

THE POWER OF FACIAL EXPRESSIONS IN SALES AVATARS: ELEVATING CONSUMER INTERACTION IN METAVERSE COMMERCE

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ABSTRACT

Metaverse commerce is reshaping e-commerce by offering immersive and interactive shopping experiences. Sales avatars, defined as digital representations of firm frontline employees in metaverse commerce, play critical roles in delivering real-time and interactive experiences. Drawing on the theory of affordances and the needs-affordances-features framework, this study investigates how the facial expressions of sales avatars (smiling vs. crying) influence consumer avatars' interaction outcomes and the underlying mechanisms through subcultural appeal. Further, we test when the mechanism by which sales avatars' facial expression leads to consumer interaction outcomes via subcultural appeal is amplified or weakened depending on sales avatar's anthropomorphism. We conducted four experiments in which consumers were exposed to virtual commerce contexts that we built on the VRChat metaverse platform. The results reveal that unlike real-world interactions, crying sales avatars compared to smiling sales avatars elicit higher intentions to interact with the sales avatar, purchase a virtual item from the sales avatar, and spread positive WOM about the experience. This counterintuitive effect is driven by consumers' heightened perceptions of subcultural appeal in the crying sales avatar context. However, when sales avatars exhibited high anthropomorphism (human-like vs. cartoon-like), the positive effect of the crying expression weakened. These findings provide actionable insights into how to strategically leverage sales avatars' facial expressions in highly immersive metaverse commerce, where consumers' desire for subcultural values is relatively high.

Keywords: Avatar; Metaverse retailing; Theory of Affordances; Facial expression; Subcultural appeal

1. Introduction

The metaverse as a virtual interactive platform is reshaping the retail landscape and the future of e-commerce (Dwivedi et al., 2023; Gleim et al., 2025; Hassounch & Brengman, 2015; Pillai et al., 2024; Taylor et al., 2024; Yoo et al., 2023; Zhang et al., 2025). In these virtual spaces, consumers navigate brands and products, visit virtual stores, interact with other consumer avatars or sales avatars, and purchase virtual items for their avatars or real products for themselves (Choi & Lee, 2024; Gleim et al., 2025; Hennig-Thurau et al., 2023; Shen et al., 2021; Taylor et al., 2024; Yoo et al., 2023). With the advancement of technologies such as virtual reality (VR) and augmented reality (AR), the metaverse has become a strategic component of firms' retail and sales operations, extending beyond advertising and branding (Choi & Lee, 2024; Martinez-Navarro et al., 2019; Shen et al., 2021). UGG, a fashion company known for its sheepskin boots, exemplifies the potential of metaverse commerce. Through the UGG World on ZEPETO, one of Asia's largest metaverse platforms with over 400 million users globally, UGG offered an immersive digital shopping experience and sold on average 6,000 digital UGG items per day during its metaverse campaign, which contributed

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to a 60% increase in physical store sales (Jeong, 2022). Metaverse commerce is being embraced by diverse sectors, including luxury brands (e.g., Gucci, Valentino), fashion (e.g., Croc), convenience stores (e.g., 7-Eleven), and entertainment (e.g., BTS concerts). Reflecting its potential, the market for metaverse commerce is projected to grow at a CAGR of 37.96% between 2025 and 2030, reaching an estimated US \$ 210.3 billion by 2030 (Statista, 2024).

Recently, firms have introduced sales avatars in their virtual stores to offer a more interactive experience and boost virtual commerce. For example, Korea's CU convenience store launched a VR store on ZEPETO, where users can browse, shop, and even interact with a sales avatar named 'Haru' (Jeon, 2022). Companies like Docomo and HP also used sales avatars in VRChat to greet visitors, distribute product brochures, and offer detailed product explanations. These sales avatars refer to 3D digital representation of a firm's frontline employees that enable real-time, embodied interactions through verbal (e.g., voice, text) and non-verbal cues like movement, smiles, and gestures (Arakji & Lang, 2008; Mehrotra et al., 2024; Nowak & Fox, 2018; Pandey & Mukherjee, 2026; Park et al., 2021). Their verbal and non-verbal behaviors strongly influence consumer perceptions and interactions in metaverse commerce (Etienne et al., 2023; Seo, 2023).

Scholars have investigated how avatars' verbal and non-verbal cues impact consumer perception, engagement, and virtual consumption experiences, with non-verbal cues often exerting greater influence (Maloney et al., 2020; Pakanen et al., 2022; Seo, 2023). Prior studies highlight the importance of non-verbal features such as facial expressions, gaze, gestures, attire, appearance, and human-likeness of avatars in shaping virtual interaction outcomes (Kang & Lee, 2025; Maloney et al., 2020; Miao et al., 2022). However, several research gaps persist. First, while avatars' facial expressions are not only immediately observable by users (Bruder et al., 2021) but also serve as critical social cues, signaling approval or denial to initiate interactions (Krämer et al., 2013), they remain underexplored compared to other non-verbal features. Seo (2023) found avatars' facial expressions and gestures to be the most influential non-verbal cues in Roblox and ZEPETO. Kruzic et al. (2020) emphasized the primacy of facial over bodily cues for interpersonal outcomes in virtual environments. These findings suggest a critical yet underexamined role for avatar facial expressions.

Second, existing research often overlooks that facial expressions may be interpreted differently in virtual settings, where consumers have distinct motivations. According to the theory of affordances and the needs-affordances-features framework, sales avatars' facial expressions offer perceived action possibilities (e.g., approach or avoidance), and consumers act to fulfill psychological needs shaped by the virtual context (Gibson, 1979; Karahanna et al., 2018; Norman, 1988; Roh et al., 2024). Hence, the same expression (e.g., crying) might evoke different responses in metaverse commerce than in physical settings. Third, prior studies have not sufficiently examined the conditions under which a sales avatar's specific facial expression leads to more positive or negative outcomes. Visual anthropomorphism, an extensively studied avatar feature, may moderate the effect of facial expressions on consumer responses in virtual commerce.

To address these gaps, this study has three objectives. First, focusing on sales avatars' facial expressions, we draw on the theory of affordance and the needs-affordances-features framework to investigate whether a crying (vs. smiling) sales avatar enhances consumers' intentions to interact, purchase virtual items, and engage in positive word-of-mouth (WOM) about their experience in the metaverse. Second, we explore why this unexpected phenomenon, which is not usual in the real world, happens in metaverse commerce with an emphasis on the mediating role of subcultural appeal of the sales avatar. Lastly, we test whether the mediating effect of a sales avatar's facial expressions via subcultural appeal is moderated by the level of visual anthropomorphism in the avatar's appearance. To these ends, we conducted four experiments in which participants interacted with firm sales avatars in a VRChat-based metaverse commerce.

Our findings challenge conventional beliefs. Consumers in highly immersive virtual commerce showed stronger interaction outcomes (i.e., higher intentions to interact, purchase virtual items, and spread positive WOM) when interacting with a crying sales avatar than with a smiling one. This counterintuitive result is explained by consumers' perception that interacting with a crying firm sales avatar (vs. with a smiling one) can better satisfy their heightened desire for subcultural values in metaverse commerce. This desire emphasizes differentiation/departure from daily routines and mainstream norms. However, when sales avatars exhibited high visual anthropomorphism (human-like vs. cartoon-like sales avatars), the positive effect of a crying expression weakened. These results affirm that the avatar's facial expressions afford different user actions depending on psychological needs unique to metaverse commerce as the theory of affordances and the needs-affordance-features framework imply. By uncovering how sales avatar-consumer interactions in highly immersive virtual commerce differ from real-world dynamics (Barta et al., 2024), our study offers new insights into optimizing sales avatar design for more effective metaverse commerce.

2. Theoretical development and research hypotheses

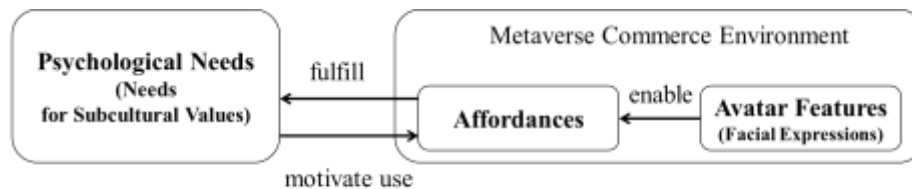
2.1. Metaverse commerce environment and theory of affordances

The metaverse is defined in this study as a three-dimensional virtual platform where real people interact through digital avatars (Kim et al., 2023; Kim et al., 2025; Taylor et al., 2024; Yoo et al., 2023). Barrera and Shah (2023) identified three core features of the metaverse experience: immersiveness, fidelity (i.e., the degree to which the metaverse environment emulates physical and functional aspects of the real world), and sociability (i.e., the degree of collective interaction among users). Similarly, Hadi et al. (2024) conceptualized the metaverse through five key elements: digitally mediated, spatial, immersive, shared, and real-time. Yoo et al. (2023) further emphasized online collaboration spaces, high consumer immersion, and interactions via digital personas as defining characteristics. In summary, the metaverse is a virtual environment where users represented by avatars immerse themselves and have real-time interactions with others. Accordingly, metaverse commerce refers to business activities and transactions conducted within these immersive, interactive, and three-dimensional virtual spaces (Arakji & Lang, 2008). It encompasses the creation of virtual shopping experiences where consumer avatars explore virtual stores, interact with products, and purchase virtual or real items using advanced technologies.

The theory of affordances provides a relevant framework for understanding these interactions in metaverse commerce (Gibson, 1979; Norman, 1988). Originally, Gibson (1979) defined affordances as the possibilities for action that the environment provides to users. Norman (1988) extended this concept to human-computer interaction, emphasizing that both the actual and perceived properties of an object suggest how it can be used. In this context, affordances are driven by cues, which are the features or properties of an object that signal to users possible actions and ways to interact (Norman, 1988; Shin, 2021, 2022). Importantly, affordances are not inherent in the object itself; rather, they emerge from user-object interaction within a specific environment (Norman, 1988; Roh et al., 2024; Suh & Wagner, 2017). Shin (2022) emphasized that affordance involves users' perceptions of features and how those features trigger their motivations in a given context. Thus, people perceive and act upon opportunities for action that are shaped by the environment. In the context of metaverse commerce, consumer avatars' possible actions are shaped by the virtual commerce environment, where features like sales avatars' facial expressions serve as cues that lead consumers to perceive possible actions and motivate consumer interaction intentions.

Building on this, Karahanna et al. (2018) integrated affordance theory with the theory of needs, introducing the needs-affordances-features framework to explain consumers' social media use. This framework suggests that consumers' psychological needs motivate them to choose platforms whose affordances can satisfy those needs. Applied to the metaverse, Zuo and Shen (2024) demonstrated that metaverse features can enable or constrain user behaviors by fulfilling or limiting user needs.

Adopting these perspectives, our study applies the theory of affordances and the needs-affordances-features framework to examine how sales avatars' facial expressions (smiling or crying) act as features that afford specific action possibilities for consumers (Pandey & Mukherjee, 2026; Suh, 2023). Of the possible actions afforded by avatar features (e.g., approach to the sales avatar or avoidance), consumers are more likely to engage in those that fulfill their psychological needs in metaverse commerce (Karahanna et al., 2018; Zuo & Shen, 2024). Given that virtual commerce contexts can prompt motivations distinct from those in the physical world (Ahn et al., 2024; Barrera & Shah, 2023; Hassounch & Brengman, 2011), consumers may perceive the same facial expression (smiling or crying) as affording different possibilities in metaverse commerce than in real life. Figure 1 illustrates how the theory of affordances and the needs-affordances-features framework are applied to this study.



Adapted from Karahanna et al. (2018)

Figure 1. Application of the Theory of Affordances to Our Context

2.2. Facial expression of sales avatars

According to the theory of affordances, a sales avatar's facial expression is a non-verbal feature that signals potential actions to users (e.g., approaching or avoiding the sales avatar) in metaverse commerce (Pandey & Mukherjee, 2026; Shin, 2022; Suh, 2023). Non-verbal cues include all informative forms or behaviors that are not purely linguistic (Maloney et al., 2020). Existing research on avatars' non-verbal cues has examined the effects of facial expressions

(e.g., Etienne et al., 2023; Kruzic et al., 2020), gaze (e.g., Li et al., 2025; Xu et al., 2025), gestures (e.g., Etienne et al., 2023; Kang & Lee, 2025), spatial behaviors (e.g., Kang & Lee, 2025), attire (e.g., Liu & Hao, 2024), gender (e.g., Liu & Hao, 2024), and anthropomorphism (e.g., Chae et al., 2025; Girondini et al., 2023; Jin & Bolebruch, 2009; Pakanen et al., 2022), among other aspects. These studies consistently show that avatars' non-verbal features are crucial variables that influence consumers' engagement, judgments, and behaviors in virtual commerce contexts, primarily by heightening their senses of embodiment and social presence (Kang & Lee, 2025; Pandey & Mukherjee, 2026; Taylor, 2002).

Although research highlights the powerful influence of avatar facial expressions compared to other non-verbal cues in virtual worlds (Jang & Kim, 2024; Kruzic et al., 2020; Seo, 2023), the specific impact of sales avatars' facial expressions, such as smiling versus crying, remains underexplored in virtual commerce. In contrast, numerous studies in physical retail and AI chatbot settings have examined whether firm representatives' smiles lead to positive evaluations and behaviors (Baek et al., 2022; Krämer et al., 2007). In physical stores, the favorable influence of a firm representative's smile is well established, showing links to favorable judgments, higher customer satisfaction, and increased purchase intention (Baek et al., 2022; Barger & Grandey, 2006; Min & Hu, 2022). These benefits occur through cognitive appraisals (e.g., perceiving the representative as helpful or the service as high-quality) and emotional contagion (Barger & Grandey, 2006; Min & Hu, 2022). Similarly, Baek et al. (2022) found that smiles from human-like AI chatbot agents increased consumers' willingness to donate, and Volonte et al. (2020) reported that users engaged longer with virtual characters that displayed positive facial expressions in VR environments. Taken together, these findings suggest that a general preference for smiling sales avatars over crying ones may also exist in metaverse commerce settings (Maloney et al., 2020).

However, as suggested by the theory of affordances and the needs-affordances-features framework, the action possibilities activated by a sales avatar's facial expression depend on the specific environment. Min & Hu (2022), for example, found that the positive effect of smile intensity on perceived warmth and competence of firm representatives was more pronounced in hedonic-oriented service contexts than in utilitarian-oriented ones. These results highlight that the effectiveness of facial expressions is not universal but rather determined by the specific context, including users' goals, desires, or motivations as illustrated in Figure 1.

2.3. Consumers' motivation and the mediating effect of subcultural appeal

Scholars have identified several key motivations that drive consumer engagement in virtual worlds: the pursuit of fun, escapism (relief from boredom and exploration of desires constrained in the real world), self-expression and identity expansion, and the creation of social interactions and relationships (Hassouneh & Brengman, 2011; Kim et al., 2025; Korkeila & Hamari, 2020; Melancon, 2011; Taylor et al., 2024). In particular, hedonic desires such as seeking thrills, novelty, or an escape from the monotony of daily life and mainstream cultural norms tend to be stronger in certain virtual environments than utilitarian desires (Ahn et al., 2024; Barrera & Shah, 2023; Hassouneh & Brengman, 2011). When consumers interact with other avatars in virtual environments for education or work collaboration or to purchase real goods for themselves, their utilitarian goals are more activated, and their behaviors may not be driven by their hedonic desires. However, hedonic desires may be amplified in metaverse commerce, where users purchase virtual goods to customize avatars, create new identities, and temporarily escape real-world judgments (Barta et al., 2024; Dwivedi et al., 2023). As a result, users with heightened needs for fun and escapism are particularly receptive to appeals that align with subcultural values.

In consumer consumption contexts, subcultural appeal emerges as a key facet of coolness, alongside originality and attractiveness (Cha, 2020; Sundar et al., 2014). Specifically, subcultural appeal centers on setting oneself apart from a crowd and avoiding daily routines or mainstream norms (Cha, 2020; Sundar et al., 2014; Warren et al., 2019). For this study, subcultural appeal is conceptualized as the extent to which consumers in metaverse commerce perceive that interacting with a sales avatar with a particular facial expression helps them distinguish themselves and avoid daily routines or mainstream norms (Sundar et al., 2014). The metaverse enables consumers to escape reality, inhabit new spaces, and adopt new personas behind a virtual mask (Dwivedi et al., 2023). The reduced risk of negative social judgment increases the desire for escapism, which in turn motivates individuals to seek subcultures as a means of expressing difference and avoiding conformity (Barrera & Shah, 2023; Dwivedi et al., 2023).

According to the theory of affordances and the needs-affordances-features framework, metaverse consumers' strong desire for subcultural values may motivate their interaction with sales avatars showing a crying facial expression (vs. a smiling facial expression), challenging mainstream expectations. In this context, a crying sales avatar may be viewed as cool, unique, and better able to satisfy users' needs for subcultural values (Gibson, 1979; Karahanna et al., 2018; Norman, 1988; Roh et al., 2024; Suh, 2023). Supporting this reasoning, researchers argue that specific features induce different user actions based on user's goals in a particular context (Suh, 2023) and the affordances of an object relate to users' need fulfillment (Zuo & Shen, 2024). Therefore, the exposure to crying sales avatars in metaverse commerce can enhance consumers' interaction outcomes to interact with the sales avatars (Kim et al., 2023;

Volonte et al., 2020), purchase virtual items from them (Pandey & Mukherjee, 2026), and spread positive WOM about the experience (Mladenović et al., 2024). In metaverse commerce, which provides virtual shopping environments, consumers' intentions to interact with sales avatars and to purchase virtual items represent two fundamental performance outcomes (Kim et al., 2023; Pandey & Mukherjee, 2026; Volonte et al., 2020). As metaverse commerce is still in its early stage of development, the dissemination of positive WOM is particularly important. Furthermore, since metaverse environments inherently offer richer opportunities for sociability and contextual factors that promote frequent and stronger information exchanges (Mladenović et al., 2024), examining consumers' intentions to spread WOM in the context of metaverse commerce is critical. Based on this logic, we propose the following hypotheses:

H1a: When interacting with a crying sales avatar (vs. with a smiling one), consumers in metaverse commerce show higher intentions to interact with the sales avatar.

H1b: When interacting with a crying sales avatar (vs. with a smiling one), consumers in metaverse commerce show higher intentions to purchase a virtual item.

H1c: When interacting with a crying sales avatar (vs. with a smiling one), consumers in metaverse commerce show higher intentions to spread positive WOM about the experience.

H2a: Consumers' perception of subcultural appeal in metaverse commerce mediates the relationship between the facial expression of a sales avatar and consumers' intentions to interact with the sales avatar.

H2b: Consumers' perception of subcultural appeal in metaverse commerce mediates the relationship between the facial expression of a sales avatar and consumers' intentions to purchase a virtual item.

H2c: Consumers' perception of subcultural appeal in metaverse commerce mediates the relationship between the facial expression of a sales avatar and consumers' intentions to spread positive WOM about the experience.

As indicated in H2, we propose subcultural appeal, a sub-dimension of coolness, as the key underlying mechanism. We focus specifically on subcultural appeal rather than the broader concept of coolness because coolness is multidimensional and sometimes internally conflicting (Kim & Park, 2019; Warren et al., 2019). While coolness often encompasses utility, attractiveness, originality (Kim & Park, 2019; Sundar et al., 2014), and even popularity, which can conflict with subcultural appeal (Warren et al., 2019), these mixed elements may obscure the phenomenon in metaverse commerce. Therefore, we argue that subcultural appeal captures the core mechanism more precisely.

2.4. Moderating role of avatar's visual anthropomorphism

Avatars' features interact rather than act independently, making it important to explore how sales avatars' facial expressions work in tandem with other traits. A sales avatar's visual anthropomorphism, defined as the extent to which it looks human (Novak & Rauh, 2006), is a widely recognized design factor in metaverse commerce (Girondini et al., 2023; Kim et al., 2023). We posit that the mediating effects of subcultural appeal between a sales avatar's facial expression and consumers' interaction intentions are influenced by the avatar's level of visual anthropomorphism (cartoon-like vs. human-like). Building on the theory of affordances and the needs-affordances-features framework, exposure to human-like sales avatars (vs. cartoon-like ones) influences consumers' psychological needs in metaverse commerce, which ultimately affects the degree of motivating consumers to engage in a certain action afforded by a sales avatar's feature.

Prior studies demonstrate that anthropomorphic avatars are commonly viewed as more credible and attractive by users (Kim et al., 2023; Park et al., 2021; Tinmaz & Dhillon, 2024). However, when avatars' facial expressions are combined with high visual anthropomorphism, consumers' motivation for subcultural values in metaverse commerce may be weakened. Girondini et al. (2023) report that human-like (vs. cartoon-like) avatars tend to induce greater anxiety in users within metaverse environments. Additionally, recent findings show that VR users experience more psychological closeness with more human-like avatars (Chae et al., 2025). Collectively, these results suggest that exposure to human-like avatars makes it harder for users to separate the virtual world from reality, prompting them to apply real-world social norms (Girondini et al., 2023). Consequently, when interacting with a human-like (vs. cartoon-like) sales avatar, consumers' desire for subcultural values may diminish, reducing the strength of the mediation via subcultural appeal.

H3a: The mediating effect of subcultural appeal between the facial expression of a sales avatar and consumers' intentions to interact with the sales avatar is stronger when the sales avatar appears cartoon-like (vs. human-like).

H3b: The mediating effect of subcultural appeal between the facial expression of a sales avatar and consumers' intentions to purchase a virtual item is stronger when the sales avatar appears cartoon-like (vs. human-like).

H3c: The mediating effect of subcultural appeal between the facial expression of a sales avatar and consumers' intentions to spread positive WOM is stronger when the sales avatar appears cartoon-like (vs. human-like).

3. Experiment 1

3.1. Overview of four experiments

We performed four experimental studies to test the hypotheses. With the help of 3D modeling techniques, we designed and created separate VR commerce contexts for the four respective experiments within the VRChat metaverse platform. In the designed virtual commerce context, participants were asked to visit and interact with firm sales avatars to purchase a virtual item for their avatars. In Experiments 1 and 2A, participants put on a VR head-mounted device (i.e., Oculus Quest 2) and navigated the VR commerce environment in their own way, whereas in Experiments 2B and 3, they were exposed to a video depicting a consumer avatar interacting with sales avatars with different facial expressions in the virtual commerce environment. The use of videos in Experiments 2B and 3 may yield a lower level of immersion than the use of VR devices in Experiments 1 and 2A, which could meaningfully alter participants' experiences. However, the video-based design enabled exact control over stimulus presentation compared with situations in which participants freely navigated the virtual world using VR devices, thereby strengthening internal validity. Furthermore, the use of videos allowed us to recruit a more representative sample through a national panel, whereas in Experiments 1 and 2A samples were limited to individuals living near a specific research laboratory who had to physically visit the site and put on VR devices. To balance internal validity and sample representativeness, we employed video-based presentations in some experiments. Nevertheless, because the inconsistency in experimental setups (VR condition vs. video-based presentation) could generate differences in consumer responses, we will compare their results in later sections.

The purpose of Experiment 1 was to test H1 and H2 in the context where cartoon-type sales avatars with either smiling or crying facial expressions sell virtual hats for avatars. Experiment 2A investigated whether the results from Experiment 1 could be generalized with human-type sales avatars (Girondini et al., 2023). The main purpose of Experiment 2B was to confirm the mediating role of subcultural appeal while excluding the other potential mediating effects of consumers' empathetic concerns for sales avatars and their need for uniqueness. Finally, Experiment 3 was conducted to test whether the mediating effects of subcultural appeal differ depending on the sales avatar's visual anthropomorphism, as hypothesized in H3.

3.2. Procedures of Experiment 1

In Experiment 1, we conducted a one-factor experiment in which a sales avatar's facial expression was manipulated as smiling or crying. Using 3D modeling techniques, we designed a separate metaverse space on the VRChat platform. In the created space, consumer avatars could see various virtual stores and other users and navigate a virtual hat store where they could purchase a virtual hat for their avatars. In front of the virtual hat store was a cartoon-style sales avatar with either smiling or crying facial expression. To control the effects of verbal or non-verbal features other than facial expressions, the sales avatar was not able to verbally communicate with the consumer avatars and used the same non-verbal features (e.g., gestures, posture) except facial expressions. Figure 2 presents snapshots of the sales avatars and the metaverse commerce environment utilized in Experiment 1.



Smiling sales avatar condition



Crying sales avatar condition

Figure 2. Snapshots of the Sales Avatars in Experiment 1

We recruited adults to participate in this experiment through a post in a location-based local online community in return for a small monetary reward (about \$6). In total, 101 people (54.5% female) aged 19 to 54 were recruited and took part in the experiment ($M_{age} = 25.76$). Participants were first asked to visit a research laboratory at a university

in Seoul, South Korea. They were randomly assigned to one of the two conditions (51 participants in the smiling facial expression condition vs. 50 participants in the crying facial expression condition) and exposed to the designed metaverse commerce environment while wearing a VR head-mounted device. After accessing the metaverse space, they first heard the recording that the participant was visiting the virtual world to look for a virtual hat for their avatars and could meet a sales avatar to sell the virtual hat. Then, they were allowed to navigate the virtual map in their own way for about 2 minutes in order to immerse themselves in the designed metaverse environment.

After the metaverse experience, they were asked to rate on a 7-point Likert scale (1: strongly disagree, 7: strongly agree) their level of intentions to interact with the sales avatar (2 items, $\alpha = 0.88$), purchase a virtual hat from the sales avatar (2 items, $\alpha = 0.89$), and spread positive WOM about the experience (5 items, $\alpha = 0.92$). They were also asked about their perceptions of the subcultural appeal of the sales avatar (4 items, $\alpha = 0.88$). For a manipulation check, participants completed a 7-point semantic differential item about what the facial expression of the virtual hat sales avatar looked like (1 = crying, 7 = smiling) and provided information about demographic variables (e.g., age, gender). Furthermore, because consumer interaction intentions with the sales avatar could be affected by perceptions of the sales avatar's competence and warmth according to the theory of social perception (Chang & Kim, 2022; Fiske et al., 2007; Min & Hu, 2022), variables on competence (3 items, $\alpha = 0.81$) and warmth (3 items, $\alpha = 0.81$) were measured and included as covariates. All the measures were drawn and adapted from existing scales. Specific measures used in the experiment, the sources of the scales, and the reliabilities of the items are presented in the Appendix.

3.3. Results of Experiment 1

The results of a t-test showed that the manipulation worked as intended. The sales avatar in the crying facial expression condition received a significantly lower score than in the smiling facial expression condition ($M_{crying} = 1.86$, $SD = 1.33$ vs. $M_{smiling} = 6.29$, $SD = 0.83$, $t = -20.10$, $p < 0.01$). To test H1, we ran a MANCOVA with competence and warmth of the sales avatar as covariates. We found that participants showed higher intention to interact with the sales avatar in the crying facial expression condition compared with in the smiling facial expression condition ($M_{crying} = 5.34$, vs. $M_{smiling} = 4.82$, $F = 4.16$, $p < 0.05$), supporting H1a. Further, participants in the crying facial expression condition expressed higher intention to purchase a virtual hat from the sales avatar ($M_{crying} = 5.36$, vs. $M_{smiling} = 4.29$, $F = 18.11$, $p < 0.01$) and higher intention to spread positive WOM about the experience ($M_{crying} = 5.65$, vs. $M_{smiling} = 5.01$, $F = 7.24$, $p < 0.01$), providing support for H1b and H1c.

To verify the mediating role of subcultural appeal hypothesized in H2, we conducted Hayes' (2022) PROCESS Model 4 with 5,000 bootstrap samples and 95% bootstrap confidence intervals; perceptions of competence and warmth of the sales avatar were also included as covariates. The results supported H2a: consumers' perception of subcultural appeal mediated between the facial expression of the sales avatar (coded as -1: crying vs. +1: smiling) and consumers' intention to interact (indirect effect: -0.30, 95% CI = [-0.47, -0.14]). In other words, with the crying sales avatar (vs. with smiling one), consumers perceived a higher level of subcultural appeal, which in turn led to enhanced intention to interact with the sales avatar. Subcultural appeal also played a significant mediating role between facial expressions of the sales avatar and intention to purchase a virtual item (indirect effect: -0.19, 95% CI = [-0.37, -0.05]), consistent with H2b. Finally, in line with H2c, the crying facial expression of the sales avatar significantly increased consumers' intention to spread positive WOM about the experience through enhanced perceptions of subcultural appeal (indirect effect: -0.21, 95% CI = [-0.35, -0.10]). In all, these results lend full support for H2.

3.4. Robustness of mediating role of subcultural appeal

Although we initially included competence and warmth of the sales avatar as covariates in the mediation analyses, this approach may inadvertently obscure potential indirect effects through competence and warmth and make it difficult to capture the full net effect of facial expressions. Therefore, we conducted an additional set of mediation analyses using Hayes's (2022) Model 4 with 5,000 bootstrap resamples to examine the mediating impact of the subcultural appeal, alongside competence and warmth of the sales avatar as simultaneous mediators in the relationships between facial expressions and interaction outcomes. The results are reported in Table 1.

Overall, the three-mediator model confirms the critical mediating role of subcultural appeal relative to the mediating effects of warmth and competence of the sales avatar. Moreover, by showing that the total effects to combine the direct effects and the indirect effects from facial expression to purchase intention and WOM intention through the three mediators are significantly negative, the results indicate that consumers in the virtual commerce environment exhibited more favorable interaction outcomes toward crying sales avatars (vs. smiling avatars), even after accounting for the mediating effects of warmth and competence of the sales avatar.

Table 1. Mediating Effect of Subcultural Appeal in Experiment 1

	DV: Intention to interact		DV: Purchase intention		DV: WOM intention	
	Effect	95% CI	Effect	95% CI	Effect	95% CI
Direct effect						
	0.06	[-0.16, 0.28]	-0.34**	[-0.59, -0.08]	-0.07	[-0.30, 0.17]
Indirect effects						
M: Subcultural appeal	-0.19**	[-0.31, -0.08]	-0.12**	[-0.26, -0.01]	-0.15**	[-0.26, -0.06]
M: Warmth	0.08	[0.01, 0.16]	0.06	[-0.01, 0.16]	0.03	[-0.03, 0.12]
M: Competence	-0.06**	[-0.15, -0.01]	0.05	[-0.02, 0.14]	0.00	[-0.07, 0.06]
Total effect						
	-0.11	[-0.32, 0.11]	-0.35**	[-0.59, -0.11]	-0.18*	[-0.36, 0.03], $p = 0.09$

** $p < 0.05$, * $p < 0.10$

4. Experiments 2A and 2B

4.1. Procedures of Experiment 2A

Experiments 2A and 2B followed basically the same procedures to corroborate the results from Experiment 1 with a different type of sales avatar. The difference between Experiments 1 and 2 is the type of sales avatars. Due to the possibility that our findings from Experiment 1 may be attributed to the cartoon character-like sales avatar (Girondini et al., 2023), we incorporated a human-type sales avatar for Experiments 2A and 2B (see Figure 3). The purpose of Experiment 2A was to replicate the results from Experiment 1 with a human-type sales avatar, whereas the purpose of Experiment 2B was to validate the mediating role of subcultural appeal by excluding other alternative explanations (i.e., empathetic concerns and need for uniqueness).



Figure 3. Snapshots of the Sales Avatars in Experiment 2A

For Experiment 2A, through a recruiting post on a location-based local community, we invited a new set of 101 respondents in return for a small monetary reward (about \$6). In all, 51.5% of the 101 respondents were male, and participants' ages ranged from 18 to 63 years old ($M_{age} = 32.05$, $SD = 11.82$). They were randomly assigned into either the smiling sales avatar condition ($N = 51$) or the crying avatar condition ($N = 50$). Similar to the Experiment 1 procedures, participants wore a VR head-mounted device, heard a voice recording explaining that they were visiting the virtual commerce market to look for virtual shoes for their avatars, and navigated the generated virtual world for about two minutes in their own way. After being immersed in the metaverse environment, they were asked to assess the same items used in Experiment 1. One notable modification in Experiment 2A was the expansion of the covariate set by newly incorporating the attractiveness of the sales avatar ($\alpha = 0.74$) and consumers' previous experience with the metaverse (one item asking whether consumers have ever experienced the metaverse), in addition to their perceptions of warmth ($\alpha = 0.88$) and competence ($\alpha = 0.86$) of the sales avatar. We conducted all experiments sequentially, and after Experiment 1, we incorporated feedback from colleagues suggesting that the attractiveness of the sales avatar and consumers' prior metaverse experience might influence the observed effects. In response, we

collected these two additional variables and included them as covariates in Experiment 2A and subsequent studies, along with warmth and competence. This extension of the covariate set helps control for potential extraneous influences more rigorously and strengthens the internal validity of the findings. All measures, their sources, and reliabilities for the scales are reported in the Appendix.

4.2. Results of Experiment 2A

The manipulation check results revealed a significantly higher score for respondents' evaluation of what the sales avatar in the shoe store looked like (1 = crying, 7 = smiling) in the smiling sales avatar condition as expected, which confirmed the successful manipulation ($M_{crying} = 1.76$ vs. $M_{smiling} = 6.35$, $t = -17.78$, $p < 0.01$). To validate H1, a MANCOVA was performed with four covariates of consumers' perceptions of the sales avatar's competence, warmth, and attractiveness and consumers' experience of the metaverse. In the crying sales avatar condition, participants reported significantly higher intentions to interact with the sales avatar ($M_{crying} = 5.37$, vs. $M_{smiling} = 4.25$, $F = 20.43$, $p < 0.01$), purchase the virtual shoes from the sales avatar ($M_{crying} = 4.96$, vs. $M_{smiling} = 4.04$, $F = 13.50$, $p < 0.01$), and spread positive WOM about the experience ($M_{crying} = 5.36$, vs. $M_{smiling} = 4.45$, $F = 14.02$, $p < 0.01$). The results provided support for H1a, H1b, and H1c that the sales avatar with a crying facial expression improved the interaction outcomes in the metaverse commerce context relative to the smiling facial expression.

The results of Hayes' PROCESS Model 4 with 5,000 bootstrap samples and 95% bootstrap confidence intervals also confirmed H2. Subcultural appeal of the sales avatar mediated between the facial expression of the sales avatar (coded as -1: crying vs. +1: smiling) and participants' intentions to interact (indirect effect: -0.22, 95% CI = [-0.41, -0.07]), purchase virtual shoes from the sales avatar (indirect effect: -0.19, 95% CI = [-0.36, -0.04]), and spread positive WOM about the experience (indirect effect: -0.28, 95% CI = [-0.49, -0.10]). As all the 95% bootstrap confidence intervals did not include zero, the three indirect effects via subcultural appeal were significant and had the expected signs.

Further, to investigate the mediating effect of subcultural appeal more rigorously and clarify the practical implications of the total effects, we employed an additional set of mediation analyses on Experiment 2A data using Hayes's (2022) PROCESS Model 4 with 5,000 resamples, in which three simultaneous mediators—subcultural appeal, warmth, and competence—were included. As shown in Table 2, the results indicate that subcultural appeal plays a key role in explaining consumers' favorable responses to crying (vs. smiling) sales avatars in the metaverse commerce context. The consistently negative total effects on all three outcome variables, after accounting for the potential offsetting influences of warmth and competence of the sales avatar, provide further support for consumers' preferences for crying sales avatars in the virtual environment.

Table 2. Mediating Effect of Subcultural Appeal in Experiment 2A

	DV: Intention to interact		DV: Purchase intention		DV: WOM intention	
	Effect	95% CI	Effect	95% CI	Effect	95% CI
Direct effect						
	-0.34**	[-0.60, -0.08]	-0.27**	[-0.53, -0.01]	-0.17	[-0.41, 0.06]
Indirect effects						
M: Subcultural appeal	-0.21**	[-0.38, -0.06]	-0.18**	[-0.34, -0.04]	-0.26**	[-0.46, -0.09]
M: Warmth	0.04	[-0.03, 0.13]	0.06	[-0.04, 0.16]	0.00	[-0.09, 0.08]
M: Competence	0.00	[-0.03, 0.03]	0.01	[-0.08, 0.09]	0.00	[-0.06, 0.06]
Total effect						
	-0.51**	[-0.75, -0.26]	-0.38**	[-0.65, -0.11]	-0.43**	[-0.67, -0.19]

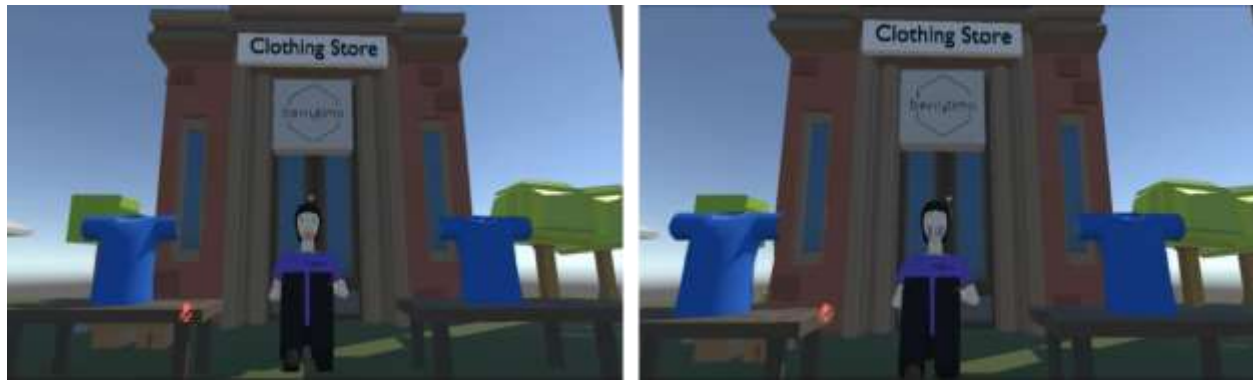
** $p < 0.05$

4.3. Procedures of Experiment 2B

The main objective of Experiment 2B is to exclude the possibility of other mediating variables underlying the processes of how sales avatars' facial expressions influence consumers' interaction outcomes in the metaverse commerce context. One prospect is consumers' empathetic concerns about the sales avatar, which refer to the degree to which consumers in a metaverse commerce context recognize the sales avatar's emotion and feel concern and sympathy toward it (Liu-Thompkins et al., 2022). Consumers may feel more empathetic concern toward the crying sales avatar than the smiling one, leading to their positive interaction intentions (Allard et al., 2020; Liu-Thompkins et al., 2022). Another possibility is consumers' need for uniqueness, which is defined as the consumer trait of pursuing differences relative to others (Tian et al., 2001). The interaction with the crying sales avatar (vs. the smiling one) may better satisfy consumers' need for uniqueness and in turn facilitate their intention to interact with it (Mou et al., 2023). Thus, in Experiment 2B, we tested whether consumers' perception of subcultural appeal in the metaverse still mediates the relations between the sales avatar's facial expression and consumers' interaction outcomes after accounting for

the mediating effects of consumers' empathetic concern toward the sales avatar and their need for uniqueness as simultaneous mediators.

Although Experiment 2B followed similar procedures to those used in Experiment 2A, the sample collection method was different. Instead of recruiting a sample through a post in a location-based local community, participants were recruited through Macromill Embrain, one of the largest national survey panels in South Korea, to allow the involvement of a more representative sample (Chang, 2020). Further, unlike Experiments 1 and 2A, in which participants themselves had access to the virtual commerce world and experienced it through a VR device, we generated two videos (two minutes and 30 seconds each) showing a consumer avatar navigating a virtual commerce world in the metaverse and seeing a human-like sales avatar with either a smiling or crying facial expression in front of a virtual clothing store (see Figure 4). The use of the video enabled exposure to exactly controlled stimuli compared with the situation where consumers navigated the virtual world on their own, which helps strengthen internal validity. Then, we assigned participants to randomly see one of the two videos as if they were the consumer avatars in the virtual commerce context (Chang & Kim, 2022).



Smiling sales avatar condition

Crying sales avatar condition

Figure 4. Snapshots of the Sales Avatars in Experiment 2B

In total, we collected 200 responses ($M_{age} = 35.08$, $SD = 8.20$; 50% male): half watched the video with the smiling sales avatar in a virtual clothing store, and the other half was exposed to the video with a crying sales avatar. The videos are available on request. After watching the video, respondents were asked to answer questions about their interaction outcomes, their perceptions of subcultural appeal, empathetic concerns, need for uniqueness, and other covariates (i.e., competence, warmth, attractiveness, experience of metaverse), demographic variables, and a manipulation check. We utilized the same measures as in Experiments 1 and 2A and added items to measure empathetic concerns adapted from Allard et al. (2020) and Fredrickson et al. (2003) ($\alpha = 0.85$) and need for uniqueness modified from Lalot et al. (2017) ($\alpha = 0.91$). All items are presented in the Appendix.

4.4. Results of Experiment 2B

The results of a t -test confirmed a successful manipulation ($M_{crying} = 2.36$ vs. $M_{smiling} = 5.80$, $t = -16.92$, $p < 0.01$). To validate the mediating role of subcultural appeal while simultaneously accounting for the potential mediating impacts of consumers' empathetic concerns and their need for uniqueness, we ran three Hayes' PROCESS Model 4 with 5,000 bootstrap samples for the respective dependent variables. In the model, the facial expression of the sales avatar (coded as -1: crying vs. +1: smiling) and the interaction intentions (i.e., intention to interact, purchase, or spread WOM) were included as the independent variable and dependent variables, respectively. Participants' perceptions of subcultural appeal, empathetic concerns, and need for uniqueness were incorporated as mediators simultaneously, whereas their perceptions of warmth and competence, attractiveness of the sales avatar, and previous experience with the metaverse were controlled as covariates. Given that the results from Experiments 1 and 2A (Tables 1 and 2) indicated only limited mediating roles of warmth and competence of the sales avatar, we included these variables as covariates and focused on examining the mediating effect of subcultural appeal, while explicitly accounting for the alternative mediating roles of consumers' empathetic concerns and their need for uniqueness.

Table 3 summarizes the results of Experiment 2B to validate the mediating role of subcultural appeal. While subcultural appeal significantly mediated the relations between the sales avatar's facial expression and the interaction

outcomes, the indirect effects through empathetic concerns and need for uniqueness were not significant. These results provide further support for H2a, H2b, and H2c.

However, unlike the results of Experiments 1 and 2A, in which respondents wore a VR device and experienced a more immersive virtual commerce environment, the findings of Experiment 2B—where respondents were exposed to a video depicting the virtual commerce environment—showed a relatively weaker mediating role of subcultural appeal. Moreover, the total effects of facial expression were not significant for consumer intentions to interact with the sales avatar or to purchase a virtual item, and were significantly negative only for WOM intention. Overall, the results based on the video-based presentation indicate that consumers in less immersive virtual contexts (i.e., video-based presentation) exhibit weaker desires for subcultural appeal and less favorable reactions toward crying (vs. smiling) sales avatars. These patterns suggest that consumers may activate their heightened desire for subcultural appeal primarily in highly immersive virtual commerce environments (i.e., use of VR devices).

Table 3. Mediating Effect of Subcultural Appeal in Experiment 2B

	DV: Intention to interact		DV: Purchase intention		DV: WOM intention	
	Effect	95% CI	Effect	95% CI	Effect	95% CI
Direct effect						
	0.02	[-0.16, 0.20]	0.06	[-0.10, 0.21]	-0.02	[-0.18, 0.14]
Indirect effect						
M: Subcultural appeal	-0.08**	[-0.15, -0.02]	-0.05**	[-0.10, -0.01]	-0.11**	[-0.19, -0.04]
M: Empathetic concerns	0.05	[-0.01, 0.12]	0.02	[-0.03, 0.08]	-0.02	[-0.09, 0.03]
M: Need for uniqueness	0.01	[-0.02, 0.06]	-0.01	[-0.05, 0.02]	-0.03	[-0.09, 0.00]
Total effect						
	0.00	[-0.17, 0.18]	0.01	[-0.14, 0.16]	-0.19**	[-0.36, -0.02]

** $p < 0.05$

5. Experiment 3

5.1. Procedures of Experiment 3

The main purpose of Experiment 3 is to test H3, which speculates the moderating role of visual anthropomorphism in the mediation process from sales avatars' facial expression to consumers' interaction outcomes via subcultural appeal. We employed a 2 (sales avatar's facial expression: crying vs. smiling) by 2 (sales avatar's anthropomorphism: cartoon-like vs. human-like) between-subjects design. We generated four different types of videos (about two minutes long) which show a consumer avatar navigating a virtual commerce market to purchase a virtual hat for their avatar and seeing a sales avatar in front of the virtual hat store. In the four videos, participants were exposed to a sales avatar with different facial expressions (crying or smiling) and visual anthropomorphism (cartoon-like or human-like). Figure 5 displays the snapshots of the four scenarios.



Smiling cartoon-like sales avatar condition



Crying cartoon-like sales avatar condition



Figure 5. Snapshots of the Sales Avatars in Experiment 3

Similar to Experiment 2B, participants were newly recruited through Macromill Embrain panel and randomly assigned to one of the four videos. In total, we collected 200 responses ($M_{age} = 34.83$, $SD = 7.87$; 50% male). Fifty respondents were randomly assigned to each scenario (videos are available on request). Participants were asked to imagine themselves to be the consumer avatars who were navigating the virtual commerce context to purchase a virtual hat for their avatars. After watching the video, they were asked to provide responses about manipulation checks, consumer interaction outcomes, subcultural appeal, various covariates, and demographics.

Most of the questions included in Experiment 3 were the same as those used in Experiments 1 and 2. However, we adjusted three things about the measures in Experiment 3 to enhance the overall rigor of our experimental method. First, to enhance the adequacy of our manipulation check of the sales avatars' facial expression, we calculated respondents' level of agreement with two sentences on a 7-point scale. "The sales avatar that you met in the virtual hat store was smiling (or crying)" is similar to the manipulation check method we used in previous experiments. We additionally assessed whether respondents actually perceived the crying facial expression (vs. smiling one) as more unique and original (key characteristics of subcultural appeal) by asking their level of agreement that "The facial expression of the sales avatar in the virtual hat store is unique (or original)." Assessing how respondents actually perceive each avatar's facial expression helps confirm the assumption that the sales avatar's crying facial expression in the metaverse commerce situation represents more subcultural appeal than the smiling one.

Second, to improve the rigor of our results, we incorporated two additional covariates which may influence their responses to different sales avatars in the metaverse commerce in Experiment 3: respondents' inclination toward subcultures and their familiarity with metaverse environments (Kim et al., 2023; Prabakaran & Patrick, 2024; Zhou et al., 2008). Based on the feedback received after collecting data for Experiment 2B, we decided to include the two additional covariates in Experiment 3. Specific items about the two additional covariates are shown in the Appendix.

Finally, we adjusted our three scales of consumers' interaction outcomes (i.e., interaction intention, purchase intention and intention to spread WOM) to improve construct validity and better reflect participants' perceptions of the specific virtual store context. Specifically, to improve the limitation of construct validity of respondents' intention to interact with the sales avatar and their purchase intentions, we expanded the item sets for interaction intention from two to three items and for purchase intention from two to four items, as shown in the Appendix. Further, we revised the WOM intention items to better reflect participants' perceptions of the specific virtual hat store context in an attempt to resolve the problem that the previous scale for WOM intention focuses on metaverse experiences in general rather than the specific virtual store experience (see the Appendix). All measures included in Experiment 3 showed good reliability (see the Appendix).

5.2. Results of Experiment 3

For the manipulation check of the sales avatar's facial expression, we conducted two *t*-tests. The results revealed that respondents in the crying condition (vs. those in the smiling condition) showed a significantly lower score on the sentence that the sales avatar that they met in the virtual hat store was smiling ($M_{crying} = 1.81$ vs. $M_{smiling} = 6.07$, $t = -24.00$, $p < 0.01$) and a significantly higher score on the sentence that the sales avatar that they met in the virtual hat store was crying ($M_{crying} = 5.96$ vs. $M_{smiling} = 1.70$, $t = 20.52$, $p < 0.01$), confirming a successful manipulation. Furthermore, we found that respondents perceived the crying avatar's facial expression (vs. the smiling one) as more unique ($M_{crying} = 4.36$ vs. $M_{smiling} = 3.66$, $t = 3.12$, $p < 0.01$) and original ($M_{crying} = 3.86$ vs. $M_{smiling} = 3.20$, $t = 2.89$, $p < 0.01$). Thus, given that unique and original are two defining components that represent subcultural appeal, the

findings affirm the assumption that participants in the metaverse commerce context perceived the crying facial expression of the sales avatar as more aligned with subcultural appeal.

To test whether the sales avatar's visual anthropomorphism manipulation worked as intended, the scores on three sentences (i.e., "The sales avatar that you met in the virtual hat store looks human/realistic/like a cartoon") were compared between the cartoon-like and human-like avatar conditions using *t*-tests. The findings confirmed that our manipulation of the avatar's visual anthropomorphism was successful (for "looks human": $M_{cartoon} = 2.13$ vs. $M_{human} = 2.78$, $t = -2.85$, $p < 0.01$, for "looks realistic": $M_{cartoon} = 2.06$ vs. $M_{human} = 2.72$, $t = -2.99$, $p < 0.01$, for "looks like a cartoon": $M_{cartoon} = 5.71$ vs. $M_{human} = 5.17$, $t = 2.62$, $p < 0.01$).

To test the moderated mediation effect of the sales avatar's anthropomorphism conjectured in H3, we ran Hayes' PROCESS Model 7 with 5,000 bootstrap samples and calculated 95% bootstrap confidence intervals for the respective dependent variables. In the model, the sales avatar's facial expression (coded as -1: crying vs. +1: smiling) and the interaction outcomes (i.e., intentions to interact, purchase, or spread WOM) were included as the independent variable and dependent variables, respectively. Participants' perception of subcultural appeal was incorporated as the mediator, whereas their perceptions of the avatar's warmth and competence, attractiveness of the sales avatar, inclination toward subcultures, and familiarity with metaverse environments were controlled as covariates.

Table 4 displays the results of the moderated mediation effects hypothesized in H3. The results lend support for H3a and H3c. When participants were exposed to cartoon-like sales avatars compared to human-like ones, the mediation effects of subcultural appeal between the sales avatar's facial expressions and participants' intentions to interact with the sales avatar and to spread WOM about the experience were stronger. Specifically, when consumers were exposed to the cartoon-like sales avatar in metaverse commerce, the one with the crying facial expression had higher subcultural appeal and ultimately led to higher intentions to interact and to spread WOM. In contrast, when participants were exposed to the human-like sales avatar, the mediating effect via subcultural appeal was not significant even though the direction was consistent with that for the cartoon-like sales avatar. We found similar patterns consistent with our expectations but the moderated mediation effect of visual anthropomorphism between facial expressions and consumers' intention to purchase virtual items was not statistically significant. Thus, we did not find evidence for H3b.

While the moderated mediation of the sales avatar's visual anthropomorphism significantly influenced participants' intentions to interact and spread WOM, it did not extend to their intention to purchase a virtual item. This may be due to the relatively small mediating effect of subcultural appeal on purchase intention. As shown in Tables 1-3, the mediating effect via subcultural appeal is notably weaker for purchase intention than for the other two outcomes. One possible explanation is that purchasing a virtual item involves a more complex decision-making process. Unlike interaction or WOM behaviors, purchase decisions may be shaped by additional factors beyond the sales avatar's visual features, such as the attractiveness, psychological ownership, or perceived scarcity of the virtual item (Pandey & Mukherjee, 2026). Therefore, the limited mediating role of subcultural appeal may not be sufficient to generate significant differences between cartoon-like and human-like avatars in influencing purchase intention. Moreover, the responses of Experiment 3 were also collected using a video-based presentation, rather than allowing participants to immerse themselves in the virtual commerce environment through a VR device. Therefore, the overall relatively weaker mediating effect of subcultural appeal consistently observed in the video-based experiments may account for the nonsignificant results on purchase intention.

Table 4. Moderated Mediation Effect of Avatar Anthropomorphism

	DV: Intention to interact		DV: Purchase intention		DV: WOM intention	
	Indirect effect	95% CI	Indirect effect	95% CI	Indirect effect	95% CI
Low Anthropomorphism (Cartoon-like)	-0.20**	[-0.34, -0.08]	-0.08	[-0.19, 0.02]	-0.20**	[-0.33, -0.09]
High Anthropomorphism (Human-like)	-0.05	[-0.14, 0.03]	-0.02	[-0.07, 0.02]	-0.05	[-0.15, 0.02]
Index of Moderated Mediation	0.15**	[0.03, 0.30]	0.06	[-0.02, 0.16]	0.15**	[0.04, 0.28]

** $p < 0.05$

6. Discussion

6.1. Theoretical implications

This study offers four important theoretical contributions to the literature on consumer behavior in virtual environments. First, this study advances a theoretical foundation for understanding unique behaviors in virtual settings

by applying affordance theory and the needs-affordances-features framework. While prior studies have examined affordances such as immersion, presence, empathy, and embodiment in the metaverse (Shin, 2022; Taylor, 2002), they primarily focused on identifying which affordances exist and how they influence users' attitudes, emotions, and behaviors. These works have not paid enough attention to the relationship between these affordances and users' psychological needs or goals. By integrating affordance theory with the needs-affordances-features framework, our study demonstrates how seemingly unconventional behaviors in virtual environments (e.g., engaging with a crying avatar) can be systematically explained through the alignment of specific avatar features with consumers' underlying motivations. This approach highlights the importance of understanding action possibilities not in isolation, but as perceived through the lens of user-driven goals (Suh, 2023; Zuo & Shen, 2024).

Second, our findings challenge assumptions about avatar facial expressions by revealing context-dependent effects. Existing research tends to view positive facial expressions (e.g., smiling) as universally beneficial across real, online, and virtual spaces (Maloney et al., 2020). However, we found that in highly immersive virtual environments where subcultural values are salient—in particular the VR device experiments, —crying avatars compared to smiling ones could elicit higher intentions to interact, purchase virtual items, and engage in positive WOM. This highlights that consumers' reactions to non-verbal cues like facial expressions are not uniform but shaped by the psychological goals embedded within the virtual context. Our study thus calls for a more nuanced understanding of avatar features by incorporating contextual motivations and user needs into analyses of facial expressions (Jang & Kim, 2024; Kruzic et al., 2020).

Third, we offer new insights into the role of avatars' visual anthropomorphism, particularly its interaction with other avatar features and the surrounding context. While previous studies consistently suggest that more human-like avatars lead to better consumer outcomes due to increased perceived credibility and attractiveness (Kim et al., 2023; Park et al., 2021; Tinmaz & Dhillon, 2024), our study reveals that this is not always the case. Specifically, we demonstrate that cartoon-like avatars, when paired with a crying facial expression in a subculturally rich and highly immersive virtual environment, can outperform more anthropomorphic avatars in driving user engagement. This underscores the importance of examining avatar features not in isolation but as interacting elements whose combined effects depend heavily on other avatar features and contexts.

Finally, this research highlights subcultural appeal as a key psychological mechanism in understanding consumer responses to sales avatars in virtual commerce. Although prior studies have noted the influence of subcultural appeal, often as a sub-dimension of coolness, on adoption of tech-savvy products/services (e.g., wearable devices, the use of service robots; Cha, 2020; Kim & Park, 2019), it has rarely been treated as a separate construct central to consumer decision-making. Our findings show that subcultural appeal mediates the effect of sales avatars' facial expression on interaction outcomes, explaining why consumers in the metaverse commerce context may favor unconventional features (i.e., crying avatars) that deviate from real-world norms. Our results imply that the subcultural appeal of the sales avatar in highly immersive metaverse commerce could be applied widely in explicating why consumers in the virtual world may positively respond to various unusual features (e.g., crying salesperson, lazy behaviors, social disruptions) that are not daily-life norms. As such, this paper makes a theoretical contribution to the metaverse research by introducing and showing the possibility that subcultural appeal could be a key mechanism behind the unconventional patterns in highly immersive virtual spaces where consumers separate from real life and create independent identities.

6.2. Managerial implications

Our findings provide actionable insights into how to design and change firms' sales avatars in the virtual commerce context. First, managers in charge of designing and administering firm representative avatars in the metaverse should pay closer attention to the design of sales avatars' facial expressions. Smiling faces have long served as the obvious norm for current firm sales avatars. Consequently, in practice, managers often design representative avatars with smiling faces without careful consideration. However, our results suggest that smiling faces (vs. crying faces) may not be the optimal choice for enhancing consumers' intentions to interact with the sales avatar, purchase virtual items from the sales avatar, or spread positive WOM, particularly in highly immersive contexts where consumers exhibit a heightened desire for subcultural values. As implied by the finding that the mediating role of subcultural appeal and the overall favorable reactions toward unconventional crying sales avatars are pronounced in highly immersive virtual environments using VR devices but attenuated in less immersive video-based contexts, our unconventional preference for crying facial expressions appears to occur primarily within highly immersive virtual commerce settings. Thus, managers should recognize this boundary condition and consider designing unique, unconventional facial expressions that activate consumers' perceptions of subcultural appeal specifically in highly immersive virtual commerce contexts, while exercising greater caution when applying such designs in lower-immersion environments.

Second, we encourage managers to implement ways to stimulate consumers' subcultural appeal in the virtual world. Our results revealed that consumers' perceptions of subcultural appeal promoted their interaction outcomes with the sales avatar. Simply put, if managers facilitate consumers' perceptions of subcultural appeal in the virtual world, firms could achieve better interaction outcomes. In accord with existing literature, current firms have made significant efforts to create realistic, immersive, interactive, and fun virtual experiences (Barrera & Shah, 2023; Dwivedi et al., 2023). Without a doubt, fidelity, immersion, interactivity, and fun factors help develop better consumer experiences in the virtual world. However, one factor that previous literature has neglected is that designing the virtual space to promote consumers' perception of subcultural appeal also helps to generate better consumer experience and improve the purchase intention of a virtual item. Thus, managers are recommended to develop firms' avatars or virtual stores/spaces to appeal to subcultural aspects.

Finally, the moderated mediation role of avatars' visual anthropomorphism implies that designers of sales avatars in metaverse commerce should adjust the degree of the avatars' visual anthropomorphism to the metaverse commerce context. Our results reveal that a more human-like sales avatar compared to a cartoon-like one tends to make it harder for users to detach from the real world and drives them to focus more on real-life norms. This suggests that firms can consider more human-like sales avatars when they expect users to evaluate activities in metaverse contexts based on real-world norms. In contrast, when firms want to create metaverse environments where users' hedonic goals or desires for subcultural values are salient, they are advised to design less human-like sales avatars.

6.3. Limitations and future research opportunities

Despite the notable insights, this research has several limitations that future researchers need to address. First and foremost, the current study simplifies the process of stimulating and satisfying consumers' subcultural appeal in virtual commerce environments by focusing almost exclusively on facial expressions of avatars as the key influencing factor and does not fully capture the multidimensional nature of subcultural appeal. Subcultural identity extends beyond appearance-based external cues such as facial expressions, and is deeply rooted in shared ways of thinking, cognitive orientations, and underlying values. Therefore, by centering our experimental design on the facial expressions of sales avatars as critical external cues and defining the construct of subcultural appeal somewhat narrowly, we may not fully capture the broader and more complex dynamics of subcultural appeal in virtual environments. Future research should therefore broaden the range of factors beyond facial expressions—such as verbal cues, behavioral patterns, and value-based narratives—to influence consumers' subcultural identity, and to capture a more comprehensive and nuanced understanding of the role of subcultural appeal in metaverse contexts.

Second, our results may not be generalized to the reality-based or functional metaverse context (e.g., metaverses for education or company meetings). Barrera & Shah (2023) noted that consumers with escapism or hedonic goals are typically motivated to avoid aspects of daily life that can be perceived as boring and routine, whereas those with functional goals (e.g., learning or holding meetings) are motivated to engage in relatively rational, task-oriented daily activities in the metaverse. In a similar vein, Barta et al. (2024) found that users created their avatars depending on the value they expected to derive from the event. Specifically, users chose formal-style avatars in the highly utilitarian value context and informal-style avatars in the highly hedonic value context. Additionally, wearing a VR head-mounted device may have enabled our participants to detach from real-life contexts and fully immerse themselves in the virtual environment, thereby amplifying their hedonic desires over functional ones (Etienne et al., 2023; Zuo & Shen, 2024). Taken together, our results may have been caused by our relatively high hedonic context in which participants were not involved in functional tasks but were navigating a virtual world, purchasing hedonic virtual items for their avatars, and enjoying a virtual experience. Thus, future scholars are recommended to validate our results in other value contexts and examine when consumers in the virtual environment behave similarly or differently from what they do in real life.

Third, the observed preferences for crying sales avatars in metaverse commerce may be partly driven by novelty effects associated with immersive VR-based environments (Gonçalves et al., 2023). In this context, the perceived novelty of the metaverse shopping experience may enhance consumer inspiration and hedonic motivation while reducing perceived risk, thereby amplifying the need for subcultural appeal and consequently, preferences for crying sales avatars.

Fourth, all participants in the four experiments were recruited from South Korea, limiting the generalizability of the results to consumers from other cultural contexts. For example, South Korean society is often characterized as relatively open to novel technologies such as the metaverse, potentially leading to an overestimation of novelty effects in our findings. However, South Korea also scores low on indulgence—a cultural dimension reflecting restraint due to strong social norms that discourage gratification—which may have suppressed counterintuitive preferences for crying sales avatars in our study. Consequently, cultural factors like technological openness and indulgence orientation could systematically influence responses to facial expressions in virtual sales environments. Future research should therefore replicate these experiments across diverse cultures to assess the robustness of our results.

Fifth, our findings on consumers' purchase intentions for virtual items may not be fully generalized to traditional purchase contexts. Although free virtual items are commonly used in metaverse research to simulate engagement, our experimental design involved no financial costs or external social evaluations typically associated with real-world purchases, potentially inflating reported intentions. This methodological difference could limit the applicability of our results to traditional purchase contexts involving real monetary transactions and heightened perceived risks.

Sixth, this study did not take into account various verbal and nonverbal features other than facial expressions and anthropomorphism of the sales avatar. Voice tone, speech speed, body gestures, head movement, and clothing styles are just a few features of the sales avatar that firms are easily able to change and customize. Future researchers are advised to pay more attention to the effective use of various verbal and nonverbal features of the sales avatar in the metaverse.

Finally, this research did not consider various psychological needs other than the desire for subcultural values which may exist in virtual contexts. This constraint to a specific psychological need limits our broad understanding of consumer behaviors in metaverse contexts. Our results confirm that even the same avatar feature could afford different action possibilities in the virtual context where a particular psychological need is more activated, consistent with affordance theory and the needs-affordances-features framework. Thus, future researchers are recommended to incorporate consumers' more profound needs which could be activated in metaverse commerce and examine how consumers respond differently to avatar features in the specific goal-driven virtual context.

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Appendix. Measures used in the experiment and reliabilities.

Variable	Items	Sources	Reliabilities			
			Exp. 1	Exp. 2A	Exp. 2B	Exp. 3
Interaction intention	I would like to communicate with the sales avatar of the hat (shoe or clothing) store in the metaverse.	Hu et al. (2025); Mull et al. (2015)	$\alpha = 0.88$	$\alpha = 0.84$	$\alpha = 0.92$	$\alpha = 0.93$
	I would like to interact with the sales avatar of the hat (shoe or clothing) store in the metaverse.					
	I would like to use the sales avatar to assist me with shopping for virtual hats. (included in Experiment 3)					
Purchase intention (Experiments 1 & 2)	I would like to purchase a virtual hat (shoes or clothing) from the hat (shoe or clothing) store in the metaverse.	Bateman & Valentine (2015)	$\alpha = 0.89$	$\alpha = 0.81$	$\alpha = 0.91$	-
	It is very likely that I would purchase a virtual hat (shoes or clothing) from the hat (shoe or clothing) store in the metaverse.					
Purchase intention (Experiment 3)	It is likely that I would purchase a virtual hat from the hat store in the metaverse.	Hu et al. (2025)	-	-	-	$\alpha = 0.89$
	It is probable that I would purchase a virtual hat from the hat store in the metaverse.					
	It is certain that I would purchase a virtual hat from the hat store in the metaverse.					
	I would definitely not purchase a virtual hat from the hat store in the metaverse. (R)					
WOM intention (Experiments 1 & 2)	I am willing to post my experience in the metaverse on SNSs.	Ertz et al. (2020); Hasan & Neela (2022)	$\alpha = 0.92$	$\alpha = 0.91$	$\alpha = 0.94$	-
	I would like to recommend others to experience the same thing in the metaverse.					
	I am willing to share my experience of the metaverse with my friends.					
	I would like to say positive things about my experience in the metaverse to other people.					
	I would like to encourage friends to experience the same thing in the metaverse.					
WOM intention (Experiment 3)	I am willing to post my experience that I met the sales avatar of the hat store in the metaverse on SNSs.	Ertz et al. (2020); Hasan & Neela (2022)				$\alpha = 0.95$
	I would like to recommend others to experience meeting the sales avatar of the hat store in the metaverse.					
	I am willing to share my experience of meeting the sales avatar of the					

	hat store in the metaverse with my friends.					
	I would like to say positive things about my experience to meet the sales avatar of the hat store in the metaverse to other people.					
	I would like to encourage friends to experience meeting the sales avatar of the hat store in the metaverse.					
Subcultural appeal	The interaction with the sales avatar of the hat (shoe or clothing) store in the metaverse makes me different from other people.	Sundar et al. (2014)	$\alpha = 0.88$	$\alpha = 0.78$	$\alpha = 0.93$	$\alpha = 0.92$
	The interaction with the sales avatar of the hat (shoe or clothing) store in the metaverse makes me stand apart from the crowd.					
	The interaction with the sales avatar of the hat (shoe or clothing) store in the metaverse makes me unique.					
	The interaction with the sales avatar of the hat (shoe or clothing) store in the metaverse makes me a leader rather than a follower.					
Empathetic concerns	I feel concern for the sales avatar of the clothing store in the metaverse.	Allard et al. (2020); Fredricks on et al. (2003)	-	-	$\alpha = 0.85$	$\alpha = 0.90$
	I feel sympathy for the sales avatar of the clothing store in the metaverse.					
	I feel compassion for the sales avatar of the clothing store in the metaverse.					
Need for uniqueness	Being different is important to me.	Lalot et al. (2017)	-	-	$\alpha = 0.91$	$\alpha = 0.93$
	I do things to set myself apart from others.					
	I have a strong need to be different from others.					
Warmth	The sales avatar of the hat (shoe or clothing) store in the metaverse is friendly.	Chang & Kim (2022)	$\alpha = 0.81$	$\alpha = 0.88$	$\alpha = 0.92$	$\alpha = 0.95$
	The sales avatar of the hat (shoe or clothing) store in the metaverse is good-natured.					
	The sales avatar of the hat (shoe or clothing) store in the metaverse is kind.					
Competence	The sales avatar of the hat (shoe or clothing) store in the metaverse is capable.	Chang & Kim (2022)	$\alpha = 0.81$	$\alpha = 0.86$	$\alpha = 0.90$	$\alpha = 0.90$
	The sales avatar of the hat (shoe or clothing) store in the metaverse is competent.					
	The sales avatar of the hat (shoe or clothing) store in the metaverse is efficient.					

Attractiveness	The sales avatar of the shoe (clothing or hat) store in the metaverse is attractive.	Cha (2020); Sundar et al. (2014)	-	$\alpha = 0.74$	$\alpha = 0.93$	$\alpha = 0.89$
	The sales avatar of the shoe (clothing or hat) store in the metaverse is hot.					
	The sales avatar of the shoe (clothing or hat) store in the metaverse is stylish.					
Familiarity with metaverse environment (Experiment 3)	I am familiar with metaverse environments.	Prabakaran & Patrick (2024)	-	-	-	$\alpha = 0.93$
	I have used metaverse platforms (e.g., Decentraland, ZEPETO, Roblox, etc.).					
	I know how to navigate within a metaverse environment.					
	I know how to interact within a metaverse environment.					
Inclination toward subcultural groups (Experiment 3)	I like to be associated with groups that are different from the mainstream.	Schouten & McAleander (1995); Zhou et al. (2008)	-	-	-	$\alpha = 0.90$
	I prefer to buy products that help me stand out from others.					
	I am attracted to trends that are unique to certain subcultures.					
	I feel proud to be identified as a member of a specific consumer subculture.					