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ARE YOU GOING TO BUY PRODUCTS ENDORSED BY VIRTUAL INFLUENCERS? THE PERSUASIVENESS OF VIRTUAL INFLUENCERS ON PURCHASE INTENTION

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ABSTRACT

With the rapid advancement of AI technology, virtual influencers (VIs) have become increasingly prominent in the digital marketing landscape. Despite their burgeoning capability—akin to human influencers (HIs)—to forge emotional connections with consumers, the specific impact of VIs on purchase intentions remains under-explored. This study investigates the influence of VIs' perceived credibility, conceptualized as a second-order construct, on consumers' purchase intentions. Furthermore, it examines the mediating roles of the Theory of Planned Behavior (TPB) components—namely attitude toward VIs, subjective norms, and perceived behavioral control—within this relationship. Utilizing data collected from an online survey of 527 Chinese participants, the study employed Partial Least Squares Structural Equation Modeling (PLS-SEM) for analysis. The results confirm a significant positive correlation between VIs' perceived credibility and purchase intention, while also validating the critical mediating roles of the aforementioned behavioral factors. These findings offer valuable theoretical and practical insights for both scholars and marketing practitioners.

Keywords: Virtual influencers, Informational influence, AI influencers, Source credibility, The theory of planned behavior, Purchase intention.

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1. INTRODUCTION

The rapid evolution of technologies, particularly artificial intelligence, has ushered in a novel paradigm of influencer marketing: virtual influencers (VIs). These computer-generated personas, native to the digital landscape, have gained substantial traction in recent years (Conti et al., 2022). A prime example is Lil Miquela, a globally recognized virtual figure who has secured high-profile collaborations with luxury brands such as Prada, Chanel, and Calvin Klein. Much like human influencers (HIs), VIs strive to cultivate emotional rapport with their audience by curating specialized content on social media platforms (Lee & Lim, 2023; Conti et al., 2022; Chaihanchanchai et al., 2024; Byun & Ahn, 2023; Chiu & Ho, 2023; Arsenyan & Mirowska, 2021). According to International Data Corporation, global expenditure on VIs is projected to surpass USD 35 billion by 2025 (Garbin, 2020). Given this meteoric rise in popularity, it is imperative to rigorously assess the marketing effectiveness of these digital endorsers (Chaihanchanchai et al., 2024; Byun & Ahn, 2023; Lou & Yuan, 2019).

Despite the shared characteristics and parallel social influence between virtual and human influencers (Stein et al., 2022; Lee & Lim, 2023), the capacity of VIs to drive specific marketing outcomes remains underexplored (Kim & Park, 2023; Chaihanchanchai et al., 2024). A notable gap exists in the literature concerning the persuasive mechanisms of VIs, particularly regarding their perceived credibility (Lee & Lim, 2023; Chiu & Ho, 2023; Chaihanchanchai et al., 2024) and the subsequent socio-psychological influences they exert on consumer behavior (Byun & Ahn, 2023). This study addresses this gap by investigating the impact of VIs' perceived credibility on consumers' purchase intentions. Furthermore, we examine the mediating roles of the Theory of Planned Behavior components—namely attitude toward VIs, subjective norms, and perceived behavioral control—in bridging the link between VI credibility and purchase behavior.

By providing a comprehensive analysis of how VIs shape consumer psychology, this study offers significant theoretical and practical contributions. The subsequent sections will elaborate on the theoretical framework, followed by the application of the PLS-SEM methodology to test the hypothesized relationships. The findings are expected to yield critical insights into the integration of virtual marketing strategies, offering a deeper understanding of how AI-driven influence can enhance marketing efficacy within the modern consumer landscape.

2. LITERATURE REVIEW

2.1. The Rise of Virtual Influencers

Virtual Influencers (VIs) are digital avatars synthesized through computer-generated imagery (CGI) and sophisticated algorithms designed to emulate human-like behaviors and tasks (Arsenyan & Mirowska, 2021; Thomas & Fowler, 2021). Driven primarily by the convergence of CGI and artificial intelligence (AI) (Koles, 2024; Sands et al., 2022; Thomas & Fowler, 2021; Mouritzen et al., 2024), these digital personas possess the capacity to mirror the capabilities of

human influencers (HIs), such as curating social media content, fostering interpersonal connections, and maintaining audience engagement (Mouritzen et al., 2024; Conti et al., 2022; Appel et al., 2020).

Despite these functional parallels, audience responses toward VIs remain markedly ambivalent (Park et al., 2021; Byun & Ahn, 2023). While existing research highlights their efficacy in enhancing brand awareness, social presence (Liu & Tao, 2022), and parasocial relationships (Lim & Lee, 2023), the credibility of VIs persists as a significant scholarly concern (Lou et al., 2023; Moustakas et al., 2020; Chaihanchanchai et al., 2024). This "credibility paradox" underscores a pressing need to decode the psychological mechanisms underpinning VI-led persuasion—a research gap further widened by the relative scarcity of studies focused on virtual endorsement contexts (Schouten et al., 2020; Kim & Park, 2023).

To address this, the current study integrates Source Credibility Theory, which identifies persuasive source attributes, with the Theory of Planned Behavior (TPB), which maps psychological processing. This integration is framed within the dual-path framework of the Elaboration Likelihood Model (ELM) (Teng et al., 2014). Within this model, VIs function as peripheral cues, while consumer cognition operates through central processing routes (Mothersbaugh et al., 2020), collectively elucidating the complex mechanisms behind virtual influencer persuasiveness.

2.2. Source credibility model (SCM)

Source credibility is a cornerstone of communication and marketing research, encompassing the communicator's characteristics that determine the receiver's acceptance of a message (Kelman & Hovland, 1953). Ohanian (1990) formalized this concept into a tri-dimensional model—comprising expertise, trustworthiness, and attractiveness—which has since been extensively validated. In the context of this study, source credibility is defined as the extent to which consumers perceive Virtual Influencers (VIs) as a reliable and authoritative source of information. Within this framework, expertise reflects the endorser's specialized knowledge that enhances perceived product quality (Erdogan, 1999), while trustworthiness denotes the honesty and reliability essential for fostering consumer confidence (Ohanian, 1990). Attractiveness extends beyond physical appeal to include personality traits and social media metrics (e.g., follower counts and engagement), which significantly facilitate parasocial interactions (Djafarova & Rushworth, 2017; Erdogan, 1999).

The application of these three dimensions—expertise, trustworthiness, and attractiveness—is instrumental in elucidating how endorser recommendations shape consumer perceptions of brands and products (Lou & Yuan, 2019). Research on human endorsers, ranging from traditional celebrities to social media influencers, consistently demonstrates that source credibility is pivotal in enhancing endorsement effectiveness (Erdogan, 1999; Ohanian, 1990; Schouten et al., 2020). Crucially, it acts as a primary driver of consumer attitudes and purchase intention, defined as the subjective probability that a consumer will perform a specific buying behavior (Ajzen & Fishbein,

1977; Ki & Kim, 2019; Lou & Yuan, 2019).

However, VI research reveals a distinct theoretical tension. On one hand, Machine Heuristic Theory (Sundar, 2008) and the CASA (Computers Are Social Actors) paradigm (Arsenyan & Mirowska, 2021) suggest that the artificiality of VIs may actually enhance credibility through perceived objectivity and the attribution of social traits (Moustakas et al., 2020). On the other hand, empirical evidence indicates that this effectiveness is highly conditional; for instance, Pearson et al. (2019) found that VIs must demonstrate superior perceived expertise to overcome the inherent trust advantage of human influencers.

Counterevidence further highlights significant limitations: consumers often perceive VIs as psychologically distant compared to HIs, which can undermine engagement and trust (Liu & Lee, 2022). Despite possessing certain credible attributes, VI recommendations frequently fail to translate into purchase intentions due to authenticity concerns (Choudhry et al., 2022). Moreover, VIs have been found to generate weaker brand attitudes (Ozdemir et al., 2023) and, in some cases, exhibit null effects across diverse product categories (Chiu & Ho, 2023).

In conclusion, while research outcomes remain inconsistent across different cultural contexts, the existing literature underscores the critical importance of examining credibility in virtual endorsement. Given the dynamic nature of consumer preferences and the rapid proliferation of VIs in the social media ecosystem (Akhtar et al., 2024), investigating the impact of source credibility on purchase intention is essential. Such insights enable brands to calibrate their marketing strategies in real-time, ensuring alignment with evolving consumer expectations. Consequently, this study proposes the following hypothesis:

H1: VIs' perceived credibility has a significant impact on purchase intention.

2.3. *The theory of planned behavior (TPB)*

The Theory of Planned Behavior (TPB), introduced by Ajzen (1991), serves as a robust framework for explaining and forecasting individual behavioral intentions. While TPB has been extensively validated in digital consumption contexts (Chetioui et al., 2020; Tiwari et al., 2023), its application to the burgeoning field of Virtual Influencers (VIs) remains limited. Following Ajzen's (1991) conceptualization, behavioral intention is driven by three core determinants: attitude, subjective norms, and perceived behavioral control. This study applies these determinants to analyze consumption behaviors within VI-driven environments.

Attitude, defined as an individual's evaluative tendency toward a specific object or action (Ajzen, 1988), significantly influences behavioral intentions (Armitage & Conner, 2001). Empirical evidence consistently demonstrates that favorable product attitudes enhance purchase probability (Chetioui et al., 2020), with research on human influencers (HIs) showing both direct and mediated effects on this relationship (Tiwari et al., 2023). However, VI endorsements have yielded divergent outcomes: some consumers exhibit less favorable attitudes toward certain VI-promoted products (Lee & Ham, 2023), while other studies report null effects on purchase

intention despite increased brand awareness (Lou et al., 2023). Given these inconsistent findings and the unique artificial nature of VIs, it is critical to investigate whether similar attitudinal dynamics apply to virtual entities. Thus, we hypothesize:

H2: Attitude toward VIs mediates the relationship between VIs' perceived credibility and purchase intention.

Subjective norms encompass an individual's perception of the expectations held by significant others—such as family, peers, and colleagues—regarding a particular behavior (Ajzen, 1991). This construct reflects perceived social pressure and the information gathered from social judgments regarding the acceptability of a behavior (Jaiswal et al., 2022; Singh et al., 2022). In this study, subjective norms refer to the extent to which consumers feel compelled to comply with social expectations when deciding whether to purchase products endorsed by VIs.

While subjective norms are known to drive purchase intentions in traditional and HI marketing (Tiwari et al., 2023), they remain understudied in the context of VIs. This study bridges this gap by utilizing Balance Theory (Heider, 1958) as a theoretical foundation. Balance Theory posits that individuals strive for cognitive consistency within a triad of perceptions. For instance, if a consumer perceives a VI as highly credible, they may anticipate that their social circle shares this positive view to avoid cognitive dissonance. This motivation for consistency suggests that a consumer's attitude and behavior will eventually align with the perceived norms of their social circle. Consequently, we propose:

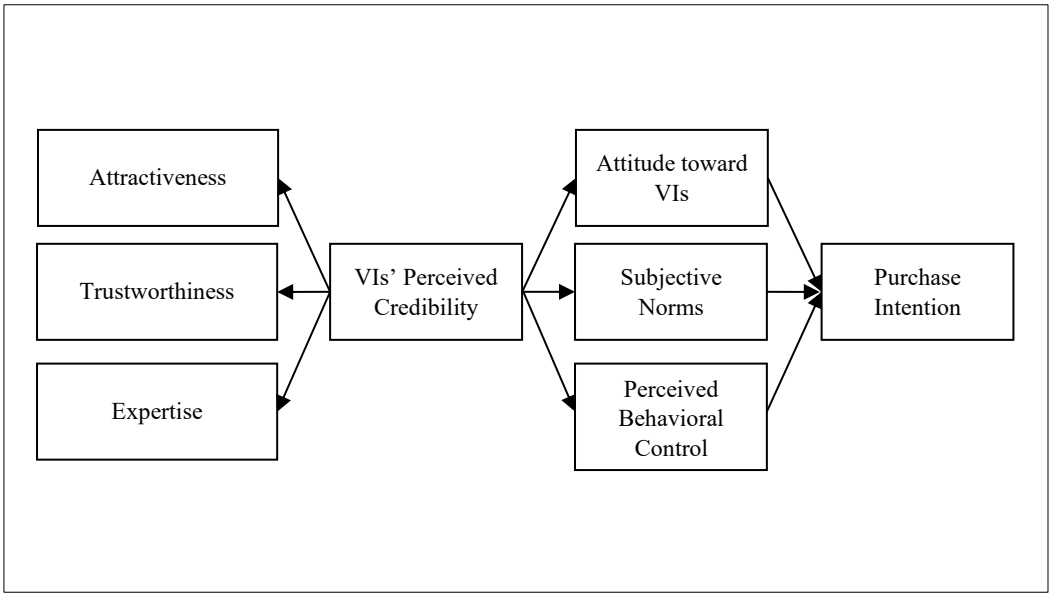
H3: Subjective norms mediate the relationship between VIs' perceived credibility and purchase intention.

Perceived Behavioral Control (PBC) refers to an individual's perception of the resources, opportunities, and control available to perform a behavior (Ajzen, 1985). Similar to Bandura's (1997) self-efficacy, PBC includes control beliefs and the perceived facilitation of achieving desired outcomes. In this study, PBC pertains to consumers' assessment of their ability to acquire VI-endorsed products, considering factors such as financial resources, purchasing convenience, and logistics.

Research indicates that PBC positively affects behavioral intentions (Jaiswal et al., 2022). However, in the age of AI and Big Data, decision autonomy has become a pivotal concern (Andr é et al., 2018). VIs, as emerging marketing tools, may sway consumer decisions through social media interaction (Moustakas et al., 2020). Examining PBC allows us to assess whether consumers feel they possess the autonomy to resist potential manipulation and make genuinely independent choices. Therefore, we propose (see Figure 1):

H4: Perceived behavioral control mediates the relationship between VIs' perceived credibility and purchase intention.

Figure 1: The Conceptual Framework



Source: Authors

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3. METHODOLOGY

3.1. Sample and data collection

For this study, Ayayi, a prominent Chinese female virtual influencer with approximately one million followers on Weibo, was selected as the research stimulus. The analysis specifically focused on audience reactions to a sponsored post featuring Ayayi endorsing a pair of branded sports shoes. To ensure the generalizability of the findings regarding the impact of VIs on purchase intentions, participants were not restricted to a single social media platform. Instead, data were collected via Wenjuanxing using a rigorous three-stage screening process: (1) Residency: Participants were required to be residents of China to ensure cultural homogeneity; (2) Engagement: A minimum social media usage of over five hours per week was required to ensure familiarity with digital marketing; and (3) Prior Interaction: Participants must have demonstrated prior interaction with virtual influencer content, such as following VI accounts or engaging with VI-related posts.

The final sample (N=527) comprised individuals aged 18 to 35, a demographic that represents the core consumer base for VI marketing in China (Lou et al., 2023). Sports shoes were strategically selected as the stimulus product category for three reasons. First, footwear is highly

prevalent in Chinese VI endorsements; statistics indicate that 87% of top-tier VIs, including Ayayi, promote this category (Franke et al., 2023). Second, sports shoes are classified as mid-to-high involvement products, where the effects of source credibility on consumer decision-making are most pronounced (Ki & Kim, 2019). Finally, the customizable digital nature of sports shoes aligns well with VI capabilities, allowing for authentic and visually compelling product demonstrations (Conti et al., 2022).

3.2. Measurement of variables

All latent variables were measured using five-point Likert scales, with items adapted from established literature to ensure content validity. Specifically, VIs' perceived credibility was conceptualized as a multidimensional construct comprising three dimensions: attractiveness, trustworthiness, and expertise. Each of these dimensions was measured using five items adapted from Ohanian (1990). In this study, perceived credibility is treated as a reflective-reflective second-order construct. This approach was adopted because the research focuses on the overall impact of credibility rather than the idiosyncratic effects of its individual components. Methodologically, employing second-order constructs simplifies structural complexity and enhances the parsimony of the PLS-SEM model (Hair et al., 2019).

Other core constructs were measured as follows: Perceived behavioral control was assessed using five items adapted from Ajzen (2011), Lavuri et al. (2023), Vabø and Hansen (2016), and Sanne and Wiese (2018). Subjective norms were measured with four items drawn from Sanne and Wiese (2018) and Chrisniyanti and Fah (2022). Attitude toward VIs was evaluated using four items from Ajzen (2011) and Vabø and Hansen (2016). Finally, purchase intention was operationalized using three items adapted from Ajzen (2011).

4. RESULTS AND DISCUSSION

4.1. Participants' demographic statistics

A total of 527 Chinese respondents participated in the online survey. The gender distribution was relatively balanced, consisting of 293 males (55.6%) and 234 females (44.4%). Regarding age, a majority of the respondents (54.1%) were aged 35 or younger. In terms of educational attainment, most participants held a bachelor's degree (40.2%), followed by a diploma (27.7%), senior high school or below (15.9%), and a master's degree (13.5%), while a smaller proportion held a doctorate (2.7%). Regarding economic status, 31.3% of the participants reported a monthly income between CNY 6,000 and 9,000, 25.4% earned below CNY 3,000, and 8.9% had no fixed monthly income.

4.2. Measurement model

The reliability and validity of the measurement model were rigorously assessed. As shown in Table 1, the factor loadings for all items exceeded the recommended threshold of 0.70 (Hair et al., 2019). Furthermore, the Average Variance Extracted (AVE) values for all constructs surpassed the suggested 0.50 benchmark (Hair et al., 2019), thereby establishing robust convergent validity.

To evaluate discriminant validity, Fornell and Larcker's (1981) criterion was employed. As illustrated in Table 2, discriminant validity was confirmed, as the correlation coefficients between any two constructs were lower than the square root of the AVE for each respective construct. Additionally, both Cronbach's Alpha and Composite Reliability (CR) values for all constructs exceeded the 0.70 threshold, signifying a high level of internal consistency and reliability (Hair et al., 2019).

Table 1: Reliability and Convergent Validity of Measurement Model

Constructs	Items	Loadings	Cronbach's alpha	CR	AVE
VIs' perceived credibility (Second-order construct)	Attractiveness	0.805	0.945	0.952	0.567
	Trustworthiness	0.819			
	Expertise	0.798			
Attractiveness	ATT1	0.971	0.962	0.971	0.869
	ATT2	0.929			
	ATT3	0.910			
	ATT4	0.926			
	ATT5	0.924			
Trustworthiness	TRU1	0.968	0.964	0.972	0.874
	TRU2	0.928			
	TRU3	0.928			
	TRU4	0.934			
	TRU5	0.913			
Expertise	EXP1	0.969	0.962	0.971	0.869
	EXP2	0.905			
	EXP3	0.927			
	EXP4	0.931			
	EXP5	0.929			
Perceived behavioral control	PBC1	0.957	0.953	0.964	0.843
	PBC2	0.884			
	PBC3	0.913			
	PBC4	0.920			
	PBC5	0.913			
Subjective Norms	SN1	0.960	0.939	0.961	0.892
	SN2	0.936			
	SN3	0.936			
Attitude toward VIs	ATU1	0.950	0.950	0.964	0.869
	ATU2	0.920			

	ATU3	0.935			
	ATU4	0.925			
Purchase intention	PI1	0.937	0.923	0.951	0.867
	PI2	0.927			
	PI3	0.929			

Notes: CR = Composite reliability; AVE = Average extracted variance

Table 2: Discriminate Validity of Measurement Model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Attitude toward virtual influencer	**0.932**							
(2) Attractiveness	0.555	**0.932**						
(3) Expertise	0.459	0.470	**0.932**					
(4) Perceived behavioral control	0.508	0.492	0.476	**0.918**				
(5) Purchase Intention	0.434	0.424	0.412	0.434	**0.931**			
(6) Subjective Norms	0.489	0.498	0.442	0.486	0.414	**0.944**		
(7) Trustworthiness	0.563	0.478	0.485	0.576	0.451	0.508	**0.935**	
(8) VIs' perceived credibility	0.653	0.804	0.798	0.639	0.531	0.599	0.819	**0.753**

Notes: The values in bold represent the square root of AVE.

4.3. *Structural model*

A fundamental prerequisite for conducting PLS-SEM is ensuring the absence of multicollinearity (Kline, 2023). According to Kline (2023), the risk of multicollinearity is considered negligible if the Variance Inflation Factor (VIF) values remain below the threshold of 5.0. Following the execution of the PLS-SEM algorithm in SmartPLS 4.0, the results indicated that the inner VIF values ranged from 1.000 to 2.511. As all values are well within the permissible limit (5.0), it can be affirmed that this structural model is free from significant multicollinearity issues.

Table 3: Structural Model Analysis

Dependent Constructs	R^2	Q^2	Predictive Constructs	F^2
Perceived Behavioral Control	0.408	0.406	VIs' perceived Credibility	0.699
Subjective Norms	0.359	0.356		0.568
Attitude toward VIs	0.427	0.424		0.752
Purchase Intention	0.314	0.279	Perceived Behavioral Control	0.012
			Subjective Norms	0.011
			Attitude toward VIs	0.010

Notes: R^2 = Coefficient of Determination; Q^2 = Cross-validated Redundancy; f^2 = Effect Size.

Following the criteria established by Hair et al. (2019), an R^2 value exceeding 0.26 indicates that the theoretical model possesses substantial explanatory power. As presented in Table 3, the variance explained ($R^{2)}$ for purchase intention, perceived behavioral control, subjective norms, and attitude toward VIs was 30.6%, 41.4%, 35.9%, and 43.4%, respectively. These results demonstrate that the structural model exhibits acceptable explanatory power.

Furthermore, the predictive relevance of the model was assessed using the blindfolding algorithm in SmartPLS 4.0. A Q^2 value greater than zero signifies that the model has adequate predictive relevance (Hair et al., 2019). As shown in Table 6, the Q^2 values for all endogenous constructs were consistently above zero, thereby confirming the model's predictive relevance.

Regarding the effect size (f^2), Cohen (1992) suggested thresholds of 0.02, 0.15, and 0.35 to represent small, medium, and large effects, respectively. Although the f^2 values for certain paths did not strictly reach the 0.02 threshold, previous literature (e.g., Gong & Jiang, 2023; Hagerty et al., 2020) suggests that effect sizes exceeding 0.01 remain acceptable in social science research. Consequently, the effect sizes of the paths in this study were deemed satisfactory for further analysis.

Finally, a bootstrapping procedure with 5,000 sub-samples was employed to evaluate the significance of the path coefficients (Hair et al., 2019). The results, summarized in Table 4, reveal a significant positive relationship between VIs' perceived credibility and purchase intention (β = 0.315, SE = 0.057, $p < 0.001$), with a 95% confidence interval excluding zero [LLCI = 0.221, ULCI = 0.408]. Thus, H1 is supported.

Table 4: Direct Path Analysis

Paths	β	SE	t	p	BC 95% CI
				LLCI	ULCI
VIs' PC > PI	0.315	0.057	5.550	0.000	0.221
VIs' PC > ATU	0.653	0.024	26.958	0.000	0.609
VIs' PC > SN	0.599	0.029	20.635	0.000	0.548
VIs' PC > PBC	0.639	0.024	26.957	0.000	0.597
ATU > PI	0.114	0.051	2.218	0.013	0.031
SN > PI	0.109	0.048	2.278	0.011	0.027
PBC > PI	0.119	0.048	2.505	0.006	0.040

Notes: β = Unstandardized coefficient; SE = Standard error; Boot BC 95% CI = Bootstrap bias-corrected confidence interval using 5000 bootstrap samples; LLCI = Lower limit of confidence interval; ULCI = Upper limit of the confidence interval; Sample size = 527.

In terms of indirect relationship analysis, the three-stage technique recommended by Jaiswal et al. (2022) was used to analyze the mediation effect in the present study. The mediating effects of attitude toward VIs on the relationships between VIs' perceived credibility and purchase intention were significant (β = 0.075; SE = 0.034; p = 0.013; LLCI = 0.020; ULCI = 0.131). Hence, H2 was supported (Table 5), and these hypotheses are both partial mediation because the dependent variable was substantially impacted by both the independent variable and the mediator (Jaiswal et al., 2022). Then, the partial mediation effects of H3 were confirmed (Table 5) because purchase intention is affected by VIs' perceived credibility (β = 0.066; SE = 0.029; p = 0.011; LLCI = 0.017; ULCI = 0.112) through subjective norms. Finally, perceived behavioral control significantly mediated the relationship between VIs' perceived credibility (β = 0.076; SE = 0.031; p = 0.007; LLCI = 0.026; ULCI = 0.129 and purchase intention. Therefore, H4 was supported (Table 5), and they were partial mediation.

Table 5: Mediating Effect Analysis.

Paths	β	SE	t	p	BC 95% CI
				LLCI	ULCI
VIs' PC > ATU > PI	0.075	0.034	2.218	0.013	0.020
VIs' PC > SN > PI	0.066	0.029	2.283	0.011	0.017
VIs' PC > PBC > PI	0.076	0.031	2.471	0.007	0.026

Notes: β = Unstandardized coefficient; SE = Standard error; Boot BC 95% CI = Bootstrap bias-corrected confidence interval using 5000 bootstrap samples; LLCI = Lower limit of confidence interval; ULCI = Upper limit of the confidence interval; Sample size = 527.

4.4. *Discussion of findings*

The findings demonstrate that VIs' perceived credibility exerts a direct and significant impact on consumers' purchase intentions. While the nexus between credibility and purchase intention is well-established in human influencer (HI) research (Tiwari et al., 2023; Lou & Yuan, 2019), prior studies have occasionally suggested that this effect might be attenuated in VIs due to their inherent lack of authentic product experience (Chiu & Ho, 2023). The discrepancy between our findings and previous research may stem from the increasingly interactive and reciprocal nature of VI-audience communication, which shares overlapping persuasive traits with HIs, such as attractiveness and expertise (Byun & Ahn, 2023). Furthermore, literature in information systems suggests that the unique features of modern VIs—specifically anthropomorphism and scalability —effectively engage audiences and shape their behavioral responses (da Silva et al., 2021). Collectively, these factors foster a growing consumer acceptance of VIs, enabling their perceived credibility to drive purchase intentions in a manner analogous to their human counterparts.

Additionally, the results indicate that attitude toward VIs significantly mediates the relationship between perceived credibility and purchase intention. Specifically, high levels of perceived credibility foster positive consumer attitudes toward the VI, which subsequently enhance purchase intentions. This mechanism aligns with established patterns in HI marketing (Tiwari et al., 2023) and can be elucidated through the Computers Are Social Actors (CASA) paradigm. CASA posits that individuals instinctively attribute social characteristics to technological entities (Arsenyan & Mirowska, 2021). By forging emotional connections and communicating via social media, VIs facilitate interactions that mirror human-to-human engagement. Consequently, consumer responses toward VIs are increasingly mimicking those toward HIs, resulting in comparable psychological and behavioral patterns (Byun & Ahn, 2023).

Furthermore, this study confirms the mediating role of subjective norms, albeit with a more modest effect size. This suggests that VIs exert a degree of social influence comparable to that of HIs (Byun & Ahn, 2023). Our results reveal that purchase decisions are shaped not only by the influencer's credibility but also by the consumer's social environment and the perceived expectations of significant others. This aligns with broader marketing literature highlighting that consumer choices are frequently guided by the social approval of family and friends (Chetioui et al., 2020; Tiwari et al., 2023). Since VIs primarily operate within social media ecosystems, the social pressures and normative influences experienced by consumers remain consistent regardless of whether the endorser is virtual or human.

Finally, the findings reveal that perceived behavioral control (PBC) mediates the link between VIs' perceived credibility and purchase intention. When consumers perceive VIs as credible, their confidence and sense of agency regarding the successful acquisition of endorsed products are heightened, thereby driving purchase intentions. In traditional influencer marketing, PBC is a critical predictor of successful outcomes (Tiwari et al., 2023). Our study extends this to the virtual realm, indicating that VI credibility not only validates the endorsement but also empowers consumers by reducing perceived barriers to purchase. These insights are instrumental for predicting consumer behavior and refining future virtual influencer marketing strategies.

4.5. *Theoretical and practical implications*

This study represents a pioneering empirical investigation into the impact of VIs' perceived credibility on purchase intention, specifically elucidating the mediating roles of attitude, subjective norms, and perceived behavioral control. The insights derived from this research offer significant theoretical and practical contributions to the evolving domain of virtual influencer marketing.

First, by integrating Source Credibility Theory with the Theory of Planned Behavior (TPB), this study provides a nuanced understanding of how VIs shape consumer behavior, extending the application of these foundational theories to AI-driven marketing contexts. The research reveals that the persuasiveness of a message and its subsequent impact on attitudinal and behavioral responses are increasingly determined by the perceived credibility of the source, regardless of its ontological status (virtual vs. human). Furthermore, our findings provide empirical support for the Computers Are Social Actors (CASA) paradigm, suggesting that as technology advances, individuals are increasingly predisposed to accept virtual characters as legitimate participants in social interaction (Arsenyan & Mirowska, 2021). This shift in acceptance fundamentally alters social expectations and receptivity, positioning VIs as influential societal actors capable of shaping consumer norms through digital recommendation systems and social media platforms (Arsenyan & Mirowska, 2021; Byun & Ahn, 2023).

Second, understanding the mediating effects of TPB components provides actionable insights for developing targeted marketing strategies that leverage cutting-edge AI technology. Marketers can employ machine learning algorithms to analyze vast datasets, thereby enhancing the customization capabilities of VIs. By detecting patterns in consumer interactions and purchasing histories, AI allows VIs to deliver hyper-personalized content. Such personalization bolsters consumers' perceived behavioral control (PBC), as they feel more empowered and informed when presented with highly relevant, tailored recommendations.

Moreover, practitioners should prioritize shaping the social ecosystem and public discourse surrounding VIs. By fostering active social media communities, implementing word-of-mouth campaigns, and showcasing social proof (e.g., user-generated reviews), brands can enhance the social legitimacy of virtual endorsements. This strategic approach elevates subjective norms, thereby amplifying purchase intentions across the digital landscape.

Finally, the integration of Natural Language Processing (NLP) and sentiment analysis enables VIs to engage in empathetic, emotionally resonant interactions. By aligning communication styles with consumer emotions, VIs can forge deeper psychological bonds with their audience. These empathy-driven interactions, facilitated by AI, are crucial for fostering positive attitudes toward VIs and securing long-term consumer loyalty and purchase commitment.

4.6. *Limitations and future suggestions*

The study's data are exclusively from Chinese consumers, which, while providing substantial insights, may limit the broader applicability of the findings. Different cultural contexts could yield varying attitudes and behaviors toward VIs. Future research should aim to include a more diverse range of geographical and cultural backgrounds to assess the generalizability of these results. Additionally, examining how cultural differences influence perceptions and interactions with VIs would offer a more comprehensive understanding and inform global marketing strategies.

The study's data are exclusively from Chinese consumers, which, while providing substantial insights, may limit the broader applicability of the findings. Different cultural contexts could yield varying attitudes and behaviors toward VIs. Future research should include a more diverse range of geographical and cultural backgrounds to assess the generalizability of these results. Examining how cultural differences influence perceptions and interactions with VIs would offer a more comprehensive understanding and inform global marketing strategies.

Lastly, this study assumes that the technological landscape is static. However, AI technologies are rapidly evolving, which may alter the dynamics of how VIs engage with consumers and how these interactions are perceived. Future research should adopt a dynamic approach, continuously monitoring and analyzing the impact of technological advancements on VIs. As AI and virtual reality technologies progress, it is crucial to examine how these developments influence the interactions between VIs and consumers. Implementing a longitudinal research design could provide deeper insights into the long-term effects of VIs on consumer behavior. Future studies should track changes in consumer behavior over time to explore the enduring effects and underlying mechanisms of VIs.

5. CONCLUSION

This study investigates the psychological mechanisms through which virtual influencers (VIs) impact consumer purchase intentions by integrating Source Credibility Theory with the Theory of Planned Behavior. The empirical results confirm that VIs' perceived credibility—comprising attractiveness, expertise, and trustworthiness—serves as a significant driver of purchase intentions. Furthermore, the analysis validates that attitude toward VIs, subjective norms, and perceived behavioral control function as critical mediators, demonstrating that VIs can

effectively mirror the persuasive power of human influencers by establishing social presence and emotional rapport in digital environments.

Beyond its commercial implications, this research aligns with the United Nations Sustainable Development Goals (SDGs) by addressing the intersection of technological innovation and social responsibility. By identifying the psychological drivers of AI-mediated persuasion, the study provides a foundation for promoting responsible consumption patterns, which is central to global sustainability objectives. Furthermore, the successful deployment of VIs reflects a significant advancement in marketing infrastructure and digital innovation. Understanding these AI-driven influence mechanisms is essential for fostering a transparent and sustainable digital economy, ensuring that as marketing technologies evolve, they continue to support ethical consumer engagement and broader global development goals.

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REFERENCES

Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin, 84*(5), 888.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In *Action control: From cognition to behavior* (pp. 11-39). Berlin, Heidelberg: Springer Berlin Heidelberg.

Ajzen, I. (1988). Attitudes, Personality, and behavior. Milton Keynes, UK: Open University Press.

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes, 50*(2), 179-211.

Ajzen, I. (2011). The theory of planned behavior: Reactions and reflections. *Psychology & health, 26*(9), 1113-1127.

Akhtar, N., Hameed, Z., Islam, T., Pant, M. K., Sharma, A., Rather, R. A., & Kuzior,A. (2024). Avatars of influence: Understanding how virtual influencers trigger consumer engagement on online booking platforms. *Journal of Retailing and Consumer Services, 78*, 103742.

Ambroise, L., & Albert, N. (2020). Celebrity endorsement: Conceptual clarifications, critical review, and future research perspectives. *Recherche et Applications En Marketing (English Edition), 35*(2), 97-122.

André, Q., Carmon, Z., Wertenbroch, K., Crum, A., Frank, D., Goldstein, W., ... & Yang, H. (2018). Consumer choice and autonomy in the age of artificial intelligence and big data. *Customer Needs and Solutions, 5*(1), 28-37.

Appel, G., Grewal, L., Hadi, R., & Stephen, A. T. (2020). The future of social media in marketing. *Journal of the Academy of Marketing science, 48*(1), 79-95.

Arsenyan, J., & Mirowska, A. (2021). Almost human? A comparative case study on the social media presence of virtual influencers. *International Journal of Human-Computer Studies, 155*, 102694.

Chetioui, Y., Benlafqih, H., & Lebdaoui, H. (2020). How fashion influencers contribute to consumers' purchase intention. *Journal of Fashion Marketing and Management: An International Journal, 24*(3), 361-380.

Chiu, C. L., & Ho, H. C. (2023). Impact of celebrity, Micro-Celebrity, and virtual influencers on Chinese gen Z's purchase intention through social media. *SAGE Open, 13*(1), 21582440231164034.

Chrisniyanti, A., & Fah, C. T. (2022). The impact of social media marketing on purchase intention of skincare products among Indonesian young adults. *Eurasian Journal of Social Sciences, 10*(2), 68-90.

Cohen, J. (1992). A Power Primer. *Psychological Bulletin, 112*(1), 155-159.

Conti, M., Gathani, J., & Tricomi, P. P. (2022). Virtual influencers in online social media. *IEEE Communications Magazine, 60*(8), 86-91.

Dhanesh, G. S., & Duthler, G. (2019). Relationship management through social media influencers: Effects of followers' awareness of paid endorsement. *Public Relations Review, 45*(3), 101765.

Djafarova, E., & Rushworth, C. (2017). Exploring the credibility of online celebrities' Instagram profiles in influencing the purchase decisions of young female users. *Computers in Human behavior, 68*, 1-7.

Djafarova, E., & Trofimenko, O. (2019). 'Instafamous' – credibility and self-presentation of micro-celebrities on social media. *Information, Communication & Society, 22*(10), 1432-1446.

El Hedhli, K., Zourrig, H., & Becheur, I. (2021). Celebrity endorsements: Investigating the interactive effects of internalization, identification and product type on consumers' attitudes and intentions. *Journal of Retailing and Consumer Services, 58,* 102260.

Flavián, C., Ibáñez-Sánchez, S., & Orús, C. (2019). The impact of virtual, augmented and mixed reality technologies on the customer experience. *Journal of Business Research, 100,* 547-560.

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research, 18*(1), 39-50.

Formentini, A. (2020). *Influencer marketing: An investigation on how the type of influencer and the brand attitude affect the purchase intention of branded content on social media* (Unpublished doctoral dissertation). Luiss Guido Carli University, Italy.

Franke, C., Groeppel-Klein, A., & Müller, K. (2023). Consumers' responses to virtualinfluencers as advertising endorsers: novel and effective or uncanny and deceiving? *Journal of Advertising, 52*(4), 523-539.

Friedman, H. H., & Friedman, L. (1979). Endorser effectiveness by product type. *Journal of Advertising Research, 19*(5), 63-71.

Gong, X., & Jiang, X. (2023). Understanding consumer impulse buying in livestreaming commerce: The product involvement perspective. *Frontiers in Psychology, 14*, 1104349.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how toreport the results of PLS-SEM. *European Business Review, 3*1(1), 2-24.

Heider, F. (1958). *The psychology of interpersonal relations*. New York: Wiley and Sons.

Huang, Q. Q., Qu, H. J., & Li, P. (2022). The influence of virtual idol characteristics on consumers' clothing purchase intention. *Sustainability, 14*(14), 8964.

Jaiswal, D., Kant, R., Singh, P. K., & Yadav, R. (2022). Investigating the role of electric vehicle knowledge in consumer adoption: evidence from an emerging market. *Benchmarking: An International Journal, 29*(3), 1027-1045.

Kelman, H. C., & Hovland, C. I. (1953). " Reinstatement" of the communicator in delayed measurement of opinion change. *The Journal of Abnormal and Social Psychology, 48*(3), 327.

Ki, C. W. C., & Kim, Y. K. (2019). The mechanism by which social media influencers persuade consumers: The role of consumers' desire to mimic. *Psychology & Marketing, 36*(10), 905-922.

Kim, H., & Park, M. (2023). Virtual influencers' attractiveness effect on purchase intention: A moderated mediation model of the product‐endorser fit with the brand. *Computers in Human Behavior, 143,* 107703.

Kline, R. B. (2023). *Principles and practice of structural equation modeling*. Guilford publications.

Lavuri, R., Jindal, A., Akram, U., Naik, B. K. R., & Halibas, A. S. (2023). Exploring the antecedents of sustainable consumers' purchase intentions: Evidence from emerging countries. *Sustainable Development, 31*(1), 280-291.

Lou, C., Kiew, S. T. J., Chen, T., Lee, T. Y. M., Ong, J. E. C., & Phua, Z. (2023). Authentically fake? How consumers respond to the influence of virtual influencers. *Journal of Advertising, 52*(4), 540-557.

Lou, C., & Yuan, S. (2019). Influencer marketing: How message value and credibilityaffect consumer trust of branded content on social media. *Journal of Interactive Advertising, 19*(1), 58-73.

Moustakas, E., Lamba, N., Mahmoud, D., & Ranganathan, C. (2020). Blurring lines between fiction and reality: Perspectives of experts on marketing effectiveness of virtual influencers. In *2020 International Conference on Cyber Security and Protection of Digital Services (cyber security)* (pp. 1-6). IEEE.

Mouritzen, S. L. T., Penttinen, V., & Pedersen, S. (2024). Virtual influencer marketing: the good, the bad and the unreal. *European Journal of Marketing, 58*(2), 410-440.

Ohanian, R. (1990). Construction and validation of a scale to measure celebrity endorsers' perceived expertise, trustworthiness, and attractiveness. *Journal of Advertising, 19*(3), 39-52.

Ozdemir, O., Kolfal, B., Messinger, P. R., & Rizvi, S. (2023). Human or virtual: Howinfluencer type shapes brand attitudes. *Computers in Human Behavior, 145*, 107771.

Sands, S., Campbell, C. L., Plangger, K., & Ferraro, C. (2022). Unreal influence: leveraging AI in influencer marketing. *European Journal of Marketing, 56*(6), 1721-1747.

Sanne, P. N., & Wiese, M. (2018). The theory of planned behavior and user engagement applied to Facebook advertising. *South African Journal of Information Management, 20*(1), 1-10.

Schouten, A. P., Janssen, L., & Verspaget, M. (2020). Celebrity vs. Influencer endorsements in advertising: the role of identification, credibility, and Product-Endorser fit. *International Journal of Advertising, 39*(2), 258-281.

Thomas, V. L., & Fowler, K. (2021). Close encounters of the AI kind: Use of AI influencers as brand endorsers. *Journal of Advertising, 50*(1), 11-25.

Tiwari, A., Kumar, A., Kant, R., & Jaiswal, D. (2023). Impact of fashion influencers on consumers' purchase intentions: theory of planned behavior and mediation of attitude. *Journal of Fashion Marketing and Management: An International Journal,28*(2), 209-225.

Vabø, M., & Hansen, H. (2016). Purchase intentions for domestic food: a moderated TPB-explanation. *British Food Journal, 118*(10), 2372-2387.