

Exploring purchase intention in metaverse retailing: Insights from an automotive platform

Haowei Zhang^a, Yang Lv^b, Justin Zuopeng Zhang^c, Linda D. Hollebeek^{d,e,f,g,h,i},
Abhishek Behl^{j,*}, Sigitas Urbonavicius^k

^a School of Economics and Management, Changchun University of Science and Technology, Changchun, 130000, China

^b School of Business and Management, Jilin University, Changchun, 130000, China

^c Department of Management, Coggin College of Business, University of North Florida, Jacksonville, FL, 32224, USA

^d Sunway Business School, Sunway University, Malaysia

^e Vilnius University, Lithuania

^f Tallinn University of Technology, Estonia

^g Umea University, Sweden

^h Lund University, Sweden

ⁱ University of Johannesburg, South Africa

^j Keele Business School, Keele University, Staffordshire, United Kingdom

^k Vilnius University, 3 Universiteto g., LT-01513, Vilnius, Lithuania

ARTICLE INFO

Handling Editor: Prof. H. Timmermans

Keywords:

Purchase intention

Metaverse

Retailing

E-tailing

Social presence

Metaverse identification

S-O-R theory

ABSTRACT

As an integration of cutting-edge digital technologies, the metaverse is set to revolutionize online retailing. This study employed a well-established metaverse automotive retailing platform in China to explore the paths influencing consumers' purchase intention when shopping in the metaverse. We adopted structural equation modeling to analyze the data obtained from 348 respondents who were planning to shop for a new car in the metaverse in China. The findings showed that the perceived social presence of others positively influences consumers' purchase intention, as mediated by their metaverse identification. Moreover, consumer stickiness and the accompaniment of friends were found to positively moderate the effect of perceived social presence on metaverse identification in metaverse retailing. Likewise, product type positively moderated the effect of metaverse identification on purchase intention. Specifically, when consumers intended to purchase environmentally-friendly (vs. unfriendly) vehicles, a stronger positive impact of metaverse identification on purchase intention was observed. The results provide valuable insight for metaverse retailers.

1. Introduction

Retailers are increasingly exploring the metaverse – a shared virtual environment that merges virtual, augmented, and mixed reality – to create immersive (e.g., work or leisure) experiences to market their products (Dwivedi et al., 2023; Singla et al., 2023). Unlike other or earlier forms of online retailing, which either offer online brochures (e.g., product catalogs) or platforms facilitating consumers' two-way interactions with retailers (Gong et al., 2022; Luo et al., 2024; Picot-Coupey et al., 2023), metaverse retailing allows users to virtually try products, explore virtual stores, personalize offerings, and interact with one another, raising their immersion in and engagement with these

environments (Kumari et al., 2024; Roh et al., 2024; Yoo et al., 2023). The highly interactive, immersive, and personalized nature of the metaverse retailing environment makes it an ideal platform for studying consumer behavior. By experiencing shopping in the metaverse, consumers' psychological states and behavioral responses can be more fully understood.

Since 2022, companies including Walmart, Burberry, and Dyson have revealed their plans to enter the metaverse retailing space. Among these initiatives, a particular metaverse-based automotive retailing platform established by a Chinese automobile manufacturer stands out (e.g., for its comprehensive functionality and accessibility). Given the numerous attributes and high price of automobiles, coupled with

* Corresponding author.

E-mail addresses: haowei.zhang@cust.edu.cn (H. Zhang), yanglv22@mails.jlu.edu.cn (Y. Lv), justin.zhang@unf.edu (J.Z. Zhang), deseo79@gmail.com (L.D. Hollebeek), abhishekbehl27@gmail.com (A. Behl), sigitas.urbonavicius@evaf.vu.lt (S. Urbonavicius).

<https://doi.org/10.1016/j.jretconser.2024.104144>

Received 1 August 2024; Received in revised form 22 October 2024; Accepted 31 October 2024

Available online 2 November 2024

0969-6989/© 2024 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

customers' need to view automobiles from multiple angles and personally experience them, metaverse retailing applications are ideally suited to market these products. Users access the platform through their mobile devices, allowing them to digitally visit the automobile showroom (see Fig. 1), which comprises six images sourced from the studied metaverse platform that shows multiple metaverse scenes (e.g., static or dynamic product displays, AI-based customer service, and the accompaniment of friends, among others).

However, despite the potential of metaverse retailing, acumen of the dynamics characterizing consumers' purchase intention in metaverse retailing lags behind to date (Barta et al., 2023; Yoo et al., 2023), exposing an important literature-based gap. While prior authors have explored consumers' purchase intention in the metaverse and related environments (Busalim et al., 2024; Mansoor et al., 2024; Park et al., 2023; Zhang et al., 2024), they mostly focus on users' own social presence or their perceived presence of others during the shopping experience (Hollebeek et al., 2020; Mansoor et al., 2024; Oh et al., 2023). Therefore, little remains known about the effect of consumers' perceived social presence (i.e., Stimulus) on their metaverse identification (i.e., Organism) and its subsequent effect on their purchase intention (i.e., Response), as explored in this research from a Stimulus-Organism-Response (S-O-R) perspective (Kabadayi et al., 2023) in the context of metaverse automobile retailing in this article. Research question (RQ) 1 addresses this issue, as follows:

RQ1: How do perceived social presence and metaverse identification influence consumers' purchase intention in metaverse retailing?

We also assess the role of potential moderators, including consumer stickiness, the accompaniment of friends, and product type, that may exert a pertinent impact on these associations. Specifically, we envisage that stickiness, the amount of time that a consumer sticks around on a metaverse retailing platform (So et al., 2024), moderates the association of social presence and consumers' metaverse identification, such that those exhibiting higher stickiness are predicted to see a stronger effect on metaverse identification. Second, we expect a moderating role of the accompaniment of friends on the same association, such that those experiencing greater accompaniment are expected to see a stronger effect of social presence on metaverse identification, given the key role of social factors in shaping this association (Barreda-Angeles and Hartmann, 2022). Accordingly, RQ2 states:

RQ2: Do (a) consumer stickiness and (b) the accompaniment of friends in the metaverse moderate the association of perceived social presence and metaverse identification?

Finally, we investigate the potentially moderating role of product (automobile) type in the association of metaverse identification and purchase intention, where environmentally-friendly (vs. unfriendly) vehicles are predicted to exert a stronger effect on purchase intention. Specifically, given contemporary consumers' growing concern for the environment (Moser, 2016), we expect this association to be strengthened for environmentally-friendly (vs. unfriendly) products. Correspondingly, RQ3 states:

RQ3: Does product type moderate the association of metaverse identification and consumers' purchase intention in metaverse retailing?

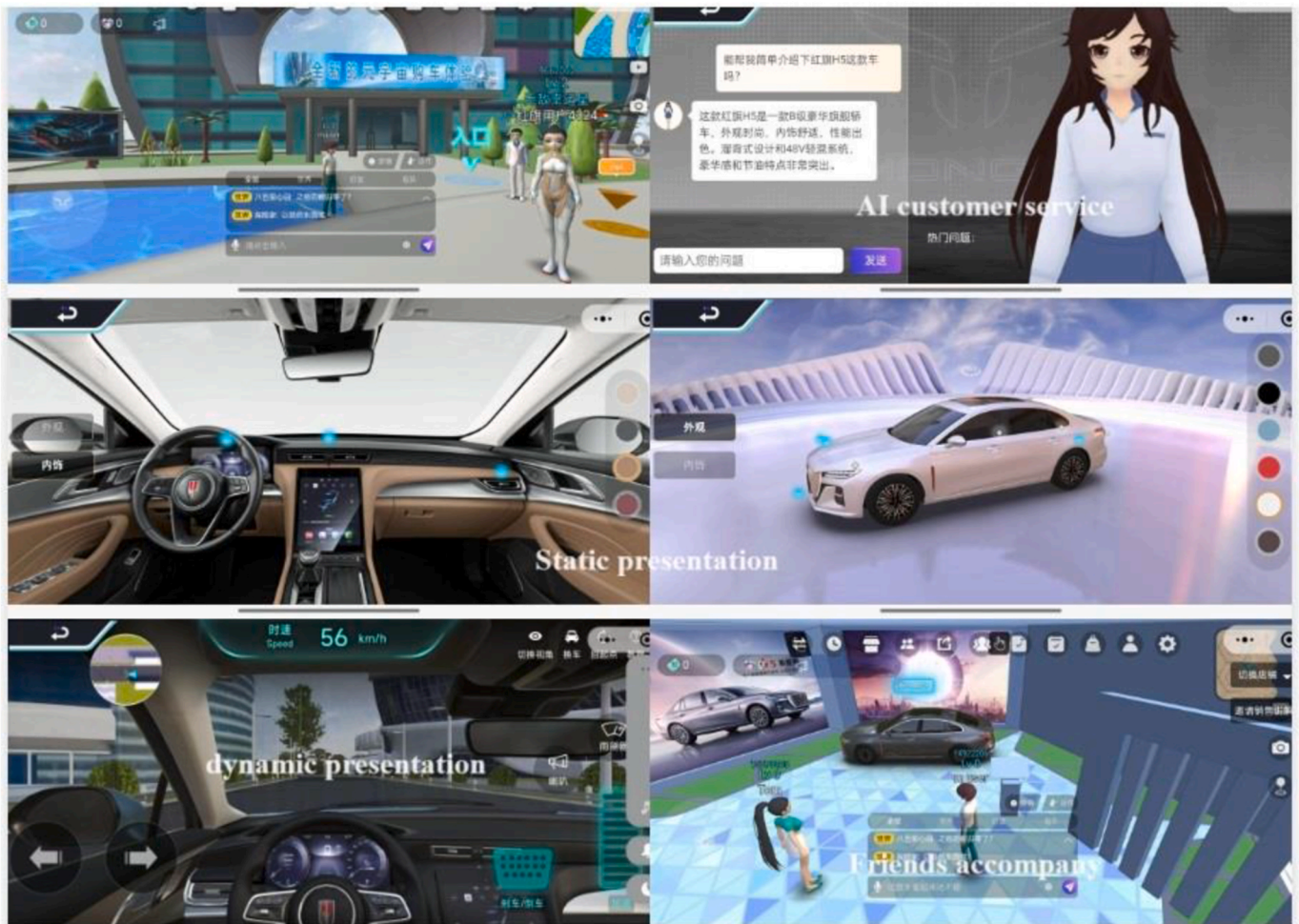


Fig. 1. The studied metaverse automotive retailing platform. Source: The (anonymous) company's metaverse platform.

This article makes the following contributions to the metaverse and retailing literature. First, we explore the effect of consumers' perceived social presence of others on their metaverse identification and its ensuing effect on their purchase intention in metaverse retailing from an SOR perspective (Hsu et al., 2024). Our findings, which extend prior authors' work on social presence and/or purchase intention in the metaverse (Zhang et al., 2022; Oh et al., 2023), offer empirical support for the proposed relationships, revealing the pertinent strategic role of fostering consumers' perceived social presence in metaverse retailing, given its observed positive effect on the development of consumers' purchase intention in metaverse retailing.

Second, our analyses advance the understanding of key moderating factors that impact the proposed associations. The empirical results confirm that consumer stickiness, the accompaniment of friends, and product type moderate the proposed associations, unveiling important new acumen of key contingencies in metaverse retailing. Specifically, the findings suggest that consumers' greater stickiness, their greater accompaniment of friends in metaverse retailing, and their intended purchase of environmentally-friendly (vs. unfriendly) vehicles (i.e., product/automobile type) strengthen the proposed associations, respectively, in turn bolstering the path to purchase intention (Park et al., 2023; Zhang et al., 2022).

We next review relevant literature in section 2, followed by conceptual development (including the development of hypotheses) in section 3. Section 4 details the deployed methodology, while section 5 presents an overview of the data analysis. Section 6 discusses the findings, derives pertinent implications from our work, and offers further research avenues. Finally, section 7 offers a conclusion to our work.

2. Literature review

2.1. Metaverse retailing

Metaverse retailing represents a transformative shift in how consumers interact with brands and products. Many large companies are considering how to adjust their strategies to build a new market in the metaverse. For example, Uniqlo has partnered with Mojang Studios to sell T-shirts in the game Minecraft (Yoo et al., 2023). Gucci has expanded its business into the metaverse, selling digital versions of its products on the Roblox virtual platform (Mancuso et al., 2023).

In the metaverse, consumers – represented by digital versions of themselves (i.e., avatars) – can visit virtual stores, browse products, purchase items, and/or engage with other shoppers, among others (Roh et al., 2024; Arya et al., 2024). Owing to its highly interactive, immersive, and personalized nature, the metaverse thus offers a unique platform to boost customer engagement (Hollebeek et al., 2019; Mehrotra et al., 2024; Mkedder and Das, 2024). For example, consumers can virtually try on apparel or view 3D models of virtual furniture as embedded in their homes (Abumalloh et al., 2023), yielding highly tailored customer experiences (Bruni et al., 2023) and raising repeat purchase intentions and loyalty (Periyasamy and Periyasami, 2023).

The metaverse is also conducive to fostering consumers' sense of *social presence*, or their felt presence of another social entity or other social entities (e.g., during the shopping experience; Van Doorn et al., 2017). Specifically, metaverse users can meet, greet, and chat with others during virtual shopping processes, raising their perceived (and the actual) social presence of virtual others in the shopping environment (Zhang et al., 2022). Social presence is in turn conducive to the development of consumers' sense of identification, or the extent to which individuals identify with the brand (Bhattacharya and Sen, 2003).

Given these benefits, metaverse retailing is not only becoming increasingly widespread but is also generating new firm tactics, strategies, and business models, including through the sale of virtual goods (e.g., virtual clothing) or the use of NFT (non-fungible token) transactions (Alon et al., 2023; Belk et al., 2022). These new models not only expand the firm's revenue opportunities but also enhance the brand's digital

image (Dwivedi et al., 2023).

2.2. Stimulus organism response (S-O-R) theory

S-O-R theory has been widely used in fields, including psychology, the behavioral sciences, and retailing, among others (Chakraborty et al., 2023; Hsu and Tsou, 2011; Kumari, 2022). The theory highlights the dynamic relationship between specific external stimuli (S), the organism (O), and the organism's responses (R) to those stimuli (Errajaa et al., 2022). For example, Pantano and Viassone (2015) explore the effect of multi-channel integration strategies on consumers' purchase intention. Consumers were found to exhibit more favorable emotional responses to these strategies and were more likely to patronize retailers employing multi-channel integration.

The theory posits that when consumers are presented with specific Stimuli (e.g., a marketing message or product), the Stimulus influence(s) their (i.e., the Organism's or O's) cognitive, affective, and motivational processes (Lajante and Ladhari, 2019), thus recognizing individual differences that generate unique effects on their intentions or behavior (i.e., Responses or R; Laato et al., 2020; Hsu and Tsou, 2011). For example, Li (2019) employed S-O-R theory to investigate consumers' social shopping intentions. The study revealed that the structure of social commerce boosted consumers' social interaction in terms of their cognitive and affective states, though it did not significantly impact their social shopping intention.

Though S-O-R theory has been shown to be beneficial to explain consumer behavior, other theories, including the Technology Acceptance Model (TAM) or the Theory of Planned Behavior (TPB) may also be useful. TAM focuses on the perceived usefulness and ease of use of technology, while in metaverse retailing, consumers pay more attention to the perception of the environment, and TPB emphasizes the influence of attitude, subjective norms, and perceived behavioral control on behavioral intention. In contrast, in a complex virtual environment such as the metaverse, S-O-R theory more comprehensively considers the impact of external stimuli on the organism's internal state and its behavioral response.

In this study, we adopt S-O-R theory to investigate how specific metaverse Stimuli (e.g., perceived social presence) affect consumers' psychological identification with the platform (i.e., Organism), in turn, influencing their purchase intention (i.e., Response). This approach permits a deeper understanding of the mechanisms driving consumer behavior in the metaverse, particularly in terms of how their social interactions in virtual environments shape purchase decision-making.

3. Theoretical background and hypothesis development

3.1. Social presence and metaverse identification

Social presence was traditionally used to describe the quality of a medium's communication (Hollebeek et al., 2020; Short et al., 1976). However, over time, its meaning has evolved to describe the degree to which an individual senses or perceives the real or imagined presence of others while communicating in virtual environments (Jiang et al., 2019). As digital technology continues to advance, the application of social presence (theory) has gradually evolved to areas like online retailing (Hassanein and Head, 2007), human-computer interaction, and human-AI interaction (Jin and Youn, 2023), among others. Building on prior social presence research, metaverse retailing acts as an important and growing communication medium in which social presence plays an important role (Zhang et al., 2022).

According to the definition of consumer brand identification (Bhattacharya and Sen, 2003), this article believes that consumers' metaverse identification refers to the degree to which consumers identify with metaverse technologies and platforms or consider themselves part of the metaverse platform, which means that there is a strong emotional bond and loyalty between consumers and the metaverse

platform. By enhancing consumers' emotional connection with and trust in the brand, social presence plays an important role in shaping consumers' metaverse identification (Keh and Xie, 2009; Saffer et al., 2013; Van Doorn et al., 2017). We posit.

H1. *Social presence positively impacts consumers' metaverse identification in metaverse retailing.*

3.2. Metaverse identification and purchase intention

Consumers' metaverse identification is a pivotal concept to understand consumer behavior. For example, metaverse identification has been shown to foster a sense of belonging to the brand, in turn raising purchase intention (Bhattacharya and Sen, 2003; Currás-Pérez et al., 2009; Pérez, 2009). Therefore, when consumers feel a strong connection to a brand, they are more likely to make purchases and recommend it to others. While this association has been explored in other (e.g., bricks-and-mortar) retailing (Tuškej et al., 2013), we expect it to transcend this context and also apply in metaverse retailing, which – due to its immersive nature (Roh et al., 2024) – is particularly conducive to bolstering consumers' metaverse identification and purchase intention (Pai and Tsai, 2011). We postulate.

H2. *Consumers' metaverse identification positively impacts their purchase intention in metaverse retailing.*

H3. *Consumers' metaverse identification mediates the positive effect of social presence on purchase intention in metaverse retailing.*

3.3. Moderating role of consumer stickiness and accompaniment of friends in metaverse retailing

Social presence is widely used to describe users' psychological sensation of being social with others in digitally mediated interactions (Hollebeek et al., 2020), including those in metaverse retailing. Metaverse serves utilitarian (e.g., communication) and more social or hedonic (e.g., interactive) purposes, thus affecting or changing users' psychological states (Brodie et al., 2011; Kumari et al., 2024).

The more time consumers spend in metaverse retailing, the stickier they are thought to be in this context (Hollebeek et al., 2014; So et al., 2024), which in turn fortifies the effect of their perceived social presence of others in this environment (Francescato et al., 2006). Consumers' increased attachment to metaverse retailing will make them more familiar with these environments, leading to more positive evaluations and attitudes toward it (Kim et al., 2023). This heightened familiarity is, in turn, expected to further strengthen the proposed effect of social presence on metaverse identification. We propose.

H4. *Consumer stickiness in metaverse retailing positively moderates the effect of social presence on metaverse identification.*

Prior research indicates that communicating with friends through computer-based interactive systems (e.g., robotic telepresence platforms) may enhance users' perceived social presence or raise the strength of this effect on specific outcome variables (e.g., identification; Choi and Kwak, 2017). For example, Oh et al. (2023) reported a positive correlation between the number of friends that Gen Z and Millennial users have in the metaverse and their social presence in these environments.

The metaverse represents a set of virtual worlds that allow users to interact and communicate with one another in the form of avatars (Miao et al., 2022). Metaverse retailing thus allows users (as avatars) to engage and communicate with others, including their friends, who are also represented as avatars in metaverse retailing. We thus suggest that the accompaniment of friends in metaverse retailing strengthens the proposed effect of the perceived social presence of others on metaverse identification, as follows.

H5. *The accompaniment of friends in metaverse retailing positively*

moderates the effect of social presence on metaverse identification.

3.4. Moderating role of product type

Industry (PwC, 2017) and academia (Chu et al., 2010; Sriram et al., 2010) generally believe that online purchase behavior differs significantly across product categories or types. Existing studies have found that product type can play a moderating role in the path of consumer purchase intention. Most of these studies have chosen completely different product types, such as hedonic and practical products (Ghasemi Siani et al., 2021; Sinha and Verma, 2020) as well as food and electrical appliances (Xiao et al., 2020), etc. Therefore, we propose product type as an additional moderating factor in the association of metaverse identification and purchase intention.

Given our focus on automobile retailing in the metaverse, we propose a differential moderating effect of product type for environmentally-friendly (vs. unfriendly) vehicles (Moser, 2016) based on their respective emissions. Environmentally-friendly vehicles are powered by alternative energy sources instead of traditional internal combustion engines (e.g., electric or hybrid cars). Environmental-unfriendly vehicles are traditional fuel-powered vehicles that emit a lot of carbon emissions while driving. Specifically, environmental-unfriendly vehicles may appeal to consumers who prefer having more conventional experiences and are insensitive to environmental sustainability. However, those who prefer environmentally-friendly vehicles (e.g., more tech-savvy and environmentally conscious individuals) are more likely to opt for more sustainable, innovative offerings. We posit.

H6. *Product type (environmentally-friendly vs. unfriendly) moderates the impact of metaverse identification on purchase intention.*

The conceptual model that summarizes the hypotheses is shown in Fig. 2.

4. Methodology

4.1. Survey instrument

To test the hypotheses, we deployed an offline survey that comprises three parts. The first section briefly introduced the research objective to the participants, followed by the measures sourced from prior literature. In line with our review, we define the metaverse as a shared virtual environment that merges virtual, augmented, and mixed reality – to create immersive (e.g., work or leisure) experiences to market their products (Dwivedi et al., 2023; Singla et al., 2023). We deployed established measures to gauge social presence, metaverse identification, and purchase intention, with minor modifications to suit the research context. To measure social presence, we adapted the scale by Ghali et al. (2024). To measure metaverse identification, we used Mael and Ashforth's (1992) and Johnson et al.'s (2012) instruments. Purchase intention was measured by adapting Dodds et al.'s (1991) and Berens et al.'s (2005) measures. To ensure the respondents' understanding of the questionnaire wording, we conducted a small pilot test prior to the main survey. All items were rated on five-point Likert scales ranging from "1" (strongly disagree) to "5" ("strongly agree"), as shown in the Appendix. Finally, the third section collected the respondents' demographic information (e.g., age, gender, family size). To ensure we received truthful responses, sensitive information (e.g., income) was excluded from the questionnaire.

The target population was Chinese customers who were planning to (re)purchase a vehicle. The studied metaverse retail platform sells automobiles produced by a Chinese manufacturer to the Chinese market. As the brand is well-known among Chinese consumers, individuals in this market are expected to be familiar with the brand, facilitating their identification, social presence, and the accompaniment of their friends in this metaverse environment, rendering the Chinese market a suitable

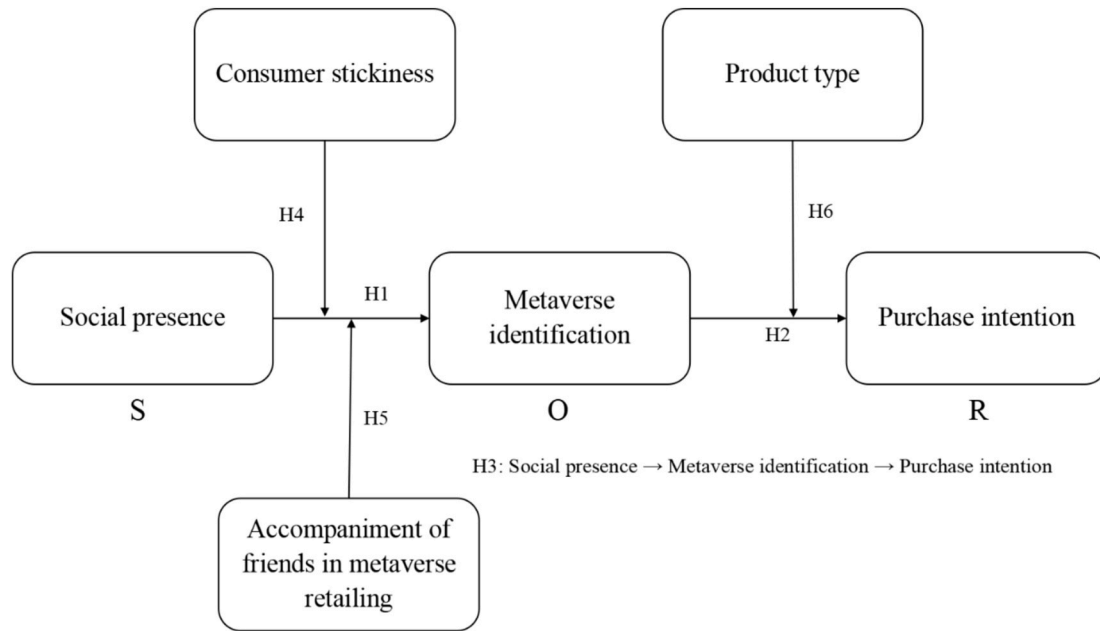


Fig. 2. Conceptual model.

context to explore our research objectives.

To ensure clarity and comprehensibility of the items, the questionnaire was translated into Chinese (Mandarin). The translation process involved two Doctoral scholars, one of whom majored in English and one in Management. Subsequently, the questionnaire was back-translated into English by another two Doctoral scholars, after which we compared the original (vs. back-translated) items to avoid semantic discrepancies.

The respondents were recruited as follows. We targeted potential customers at vehicle stores. Respondents were asked the following screening question: “Do you intend to purchase a vehicle in the near future (next 3 months)?” Only individuals who answered “yes” to this question were requested to continue with the main survey. Eligible respondents were then provided with the metaverse address and the registration and usage instructions for the metaverse automotive online retailing platform.

They were reminded that they were able to invite friends to enter the metaverse retailing space together. They also received the questionnaire that they were requested to carefully complete and return to the specified email address. As a token of appreciation, participants were bestowed with a small car model as a gift.

4.2. Respondents’ demographic profile

We collected a total of 383 completed surveys. While Generation X (Gen X) comprises individuals between 1965 and 1979, Generation Y (Gen Y) encompasses those born from 1980 to 1994, and Generation Z (Gen Z) comprises individuals born from 1995 to 2009 (Guo and Luo, 2023; Lissitsa and Kol, 2016). Given the relatively small number of questionnaires collected from Gen X and recognizing that Gen Y and Gen Z represent important and growing customer segments, we excluded the Gen X responses and retained only those from Gen Z and Gen Y. To ensure that the respondents truly experience the functionality of metaverse retailing, we excluded those questionnaires with a duration of experience of less than 5 min, yielding a total of 348 valid responses (for descriptive statistics, please refer Table 1).

Table 1 Demographic respondent profile.

Variable		Frequency	Proportion (%)
Gender	Female	167	48.0
	Male	181	52.0
Age	Gen Y	188	54.0
	Gen Z	160	46.0
Education	High school degree or below	58	16.7
	Junior college degree	98	28.2
	Bachelor degree	95	27.3
	Graduate degree	97	27.9
Occupation	Employee	123	35.3
	Entrepreneur	77	22.1
	Civil servant	85	24.4
	Others	63	18.1
Family size	1	103	29.6
	2	103	29.6
	3	77	22.1
	≥4	65	18.7
No. Vehicle purchases	First purchase	217	62.4
	Repurchase	131	37.6
Stickiness	<15 min	17	4.9
	16–30 min	104	29.9
	31–45 min	52	14.9
	46–60 min	88	25.3
	>61 min	87	25.0
Accompaniment of friends in the metaverse	0	43	12.4
	1	115	33.0
	2	72	20.7
	3	93	26.7
	≥4	25	7.2
Product type	Environmentally-unfriendly	130	37.4
	Environmentally-friendly	218	62.6

5. Results

5.1. Common method bias

Common method bias refers to the overlap of variation between variables due to using the same data source, measurement tool, and/or

research context, which however does not represent a true relationship between constructs (Hair et al., 2010). To attenuate the potential effect of common method bias, we adopted design measures (e.g., using a differing item sequence across the respondents). We also used common method bias assessment tools to evaluate its potential impact on the data. Specifically, we deployed the Harman single-factor test. The results showed that the first factor explained 37.561% of the observed variation, thus remaining well under the 40% threshold (Hair et al., 2010). We also deployed the unmeasured latent methods factor (Chen et al., 2024) to further test for common method bias. The results show that after the introduction of the common method factor, the changes in each fit index were <0.05, including $\Delta_{RMSEA} = 0.001$, $\Delta_{SRMR} = 0.002$, $\Delta_{CFI} = -0.007$, $\Delta_{TLI} = -0.004$, and $\Delta_{NFI} = 0$. We therefore conclude that common method bias is not an issue in our data.

5.2. Reliability and validity testing

To test scale reliability, we employed Cronbach’s α (please refer results in Table 2). Overall, Cronbach’s alphas for the three constructs exceeded the critical threshold of 0.7 (Hair et al., 2010), indicating the adequate reliability (internal consistency) of the scales.

To test scale validity, we assessed each scale’s capacity to measure the intended construct (Hair et al., 2010). First, the KMO statistic and Bartlett’s sphericity test were conducted (see Table 3). The results showed that the KMO values for each construct exceeded or approached the threshold value of 0.7, and the significance levels of Bartlett’s sphericity test were all less than 0.001, revealing statistical significance, thus confirming the suitability of factor analysis for each variable. The cumulative variance explained was 64.729% for social presence, 62.66% for metaverse identification, and 70.68% for purchase intention. These findings suggest that each factor effectively explains the observed variance in the original scale items, providing preliminary evidence of scale validity.

We then performed confirmatory factor analysis (CFA) on the data. The three scales’ discriminant validity and intrinsic quality were evaluated by computing the average variance extracted (AVE) and composite reliability (CR) scores. According to Iyer et al. (2018), AVE values > 0.5 and CR values > 0.7 indicate good convergent validity. Furthermore, when the square root of the AVE for each variable surpasses the correlation coefficient between that variable and others, the scale is thought to exhibit good discriminant validity. Maximum likelihood estimation was used to determine the factor loadings for each variable. Fit indices, including the chi-square/degrees of freedom (χ^2/df), comparative fit index (CFI), root mean square error of approximation (RMSEA), normed fit index (NFI), and goodness of fit index (GFI) were also employed to assess the convergent validity of the scales. The factor analysis results are presented in Table 4, with the correlation analysis outcomes being shown in Table 5.

The factor loadings exceeded the value of 0.6, while the cumulative variance explained was 66.79%, surpassing the threshold value. Moreover, the CR values for each variable exceeded the critical threshold of 0.7, and the AVE values surpassed or approached the critical threshold of 0.5, indicating good convergent validity of each of the deployed scales. The fit indices are as follows: $\chi^2/df = 1.323 < 3$, $GFI = 0.96 > 0.9$, $CFI = 0.99 > 0.9$, $NFI = 0.96 > 0.9$, and $RMSEA = 0.031 < 0.1$, indicating the model’s good fit to the data. Furthermore, the square root of the AVE for each variable exceeded the corresponding Pearson correlation coefficients with other factors, indicating good discriminant

Table 2
Reliability analysis.

Construct	Cronbach’s α coefficient
Social presence	0.863
Metaverse identification	0.768
Purchase intention	0.792

Table 3
KMO value and Bartlett’s sphericity testing.

Construct	KMO	Bartlett’s sphericity test		Cumulative explanatory variance
		Approximate chi-square	Sig.	
Social presence	0.869	742.081	0.000	64.729%
Metaverse identification	0.777	443.396	0.000	62.66%
Purchase intention	0.697	315.823	0.000	70.678%

Table 4
CFA results.

Construct	Item	Loading	AVE	CR
Social presence	SP1	0.822	0.567	0.866
	SP2	0.802		
	SP3	0.795		
	SP4	0.757		
	SP5	0.748		
Metaverse identification	MI1	0.778	0.462	0.772
	MI2	0.774		
	MI3	0.795		
	MI4	0.673		
Purchase intention	PI1	0.798	0.575	0.799
	PI2	0.841		
	PI3	0.821		

Table 5
Pearson correlations and AVE values.

Construct	1	2	3
Social presence	0.753		
Metaverse identification	0.414***	0.68	
Purchase intention	0.2***	0.369***	0.758

Notes - *** indicates $p < 0.001$; Diagonal values represent the square roots of the AVE.

validity.

5.3. Hypothesis testing results

We first examined the effect of the control variables on the dependent variable (see Table 6). The test results indicated that gender significantly negatively impacted purchase intention. Specifically, we assigned males (1) and females (2). Based on our analyses, males were found to exhibit a higher purchase intention of specific brands in metaverse retailing (e.g., owing to their typically greater interest in cars vs. females).

We next deployed structural equation modeling (SEM) to assess the direct effects (see Fig. 3). The SEM results indicate that social presence significantly positively affects consumers’ metaverse identification, in turn significantly positively influencing their purchase intention. Therefore, the results support H1 and H2.

We then deployed bootstrapping (setting 5000 times) to assess the

Table 6
Effect of control variables.

Control variables	Purchase intention
Gender	-0.11*
Age	0.002
Education	-0.069
Occupation	0.023
Family size	0.007
No. Of vehicle purchases	-0.059

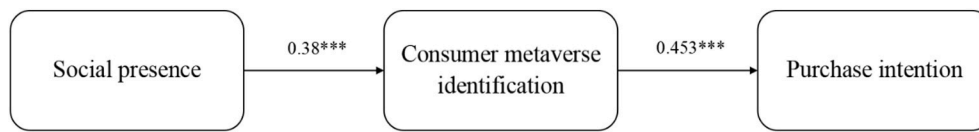


Fig. 3. Structural equation modeling results.

mediating role of metaverse identification (see Table 7). The bootstrapping results demonstrate that the direct effect of social presence on purchase intention was non-significant ($\beta = 0.062, p > 0.05$), while its indirect effect (through metaverse identification) was significant ($\beta = 0.155, 95\% \text{ BootCI} : [0.098, 0.212]$). These findings suggest that metaverse identification fully mediates the positive effect of social presence on purchase intention, supporting H3.

We conducted the following analyses to test H5 and H6, which proposed a moderating role of consumer stickiness and the accompaniment of friends in metaverse retailing, respectively, on the positive effect of social presence on metaverse identification. First, metaverse identification was set as the dependent variable, and social presence, consumer stickiness, and the interaction term (social presence x stickiness) were set as the independent variables. To address potential collinearity issues, social presence and stickiness were standardized before constructing the interaction terms, which were also adopted to analyze the effect of the accompaniment of friends (see Table 8).

The results in Table 8 indicate that the interaction between social presence and consumer stickiness significantly and positively correlates with purchase intention ($\beta = 0.066, p < 0.05$), as shown in Table 8 (Model 3). This finding suggests that the stickier consumers are in metaverse retailing, the stronger the positive effect of their perceived social presence on their metaverse identification. The interaction term between social presence and the accompaniment of friends in metaverse retailing was significantly positively correlated with metaverse identification ($\beta = 0.104, p < 0.01$), as shown in Table 8 (Model 5). This finding suggests that having more friends to accompany a consumer during their metaverse-based shopping sessions strengthened the positive impact of the consumer's perceived social presence on their metaverse identification.

Moreover, by adjusting one standard deviation above and below the mean of consumer stickiness, we divided the sample into two groups (high vs. low stickiness) to show the differences in the relationship between perceived social presence and metaverse identification across these groups (see Fig. 4). Likewise, the accompaniment of friends in the metaverse was found to positively moderate the effect of perceived social presence on metaverse identification (see Fig. 5), supporting H4 and H5.

We next tested H6, which addresses the moderating role of product type on the relationship between metaverse identification and purchase intention. First, purchase intention was set as the dependent variable. Then, metaverse identification, product type, and the interaction term (metaverse identification x product type) were set as independent variables (see Table 9).

The findings in Table 9 indicate that the interaction term between metaverse identification and product type was significantly positively correlated with purchase intention ($\beta = 0.248, p < 0.05$), as shown in Table 9 (Model 8). The results reveal that metaverse identification had a greater effect on purchase intention for environmentally-friendly (vs. unfriendly) vehicles, as shown in Fig. 6.

Table 7
Mediating effect of metaverse identification.

SP=>MI=>PI	Effect	p	95%BootCI
Total effect	0.217	0.000***	[0.104,0.329]
Indirect effect	0.155	0.000***	[0.102,0.217]
Direct effect	0.062	0.301	[-0.055,0.178]
Result	Full mediation		

Table 8
Moderating effect of consumer stickiness and the accompaniment of friends.

Dependent variable	Model 1	Model 2	Model 3	Model 4	Model 5
SP	0.332***	0.025***	0.026	0.32***	0.022
STI		0.308***	0.119		
AOF				0.233***	-0.05
SP*STI			0.066*		
SP*AOF					0.104**
The dependent variable is MI					

Notes - SP = Social presence; MI = Metaverse identification; STI = Consumer stickiness; AOF = Accompaniment of friends; *, ** indicates $p < 0.05$, ** indicates $p < 0.01$, *** indicates $p < 0.001$.

6. Discussion, implications, and limitations

6.1. Discussion and theoretical implications

The findings answer the research questions and raise important implications for further theory development. First, drawing on S-O-R theory, the results suggest that consumers' perceived social presence of others positively affects their metaverse identification in metaverse retailing, which is in turn found to boost their purchase intention. Therefore, metaverse retailers and brands that are able to raise or optimize consumers' perceived social presence of others are expected to see individuals' greater intent to purchase their products, revealing the strategic role of social presence in this context (Van Doorn et al., 2017). In other words, when making purchases, metaverse users tend to enjoy or favor the presence of others (e.g., to help them make purchase decisions or to offer social approval; Hennig-Thurau et al., 2023), thus raising important implications for further theory development. For example, according to social presence theory, key social presence drivers include the communication mechanism's intimacy and immediacy (Hollebeek et al., 2020). Therefore, what is the relative importance of intimacy (vs. immediacy) in fostering consumers' perceived social presence in specific metaverse retailing contexts? Do consumers prefer lower (vs. higher) levels of social presence for the purchase of some products vs. others (e.g., may differences exist across those that do not (vs. do) require social approval, that are non-conspicuous (vs. conspicuous), or that enable more private (vs. public) forms of consumption)?

Second, the findings corroborate the proposed moderating effects, thus raising further issues for theory development. For example, consumer stickiness and the accompaniment of friends were both found to moderate the association of social presence and metaverse identification in metaverse retailing, with higher (vs. lower) levels of these respective variables yielding a stronger effect on this association, respectively. Issues for further theory development include: What is the relative importance of these moderating factors in the proposed association (e.g., which is more important in specific contexts)? To what extent may stickiness and the accompaniment of friends be related (vs. independent), as the accompaniment of friends is likely to see users stick around longer on metaverse retailing platforms?

6.2. Managerial implications

The findings also yield important implications for metaverse retailers and managers. First, based on the results, we recommend metaverse retailers to boost consumers' purchase intentions by strategically

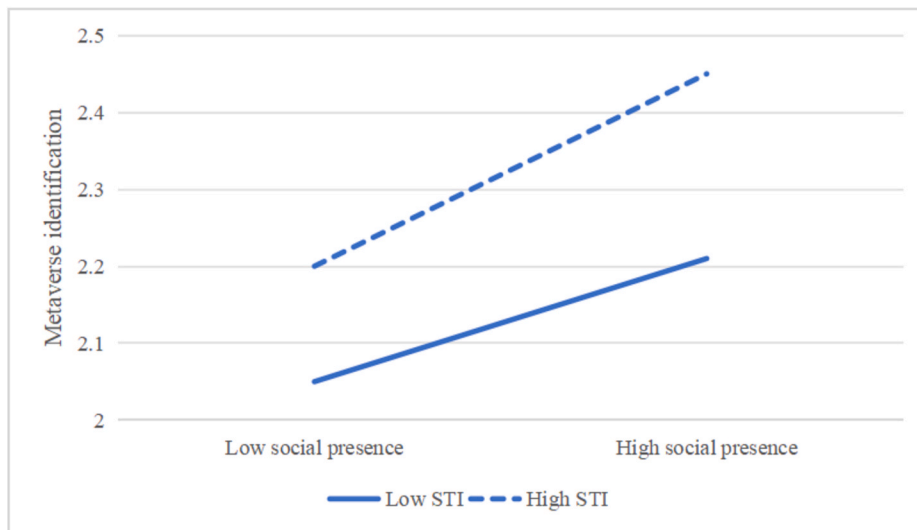


Fig. 4. Moderating effect of consumer stickiness (STI).

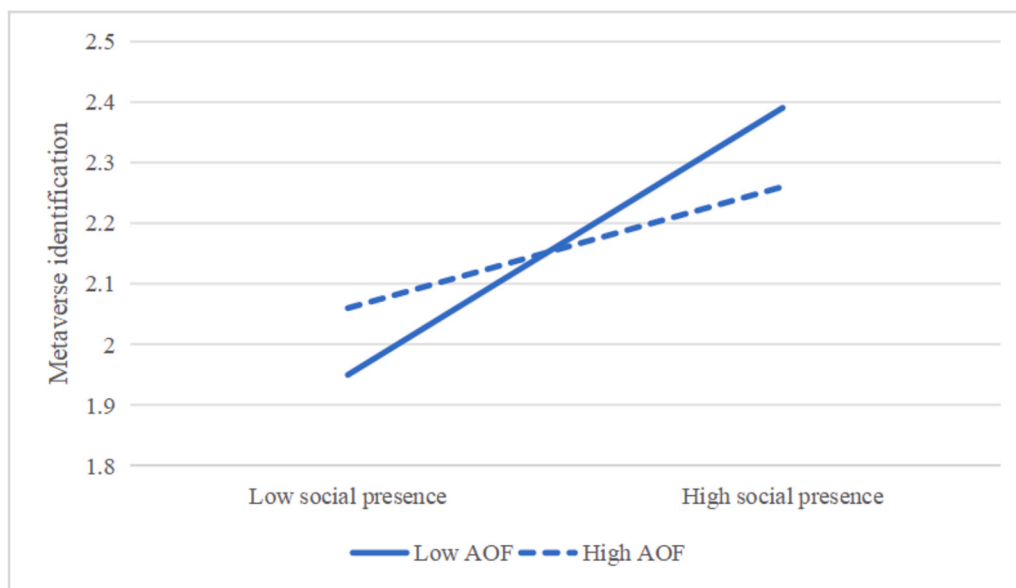


Fig. 5. Moderating effect of the accompaniment of friends (AOF).

Table 9
Moderating effect of product type.

Dependent variable	Model 6	Model 7	Model 8
MI	0.498***	0.497***	0.101
PT		1.383***	0.65
MI*PT			0.248*

The dependent variable is PI

Notes - MI = Metaverse identification; PT = Product type; PI = Purchase intention; * indicates $p < 0.05$; *** indicates $p < 0.001$.

nurturing their perceived social presence of others (e.g., the accompaniment of their friends) in the metaverse. For example, metaverse platforms may be designed for users to invite others to the platform that they identify with (e.g., friends, family members, or (virtual) influencers), to join or share their shopping journey with them, to shop together on these platforms, and/or to focus on shared, communal, or conspicuously (vs. privately) consumed products (Kim and Park, 2024). We also recommend metaverse retailers to stimulate consumers to use

social interaction-facilitating technology (e.g., VR or smart glasses) to further augment their interactive metaverse experience, in turn boosting their positive responses to the deployed stimuli.

Second, we also attained empirical support for the proposed moderating effects. Based on these results, we recommend metaverse retailers to cultivate consumers' stickiness on their platforms (e.g., by stimulating their enduring cognitive, emotional, and behavioral engagement that sees consumers' extensive personal resource investments in their interactions with brands in the metaverse (Hollebeek et al., 2019, 2014). Moreover, the accompaniment of friends in metaverse retailing can be stimulated by designing interactive, communal, and/or shared metaverse retailing interfaces and formats (Arya et al., 2024), including through interactive, communal, and/or shared metaverse retailing interfaces. For example, incorporating gamification elements like rewards, challenges, or leaderboards is expected to be conducive to consumers' engagement, sense of achievement, and loyalty (e.g., by making the shopping experience more enjoyable and immersive).

Finally, regarding product type, we found more innovative, new, and

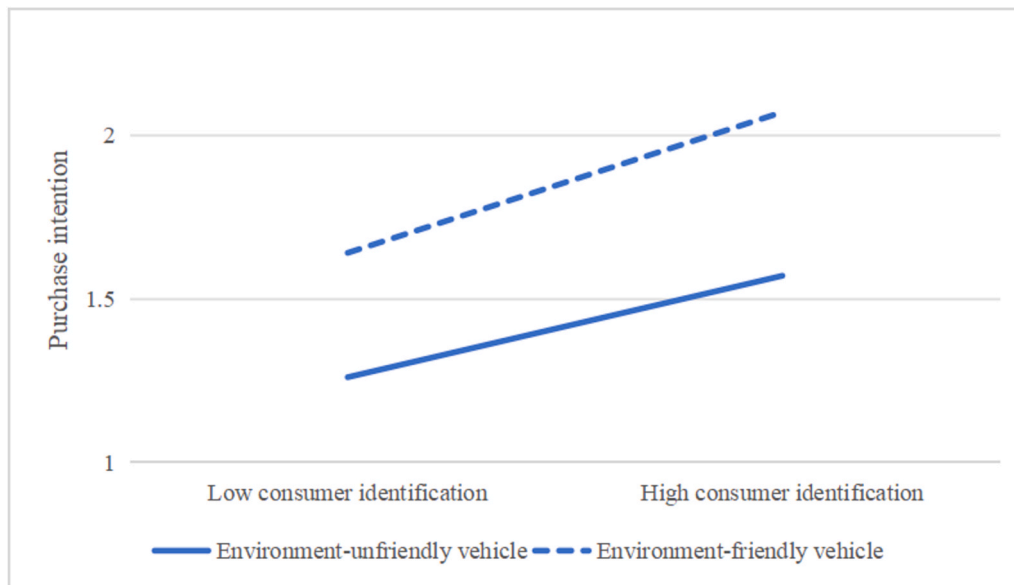


Fig. 6. Moderating effect of product type.

environmentally-friendly, rather than traditional fuel-based (i.e., environmentally-unfriendly), automobile products to strengthen the impact of consumers' metaverse identification on their intention to purchase these respective products. As carbon neutrality or Net Zero goals are rising in importance, consumers' environmental awareness is increasing in parallel, particularly in Gen Y and Z. Correspondingly, we recommend that metaverse retailers actively participate in R&D activities, practices, and strategies to ensure their ongoing future supply of environmentally-friendly products.

6.3. Limitations and future research

Notwithstanding its contribution, this research also has limitations that yield additional research opportunities. First, our analyses were conducted in a single context, namely that of a Chinese automobile metaverse retailing platform. Future research may, therefore, wish to apply the proposed model in other (e.g., product or cultural) contexts (Hollebeek, 2018), which may see the emergence of different results. For example, while automobiles are only infrequently purchased, other product categories (e.g., FMCGs) tend to be repurchased at a much higher rate, thus potentially seeing different results from those attained in this research.

Second, while we explored a specific set of constructs in the context of metaverse retailing (e.g., social presence, metaverse identification), alternate or additional constructs that are likely to exert key effects (e.g., customer engagement, brand love, or social influence) on consumer behavior in metaverse retailing remain open for further exploration (Ferdous et al., 2024), whether from an S-O-R or another, related theoretical perspective (e.g., S-D logic). Relatedly, while we deployed purchase intention as our dependent variable, future researchers may wish to use actual purchase data, thus potentially raising the accuracy of their findings. Finally, our cross-sectional data captured consumers' perceptions of and intentions regarding metaverse retailing at a single snapshot in time. Therefore, further research may wish to conduct longitudinal analyses that assess the development of the studied variables over time (So et al., 2024).

7. Conclusion

Drawing on S-O-R theory, this study highlights the key role of

perceived consumers' perceived social presence and identification in influencing their purchase intention in metaverse retailing environments. Specifically, the findings indicate that consumers' perceived social presence of others in the metaverse boosts their metaverse identification, in turn raising their purchase intention. Consumer stickiness and the accompaniment of friends were also found to moderate (i.e., strengthen) these associations, such that consumers' greater stickiness and greater accompaniment of friends further strengthen their metaverse identification. Moreover, environmentally-friendly (vs. unfriendly) products were found to bolster the effect of consumers' metaverse identification on their intent to purchase the marketed products. Overall, the attained insight offers valuable guidance for metaverse retailers aiming to boost consumers' identification and purchase intention in metaverse retailing.

CRediT authorship contribution statement

Haowei Zhang: Writing – original draft, Supervision, Methodology, Data curation, Conceptualization. **Yang Lv:** Writing – original draft, Validation, Formal analysis, Data curation, Conceptualization. **Justin Zuopeng Zhang:** Writing – original draft, Validation, Supervision, Formal analysis. **Linda D. Hollebeek:** Writing – review & editing, Writing – original draft, Supervision, Software, Resources, Project administration. **Abhishek Behl:** Writing – original draft, Resources, Conceptualization. **Sigitas Urbonavicius:** Writing – original draft, Visualization, Supervision, Resources, Formal analysis.

Funding

This research was supported by Jilin Provincial Department of Education Scientific Research Project (JKH20240954SK) and by Jilin Association for Higher Education Research Project “Research on Empowering New Quality Productivity Development through Higher Education” (JGJX24D0146).

Declaration of competing interest

We confirm that the authors do not have any conflict of interest.

Appendix

Construct	Items	Sources
Social presence (SP)	SP1. I felt the social interaction in the metaverse-based automotive online retail platform SP2. I felt like my real place has shifted to the metaverse-based automotive online retail platform SP3. I felt the enthusiasm of human beings in communicating with the AI customer service of metaverse-based automotive online retail platform SP4. I can interact with others in the metaverse-based automotive online retail platform SP5. I felt as if I was there, appreciating the vehicle both statically and dynamically.	Ghali et al. (2024)
Metaverse identification (MI)	MI1. The content in the metaverse-based automotive online retail platform evoked my emotional response MI2. Using this metaverse-based automotive online retail platform gave me a sense of pride MI3. I strongly support the development of the metaverse-based automotive online retail platform MI4. I am willing to continue to pay attention to the relevant information and development status of the metaverse-based automotive online retail platform	Mael and Ashforth (1992), Johnson et al. (2012)
Purchase intention (PI)	PI1. I am willing to buy automobile products from the metaverse-based automotive online retail platform PI2. I may soon be trading on the metaverse-based automotive online retail platform PI3. I will recommend automobile products from the metaverse-based automotive online retail platform to others	Dodds et al. (1991), Berens et al. (2005)

Data availability

Data will be made available on request.

References

Abumalloh, R.A., Nilashi, M., Ooi, K.B., Wei-Han, G., Cham, T.-H., Dwivedi, Y.K., Hughes, L., 2023. The adoption of metaverse in the retail industry and its impact on sustainable competitive advantage: moderating impact of sustainability commitment. *Ann. Oper. Res.* 1–42. <https://doi.org/10.1007/s10479-023-05608-8>.

Alon, I., Bretas, V.P., Katrih, V., 2023. Predictors of NFT prices: an automated machine learning approach. *J. Global Inf. Manag.* 31 (1), 1–18. <https://doi.org/10.4018/JGIM.317097>.

Arya, V., Sethi, D., Hollebeek, L., 2024. Using augmented reality to strengthen consumer/brand relationships: the case of luxury brands. *J. Consum. Behav.* <https://doi.org/10.1002/cb.2419>.

Barreda-Ángeles, M., Hartmann, T., 2022. Psychological benefits of using social virtual reality platforms during the covid-19 pandemic: the role of social and spatial presence. *Comput. Hum. Behav.* 127, 107047.

Barta, S., Gurrea, R., Flavián, C., 2023. Telepresence in live-stream shopping: an experimental study comparing Instagram and the metaverse. *Electron. Mark.* 33, 29. <https://doi.org/10.1007/s12525-023-00643-6>.

Belk, R., Humayun, M., Brouard, M., 2022. Money, possessions, and ownership in the metaverse: NFTs, cryptocurrencies, Web3 and wild markets. *J. Bus. Res.* 153, 198–205.

Berens, G., Van Riel, C.B.M., Van Bruggen, G.H., 2005. Corporate associations and consumer product responses: the moderating role of corporate brand dominance. *J. Market.* 69, 35–48. <https://doi.org/10.1509/jmkg.69.3.35.66357>.

Bhattacharya, C.B., Sen, S., 2003. Consumer–company identification: a framework for understanding consumers’ relationships with companies. *J. Market.* 67, 76–88. <https://doi.org/10.1509/jmkg.67.2.76.18609>.

Brodie, R.J., Hollebeek, L.D., Jurić, B., Ilić, A., 2011. Customer engagement: conceptual domain, fundamental propositions, and implications for research. *J. Serv. Res.* 14, 252–271. <https://doi.org/10.1177/1094670511411703>.

Bruni, R., Colamatteo, A., Mladenović, D., 2023. How the metaverse influences marketing and competitive advantage of retailers: predictions and key marketing research priorities. *Electron. Commer. Res.* <https://doi.org/10.1007/s10660-023-09779-1>.

Busalim, A., Hollebeek, L.D., Lynn, T., 2024. The effect of social commerce attributes on customer engagement: an empirical investigation. *Int. Res.* 34 (7), 187–214. <https://doi.org/10.1108/INTR-03-2022-0165>.

Chakraborty, D., Mehta, P., Dash, G., Khan, N., Jain, R.K., Biswas, D., 2023. What drives consumers to adopt mobile payment apps in the post-COVID-19 scenario: the role of openness to change and user involvement. *J. Global Inf. Manag.* 31 (1), 1–24. <https://doi.org/10.4018/JGIM.332799>.

Chen, C., Zheng, X., Cui, Y., Mu, H., Yang, Q., Zhang, M., Xu, H., Guan, J., Chen, W., Lang, H., 2024. Heterogeneity of work alienation and its relationship with job embeddedness among Chinese nurses: a cross-sectional study using latent profile analysis. *BMC Nurs.* 23, 122. <https://doi.org/10.1186/s12912-023-01674-2>.

Choi, J.J., Kwak, S.S., 2017. Who is this?: identity and presence in robot-mediated communication. *Cognit. Syst. Res.* 43, 174–189. <https://doi.org/10.1016/j.cogsys.2016.07.006>.

Chu, J., Arce-Urriza, M., Cebollada-Calvo, J.-J., Chintagunta, P.K., 2010. An empirical analysis of shopping behavior across online and offline channels for grocery products: the moderating effects of household and product characteristics. *J. Interact. Market.* 24, 251–268. <https://doi.org/10.1016/j.intmar.2010.07.004>.

Currás-Pérez, R., Bigné-Alcañiz, E., Alvarado-Herrera, A., 2009. The role of self-definitional principles in consumer identification with a socially responsible company. *J. Bus. Ethics* 89, 547–564. <https://doi.org/10.1007/s10551-008-0016-6>.

Dodds, W.B., Monroe, K.B., Grewal, D., 1991. Effects of price, brand, and store information on buyers’ product evaluations. *J. Market. Res.* 28, 307–319. <https://doi.org/10.1177/002224379102800305>.

Dwivedi, Y.K., Hughes, L., Wang, Y., Alalwan, A.A., Ahn, S.J., Grace, Balakrishnan, J., Barta, S., Belk, R., Buhalis, D., Dutot, V., Felix, R., Filieri, R., Flavián, C., Gustafsson, A., Hinsch, C., Hollensen, S., Jain, V., Kim, J., Krishen, A.S., Lartey, J.O., Pandey, N., Ribeiro-Navarrete, S., Raman, R., Rauschnabel, P.A., Sharma, A., Sigala, M., Veloutsou, C., Wirtz, J., 2023. Metaverse marketing: how the metaverse will shape the future of consumer research and practice. *Psychol. Market.* 40, 750–776. <https://doi.org/10.1002/mar.21767>.

Errajaa, K., Hombourger-Barès, S., Audrain-Pontevia, A.-F., 2022. Effects of the in-store crowd and employee perceptions on intentions to revisit and word-of-mouth via transactional satisfaction: a SOR approach. *J. Retailing Consum. Serv.* 68, 103087.

Ferdous, J., Iqbal, M.A., Rana, M.R.I., Akter, M., Mahdi, E.H., 2024. Gen Z consumers’ thought on metaverse: insight from a developing country’s perspective. In: *International Textile and Apparel Association Annual Conference Proceedings*. Iowa State University Digital Press.

Francescato, D., Porcelli, R., Mebane, M., Cuddetta, M., Klobas, J., Renzi, P., 2006. Evaluation of the efficacy of collaborative learning in face-to-face and computer-supported university contexts. *Comput. Hum. Behav.* 22, 163–176.

Ghali, Z., Rather, R.A., Khan, I., 2024. Investigating metaverse marketing-enabled consumers’ social presence, attachment, engagement and (re) visit intentions. *J. Retailing Consum. Serv.* 77, 103671.

Ghasemi Siani, M., Mohammadi, S., Soltan Hosseini, M., Dickson, G., 2021. Comparing young adult responses to rational and emotional sports product advertisements: the moderating role of product type and gender. *Int. J. Sports Mark. Spons.* 22, 798–815. <https://doi.org/10.1108/IJSMS-04-2020-0045>.

Gong, H., Zhao, M., Ren, J., Hao, Z., 2022. Live streaming strategy under multi-channel sales of the online retailer. *Electron. Commer. Res. Appl.* 55, 101184. <https://doi.org/10.1016/j.elerap.2022.101184>.

Guo, W., Luo, Q., 2023. Investigating the impact of intelligent personal assistants on the purchase intentions of Generation Z consumers: the moderating role of brand credibility. *J. Retailing Consum. Serv.* 73, 103353. <https://doi.org/10.1016/j.jretconser.2023.103353>.

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., 2010. *Multivariate Data Analysis*. Pearson.

Hassanein, K., Head, M., 2007. Manipulating perceived social presence through the web interface and its impact on attitude towards online shopping. *Int. J. Hum. Comput. Stud.* 65, 689–708.

Hennig-Thurau, T., Aliman, D.N., Herting, A.M., Cziehso, G.P., Linder, M., Kübler, R.V., 2023. Social interactions in the metaverse: framework, initial evidence, and research roadmap. *J. Acad. Market. Sci.* 51, 889–913. <https://doi.org/10.1007/s11747-022-00908-0>.

Hollebeek, L.D., 2018. Individual-level cultural consumer engagement styles: Conceptualization, propositions and implications. *Int. Market. Rev.* 35, 42–71.

Hollebeek, L.D., Clark, M.K., Andreassen, T.W., Sigurdsson, V., Smith, D., 2020. Virtual reality through the customer journey: framework and propositions. *J. Retailing Consum. Serv.* 55, 102056.

Hollebeek, L.D., Glynn, M.S., Brodie, R.J., 2014. Consumer brand engagement in social media: conceptualization, scale development and validation. *J. Interact. Market.* 28, 149–165. <https://doi.org/10.1016/j.intmar.2013.12.002>.

Hollebeek, L.D., Sprött, D.E., Andreassen, T.W., Costley, C., Klaus, P., Kuppelwieser, V., Karahasanovic, A., Taguchi, T., Islam, J.U., Rather, R.A., 2019. Customer engagement in evolving technological environments: synopsis and guiding propositions. *Eur. J. Market.* 53, 2018–2023.

Hsu, H.-Y., Tsou, H.T., 2011. The effect of website quality on consumer emotional states and repurchases intention. *Afr. J. Bus. Manag.* 5, 6194.

Hsu, W.-C., Lee, M.-H., Zheng, K.-W., 2024. From virtual to reality: the power of augmented reality in triggering impulsive purchases. *J. Retailing Consum. Serv.* 76, 103604.

- Iyer, P., Davari, A., Mukherjee, A., 2018. Investigating the effectiveness of retailers' mobile applications in determining customer satisfaction and repatronage intentions? A congruency perspective. *J. Retailing Consum. Serv.* 44, 235–243.
- Jiang, C., Rashid, R.M., Wang, J., 2019. Investigating the role of social presence dimensions and information support on consumers' trust and shopping intentions. *J. Retailing Consum. Serv.* 51, 263–270.
- Jin, S.V., Youn, S., 2023. Social presence and imagery processing as predictors of chatbot continuance intention in human-AI-interaction. *Int. J. Hum. Comput. Interact.* 39, 1874–1886. <https://doi.org/10.1080/10447318.2022.2129277>.
- Johnson, M.D., Morgeson, F.P., Hekman, D.R., 2012. Cognitive and affective identification: exploring the links between different forms of social identification and personality with work attitudes and behavior. *J. Organ. Behav.* 33, 1142–1167. <https://doi.org/10.1002/job.1787>.
- Kabadayi, E.T., Aksoy, N.C., Turkay, P.B., 2023. How does customer engagement value occur in restaurants? A stimulus-organism-response(S-O-R) perspective. *Serv. Ind. J.* 43, 497–524. <https://doi.org/10.1080/02642069.2022.2075350>.
- Keh, H.T., Xie, Y., 2009. Corporate reputation and customer behavioral intentions: the roles of trust, identification and commitment. *Ind. Market. Manag.* 38, 732–742.
- Kim, D.Y., Lee, H.K., Chung, K., 2023. Avatar-mediated experience in the metaverse: the impact of avatar realism on user-avatar relationship. *J. Retailing Consum. Serv.* 73, 103382. <https://doi.org/10.1016/j.jretconser.2023.103382>.
- Kim, H., Park, M., 2024. When digital celebrity talks to you: how human-like virtual influencers satisfy consumer's experience through social presence on social media endorsements. *J. Retailing Consum. Serv.* 76, 103581.
- Kumari, P., 2022. How does interactivity impact user engagement over mobile bookkeeping applications? *J. Global Inf. Manag.* 30 (5), 1–16. <https://doi.org/10.4018/JGIM.301270>.
- Kumari, V., Bala, P.K., Chakraborty, S., 2024. A text mining approach to explore factors influencing consumer intention to use metaverse platform services: insights from online customer reviews. *J. Retailing Consum. Serv.* 81, 103967.
- Laato, S., Islam, A.N., Farooq, A., Dhir, A., 2020. Unusual purchasing behavior during the early stages of the COVID-19 pandemic: the stimulus-organism-response approach. *J. Retailing Consum. Serv.* 57, 102224.
- Lajante, M., Ladhari, R., 2019. The promise and perils of the peripheral psychophysiology of emotion in retailing and consumer services. *J. Retailing Consum. Serv.* 50, 305–313.
- Li, C.-Y., 2019. How social commerce constructs influence customers' social shopping intention? An empirical study of a social commerce website. *Technol. Forecast. Soc. Change* 144, 282–294.
- Lissitsa, S., Kol, O., 2016. Generation X vs. Generation Y—A decade of online shopping. *J. Retailing Consum. Serv.* 31, 304–312.
- Luo, D., Doucé, L., Nys, K., 2024. Multisensory museum experience: an integrative view and future research directions. *Mus. Manag. Curatorship* 1–28. <https://doi.org/10.1080/09647775.2024.2357071>.
- Mael, F., Ashforth, B.E., 1992. Alumni and their alma mater: a partial test of the reformulated model of organizational identification. *J. Organ. Behav.* 13, 103–123. <https://doi.org/10.1002/job.4030130202>.
- Mancuso, I., Petruzzelli, A.M., Panniello, U., 2023. Digital business model innovation in metaverse: how to approach virtual economy opportunities. *Inf. Process. Manag.* 60, 103457.
- Mansoor, S., Rahman, S.M., Bowden, J.L.-H., 2024. Purchase spillovers from the metaverse to the real world: the roles of social presence, trialability, and customer experience. *J. Consum. Behav.* 1. <https://doi.org/10.1002/cb.2353>.
- Mehrotra, A., Agarwal, R., Khalil, A., Alzeiby, E.A., Agarwal, V., 2024. Nitty-gritties of customer experience in metaverse retailing. *J. Retailing Consum. Serv.* 79, 103876. <https://doi.org/10.1016/j.jretconser.2024.103876>.
- Miao, F., Kozlenkova, I.V., Wang, H., Xie, T., Palmatier, R.W., 2022. An emerging theory of avatar marketing. *J. Market.* 86, 67–90. <https://doi.org/10.1177/0022242921996646>.
- Mkedder, N., Das, M., 2024. Metaverse integration challenges: an in-depth ISM and MICMAC analysis. *J. Retailing Consum. Serv.* 77, 103684. <https://doi.org/10.1016/j.jretconser.2023.103684>.
- Moser, A., 2016. Consumers' purchasing decisions regarding environmentally friendly products: an empirical analysis of German consumers. *J. Retailing Consum. Serv.* 31 (Jul), 389–397.
- Oh, H.J., Kim, J., Chang, J.J.C., Park, N., Lee, S., 2023. Social benefits of living in the metaverse: the relationships among social presence, supportive interaction, social self-efficacy, and feelings of loneliness. *Comput. Hum. Behav.* 139, 107498. <https://doi.org/10.1016/j.chb.2022.107498>.
- Pai, P.-Y. (Patty), Tsai, H.-T., 2011. How virtual community participation influences consumer loyalty intentions in online shopping contexts: an investigation of mediating factors. *Behav. Inf. Technol.* 30, 603–615. <https://doi.org/10.1080/0144929X.2011.553742>.
- Pantano, E., Viassone, M., 2015. Engaging consumers on new integrated multi-channel retail settings: challenges for retailers. *J. Retailing Consum. Serv.* 25, 106–114.
- Park, Y., Ko, E., Do, B., 2023. The perceived value of digital fashion product and purchase intention: the mediating role of the flow experience in metaverse platforms. *Asia Pac. J. Mark. Logist.* 35, 2645–2665.
- Pérez, R.C., 2009. Effects of perceived identity based on corporate social responsibility: the role of consumer identification with the company. *Corp. Reput. Rev.* 12, 177–191. <https://doi.org/10.1057/crr.2009.12>.
- Periyasamy, A.P., Periyasami, S., 2023. Rise of digital fashion and metaverse: influence on sustainability. *DES* 1, 16. <https://doi.org/10.1007/s44265-023-00016-z>.
- Picot-Coupey, K., Bouragba, Y., Collin Lachaud, I., Gallarza, M.G., Ouazzani, Y., 2023. Live streaming shopping as a new retail format: insights from a qualitative study of consumers and retailers. *Int. J. Retail Distrib. Manag.* 51, 1313–1351. <https://doi.org/10.1108/IJRDM-12-2022-0505>.
- PwC, 2017. Total retail 2017 [WWW Document]. URL. <https://www.pwc.com/id/en/publications/assets/cips/total-retail-2017.pdf>. (Accessed 7 June 2024).
- Roh, T., Xiao, S., Park, B.I., 2024. What makes metaverse users immersed in the flow state in an emerging market? An application of affordance theory and ISSM. *J. Retailing Consum. Serv.* 81, 104012.
- Saffer, A.J., Sommerfeldt, E.J., Taylor, M., 2013. The effects of organizational Twitter interactivity on organization–public relationships. *Publ. Relat. Rev.* 39, 213–215.
- Short, J., Williams, E., Christie, B., 1976. *The Social Psychology of Telecommunications* (No Title).
- Singla, A., Gupta, N., Aeron, P., Jain, A., Garg, R., Sharma, D., Gupta, B.B., Arya, V., 2023. Building the metaverse: design considerations, socio-technical elements, and future research directions of metaverse. *J. Global Inf. Manag.* 31 (2), 1–28. <https://doi.org/10.4018/JGIM.321755>.
- Sinha, S.K., Verma, P., 2020. Impact of sales Promotion's benefits on perceived value: does product category moderate the results? *J. Retailing Consum. Serv.* 52, 101887. <https://doi.org/10.1016/j.jretconser.2019.101887>.
- So, K.K.F., Li, J., King, C., Hollebeek, L.D., 2024. Social media marketing activities, customer engagement, and customer stickiness: a longitudinal investigation. *Psychol. Market.* 41, 1597–1613. <https://doi.org/10.1002/mar.21999>.
- Sriram, S., Chintagunta, P.K., Agarwal, M.K., 2010. Investigating consumer purchase behavior in related technology product categories. *Market. Sci.* 29, 291–314. <https://doi.org/10.1287/mksc.1090.0506>.
- Tuskej, U., Golob, U., Podnar, K., 2013. The role of consumer–brand identification in building brand relationships. *J. Bus. Res.* 66, 53–59.
- Van Doorn, J., Mende, M., Noble, S.M., Hulland, J., Ostrom, A.L., Grewal, D., Petersen, J.A., 2017. Domo arigato mr. Roboto: emergence of automated social presence in organizational frontlines and customers' service experiences. *J. Serv. Res.* 20, 43–58. <https://doi.org/10.1177/1094670516679272>.
- Xiao, J., Xie, L., Shahzad, M.F., Khattak, J.K., 2020. The moderating role of product type in network buying behavior. *Sage Open* 10, 2158244020917953. <https://doi.org/10.1177/2158244020917953>.
- Yoo, K., Welden, R., Hewett, K., Haenlein, M., 2023. The merchants of meta: a research agenda to understand the future of retailing in the metaverse. *J. Retailing* 99, 173–192. <https://doi.org/10.1016/j.jretai.2023.02.002>.
- Zhang, L., Anjum, M.A., Wang, Y., 2024. The impact of trust-building mechanisms on purchase intention towards metaverse shopping: the moderating role of age. *Int. J. Hum. Comput. Interact.* 40, 3185–3203. <https://doi.org/10.1080/10447318.2023.2184594>.
- Zhang, X., Shao, C., Wang, B., Huang, S., Yang, X., 2022. Car purchase intention modeling in the context of COVID-19: an integrated analysis of impact range and impact asymmetry. *J. Adv. Transport.* 2022, 1–15. <https://doi.org/10.1155/2022/9401386>.