirectly supported by previous studies focused on advertising (e.g., Lee, 2010) and crisis organizational (e.g., Jahng & Hong, 2017) contexts. In particular, the aforementioned literature has analyzed the moderating role of brand attitude ex ante within the relationship between perceptual variables concerning brands and organizations, such as persuasive intent of advertising and attitude toward advertising (Lee, 2010) or corporate crisis response strategies and brand reputation (Jahng & Hong, 2017). Otherwise, our study considers the moderating role of brand attitude in the causal relationship between psychological discomfort, i.e., an individual variable related to pain (Ashkenazy et al., 2019), which is interpreted as a profound and extremely complex psychological phenomenon (Hadjistavropoulos, 2004), and attitude toward VR-based metaverses. In this regard, the findings also contribute to the cyberpsychology literature (e.g., Riva & Wiederhold., 2022), which has initiated research on users' feelings in accepting VR-based contexts (e.g., Liu et al., 2020). However, to the best of our knowledge, previous studies have not analyzed the moderating role that the positive attitude toward the "object of the experience", in our study the brand, might play in the relationship between individual psychological discomfort and the acceptance of technology.

The present research offers fruitful managerial implications, as it sheds light on one of the possible mechanisms underlying low VR-based metaverse attitudes by identifying a psychological cause (i.e., psychological discomfort) and an evaluative variable that can mitigate it (i.e., brand attitude ex ante). In particular, we suggest that managers promote the use of VR devices through ad hoc activities, such as attending innovative fairs open to consumers, to familiarize participants with the new technology and decrease the risk of experiencing psychological discomfort (Sánchez-Prieto et al., 2017; Tsai et al., 2019). Second, it is advisable to target the experience to consumers who already have a positive attitude toward the brand to moderate the feeling of psychological discomfort that might drive them away from VR. Third, we suggest moving forward with marketing campaigns that aim to improve brand attitudes in consumers, who will be more predisposed to appreciate immersive brand experiences in VR-based metaverses.

However, our study presents some limitations, opening new lines of research. First, the present investigation focuses only on Italian Gen Z users. Thus, future research could also consider other countries and different age groups (e.g., Gen X, Millennials). In addition, our article considers only an evaluative variable concerning VR-based metaverse technology. Therefore, future lines of research could extend the analysis by making use of the technology acceptance model (TAM) to study the other variables that can influence the intention to use metaverse technology (e.g., perceived ease of use, perceived usefulness). Finally, this study invites researchers to investigate the risks and drawbacks of accessing brand experiences in VR-based metaverses, as well as the variables that can moderate or neutralize negative effects on consumers, to ensure a pleasant and safe experience.

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Appendix

Table 2: Measurement scales

Constructs	Measurement items	Λ	α	CR	AVE
Psychological discomfort (7-point Likert scale, 1= strongly disagree, 7=strongly agree)	During my experience in VR-based metaverse, I felt...				
	1. embarrassment	.67	.92	.90	.54
	2. uncertainty	.54			
	3. vulnerability	.60			
	4. fear	.83			
	5. stress	.72			
	6. loss of body control, threat	.80			
	7. anxiety	.78			
	8. depression	.81			
Attitude toward VR-based metaverses (7-point Likert scale, 1= strongly disagree, 7=strongly agree)	VR-based metaverse context is…				
	1. favorable	.54	.83	.85	.66
	2. appealing	.94			
	3. attractive	.58			
Brand attitude ex ante (7-point Likert scale, 1= strongly disagree, 7=strongly agree)	Brand X is…				
	1. a good brand	.61	.71	.74	.50
	2. a pleasant brand	.91			
	3. an attractive brand	.89			

Notes: Λ=Lambda loadings; α= Cronbach's alpha; CR= Composite Reliability; AVE= Average Variance Extracted.
Source: Authors' elaboration

Table 2: Mean scores, standard deviations per construct, and bivariate correlations among constructs

	Psychological discomfort M=1.45 SD=1.08	Attitude toward VR-based metaverses M=6.19 SD=1.08	Brand attitude ex ante M=4.28 SD=1.37
Psychological discomfort	1		
Attitude toward VR-based metaverses	-.30**	1	
Brand attitude ex ante	-.12*	.22**	1

Notes: **Correlation is significant at p=.01; *Correlation is significant at p=.1. The matrix is diagonal.
Source: Authors' elaboration