

Instagram Users' Para-Social Interactions with Virtual Influencers: The Mediating Role of Human-Likeness, Perceived Similarity, and Wishful Identification

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Abstract: *With technological developments, virtual influencers have been created and are experienced by social media users and practitioners. As it is a relatively new topic, existing research on users' para-social responses toward virtual influencers is currently insufficient. Therefore, this study conducted an online experiment (N = 211), comparing Instagram users' para-social interactions with virtual or human influencers. After participants were exposed to images of human and virtual influencers, they were asked to complete the questionnaires. The results showed a significant difference between the users' para-social responses to the two groups. Additionally, four relevant mediator variables were examined. "Mental human-likeness" and "wishful identification" were found to have significant negative mediating effect on the relationship between influencer type and users' para-social interactions. The results have important implications for media psychology and contribute to studies on virtual influencers.*

Keywords: virtual influencer, para-social interaction, media psychology, Instagram, social media

1. Introduction

Organizations employ social media influencers to promote their products and services (Mediakix, 2017). Owing to their deliberate social media presentation, these influencers have gained popularity (Khamis et al., 2017). It is anticipated that the worldwide influencer marketing market would expand at a compound annual growth rate of 12.6%, from \$13.8 billion in 2021 to \$22.2 billion in 2025 (HypeAuditor, 2022). Human influencers (HIs) have been the primary actors in social media marketing; however, owing to recent technical breakthroughs, virtual influencers (VIs) are currently being utilized as a marketing tool, although, this concept is still relatively new. VIs are social media celebrities who are partly or totally unreal (e.g., digitally generated 3D characters), but deliver similar content as authentic HIs do (Stein et al., 2022). According to Baklanov (2021), the rate of engagement for VIs is almost three times that of HIs. This trend, which is already in its third year, illustrates the followers' regular contact with the work of VIs, demonstrating their tremendous popularity.

The increasing popularity of VIs on social media has piqued the interest of academics, and many researchers have started to focus on content related to VIs. Arsenyan and Mirowska (2021) investigated the similarity between VIs and humans in terms of behaviors and responses

to VIs and HIs on social media. Moustakas et al. (2020) investigated the benefits and drawbacks of utilizing VIs as a marketing strategy. Park et al. (2021) examined the differences between VIs and HIs as social actors in the context of social media content. Shin and Lee (2020) analyzed the interaction and engagement of social media users with respect to VIs. Robinson (2020) discussed the ontological nature of VI. Nonetheless, the interaction between social media users and VIs has not yet been thoroughly investigated. Therefore, this study aimed to investigate para-social interactions (PSI). PSI is a fundamental aspect of media psychology, and is a complex set of responses to media personalities (Schramm & Hartmann, 2008)). We conducted an online experiment, and compared the PSI levels of the users in response to Vis and HIs with a focus on Instagram. In addition, other related elements, including human-likeness, perceived similarity (PS), and wishful identification (WI) were investigated as potential mediators influencing PSI levels.

2. Literature Review

2.1 The VI Concept

VIs can be classified in numerous ways pertaining to visual representation. There are anime- or cartoon-like (e.g., @Noonooori), or highly realistic (e.g., @Lil Miquela) images of individuals (Arsenyan & Mirowska, 2021). This study focused primarily on human-like VIs. In addition to differences in appearance, VIs can also be categorized based on the content. VIs are portrayed as supermodels (e.g., @shudu.gram), brand ambassadors (e.g., @magazineluiza), fashion people (e.g., @Rozy.gram) etc. Additionally, there are VIs that post about their daily lives (e.g., @Lil Miquela).

VIs are roughly characterized as artificial media personalities developed by individual programmers or media firms who commonly wish to stay anonymous. As digitally-made personas, they are identified by a computer-generated visage that is either connected to a digital body or overlaid on a genuine human body (Stein et al., 2022). Although VIs can achieve many of the same things as HIs do on social media, they are ontologically distinct from HIs. Nevertheless, there are arguments on both sides addressing the special character of human reactions to virtual personas in these situations. First, based on the “computers are social actors” paradigm, scholars claimed that inter-human and human-computer interactions share similar attributes (Edwards et al., 2019; Nass & Moon, 2000). Alternatively, interpersonal theory-based studies discovered that when participants were asked whether they thought they were communicating with a virtual agent or a real person, their responses varied (Shechtman & Horowitz, 2003). the “uncanny valley” hypothesis captured this concept as well (Mori et al., 2012). This research examined the debate from the perspective of PSI to establish its direction. PSI is one of the most fundamental concepts of media psychology (Giles, 2002); however, these fundamental aspects of users’ interaction with VIs have not been exhaustively investigated. Previous PSI studies on VIs focused primarily on streaming platforms, including YouTube and Twitch (Stein et al., 2022), but neglected other platforms (e.g., Instagram). To address this gap, this study attempted to observe users’ PSI levels on Instagram, one of the biggest and most active social media platforms (Terttunen, 2017).

2.2 VIs and PSI

In media psychology, the notion that varied protagonist behaviors would elicit stronger or weaker audience responses has a long history. PSI may be thought of as individuals’ one-way situational reactions to fictional media characters. Historically, PSIs were believed to be mostly the result of basic perceptual illusions (Horton & Richard Wohl, 1956). With a deeper understanding, scholars believed that PSI included three main components: cognition, emotion,

and conation (Dibble et al., 2016; Schramm & Hartmann, 2008). People who often interact with the same media persona via PSI are more likely to form para-social relationships. These relationship links that transcend several reception settings may form friendship, or even romantic relationships (Tukachinsky & Stever, 2019).

While both PSI and VIs started within the context of conventional mass communication, they are seen as having special significance for individuals' online interactions with celebrities (Breves et al., 2021). Influencers commonly utilize online social media platforms to disclose themselves, benefit from a high level of immediacy, and provide remarkable online contact, all of which have been shown to predict powerful para-social reactions (Kim & Song, 2016; Tukachinsky & Stever, 2019). Moreover, studies have shown that consumers perceive social media influencers as more similar to themselves than to conventional celebrities (Schouten et al., 2020), which is another vital aspect that may cause potent para-social responses.

Although several studies have shown that interacting with a social media influencer may be beneficial for both parties, other studies have questioned whether this interaction fits the definition of "para-social" (Kowert & Daniel, 2021; Lou, 2022). It is not unheard of for social media users to remark on an influencer's post with the hope of being noticed or perhaps receiving a response (Wulf et al., 2021). Nevertheless, users' interactions with influencers are typically disregarded; therefore, it is important to remember that this connection is still mostly one-sided, and hence, not analogous to common social interactions (Bond, 2016; Giles, 2002). According to Breves et al. (2021), compared with traditional media, PSIs in new media are often higher, and the way users reach out to internet influencers is more akin to writing to a celebrity (Kowert & Daniel, 2021).

Some studies have suggested that PSI with a real person is different from that with a digitally created character. Others have shown that the ontological nature of the character can affect PSI levels of the audience. Giles (2002) argued that audiences generally respond more strongly to human para-social responses than to animated characters. Moreover, Sheldon et al. (2021) claimed that the PSI of digitally made film heroes is much lower than that of human beings, highlighting the effect of the ontological nature of a persona on viewer involvement. In addition, Arsenyan and Mirowska (2021) found that VIs received significantly lower positive reactions from Instagram users than HIs did, based on the "uncanny valley" hypothesis. Therefore, this study assumed that VIs and HIs offer different PSI to users on social media platforms (the PSI level of VIs is lower than that of HIs). Thus, the following hypothesis was proposed:

H1: PSI with HIs will be stronger than PSI with VIs.

2.3 Visual and Mental Human-Likeness

Because PSI has a strong influence on media reception, researchers have been trying to identify the underlying influencing factors that cause stronger PSI. From an evolutionary perspective, human characteristics related to visual stimuli are assumed to naturally elicit para-social reactions (Giles, 2002). This finding is considered vital, and suggests that digitally generated characters' visual appearance would influence audiences' PSI.

Users' para-social responses to virtual personas may be influenced by two factors: the artificial appearance (i.e., fewer human-like qualities visually) and perceptions of the artificial intelligence (or non-human mind) underpinning virtual influences. Human-computer interaction literature demonstrates unambiguously that the mental and physical features of

digital characters are typically appraised separately, leading to different effects (Ferrari et al., 2016; Stein et al., 2020; Yin et al., 2021). Thus, this study also focused on mental human-likeness (MHL).

Modern artificial intelligence agents have significant accomplishment, but they are considered inferior to humans in terms of agency and experience (Broadbent et al., 2013; Haslam et al., 2008). Hence, a person's attitude toward an entity seems to be influenced by their assessment of its intellectual capacity (Waytz et al., 2010; Yam et al., 2021); for example, moral expectations that lead to reduced compassion and adaptation. Additionally, in practice, these influences may fade to some extent once the audience becomes aware that there is a person directing the behavior of the virtual persona (Fox et al., 2015; Stein & Ohler, 2017). Stein et al. (2022) argued that most online influencer platforms are careful to hide the fact that they include actual individuals, or even imply that there is no actual human involvement. However, in many cases, viewers may still assume the presence of human minds, which may negatively affect PSI. Therefore, the following hypotheses were proposed:

H2a: The effect of H1 will be mediated by the influencer's visual human-likeness (VHL).

H2b: The effect of H1 will be mediated by the influencer's MHL.

2.4 PS and WI

According to previous studies on the development of par-asocial phenomena, one of the strongest indicators of PSI is the degree to which people see themselves reflected in media characters (Giles, 2002). Although, this is already addressed by the concept of human-likeness, it follows a feeling of resemblance that may arise from a great variety of characteristics. For example, Turner (1993) found that viewers' para-social reactions to TV characters grew in tandem with their perceptions of the characters' shared views and social origins. According to other studies (Tian & Hoffner, 2010; Xu et al., 2021), this result has been repeated across a wide variety of media (e.g., film). Our study expected this not only because the avatars differ in ontological nature and physical characteristics, but also because viewers may believe that they belong to a non-human group. Similarly, the researchers of this study hypothesized that viewers could have a harder time immersing themselves in a digitally constructed identity, which would further diminish the degree to which they felt emotionally invested in the characters and hence, the PSI.

In addition to PS, WI may also improve para-social responses (Lim et al., 2020; Schouten et al., 2020). According to media psychologists, WI refers to the possibility that viewers can develop an unrealistic desire to emulate a media character even if they do not consider the character as personally relatable (Hoffner, 1996; Hoffner & Buchanan, 2005). In the context of this study, users were expected to become more like their virtual or human counterparts under the influence of WI. WI overlaps and differs from participation forms based on PS (Feilitzen & Linné, 1975; Van Looy et al., 2012). Para-social relationships are strengthened when viewers identify with fictional characters they like watching (Lim et al., 2020; Tian & Hoffner, 2010). Considering the types of influencers in question, this study assumed that WI would be more skewed toward VIs. Moreover, according to Stein et al. (2022) people may consider WI in the first place, as VI is in another ontological category. Therefore, the following hypotheses are proposed:

H3a: H1's effects will be mediated by the PS to the influencer.

H3b: H1's effects will be mediated by WI with the influencer.

3. Materials and Methods

3.1 Participants

The target participants were Instagram users with exposure to the VI content. Participants were recruited through Amazon MTurk, which is a crowdsourcing platform served for participants and experimental designers. Previous research showed that MTurk samples produced credible results with a low error rate (Callison-Burch, 2009). Furthermore, MTurk enables researchers to run studies at a faster pace and lower cost (Paolacci et al., 2010).

The questionnaires were included an explanation letter which included the study objectives, instructions for completing the questionnaire, and an expression of gratitude for participating in the study. Respondents only completed the questionnaire if they consented to participate in the study. All participant details were confidential and there were no predictable risks for participants in this survey. After excluding five participants who failed the attention check, the final sample consisted of 211 participants, including 119 men and 92 women. In terms of Instagram usage, 89.57% of participants reported that they used Instagram every day. In addition, 63.98% reported that they followed more than five influencers.

3.2 Procedure

Previous PSI studies related to VIs mainly focused on streaming platforms (e.g., YouTube or Twitch) and excluded other platforms such as Instagram (Stein et al., 2022). Additionally, the interactive and immediate nature of Instagram's features and its personal communication style offers the perfect setting for the development of PSI (Labrecque, 2014). Thus, Instagram was considered a suitable social media platform for this research.

3.3 Stimulus Material

For the stimulus materials, Lil Miquela (as a VI) and Marta Cygan (as an HI) were selected as the research objects. Lil Miquela and Marta Cygan are considered influencers with highly similar attributes (Arsenyan & Mirowska, 2021). Both are women aged between 18 to 29, Instagram-famous, from the lifestyle content creator category, financially independent, have no children, are heterosexual, reside in the West Coast of the United States, and engage in artistic creation. Stimulus materials were edited by photoshop. In contrast to videos, images were utilized as stimulus materials as there was no need to regulate speech, imitation, or gestures (Gierl & Praxmarer, 2001). The images of Lil Miquela and Marta Cygan were used, and participants were randomly exposed to one of the images after reporting their demographic information. Then, they were asked to complete the questionnaire. Figure 1 provides an overview of stimulus materials. In addition, the original colors of the pictures were retained for a natural expression, which could cause subtle potential disruptions to the participants. In the two photos of the influencers, there were some differences in their shooting angles, facial expressions, movements, and backgrounds; however, they had comparable sizes. Other users' comments were blurred to avoid any confusion (Choi & Rifon, 2012). Thus, it was expected in this research that these distinctions would not have any major impact on the participants' PSI.

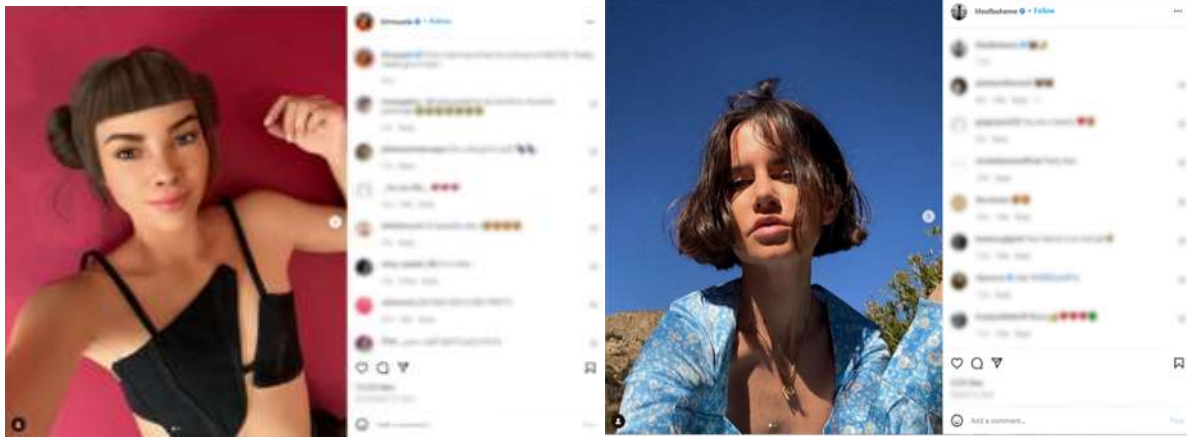


Figure 1: Stimulus material: virtual influencer: Lil Miquela (left) and human influencer: Marta Cygan (right)

3.4 Measures

All measures were adopted from previous studies. Questionnaires were formed using five-point Likert scales. The final questionnaire contained 37 items, as well as personal information and an attention check.

3.4.1 PSI

Schramm and Hartmann (2008) provided a comprehensive PSI scale that covers a wide psychological range of audience responses, including cognitive, affective, and behavioral items. This study chose six cognitive items (e.g., “I carefully watched the post of the influencer.”), five affective items (e.g., “I liked this influencer”), and four behavioral items (e.g., “I said something to the influencer on impulse”) to compose a PSI scale (Cronbach’s $\alpha = .94$).

3.4.2 VHL and MHL

Artificial entities’ human likeness may be measured using various scales provided by the human-computer interaction literature (e.g., Bartneck et al., 2009; Ho & MacDorman, 2017). However, the scale developed by Stein et al. (2022) was adopted in this study, including six VHL (e.g., “The influencer does not look like an artificial character”; Cronbach’s $\alpha = .88$) and six MHL items (e.g., “The influencer has a soul to me”; Cronbach’s $\alpha = .89$).

3.4.3 PS and WI

Participants were asked questions referenced from Van Looy et al.’s (2012) study to determine their levels of PS and WI with the given influencers. The scale included good practical ranges

and psychometric quality, including five PS (e.g., “The influencer is similar to me”; Cronbach’s $\alpha = .87$) and five WI items (e.g., “I would like to be more like the influencer”; Cronbach’s $\alpha = .85$).

4. Results

For Table 1 illustrates the means and standard deviations across the groups and t-test results across different aspects. Table 2 shows the zero-order correlations between study variables.

Table 1: Descriptive statistics for the obtained measures

Variable	VI	HI	T	p	Cohen's d
	M(SD)	M(SD)			
PSI	2.82(.74)	3.40(.80)	-5.51	.000***	.76
VHL	2.79(.82)	3.44(.85)	-5.62	.000***	.78
MHL	2.73(.84)	3.38(.93)	-5.36	.000***	.74
PS	2.70(.81)	3.34(.96)	-5.22	.000***	.72
WI	2.75(.69)	3.50(.85)	-7.06	.000***	.98

SD: standard deviation, PSI: para-social interaction, VHL: visual human-likeness, MHL: mental human-likeness, PS: perceived similarity, WI: wishful identification, VI: virtual influencer, HI: human influencer.

All scales range from 1 to 5

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 2: Zero-order correlations between study variables.

Variable	1	2	3	4	5	6	7
1 Age	1						
2 Sex	-.01	1					
3 PSI	-.04	.08*	1				
4 VHL	-.11*	-.01	.42***	1			
5 MHL	-.04	.00	.58***	.58***	1		
6 PS	-.04	.05	.62***	.67***	.68***	1	
7 WI	-.12*	-.08*	.52***	.63***	.62***	.68***	1

Sex coded with "1" = male, "2" = female

PSI: para-social interaction, VHL: visual human-likeness, MHL: mental human-likeness, PS: perceived similarity, WI: wishful identification

* $p < .05$, ** $p < .01$, *** $p < .001$

4.1 Welch's t-test

PSI levels were compared between influencer types (VI vs HI) using Welch's t-test that was conducted separately to validate the primary hypothesis (H1). The PSI levels of the individuals were found to be substantially different between VIs and HIs. The statistical results are shown in Table 1. A significant difference ($t = -5.51$, $p < .001$) was found between the VI ($N = 106$, $M = 2.82$, $SD = .74$) and HI groups ($N = 105$, $M = 3.40$, $SD = .80$). Further investigation revealed that it persisted after controlling for participants' familiarity with Instagram and overall interest in the influencer's material. Thus, H1 was supported.

4.2 Mediation Effects

To investigate the mediating effect, a parallel mediation model was computed using Model 4 of PROCESS macro for SPSS (Hayes, 2013) with 20,000 bootstrap iterations. It included the following mediating roles: VHL/MHL, PS, and WI. The results are summarized in Figure 2.

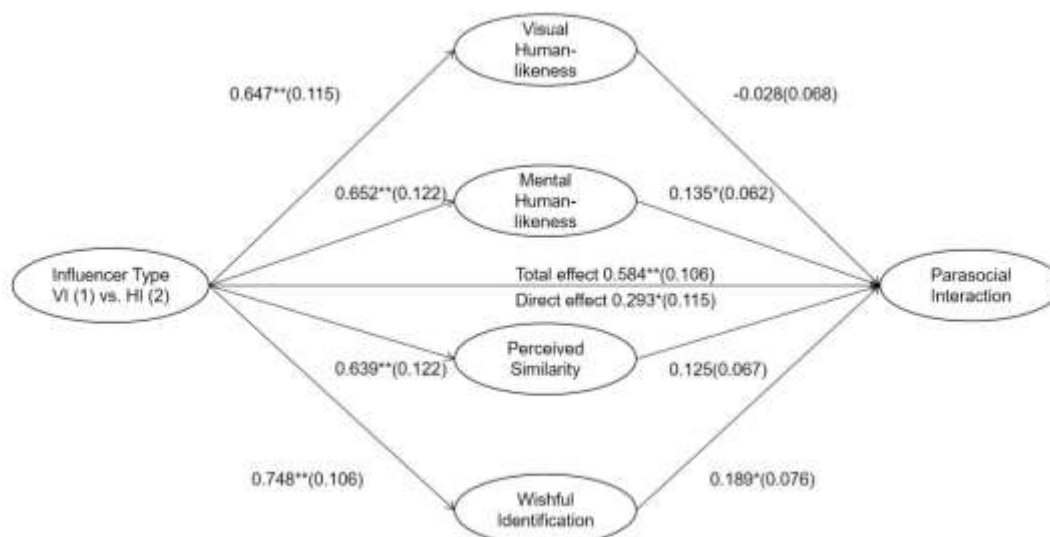


Figure 2: Parallel mediation model. Influencer type coded with “1” = VI, “2” = HI; VI: virtual influencer, HI: human influencer; standard errors in parentheses. * $p < .05$, ** $p < .01$, * $p < .001$.**

The analysis showed significant indirect effects of the influencer type on PSI through MHL ($b = .10$, $SE = .09$, $CI [.01, .18]$) and WI ($b = .14$, $SE = .06$, $CI [.03, .26]$), but not through VHL ($b = -.02$, $SE = .05$, $CI [-.12, .08]$) or PS ($b = .08$, $SE = .04$, $CI [-.00, .17]$). Moreover, between the influencer type and participants’ PSI, a significant positive direct effect ($b = -.29$, $SE = .12$, $95\% CI [.07, .52]$) and a significant positive total effect were found ($b = .58$, $SE = .11$, $CI [.38, .79]$).

Considering the experimental conditions’ coding of influencer type, Instagram users had a lower perception of MHL and WI toward Lil Miquela than toward Marta Cygan, which further reduced PSI levels. Furthermore, the positive direct impact suggested that participants demonstrated a higher para-social reaction to Marta Cygan after controlling for the four relevant mediating variables.

5. Discussion

The world of social media has introduced the younger generation to new types of celebrities. However, the large number of users on each site makes it difficult to stand out. Increasing numbers of content providers are embracing Vis, which are well-crafted digital personas that deliver conventional influencer material, to attract audience attention. Focusing on this new trend, this study evaluated numerous theory-based hypotheses, including how the ontological character of influencers affects viewers’ para-social responses, as well as significant mediating elements that influence the relationship. The results demonstrated that both of these induced comparable PSI values. MHL and WI exerted a substantial mediating impact. However, VHL and PS were ineffective as mediators.

The significant difference in PSI between VI and HI contradicted the “computers are social actors” paradigm discussed in section 2.1 of the literature review (Edwards et al., 2019; Nass & Moon, 2000). In the context of this study, inter-human interaction had a different attribution than human-computer interaction. In contrast, the results corroborate the interpersonal theory (Shechtman & Horowitz, 2003) and “uncanny valley” hypothesis (Mori et al., 2012). It also supports Giles (2002) and Sheldon et al. (2021)’s contention that PSI levels of the audience differ when confronted with actual vs. fictional individuals.

Several of the study's assumptions were validated by the finding that MHL and WI had substantial negative mediation effects. The result supported the previous view that avatars are inferior to real people in terms of agency and experience (Broadbent et al., 2013), which is also responsible for lowering the audiences' PSI levels toward VIs. In addition, the results supported the view of previous researchers that once the audience realize that VIs are controlled by a real person, it will have a negative impact (Fox et al., 2015; Stein & Ohler, 2017) on para-social responses.

The results showed that WI had a significant mediating effect on the relationship between influencer type and PSI, which supported previous research (Lim et al., 2020; Schouten et al., 2020) on VIs. In the context of this study, WI was an important factor in mediating PSI level, which put forward limitations to the research of Stein et al. (2022). The ontological nature of VIs prevents viewers from considering the possibility of WI, and therefore, significantly affects PSI. Moreover, this study believed that on Instagram, people regarded Internet celebrities more as friends than as idols, leading to a low level of WI, and thus the mediating effect of WI is obvious.

By contrast, the insignificant mediating effect of VHL and PS contradicted our hypotheses H2a and H3a. With this pattern of data, numerous alternatives were addressed regarding whether undiscovered variables might have reinforced the participants' PSI toward VIs, hence, nullifying both mediating effects. This study hypothesized that novelty effects might influence the observations. As VIs are still somewhat novel, many participants in their respective environments might be inquisitive about the virtual figures represented. In turn, this interest and fascination might have resulted in an increased propensity to develop PSI. Giles (2002) believed that human visual characteristics, such as the human face, are essential evolutionary triggers for para-social behaviors. However, in the context of this study, visual characteristics did not have a significant role in determining PSI levels. In addition, this study hypothesized that because VIs are relatively new with a high visual similarity to humans, participants might be affected by the novelty effect and become curious about VIs (Stein et al., 2022), which would increase the observed PSI level and render the mediating effect of VHL insignificant. The statistical irrelevance of PS contradicts prior research (Stein et al., 2022; Turner, 1993). In the context of Instagram, the results indicated that PS was not a significant influencer of para-social reactions, in contrast to the contexts of TV (Turner, 1993) and streaming media (Stein et al., 2022). Digitally constructed roles will lessen the apparent similarity of Instagram users but will have no effect on PSI. This study implied that participants only interact with an image of the influencer, which is insufficient for recognition.

6. Limitation and Future Research

This study focused solely on a limited empirical component of the broader topic of social media. Considering this, future research should expand on this experiment with various types of influencers, preferably including social media influencers from other platforms (e.g., Facebook or Pinterest). Because the stimulus material was primarily designed for image-based settings, the empirical findings for influencer accounts on other social media platforms may vary.

Considering the consistency of the observed effects, this online experiment comprised a single media exposure and measurement; thus, it could not be thoroughly understood how the viewers' experience would evolve with repeated exposure to the same influencer. Through follow-up research that examines long-term impacts, academics may acquire useful insights

not only current PSI, but on para-social relationships in general. Additionally, it could disclose whether the novelty effect of VIs wears off over time, which will ultimately be damaging to their effectiveness. Moreover, for practicality purposes, this study utilized brief post photos and not a variety of contents. It is likely that allowing individuals to have a greater range of experiences may increase their degree of emotional responses (Luo et al., 2020).

To acquire a deeper knowledge of contemporary events, it will also be important to examine diverse samples, such as those categorized by age, cultural background, or area of interest. While the majority of the present study's participants were young media-savvy individuals having varied degrees of experience with the environment in hand, it may be worthwhile to examine the responses of people or devoted followers who are entirely unfamiliar with the effect of social media. Research of this kind would benefit immensely by including participants of varied ages, as the younger generation is typically more comfortable with digital technology (and digitally manufactured identities) than is the older generation.

7. Conclusion

Based on the results of this study, VIs may occupy a distinct role. Certain qualities of the portrayed personalities lowered the para-social reactions of the participants. Even as VIs become more widespread on social media, it is unclear how these effects will evolve. Considering the significant elements of authenticity and intimacy in cyberspace (Guthrie, 2020; Stein, Koban, et al., 2020), these synthetic works may eventually run against a “human ceiling” that restricts their ability to interact with the users (Stein et al., 2022). However, it is noteworthy that the evolving notion of identity in society may have an effect on how people perceive digital celebrities. With the proliferation of online “influencers” across a variety of platforms, researchers and industry observers would do well to learn more about this fascinating phenomenon.

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Declaration of interest

There are no relevant financial or non-financial competing interests to report.

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