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Building connections with virtual influencers: the role of friendship and psychological well-being in driving social media engagement and purchase intention

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Abstract

Purpose – With the rise of virtual influencers (VIs) in digital marketing, their role in fostering parasocial relationships with followers has gained significant attention. However, few studies have examined how these interactions influence followers' psychological well-being and engagement intentions. Consequently, this study explores parasocial interactions between VIs and their followers within the context of digital marketing communication. We assess how the communication strategies of language similarity, interest similarity and self-disclosure employed by VIs impact followers' perceived friendship, psychological well-being, social media engagement and purchase intention.

Design/methodology/approach – This investigation surveyed 587 US participants, all followers of human-like VIs. The study examined communication strategies employed by VIs, including language similarity, interest similarity and self-disclosure and their effects on followers' perceived friendship, psychological well-being, social media engagement and purchase intention. Structural equation modeling was used to analyze these relationships.

Findings – Language and interest similarity significantly enhance perceived friendship, while self-disclosure strengthens both perceived friendship and psychological well-being. Interaction frequency had no significant effect on friendship. Perceived friendship positively influences well-being and social media engagement but does not directly affect purchase intention. However, psychological well-being significantly drives both engagement and purchase intention. Indirect effects illustrate that language similarity, interest similarity and self-disclosure influence engagement and purchasing through their impact on friendship and well-being.

Originality/value – This study extends the parasocial interaction framework to VIs, emphasizing how communication strategies foster virtual relationships. It provides new insights into how perceived friendship and well-being mediate these effects, deepening our understanding of the dynamics between digital communication and follower intention in VI marketing.

Keywords Parasocial interaction, Digital communication strategy, Virtual influencer, Friendship, Psychological well-being, Social media engagement

Paper type Research paper

1. Introduction

Driven by rapid advancements in artificial intelligence (AI) and media technologies, virtual influencers (VIs) have become a dominant force in marketing (Byun and Ahn, 2023; Lim and Lee, 2023). These VIs, developed by AI algorithms, closely mimic human personalities and actively engage with audiences across social media platforms such as Instagram, YouTube, and TikTok (Kim and Baek, 2024). As brands increasingly leverage digital personas to foster consumer relationships, the impact of VIs on audience engagement and purchase intention has gained widespread attention (Sands *et al.*, 2022; Zheng *et al.*, 2024). Despite their digital nature, VIs often establish parasocial relationships with followers, creating emotional connection, trust, and influence (Stein *et al.*, 2024; Leung *et al.*, 2022).

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Media technologies such as AI-based deepfake software, natural language processing (NLP), and digital rendering tools are central to creating human-like VIs (Zheng *et al.*, 2024). These technologies enable the development of hyper-realistic digital personas that replicate human-like behavior, speech, and appearance (Lim and Lee, 2023). Human-like VIs, specifically designed to imitate human influencers, differentiate themselves from other digital avatars by closely imitating human influencers in their interaction styles, facial expressions, and body language, making them more relatable to social media users (Kim and Baek, 2024). Consequently, this study focuses on human-like VIs designed to blur the boundary between human and digital interactions by employing personalized communication strategies to form strong emotional bonds with followers (Barari, 2023).

To date, few studies have examined how human-like VIs impact followers' psychological well-being and how these interactions translate into behavioral outcomes (e.g. social media engagement, purchase intention) (Barari, 2023; Byun and Ahn, 2023; Kim and Baek, 2024). Lim and Lee (2023) examined parasocial interactions between human influencers and their followers; however, little is known about how such interactions unfold in the context of human-like VIs. Given VIs increasing influence on consumer behavior, it is crucial to understand how these digital personas influence follower perceptions and actions (Stein *et al.*, 2024; Zheng *et al.*, 2024). This study addresses this gap by investigating the psychological and behavioral effects of communication strategies employed by human-like VIs.

The relevance of VI marketing has recently intensified as more brands turn to digital personas to engage consumers across diverse industries (Dabiran *et al.*, 2024). VIs continue to captivate a wide range of audiences (Byun and Ahn, 2023). Their ability to form personalized, intimate relationships with followers through tailored communication strategies (e.g. language similarity, self-disclosure) makes them an essential modern marketing strategy (Barari, 2023; Leung *et al.*, 2022). In light of this, it is imperative to explore how these strategies impact follower engagement, psychological well-being, and purchase intention.

This study aims to enhance the understanding of VI marketing by investigating how communication strategies (e.g. language similarity, interest similarity, self-disclosure) influence followers' perceived friendship and psychological well-being (Kim and Kim, 2022; Park *et al.*, 2021). Additionally, the scarcity of empirical research examining the psychological effects of interactions with VIs presents a notable gap in the literature. To address this gap, we examine how these communication strategies foster perceived friendship, which, in turn, influences psychological well-being, social media engagement, and purchase intention (Barari, 2023; Stein *et al.*, 2024).

To ensure a coherent structure, this introduction establishes a clear progression from defining the technological and marketing significance of VIs to outlining the research gap. The fourth paragraph, which previously discussed the importance of VIs again, has been streamlined to align with the discussion of existing gaps. Furthermore, to comprehensively reflect the study's objectives, the research questions have been refined:

RQ1. How do communication strategies employed by human-like VIs affect followers' perceived friendship and psychological well-being?

RQ2. What role does perceived friendship play in influencing social media engagement and purchase intention?

RQ3. How does psychological well-being influence social media engagement and purchase intention?

By incorporating these refinements, the study provides a clearer understanding of how human-like VIs shape follower perceptions and behavioral intentions. This research contributes to the growing body of VI marketing knowledge by offering empirical evidence on these effects. Through an analysis of 587 respondents, our findings reveal the importance of communication strategies in shaping follower perceptions and intentions, offering valuable insights for both academics and practitioners. Additionally, we provide recommendations for future research.

2. Literature review

This literature review provides the theoretical foundation for understanding how VIs shape followers' psychological well-being and engagement through communication strategies. It focuses on two key frameworks: (1) parasocial interaction (PSI) and (2) structural and situational communication skills. The first subsection explores PSI, originally developed for traditional media, and its extension to social media. Research supports applying PSI to VIs, showing how they, like traditional media figures, foster emotional connections despite the lack of direct interaction. The second subsection examines structural and situational communication skills, which are essential for understanding VI-follower relationships. Structural skills (e.g. language, interest similarity) create a foundation of shared identity, while situational skills (e.g. interaction frequency, self-disclosure) allow VIs to engage followers in a dynamic, personalized manner. These frameworks guide the reader through how VIs use these strategies to influence follower emotions and intentions, enhancing psychological well-being and social media engagement.

2.1 Theoretical background

PSI is a well-established concept in media communication psychology, originally developed to explain how individuals form one-sided relationships with media personalities, such as celebrities and TV characters (Aw and Labrecque, 2020; Bhattacharya, 2023; Horton and Wohl, 1956; Kim and Kim, 2020; Ma and Li, 2024). Although initially grounded in traditional media, PSI has been widely extended to digital and social media platforms, where users develop emotional bonds with influencers, including VIs. The core of PSI remains the same: followers feel connected to media figures who may be unaware of their individual existence, fostering a sense of intimacy and friendship (Kim and Kim, 2022; Ma and Li, 2024; Yuksel and Labrecque, 2016). This concept is highly relevant to social media environments, where users experience similar psychological effects when engaging with VIs.

Recent studies illustrate how the same psychological mechanisms that apply to traditional media figures also apply to influencers in digital environments (Kim and Baek, 2024; Kim and Kim, 2020; Ma and Li, 2024). Social media platforms provide interaction opportunities, yet parasocial relationships persist, as these interactions often remain one-sided, with influencers shaping the emotional experiences of their followers through content creation. Our research explores how VIs utilize language similarity, interest similarity, interaction frequency, and self-disclosure to create parasocial relationships with followers, mirroring traditional media strategies that establish trust and perceived friendship with audiences (Aw and Labrecque, 2020; Bhattacharya, 2023; Horton and Wohl, 1956).

This study highlights how VIs replicate aspects of traditional media personalities while also adapting to social media's interactive nature. Although VIs operate in a more participatory environment, they use communication strategies like language similarity and self-disclosure, foundational to traditional media parasocial relationships (Stein *et al.*, 2024), to cultivate emotional bonds with followers. These strategies foster trust and a sense of connection, just as television and film personalities have done (Lim and Lee, 2023). Despite different media landscapes, the psychological foundation of PSI remains consistent. The ways audiences form emotional attachments to media figures, whether on television or through a digital platform, are fundamentally the same (Ma and Li, 2024; Kim and Kim, 2022; Yuksel and Labrecque, 2016). Therefore, applying the PSI framework to VIs in a social media context is both appropriate and necessary, as this study demonstrates how VIs shape followers' emotions and intentions by leveraging parasocial relationships (Lim and Lee, 2023). By fostering emotional connections through interaction frequency and self-disclosure, VIs emulate the impact traditional media figures have had on audiences, driving engagement and purchase intention (Ma and Li, 2024; Stein *et al.*, 2024).

2.2 Structural and situational communication skills

Structural communication skills refer to how messages are crafted to resonate with an audience, such as through language and interest similarity by VIs (Vrontis *et al.*, 2021). "Language

similarity" involves aligning a VI's language with that of their followers, enhancing the effectiveness of digital content by fostering a sense of closeness and shared identity (Kim and Baek, 2024; Vrontis *et al.*, 2021). When VIs use familiar or culturally reflective language, it strengthens followers' connection, especially when the language mirrors their vernacular or background (Kim and Kim, 2022). "Interest similarity" pertains to aligning content shared by VIs with followers' preferences. By focusing on relevant themes, hobbies, or values, VIs make their content more meaningful, creating a deeper sense of relatability and shared identity (Kim and Kim, 2020; Naderer *et al.*, 2021).

Situational communication skills involve adapting communication strategies to different contexts and audiences (Shen *et al.*, 2022). For VIs, this includes interaction frequency and self-disclosure (Wang and Liao, 2023). "Interaction frequency" refers to how often followers engage with a VI's content (e.g. likes, comments, live sessions), and requires VIs to strategically manage the timing and nature of these interactions to maintain ongoing engagement and a sense of friendship (Kim and Kim, 2020; Peng *et al.*, 2017). Self-disclosure involves a VI's ability to share personal details and emotions, carefully balancing depth and frequency to build trust and authenticity, depending on situational context and audience expectations (Wang and Liao, 2023). When VIs engage in self-disclosure, they foster perceptions of authenticity, encouraging followers to reciprocate and deepen the emotional bond (Kim and Kim, 2020; Naderer *et al.*, 2021).

The combination of structural and situational communication skills enables VIs to mimic real-life human interactions in digital spaces, fostering deep parasocial relationships (Kim and Baek, 2024; Shen *et al.*, 2022). Structural skills (e.g. language similarity, interest similarity) establish a solid foundation for these relationships by creating a shared identity and common ground (Vrontis *et al.*, 2021). In contrast, situational skills (e.g. interaction frequency, self-disclosure) allow for dynamic, adaptive engagement, replicating the give-and-take of real friendships (Wang and Liao, 2023). These skills are critical for maintaining and deepening emotional bonds between VIs and followers, enhancing psychological well-being, engagement, and purchase intention (Kim and Baek, 2024; Shen *et al.*, 2022). Thus, the strategic use of these communication skills is integral to shaping follower perceptions and intentions, highlighting VIs pivotal role in digital marketing (Vrontis *et al.*, 2021).

2.3 Perceived friendship

Perceived friendship, a concept rooted in PSI theory, explains how individuals form one-sided emotional relationships with media figures, including VIs, despite the lack of real, reciprocal interaction. Among PSI components, perceived friendship is particularly relevant as it encapsulates the emotional closeness, trust, and sense of social connection that followers feel toward VIs. Unlike admiration or mere identification, perceived friendship reflects a deeper, personal connection that mirrors real-life social relationships and fosters engagement and influence (Reinikainen *et al.*, 2020; Vrontis *et al.*, 2021). Particularly, perceived friendship aligns with the interactive and immersive nature of digital platforms, where VIs can simulate real-time engagement through direct messages, personalized content, and consistent interaction (Yan *et al.*, 2024). This differentiates perceived friendship from other PSI components by emphasizing not only emotional attachment but also behavioral outcomes, such as increased social media engagement and consumer actions (Kim and Kim, 2022).

According to social identity theory, the perception of friendship emerges when followers identify with their favorite VIs as part of their in-group, sharing common traits, interests, or communication patterns (Vrontis *et al.*, 2021). This perceived similarity builds trust and loyalty, making the VI appear more approachable and relatable. While these relationships lack the two-way interaction of real friendships, the emotional investment from followers often mirrors the trust, comfort, and support found in real-world social bonds (Aw and Labrecque, 2020). Kim and Kim (2022) find that these relationships can significantly impact follower engagement, deepening the parasocial bond.

2.4 Psychological well-being

Psychological well-being, which encompasses emotional fulfillment, life satisfaction, and mental health, is significantly influenced by interactions between VIs and their followers (Luo and Hancock, 2020; Mackson *et al.*, 2019). In the context of parasocial relationships, psychological well-being refers to the positive emotional and mental health outcomes that followers experience as a result of these interactions. Digital relationships with VIs can profoundly impact followers' psychological well-being by providing emotional support, entertainment, and a sense of belonging (Vrontis *et al.*, 2021).

Drawing from self-determination theory, which emphasizes the importance of autonomy, competence, and relatedness in fostering well-being, parasocial relationships with VIs satisfy the human need for relatedness by fostering a sense of connection, even without direct interaction (Kim and Kim, 2022). These one-sided digital bonds help mitigate feelings of loneliness and isolation, contributing positively to followers' mental and emotional health (Luo and Hancock, 2020). Accordingly, followers who experience emotional fulfillment from their parasocial relationships are more likely to engage with content and develop lasting attachments to the VI (Reer *et al.*, 2019). This enhances their psychological well-being, strengthens the follower's connection to the influencer, and motivates increased engagement and social media activity (Luo and Hancock, 2020).

2.5 Research hypotheses development

This study proposes a conceptual model grounded in PSI and communication strategies, which examines how VIs influence followers' perceived friendship, psychological well-being, social media engagement, and purchase intention. Each construct is chosen for its relevance to existing digital marketing and communication theory (Farivar and Wang, 2022; Lin *et al.*, 2021). Language and interest similarity represent key structural communication skills that build trust and closeness between the influencer and the follower. Interaction frequency and self-disclosure, as situational communication skills, allow VIs to foster dynamic, personalized interactions, enhancing emotional bonds. These constructs are crucial for understanding how VIs emulate real-life human interaction to drive purchase intention.

The model is built on social identity theory (Farivar and Wang, 2022) and social exchange theory (Kim and Kim, 2022; Lin *et al.*, 2021), which explain how perceived similarity and mutual benefits strengthen relationships and positive outcomes. Social identity theory posits that individuals define themselves through group memberships and shared social identities (Farivar and Wang, 2022). When individuals perceive similarities with a group or its members, they develop a sense of belonging, which strengthens emotional connections and influences behaviors. In the context of VIs, followers may identify with a VI based on shared communication styles, interests, and disclosure patterns, leading to the formation of perceived friendship and enhanced engagement (Kim and Baek, 2024).

Specifically, language similarity signals in-group membership by reinforcing familiarity and relatability, making the VI appear more approachable and trustworthy. Interest similarity further enhances this effect by aligning content with the personal values and hobbies of followers, strengthening the perceived bond. Additionally, self-disclosure fosters deeper emotional connections, as followers interpret these personal insights as a sign of authenticity and relatability (Su *et al.*, 2015). By fostering perceived friendship, these communication strategies contribute to psychological well-being, which aligns with research suggesting that strong social bonds (Kim and Kim, 2022). Furthermore, social identity theory suggests that when individuals feel emotionally connected to a figure they identify with, they are more likely to engage in social behaviors (Lin *et al.*, 2021). Consequently, this study explores three key research questions, and the following hypotheses are developed: H1 and H2 address RQ1, while H3, H4, and H5 relate to RQ2 and RQ3.

From a psychological standpoint, SI theory suggests that individuals are more likely to connect with those they perceive as belonging to their social group, often indicated by shared

language and interests (Kim and Kim, 2022). Kadekova and Holienčinova (2018) and Kim and Kim (2020) have shown that such similarities act as cues for group membership, fostering comfort, familiarity, and stronger perceptions of friendship. Social exchange theory further posits that relationships are strengthened when mutual benefits (e.g. shared interests) are perceived, enhancing a sense of friendship (Kim and Kim, 2020). Additionally, self-disclosure deepens communication, building trust and intimacy—a process well-documented in earlier research (Su *et al.*, 2015; Wang and Liao, 2023). Frequent engagement with VIs can mimic repeated real-life interactions, leading followers to perceive a deeper psychological connection (Wang and Liao, 2023). Thus, we propose the following hypotheses:

H1a. Virtual influencers' language similarity positively impacts followers' perceived friendship.

H1b. Virtual influencers' interest similarity positively impacts followers' perceived friendship.

H1c. Virtual influencers' interaction frequency positively impacts followers' perceived friendship.

H1d. Virtual influencers' self-disclosure positively impacts followers' perceived friendship.

Social identity theory suggests that individuals who feel a sense of belonging to a social group, marked by shared traits (e.g. language, interests) tend to experience higher psychological well-being due to feelings of acceptance and inclusion (Kim and Kim, 2020; Stawarczyk *et al.*, 2012; Suh and Li, 2022). Engaging with others who share similar interests often leads to enjoyment, fulfillment, and satisfaction, key components of well-being (Kim and Kim, 2022). Self-disclosure plays a vital role in emotional regulation, as sharing experiences helps express and validate positive emotions (Cheung *et al.*, 2015; Leite and Baptista, 2022). When VIs engage in self-disclosure, it encourages followers to reflect similar positive emotional states, enhancing their psychological well-being (Leung *et al.*, 2022). Attachment theory also highlights how consistent interaction fosters comfort and security, boosting well-being (Kim and Kim, 2020). Frequent engagement with VIs can simulate social connections, creating a sense of attachment and improving overall well-being (Leite and Baptista, 2022). Based on these insights, we formulate the following hypotheses:

H2a. Virtual influencers' language similarity positively impacts followers' psychological well-being.

H2b. Virtual influencers' interest similarity positively impacts followers' psychological well-being.

H2c. Virtual influencers' interaction frequency positively impacts followers' psychological well-being.

H2d. Virtual influencers' self-disclosure positively impacts followers' psychological well-being.

In the realm of psychology, perceived friendship holds significance as a manifestation of social connection and social support (Kim and Kim, 2022). Social support theory asserts that supportive close relationships contribute to elevated levels of psychological well-being due to the sense of support and connection nurtured within these relationships (Youn and Jin, 2021). When followers perceive a connection to VIs, they are more motivated to engage with VIs through activities such as sharing, liking, commenting, and participating in discussions. Perceived friendship influences social media engagement by enhancing connectedness (Kim

and Kim, 2020). Furthermore, followers who regard VIs as friends are more likely to trust the influencer's opinions and recommendations (Lim and Kim, 2011; Youn and Jin, 2021). Thus, perceived VI friendship is expected to positively influence purchase intentions (Lim and Kim, 2011). Consequently, we develop the following hypotheses:

H3a. Followers' perceived friendship with virtual influencers positively impacts their psychological well-being.

H3b. Followers' perceived friendship with virtual influencers positively impacts their social media engagement.

H3c. Followers' perceived friendship with virtual influencers positively impacts their purchase intention.

Grounded in the broaden-and-build theory of positive emotions, it is posited that individuals' positive psychological states can expand their cognitive and emotional capacities (Qayyum *et al.*, 2023). On social media, a heightened psychological well-being serves as a motivational catalyst for individuals, encouraging increased engagement in digital interactions and content consumption. This heightened engagement, nurtures positive emotions (Qayyum *et al.*, 2023; Reer *et al.*, 2019). Furthermore, as psychological well-being elevates an individual's emotional state, followers are more likely to engage in activities such as sharing, liking, and commenting on social media posts. Hence, their positive emotional states influence decision-making (Qayyum *et al.*, 2023; Reer *et al.*, 2019). As such, we establish the following hypotheses:

H4a. Followers' psychological well-being positively impacts their social media engagement.

H4b. Followers' psychological well-being positively impacts their purchase intention.

Active digital engagement fosters a heightened cognitive processing of information (Baek and Kim, 2023; Kim and Baek, 2024; Park *et al.*, 2021). When followers interact with VIs posts and discussions, they seek information pertaining to product features, benefits, and user experiences as recommended and discussed by their favored VIs (Kim and Kim, 2020). This cognitive engagement typically results in an augmentation of awareness and knowledge, both of which represent pivotal factors within the complex framework of followers' decision-making processes, particularly in the context of purchasing decisions (Park *et al.*, 2021). In light of these, the final hypothesis is:

H5. Followers' social media engagement positively impacts their purchase intention.

3. Methods

3.1 Data collection

This study focused on U.S. followers to human-like VIs, chosen due to the country's leadership in social media use and AI adoption, making it a prime setting for exploring VIs. The U.S. is a major market for platforms like Instagram, YouTube, and TikTok, where consumers are highly engaged with digital content, including AI-driven innovations like VIs. In 2023, influencer marketing in the U.S. surpassed $16.4bn, highlighting the market's significance for traditional influencers and VIs (Statista, 2024). The U.S. also offers a culturally diverse, digitally savvy audience that forms strong parasocial relationships, making it ideal for studying the psychological impacts of VIs on social media engagement and purchase intention (Kim and Baek, 2024; Zheng *et al.*, 2024).

Participants were recruited using Amazon Mechanical Turk (MTurk) and Qualtrics, both widely used in social science research for efficiently accessing diverse samples (Hauser and

Schwarz, 2016; Kees *et al.*, 2017). To ensure participant reliability, criteria included a HIT approval rating of 95% or higher and at least 500 approved HITs on MTurk, following standard practices to filter for quality responses (Peer *et al.*, 2014). Screening questions ensured respondents were U.S.-based, familiar with VIs, and subscribed to their official social media channels, enhancing sample representativeness (Statista, 2024).

The survey began with a comprehensive definition of VIs, characterizing them as digitally created personas powered by AI and graphic design, which simulate human-like interactions on social media platforms, and entirely fictional characters managed by brands or creative agencies, engaging social media users by sharing content, responding to comments, and collaborating with brands. Participants viewed randomly selected videos and images from VIs' social media posts and confirmed their familiarity with this specific subtype, characterized by a human-like appearance. Screening questions verified that participants had viewed content from human-like VIs and were subscribed to their official channels. Participants were prompted to name their favorite VI, and these responses were cross-verified through Google searches to ensure accurate identification. Demographic questions further confirmed U.S. nationality, ensuring cultural homogeneity. Participants were compensated $0.50 for completing the survey.

Data collection occurred in May 2022, yielding 600 responses. After excluding surveys that failed attention-check questions or provided invalid responses (e.g. incomplete social media profiles, rapid survey completion under three minutes), 587 valid responses were included in the final analysis. The sample size exceeded the recommended 384 participants based on Cochran's formula, ensuring generalizability (Cochran, 1942; Nanjundeswaraswamy and Divakar, 2021). While larger than typical SEM recommendations, this sample improved statistical power, minimizing Type II errors and providing more precise parameter estimates (Kline, 2023; Kyriazos, 2018). Most participants primarily engaged with VIs on Instagram and YouTube, reflecting broader U.S. social media usage patterns, where visual and video-based content thrives (Jhawar *et al.*, 2023). These platforms are popular for influencer marketing, including VIs, due to their focus on dynamic, multimedia content and high user engagement, aligning with the capabilities of VIs. Table 1 presents a demographic characteristic breakdown.

3.2 Measures

In this study, the assessment of various constructs necessitated adapting and modifying multiple measurement items, drawing from the realms of digital communication, social media marketing, and online consumer behavior. These measures were meticulously refined during the conceptualization phase and demonstrated robust reliability and validity across diverse research contexts. To safeguard content validity during the measurement development process, two esteemed scholars in the fields of digital communication and digital marketing were invited to critically evaluate and provide feedback on the selected and revised measurement items. A pilot test involving 50 undergraduate participants was then conducted to fine-tune specific items and enhance the questionnaire's overall structure. Particularly, in this study, social media engagement was operationalized as user interactions with VIs on digital platforms, including likes, shares, comments, and follows, which reflects active participation and involvement in the VI's content (vs. interaction frequency: how often a user encounters a VI's content, regardless of engagement depth). Purchase intention was operationalized as a consumer's likelihood of buying a product based on exposure to a VI's content.

To mitigate the common method variance, as recommended by MacKenzie and Podsakoff (2012), survey items, excluding demographic variables, were randomized. Respondents evaluated the items using a 7-point Likert scale ranging from "1 = strongly disagree" to "7 = strongly agree" (Table 2). The 7-point Likert scale was chosen for its ability to capture a greater degree of variation in respondents' attitudes compared to shorter scales. Research suggests that a 7-point scale strikes a balance between reliability and clarity, while avoiding

Table 1. Demographic analysis of respondents

Demographic variables		$n = 587$	Percent
Gender	Male	279	47.5
	Female	308	52.5
Age	20s	422	71.8
	30s	144	24.5
	40s	12	2.0
	Over 50	9	1.7
The most used social network site to interact with the preferred VI	Facebook	38	6.4
	Twitter	23	3.9
	Instagram	258	43.9
	YouTube	253	43.1
	Others	15	2.7
Education	High school graduate	98	16.6
	Associate degree	121	20.6
	Bachelor's degree	336	57.2
	Graduate degree	32	5.6
Occupation	Self-employed	116	19.7
	Employed	301	51.2
	Out of work and looking for work	24	4.0
	Homemaker	82	13.6
	Student	22	3.7
	Military	42	7.8

Source(s): Authors' own work

response bias associated with smaller scales. It also offers more granularity for measuring subtle differences in perceptions (Joshi *et al.*, 2015).

4. Results

4.1 Measurement model

Prior to examining the proposed relationships among the study variables, we conducted a comprehensive statistical inquiry to assess the reliability and validity of the various factors and their corresponding indicators. In the initial step, reliability was evaluated utilizing Cronbach's alpha coefficients in SPSS 28.0. As depicted in Table 2, all variables exceeded the conventional threshold of 0.70, commonly accepted in the social sciences (Baek and Kim, 2023; Hair *et al.*, 2010). Specifically, Cronbach's alpha coefficients were as follows: language similarity = 0.876; interest similarity = 0.765; interaction frequency = 0.773; self-disclosure = 0.831; perceived friendship = 0.901; psychological well-being = 0.818; social media engagement = 0.808; and purchase intention = 0.769. Notably, no items were excluded during this rigorous evaluation process.

To assess the data's suitability for factor analysis, we conducted Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. Bartlett's test was significant ($\chi^2 = 1600.32$, $p < 0.001$), indicating sufficient correlations among variables to justify the use of factor analysis. The KMO value of 0.850 exceeded the recommended 0.600 threshold, confirming the sample size was adequate. These results demonstrate that the data were appropriate for conducting factor analysis and further structural assessments (Hair *et al.*, 2010).

To assess validity, a confirmatory factor analysis (CFA) was conducted using AMOS 28.0, following the guidelines proposed by Anderson and Gerbing (1992) and Bollen (2002). AMOS 28.0, a widely recognized software, was chosen for its robust capacity in estimating model parameters, evaluating model fit and allowing for covariance-based SEM, which is

Table 2. Measurement model from CFA

Constructs and sources	Items	Standardized estimates	Critical ratios
Language similarity from Su *et al.* (2015)	1. My preferred virtual influencer employs a communication style (language, phrases, terms, etc.) that resonates with me on social media platforms	0.813	Fixed
	2. The way my preferred virtual influencer communicates is akin to how I interact with my friends on social media	0.723	18.944
	3. There's a notable similarity between my communication style and that of my preferred virtual influencer on social media	0.852	23.506
	4. I appreciate the communication style adopted by my preferred virtual influencer on social media platforms	0.816	22.189
Interest similarity from Su *et al.* (2015)	1. I find myself intrigued by the topics my favorite virtual influencer discusses on their social media profiles	0.811	Fixed
	2. My preferred virtual influencer shares common interests with me when they communicate on social media platforms	0.572	14.049
	3. I have a positive affinity for the content my favorite virtual influencer shares on their social media pages	0.841	22.403
Interaction frequency from Su *et al.* (2015)	1. How frequently do you engage with the content (e.g. text, images, or videos) shared by your preferred virtual influencer on their social media profiles?	0.548	Fixed
	2. How often do you express your approval by clicking the "like" button on the posts made by your favorite virtual influencer on their social media profiles?	0.741	13.153
	3. How frequently do you participate in discussions by leaving comments on the posts made by your preferred virtual influencer on their social media profiles?	0.790	12.733
	4. How often do you distribute the content shared by your favorite virtual influencer on their social media profiles with your own network?	0.773	12.610
Self-disclosure from Su *et al.* (2015)	1. My preferred virtual influencer willingly shares personal details with their followers on their social media profiles	0.680	Fixed
	2. My favorite virtual influencer is candid about their emotions when communicating with followers on their social media profiles	0.619	13.590
	3. My preferred virtual influencer is quite transparent about themselves when interacting with followers on their social media profiles	0.820	17.398
	4. My favorite virtual influencer discloses a significant amount of information about themselves on their social media profiles	0.637	13.956
	5. My preferred virtual influencer provides substantial insights into their life on their social media profiles	0.789	16.845

(*continued*)

Table 2. Continued

Constructs and sources	Items	Standardized estimates	Critical ratios
Perceived friendship from Yim *et al.* (2008)	1. The interaction I have with my preferred virtual influencer on social media platforms feels personally connected	0.762	Fixed
	2. I experience a sense of closeness and intimacy when I engage with my favorite virtual influencer on their social media profiles	0.717	17.734
	3. Interacting with my favorite virtual influencer on social media is akin to conversing with one of my close friends	0.739	18.362
	4. I perceive my favorite virtual influencer as someone who could be a friend in real life	0.858	21.856
	5. I feel emotionally connected to my favorite virtual influencer in real life	0.779	19.550
	6. I have a desire to reciprocate and support my favorite virtual influencer in real life	0.671	16.500
	7. I am inclined to share my genuine thoughts and feelings with my favorite virtual influencer	0.681	16.755
Well-being from Lee (2018)	1. The social media presence of my favorite virtual influencer fulfills my overall needs	0.602	Fixed
	2. The social media profiles of my favorite virtual influencer significantly contribute to my social well-being	0.801	17.571
	3. The social media profiles of my favorite virtual influencer play a significant role in enhancing my leisure well-being	0.841	14.231
Social media engagement from Giakoumaki and Krepapa (2020)	1. I have the intention to click the "like" or similar approval features for the video content created by this virtual influencer	0.679	Fixed
	2. I am inclined to share the video content produced by this virtual influencer	0.680	14.615
	3. I intend to provide comments or feedback on the video content created by this virtual influencer	0.854	17.536
	4. I have a desire to maintain my ongoing subscription to the channel of this virtual influencer	0.661	14.237
Purchase intention from Baek and Yoon (2022)	1. Please indicate the likelihood of purchasing a product recommended by this virtual influencer, ranging from "Very Unlikely" to "Very Likely."	0.764	Fixed
	2. Please rate the possibility of purchasing a product recommended by this virtual influencer on a scale from "Impossible" to "Possible."	0.508	10.895
	3. Please assess the probability of purchasing a product recommended by this virtual influencer on a scale from "Improbable" to "Probable."	0.825	14.947

Source(s): Authors' own work

well-suited for confirming theoretical models and testing the relationships between latent constructs (Hair *et al.*, 2010). This CFA aimed to elucidate the relationships, significance, quantity, and patterns between the factors and their corresponding indicators. The results exhibited favorable overall fit indices: $\chi^2 = 1{,}436.191$, degrees of freedom = 464, $p < 0.001$ (χ^2/degrees of freedom = 3.095, below the recommended threshold of 3.5), Root Mean Square Error of Approximation (RMSEA) = 0.060 (below the threshold of 0.080), Normed Fit Index

(NFI) = 0.916 (exceeding the 0.90 benchmark), Comparative Fit Index (CFI) = 0.915 (exceeding the 0.90 benchmark), and the Tucker-Lewis Index (TLI) = 0.904 (surpassing the 0.90 benchmark) (Hair *et al.*, 2010). Throughout this rigorous CFA, no indicators were removed, and all constructs demonstrated convergent validity exceeding the recommended minimum threshold (i.e. standardized estimates of each indicator surpassing 0.50, $p < 0.01$, critical ratios for all factor loadings exceeding 1.960, $p < 0.05$), and composite construct reliabilities for all constructs exceeded 0.60, aligning with established criteria (Hair *et al.*, 2010) (Tables 2 and 3).

To assess discriminant validity, we employed the Heterotrait-Monotrait (HTMT) ratio. All HTMT values between constructs were below the recommended threshold of 0.850 (Henseler *et al.*, 2015) (Table 3), confirming the constructs are sufficiently distinct from one another. These results provide strong evidence that the constructs are not overly similar, further supporting the overall validity of the model.

To address the potential common method variance (CMV) issue, we randomized the question order in the survey and implemented a rigorous statistical approach to systematically evaluate this issue, which may arise due to methodological constraints inherent in the survey methodology (MacKenzie and Podsakoff, 2012). These constraints encompass various response biases associated with scale types, social desirability, halo effects, and response formats, as elucidated by Bagozzi and Yi (1990). Harman's one-factor test indicated that the first factor explained 32% of the variance, below the recommended threshold of 50%, suggesting that CMB is not a significant concern. Furthermore, the average inter-item correlation was 0.32, within the acceptable range of 0.15–0.50, indicating appropriate internal consistency among the items. Additionally, the variance inflation factor values for all constructs were below 2.5, well within the accepted threshold of 3, confirming that multicollinearity and CMV are unlikely to be problematic in this study (Hair *et al.*, 2010; MacKenzie and Podsakoff, 2012).

4.2 Testing of the research hypotheses via structural equation modeling

Covariance-based structural equation modeling (CB-SEM) using AMOS 28.0 was employed for this study. CB-SEM is preferred when the research aims to confirm theoretical models and test relationships between latent constructs, as it provides a rigorous analysis of the model's fit to the data (Hair *et al.*, 2010). Compared to variance-based (VB) SEM, CB-SEM offers a more accurate assessment of model parameters when the focus is on theory confirmation rather than prediction (Dash and Paul, 2021).

Table 3. Construct intercorrelations, heterotrait-monotrait (HTMT), means, and standard deviations

HTMT	LS	IS	IF	SD	PF	PW	SE	PI
LS	1							
IS	0.791	1						
IF	0.763	0.723	1					
SD	0.771	0.744	0.712	1				
PF	0.732	0.784	0.681	0.753	1			
PW	0.682	0.702	0.643	0.735	0.772	1		
SE	0.654	0.694	0.605	0.712	0.792	0.723	1	
PI	0.613	0.652	0.572	0.663	0.703	0.653	0.721	1
Mean	5.457	5.779	5.441	5.730	5.279	5.634	5.334	5.787
SD	1.193	1.056	1.068	1.033	1.120	1.120	1.233	1.182
AVE	0.644	0.564	0.518	0.509	0.557	0.570	0.522	0.507
CCR	0.878	0.791	0.808	0.837	0.897	0.796	0.812	0.748

Note(s): LS: Language similarity; IS: Interest similarity; IF: Interaction frequency; SD: Self-disclosure; PF: Perceived friendship; PW: Psychological Well-being; SE: Social media engagement; PI: Purchase intention
Source(s): Authors' own work

Control variables, such as age, gender, and social media usage (e.g. duration of time spent on social media, frequency of interactions with VIs), were included to account for potential demographic and behavioral differences. This inclusion supports the validity of the proposed model and highlights the generalizability of the results. The comprehensive assessment of the proposed model yielded the following overall goodness-of-fit statistics: χ^2 = 1,478.514, degrees of freedom = 472, $p < 0.001$, χ^2/degrees of freedom = 3.132, RMSEA = 0.060, NFI = 0.877, CFI = 0.912, and TLI = 0.902. The model's explanatory power was evaluated using the Squared Multiple Correlations (SMC) for each endogenous variable (Table 4). Perceived friendship has an SMC of 0.641, meaning its variance is 64.1% explained by language similarity, interest similarity, interaction frequency, and self-disclosure. Psychological well-being (SMC = 0.765) is largely explained by perceived friendship and

Table 4. Standardized structural estimates

Path	Standardized estimates	Standardized errors	Critical ratios	Results
H1a:Language similarity → Perceived friendship	0.340	0.071	4.804**	Accepted
H1b:Interest similarity → Perceived friendship	0.292	0.097	3.302**	Accepted
H1c:Interaction frequency → Perceived friendship	0.066	0.117	0.776	Rejected
H1d:Self-disclosure → Perceived friendship	0.173	0.084	2.265*	Accepted
H2a:Language similarity → Psychological well-being	−0.057	0.064	−0.757	Rejected
H2b:Interest similarity → Psychological well-being	0.449	0.092	4.494**	Accepted
H2c:Interaction frequency → Psychological well-being	−0.071	0.104	−0.801	Rejected
H2d:Self-disclosure → Psychological well-being	0.302	0.076	3.654**	Accepted
H3a:Perceived friendship → Psychological well-being	0.311	0.055	4.806**	Accepted
H3b:Perceived friendship → Social media engagement	0.606	0.069	8.643**	Accepted
H3c:Perceived friendship → Purchase intention	−0.018	0.072	−0.186	Rejected
H4a:Psychological well-being → Social media engagement	0.280	0.077	4.225**	Accepted
H4b:Psychological well-being → Purchase intention	0.514	0.090	5.632**	Accepted
H5:Social media engagement → Purchase intention	0.342	0.083	3.521**	Accepted

Indirect path	Standardized estimates	*p*-value
Language similarity → Social media engagement	0.220	0.001
Interest similarity → Social media engagement	0.329	0.004
Self-disclosure → Social media engagement	0.205	0.002
Language similarity → Purchase intention	0.094	0.149
Interest similarity → Purchase intention	0.385	0.005
Self-disclosure → Purchase intention	0.250	0.003

Endogenous variables	SMC
Perceived friendship	0.641
Psychological well-being	0.765
Social media engagement	0.707
Purchase intention	0.619

Note(s): $^{**}p < 0.01$, $^{*}p < 0.05$
Source(s): Authors' own work

communication strategies. Social media engagement (SMC = 0.707) is driven by perceived friendship and psychological well-being, while purchase intention (SMC = 0.619) is influenced by social media engagement and psychological well-being. This robust explanatory capability supports the overall strength and viability of the theoretical framework, confirming that the predictors and mediators effectively account for significant variance in key outcomes (Hair *et al.*, 2010). Detailed estimates of each path within the proposed model are presented in Figure 1 and Table 4.

The empirical findings reveal significant influences across perceived friendship, psychological well-being, social media engagement, and purchase intention. Language similarity (H1a), interest similarity (H1b), and self-disclosure (H1d) emerged as key communication strategies positively affecting perceived friendship between followers and VIs. Specifically, language and interest similarity enhanced perceptions of emotional closeness, making followers feel more connected. This demonstrates that when VIs communicate using relatable language or shared interests, they effectively replicate human-like interactions, fostering emotional bonds despite their artificial nature. However, interaction frequency (H1c) did not significantly impact perceived friendship, suggesting that communication quality is more crucial than the sheer quantity of interactions.

Interest similarity (H2b) and self-disclosure (H2d) were found to positively influence followers' psychological well-being, which is defined as the emotional satisfaction and positive mental state derived from VI interactions. These results indicate that when VIs align their content with followers' interests or share personal insights, followers experience greater emotional fulfillment. In contrast, language similarity (H2a) and interaction frequency (H2c) did not significantly influence well-being, suggesting that deeper, meaningful content has a stronger effect on emotional well-being than superficial or frequent communication.

These findings align with existing research on human influencers, where interest similarity and self-disclosure are known to facilitate emotional connections (Aw and Labrecque, 2020; Kim and Kim, 2020). However, while previous research suggests that language similarity enhances emotional connections with human influencers (Barari, 2023; Bhattacharya, 2023), our findings indicate that this effect does not hold for VIs in the same way. This distinction

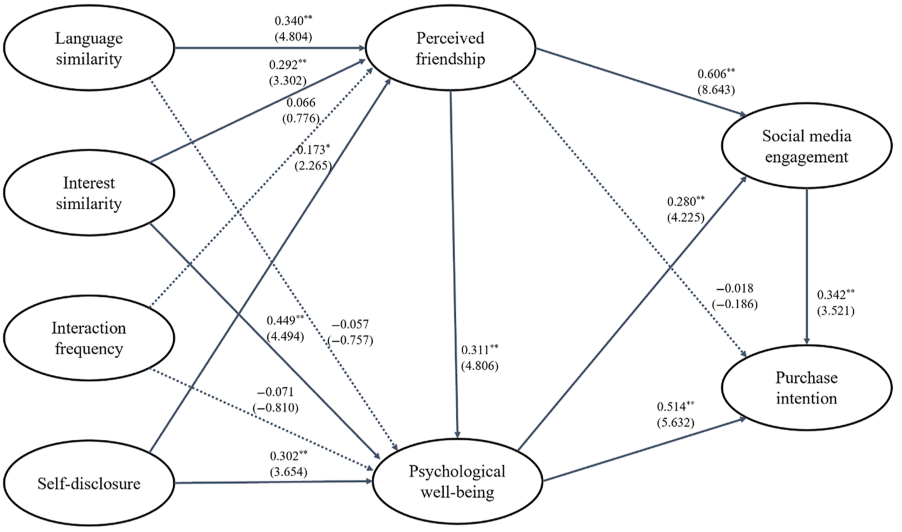

Figure 1. Estimates of SEM. Note. $^{**}p < 0.01$, $^{*}p < 0.05$, standardized coefficient (critical ratio), solid line: significant path, dotted line: insignificant path. Source: Authors' own work

highlights the unique nature of parasocial interactions with VIs, suggesting that factors such as content relevance and self-disclosure may play a more significant role in fostering perceived friendship and psychological well-being in digital influencer relationships.

Interestingly, our findings diverge from traditional PSI frameworks regarding interaction frequency. Prior studies suggest that frequent interactions strengthen parasocial relationships (Kim and Baek, 2024), but our results indicate that interaction frequency does not significantly impact perceived friendship. This suggests that, for VIs, high-quality, strategic communication (e.g. language, content alignment) may be more effective than frequent interactions in cultivating emotional closeness (Barari, 2023; Lim and Lee, 2023). Additionally, while interest similarity and self-disclosure positively affected psychological well-being, language similarity did not. This challenges earlier studies that emphasized the role of linguistic alignment in fostering emotional connections (Aw and Labrecque, 2020), suggesting that deeper personal relevance is more impactful for well-being than surface-level language alignment.

The study demonstrated that perceived friendship significantly impacted psychological well-being (H3a) and social media engagement (H3b), but did not directly influence purchase intention. This finding emphasizes that perceived closeness, beyond direct communication, is crucial in how followers derive emotional benefits from interactions with VIs. By establishing emotional connections through engaging and personalized communication, VIs improve followers' psychological well-being, reinforcing the importance of perceived closeness in digital influencer relationships.

Psychological well-being notably affected social media engagement (H4a) and purchase intention (H4b), underscoring that followers experiencing greater emotional satisfaction are more inclined to engage actively with VIs and convert engagement into purchase intention. Additionally, social media engagement significantly influenced purchase intention (H5), confirming that followers who interact more actively with VI content are more likely to act on product endorsements. These findings highlight a powerful link between emotional fulfillment, active engagement, and consumer behavior, showing that positive emotions derived from interactions can drive purchase decisions.

Our analysis also explored indirect effects, revealing that language similarity (standardized indirect estimate = 0.220, $p < 0.01$), interest similarity (0.329, $p < 0.01$), and self-disclosure (0.205, $p < 0.01$) had significant indirect impacts on social media engagement, mediated through perceived friendship and psychological well-being. Similarly, interest similarity (0.385, $p < 0.01$) and self-disclosure (0.250, $p < 0.01$) had significant indirect effects on purchase intention, mediated by perceived friendship, well-being, and engagement (Table 4). These findings highlight that VIs shape consumer behavior through direct interactions and by fostering deep emotional connections that lead to engagement and purchase intention.

5. Conclusion and discussion

5.1 Theoretical implications

This study makes significant contributions to extending PSI framework by incorporating human-like VIs. Traditionally, PSI models focused on human media figures, including television personalities and social media influencers (Horton and Wohl, 1956). However, the increasing prevalence of AI-driven personas like VIs has not been adequately theorized within this framework. Our findings demonstrate that VIs, despite their non-human nature, can foster emotional bonds similar to those observed with human influencers. Specifically, language similarity, interest similarity, and self-disclosure emerged as pivotal communication strategies used by VIs to significantly influence perceptions of friendship and psychological well-being in digital interactions (Leung *et al.*, 2022; Stein *et al.*, 2024).

Expanding the PSI framework to encompass VIs marks a critical theoretical advancement, suggesting that parasocial relationships are not confined to human interactions but can be effectively replicated by AI-driven entities. This highlights the potential for AI-human

emotional bonding across various digital contexts (Yan *et al.*, 2024). It broadens the applicability of parasocial theories to emerging technologies, where users engage with non-human agents in ways that mimic human interactions (Dabiran *et al.*, 2024; Suh and Li, 2022). By establishing that VIs can induce similar psychological effects as human influencers, our study paves the way for further research into how individuals perceive and emotionally connect with non-human agents in an increasingly digitalized world (Zheng *et al.*, 2024).

Beyond extending PSI theory, this research contributes new insights into the mediating mechanisms that drive the impact of VI communication strategies on follower outcomes. We identify perceived friendship and psychological well-being as key mediators explaining how VIs influence engagement and purchase intentions. This nuanced understanding introduces a new dimension to existing influencer marketing frameworks, which have traditionally emphasized outcomes like satisfaction, trust, and identification (George *et al.*, 2020; Kim and Baek, 2024). By revealing that emotional well-being is a critical determinant of consumer engagement and intention, our research shifts the focus from influencer-centric metrics to user-centric outcomes, positioning VIs as not just tools for brand promotion but as agents capable of enhancing users' satisfaction and well-being through digital interactions (Barari, 2023; Bruggeman *et al.*, 2019). This opens up new avenues for exploring how well-being-oriented digital strategies can foster deeper engagement across social media and other digital contexts.

Our findings also offer critical insights into digital communication strategies for VIs. By showing that language similarity significantly enhances perceived friendship, the research introduces a novel theoretical pathway, suggesting that linguistic alignment between VIs and followers is a key predictor of emotional connection and perceived authenticity (Kim and Kim, 2022; Vrontis *et al.*, 2021). This contribution challenges traditional views of PSI, where language style and tone were considered secondary factors, emphasizing that in the digital age, subtle variations in language use can foster or hinder perceived closeness in online relationships. Future research should explore the implications of linguistic strategies, such as varying levels of formality, cultural references, and regional dialects, to better understand how they influence the authenticity of VIs and the strength of parasocial bonds.

Another theoretical contribution is the role of interest similarity in driving deeper connections between VIs and followers. Our findings indicate that when VIs share content that resonates with followers' specific hobbies, values, or beliefs, they can strengthen emotional bonds and enhance psychological well-being (Byun and Ahn, 2023; Leite and Baptista, 2022). This underscores the importance of content curation and niche targeting as central strategies in digital marketing. While prior research has largely focused on broad-based content strategies, our study suggests that marketers and researchers should consider how VIs can tap into micro-communities and specialized interest groups to build stronger, more personalized relationships. Future studies could investigate how VIs deepen these connections by aligning their content with evolving follower interests, further enriching the field of digital content marketing (Lim and Lee, 2023).

Lastly, self-disclosure, often associated with human authenticity, emerges as a vital tool for VIs in building trust and fostering closeness with followers. Our findings show that self-disclosure can be effectively utilized by AI-driven entities, challenging the conventional belief that it is unique to human-to-human interactions. This suggests that artificial agents can cultivate perceptions of authenticity by sharing "personal" insights or experiences, albeit in a carefully crafted manner (Kim and Kim, 2022).

5.2 Practical implications

The findings emphasize the importance of language similarity, self-disclosure, and consistent interaction in fostering perceived friendship with VIs. For creators, this means designing VIs that maintain a relatable communication style, building trust and emotional connections. For example, "Lil Miquela" engages audiences by sharing personal updates in a conversational

tone, mimicking a friend's style, which helps create a loyal following. Creators can replicate this by ensuring their VIs interact authentically and regularly, using language that resonates with their target audience. A virtual fitness coach, for instance, could share workout tips, motivational messages, and engage with followers about their fitness goals, fostering a sense of community. Marketers can leverage this by aligning VIs with a brand's personality while ensuring they remain approachable and genuine. For instance, a wellness brand could create a VI that speaks empathetically about mental health, shares personal experiences, and invites followers to do the same, encouraging interaction (Kim and Baek, 2024).

The study also suggests that perceived friendship is strengthened when followers feel a connection to tailored content. VIs can deepen connections by engaging with niche communities through focused, relevant content. For instance, a VI targeting gamers, like "Yuna," could create content centered around popular games, share tips, and discuss gaming trends, building a dedicated following among enthusiasts. Brands targeting niche markets should develop VIs that engage specific communities. For example, a company promoting eco-friendly products could introduce a VI advocating sustainability, sharing tips on reducing waste, and discussing environmental issues, deepening emotional connections and driving engagement (Reinikainen *et al.*, 2020).

The importance of narrative and self-disclosure in building emotional bonds is also highlighted. VIs are more effective when they have relatable backstories, similar to how human influencers share their life journeys. For example, "Imma" from Japan shares her "daily life" as a digital persona, posting about her interests, friends, and experiences, creating an engaging, relatable narrative (Miyake, 2023). Brands can adopt this by crafting backstories for their VIs that align with their mission. For instance, a fitness VI could share their "fitness journey," offering workout tips, challenges, and progress updates. This approach mirrors the experiences of the target audience, creating a shared journey and encouraging ongoing engagement. Regular updates to these narratives help sustain follower interest (Miyake, 2023).

These implications extend beyond marketing. Media companies can use VIs to create engaging content that blends virtual and real-world elements, offering unique interactive experiences such as digital shows, virtual concerts, or live interviews to attract younger, tech-savvy audiences (Barari, 2023; Yan *et al.*, 2024). Digital health can explore VIs as digital companions to address social isolation, leveraging their ability to provide a sense of companionship. For example, a VI like "CalmAI" could be integrated into a health app to offer daily motivational messages, guided meditations, and check-ins. By mimicking supportive behaviors—such as providing affirmations and celebrating progress—CalmAI could alleviate stress and loneliness, making it a valuable tool for those seeking emotional support (Barari, 2023). This approach can also serve as a bridge to more comprehensive mental health resources, offering consistent, non-judgmental support (Yan *et al.*, 2024).

5.3 Limitations and directions for future studies

While this study offers valuable insights into the role of human-like VIs in shaping follower intention and well-being, several limitations must be acknowledged. Firstly, our research focused on positive outcomes from VI interactions, such as perceived friendship, well-being, and engagement, without exploring potential negative effects like loneliness or detachment. Future studies should examine both positive and negative impacts for a more comprehensive understanding. Secondly, the study concentrated on the communication strategies of human-like Vis, without accounting for other VI types (e.g. cartoon-like, robot-based). Variations in VI appearance may affect follower perceptions differently, suggesting the need for future research comparing how different VI strategies and appearances influence well-being and engagement.

Additionally, although our findings highlight perceived friendship and psychological well-being, we did not test a formal research model that comprehensively integrates them with additional mediating variables such as authenticity, trust, or attachment. Future research

should develop and empirically test an extended conceptual model that includes these factors to further elucidate the mechanisms underlying VI-follower interactions. Our sample was also limited to U.S.-based followers, which may not reflect interactions in other cultural contexts. Future research should explore these dynamics across diverse cultures to determine if cultural differences impact how followers engage with VIs. Lastly, while the study examined language and self-disclosure, other communication factors (e.g. humor, tone) were not considered. Future studies should investigate how these elements further impact engagement and purchase intention.

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