

**Exploring the Effects of Virtual and Human influencers on Consumers' Credibility Perception and
Purchase intention: The Moderating Role of Product Type**

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Abstract

This study investigates the impact of humanized virtual influencers and human influencers in social media advertisements on consumers' perceptions of credibility and purchase intention, focusing on the moderating role of product type. The main objective of the study was to determine whether humanized virtual influencers, when compared to human influencers, would be perceived as more credible by having higher levels of expertise and trustworthiness, consequently influencing consumers' purchase intention. A 2 (Type of influencer: human vs. virtual) x 2 (Product type: human property vs. machine property) between subjects design experiment ($N = 130$) was conducted to test the research question. Results from Partial Least Squares Structural Equation Modeling (PLS-SEM) indicated that influencer type influenced perceived expertise and perceived trustworthiness, wherein human influencers caused greater levels of perceived expertise and trustworthiness. Additionally, product type played the role as a moderator, positively influencing perceived expertise and trustworthiness when a human influencer endorsed both human property products and machine property products. Moreover, trustworthiness significantly influenced purchase intention. However, the study did not find evidence of perceived expertise directly affecting purchase intention. This study concludes by discussing theoretical and practical implications of the findings and suggesting potential directions for future research.

Keywords: virtual influencers, human influencers, credibility, trustworthiness, expertise, purchase intention, product type, machine property products, human property products

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Exploring the Effects of Virtual and Human Influencers on Consumers' Credibility Perception and Purchase Intention: The Moderating Role of Product Type

In recent years, social media has transformed the marketing landscape, and influencer marketing has become a popular and effective method for companies to advertise their products and services (Gregorius & Gregorius, 2019). Virtual influencers, are a novel addition to influencer marketing. Virtual influencers are computer-generated characters with a curated personality and appearance, ranging from human-like to cartoonish. These computer-generated characters offer a unique advantage over human influencers, as brands can have complete control over their image, personality, and messaging (Arsenyan & Mirowska, 2021). Despite this, their effectiveness in comparison to their human counterparts in influencing consumer behavior remains an area of exploration.

The credibility of influencers is one of the key factors that can be used to measure the effectiveness of influencer marketing. According to Ayeh (2015) and Tseng and Fogg (1999) trustworthiness and expertise are the main components of source credibility. When consumers perceive influencers as credible information sources due to their expertise and trustworthiness, they are more likely to consider the products or services recommended by that influencer, which can lead to a purchase intention (Shamim & Islam, 2022; Belanche et al., 2021).

Despite the significance of credibility in influencer marketing research, there is a lack of studies comparing the credibility of virtual influencers to human influencers. Albeit limited, recent research found the empirical evidence that human influencers may be perceived as more credible than virtual influencers (Kim et al., 2023). However, the concept of machine heuristics (i.e., a belief that machines are reliable and trustworthy; Sundar & Kim, 2019) suggests that virtual influencers may be perceived as more credible than human influencers as they activate the stereotype that machines are more objective and immune to scandals than human influencers.

Additionally, the type of product being promoted may influence the relationship between influencer type and credibility (Schouten, 2020). Previous research in the field of influencer

marketing has identified product type as a significant variable (Veirman et al., 2017), suggesting that the perceived credibility of the influencer may vary depending on the product or service that is being advertised by them (Chung & Kim 2020). For products with machine properties, like a programming course, aligning with virtual influencers' machine-like attributes may trigger machine heuristics, enhancing virtual influencers' credibility over human influencers (Sundar & Kim, 2019). On the other hand, products with human properties, such as a vocal lesson course, could yield different credibility outcomes, potentially favoring human influencers. By including product type (human property vs. machine property) as a moderator variable, a more nuanced understanding of the relationship between influencer type, credibility, and purchase intention can be gained. While there is research on the impact of influencers on purchase intention, there is still little known about how credibility impacts this relationship, particularly for the two distinct types of influencers (virtual vs. human) in different product contexts. Therefore, this study aims to fill this theoretical gap by examining how the source credibility of an influencer impacts purchase intention in two different product categories (human property vs. machine property).

This study has two objectives. This study's primary objective is to determine which type of influencer (virtual vs. human) is viewed as more credible by consumers moderated by product type (human property vs. machine property). The second objective is to investigate how this perception of credibility may affect purchase intention. Therefore, the following research questions were formulated:

RQ1: Will virtual influencers be perceived as more credible than human influencers?

RQ2: Will the product category (machine vs. human) moderate the relationship between influencer type (virtual vs. human) and credibility?

RQ3: Will perceived credibility of an influencer affect the purchase intention of consumers?

Literature Review

Human influencers vs. Virtual Influencers

Human influencers are referred to as social media influencers in this study. A social media

influencer is a person with a large following on social media platforms, such as Instagram, YouTube, or TikTok, and the ability to influence the opinions and behaviors of their followers (Kay, Mulcahy, & Parkinson, 2020). Through sponsored posts, endorsements, and partnerships, influencers may advertise products, services, and brands to their audience (Freberg et al., 2011). They can be classified according to their number of followers, content niche, and engagement rate. Micro-influencers, for instance, have a smaller following but a more engaged audience, whereas macro-influencers have a larger reach but possibly a weaker connection with their followers (Li & Peng, 2020; Freberg et al., 2011). Moreover, because Influencers are able to establish trust, credibility, and brand loyalty with their followers, they are an attractive marketing instrument for brands seeking to promote their products or services (Brand & Brand, 2020).

Virtual influencers are a recent development in influencer marketing. Virtual influencers come in different forms of avatars (Andersson & Sobek, 2020). Choudhry et al. (2022) has categorized the various varieties of influencers into three categories: humanized virtual influencers, animated virtual influencers, and virtual influencers that are not human. This research will focus on humanized virtual influencers. However, a comprehensive explanation of virtual influencers will be provided to clarify their concept.

Virtual influencers are computer-generated personas designed to interact with social media audiences. In contrast to traditional influencers, humanized virtual influencers are digital avatars intended to appear and behave like humans (Arsenyan and Miroswka, 2021). Creators of such avatars construct their appearance and personality to appeal to specific target audiences (Moustakas et al., 2020). Virtual influencers are not constrained by the physical or personal limitations that effect human influencers, allowing them to be tailored to specific audiences and perfectly aligned with a brand's identity and values (Wielki, 2020). Despite their prospective advantages, there is still much to learn about the comparative effectiveness of virtual influencers and their human counterparts in influencing consumer behavior.

The source credibility of influencers is an important aspect when measuring the effectiveness

of influencer marketing. Although the concept of credibility has often guided previous researchers in predicting the efficacy of influencer marketing, there is dearth of research comparing the effects of virtual influencers on credibility compared to that of human influencers.

Perceived Credibility

This study examines the perceived credibility of (virtual vs. human) influencers by consumers. Credibility is a multifaceted concept that has been extensively investigated in numerous fields of study, such as marketing, communication, and psychology. Credibility is a crucial factor in determining the effectiveness of an influencer's messages in influencing consumer attitudes and behaviors (Chen & Sharma, 2020). Moreover, prior studies have found that the source's or message's credibility is an essential factor in persuasion (Hovland & Weiss, 1951).

Hovland and Weiss (1951) proposed two factors that determine the credibility of a source: expertise and trustworthiness. Expertise refers to the level of knowledge and competence demonstrated by the source in the relevant domain (McCrosky, 1966). Trustworthiness refers to the extent to which the source is perceived as honest, sincere, and impartial (Giffin, 1967). When considering the field of influencer marketing, it becomes apparent that trustworthiness and expertise hold significant importance. Influencers who have established themselves as experts in a particular niche or industry are likely to be perceived as more credible, as they have demonstrated a deeper knowledge and understanding of the products or services they endorse (Audrezet et al., 2020). When consumers view influencers as honest sources of information, they are more likely to consider the products/services recommended by the influencer (Shamim & Islam, 2022). In addition, influencers who are authentic and transparent in their communication with their audience, including the disclosure of sponsored posts or partnerships, are perceived as more trustworthy and credible (Lou & Yuan, 2019). Influencers who lack trustworthiness may struggle to acquire and retain a loyal audience, and their endorsements may be viewed as insincere and devoid of value (Andersson & Sobek, 2020). Likeability or attractiveness is an additional factor that can increase an influencer's credibility, as audiences are more likely to trust those whom they perceive as relatable and friendly (McGuire, 1985).

In this study, we will only focus on expertise and trustworthiness, leaving out the aspect of attractiveness. This decision is supported by previous research that consistently highlights trustworthiness and expertise as the main factors of source credibility. Studies like Ayeh (2015), Hovland and Weiss (1951) and Tseng and Fogg (1999) underline this perspective.

Expertise and Trustworthiness

The role of expertise plays a crucial part in molding consumer perceptions and influencing purchase decisions within the dynamic field of influencer marketing (Belanche et al., 2021). Expertise, as a fundamental element of source credibility, refers to the perceived degree of knowledge, competence, skill, and authority that an influencer holds with respect to the endorsed product or subject matter (Ohanian, 1990; McCrosky, 1966). In regards to influencer marketing, expertise refers to the ability of an influencer to provide accurate and insightful information, so enabling customers to make well-informed decisions. In the context of present-day consumer behavior, endorsements have evolved beyond simple product recommendations and entail the advice given by influencers who have the ability to offer meaningful insights and authentic endorsements (Chopra et al., 2021). The credibility of an influencer is enhanced by their perceived expertise, which is crucial in building an authentic connection with the audience (McCroskey & Teven, 1999). When an influencer exhibits an in-depth understanding of the various characteristics, benefits, and practical uses of a particular product, they undergo a transformation into a reliable and credible source of expertise, comparable to a specialist within the respective business (Belanche et al., 2021). The concept that the credibility obtained from an influencer's expertise has a substantial impact on customer attitudes and behaviors is substantiated by empirical studies (Veirman et al., 2017; Belanche et al., 2021). According to Ohanian (1990), consumers are more likely to trust suggestions from individuals who are viewed as educated and well-informed in the relevant topic area. The perception of expertise not only serves to bolster the credibility of influencers but also builds a sense of reliability, thereby impacting customer intentions to engage in purchasing behavior's (Chopra et al., 2021).

Similar to the concept of expertise, trustworthiness holds significant importance in the field

of influencer marketing since it greatly influences consumer views and ultimately impacts their purchasing choices (Ohanian, 1990; Adiwijaya, 2014). The importance of trustworthiness in establishing source credibility has been supported by research, as highlighted by Ohanian (1990) and further validated by the study conducted by McCroskey and Teven (1999). Trustworthiness plays a crucial role in the complex dynamic between influencers and their audience, carrying substantial implications. The concept of trustworthiness extends beyond the verbal communication of an influencer, and is instead based on the alignment between their values and the attributes of the products they endorse (Schouten et al., 2020). Consumers express a preference for authentic and transparent influencers, as they foster a sense of assurance that the products or services being promoted are in line with their personal interests (Balaban et al., 2022). It is integral to an influencer's credibility, particularly when consumers perceive endorsements as transparent and unbiased (Balaban et al., 2022). This statement aligns with the findings of Ohanian (1990), who argues that credibility is bolstered by the demonstration of authentic intentions, hence establishing trustworthiness.

In conclusion, the key factors that contribute to the credibility of a source in the field of influencer marketing are expertise and trustworthiness. Expertise encompasses the depth of knowledge, competence and level of authority possessed by an influencer, whereas trustworthiness encompasses the attributes of honesty, impartiality and reliability. These qualities not only serve to strengthen the credibility of an influencer, but also make a substantial impact on customer attitudes and behaviors. Comprehending the complex relationship among expertise and trustworthiness within source credibility is essential for understanding how these factors contribute to audience perceptions and decision-making in the field of influencer marketing.

Source Credibility and Influencer Type

Credibility has frequently guided researchers in predicting the effectiveness of influencer marketing, but comparative research on the effects of virtual versus human influencers on credibility is still limited. Within this context, the distinctive attributes of virtual influencers beckon for deeper

exploration, particularly when considering the sub-constructs of trustworthiness and expertise as integral components of credibility (Ayeh, 2015; Tseng and Fogg, 1999).

Albeit limited, the study of Kim et al. (2023), indicates that human influencers may currently hold greater credibility. However, when examining the concept of credibility through the lens of machine heuristics as proposed by Sundar and Kim (2019), it offers an alternative viewpoint. This concept explores the manner in which individuals regard machines as entities that possess reliability and trustworthiness. Within the field of influencer marketing, this suggests that virtual influencers, who possess machine-like characteristics have the potential to evoke a sense of intrinsic neutrality and resistance to controversy, traits typically attributed to machines. Virtual influencers are intentionally created to possess qualities such as consistency, reliability, and a lack of human vulnerabilities (Arsenyan & Miroswka, 2021). Consequently, they may unintentionally cultivate a perception of being more trustworthy and less prone to the kind of mistakes that human influencers may encounter. Multiple studies have provided empirical evidence supporting the aforementioned idea, which posits that individuals tend to place greater trust in virtual agents as opposed to human agents. This inclination is attributed to the prevailing belief that virtual agents are more likely to contain accurate knowledge relative to their human counterparts as suggested by Matsui and Yamada (2019). In a manner akin to trustworthiness, the perception of expertise frequently relies on the perceived extent of knowledge demonstrated by an influencer within a specific field (Brahim, 2020). Virtual influencers possess machine-generated identities and have constant access to knowledge, which can give the perception of unwavering expertise. Machine heuristics, as elucidated by Sundar and Kim (2019), contribute to this perception. There is a tendency among individuals to identify machines with qualities such as accuracy and reliability. This association, when applied to virtual influencers, might lead to the perception that they possess wide and accurate knowledge. The virtual influencers' ability to communicate consistently and without errors is in accordance with the characteristics often associated with expertise (Sundar, 2008; Sundar & Kim, 2019).

Given that machine heuristics studies indicate that virtual influencers may be perceived as

more credible than human influencers due to their machine properties, we propose the following hypothesis:

H1(a/b). Participants who are exposed to virtual influencers will report a greater level of perceived a) expertise and b) trustworthiness compared to the participants who are exposed to human influencers.

Moderating Role of Product Types: Machine Properties vs. Human Properties

The relationship between influencer type and credibility may be affected by the nature of the promoted product or service (Schouten, 2020). Previous research in the field of influencer marketing has identified product type as a significant variable (Veirman et al., 2017), suggesting that the perceived credibility of the influencer may vary based on the advertised product or service (Chung & Kim, 2020). The type of product or service being promoted plays a crucial role in determining an influencer's credibility and, consequently, the efficacy of their endorsement (Belanche et al., 2021). For instance, when a fitness influencer endorses a workout supplement and provides comprehensive explanations about its constituents, benefits, and optimal usage, their perceived expertise and trustworthiness contributes to building credibility (Aguilar & Arbaiza, 2021). According to the machine heuristics theory, consumers evaluate the credibility of virtual influencers based on their preexisting beliefs and assumptions about machines (Sundar & Kim, 2019). Due to their alignment with machine characteristics, virtual influencers may be perceived as more credible when promoting products or services with machine-like properties, such as programming courses or software.

This is consistent with Festinger's (1957) cognitive dissonance theory, which states that consumers experience discomfort or dissonance when their beliefs or attitudes do not correlate with their actions, such as when they purchase a product that contradicts their values or beliefs (Belanche et al., 2021). Hence, when the endorsed product or service exhibits machine-like properties, consumers might encounter cognitive dissonance upon perceiving a human influencer's endorsement. This arises due to the incongruity with their preexisting perceptions and beliefs concerning machines. As they correlate with human characteristics, human influencers may be perceived as more credible

when endorsing products or services with human-like properties, such as vocal lesson courses.

Additionally, the study conducted by Lee (2018) provides valuable insights into the influence of trust, fairness, and emotional responses on individual perceptions within the context of algorithmic choices. While Lee's research is primarily focused on algorithmic management, the concepts of trust and emotional reactions can be applied in a similar manner within the field of influencer marketing. The relationship between an influencer's characteristics and the product or service they endorse has the potential to elicit emotional reactions and impact perceptions of trust (Lee, 2018). The concept of emotions potentially influencing trust is consistent with the theory regarding the perceived credibility of virtual influencers supporting products with machine-like characteristics.

Based on points made by Festinger (1957), Sundar & Kim, (2019) and Belanche (2021) it may be argued that human influencers, due to their alignment with human characteristics, could be perceived as more credible when endorsing products or services that have human-like properties. The alignment between the characteristics of an influencer and the product they endorse has the potential to create a perception of authenticity and reduce cognitive dissonance leading to a positive impact on perceived credibility. Therefore, the connection between the type of influencer and the properties of the endorsed product or service has the potential to greatly affect the perceived credibility of the influencer, which, in turn, can have an impact on customers' attitudes and purchase intentions. On the basis of these theories it is hypothesized that the alignment between the characteristics of the promoted product or service and the type of influencer endorsing it will have a substantial effect on the influencer's perceived credibility:

H2(a/b). Product type will moderate the relationship between the influencer type and perceived a) expertise and b) trustworthiness such that the relationship will be positively strengthened when there is a match between product and influencer type.

Credibility and Purchase Intention

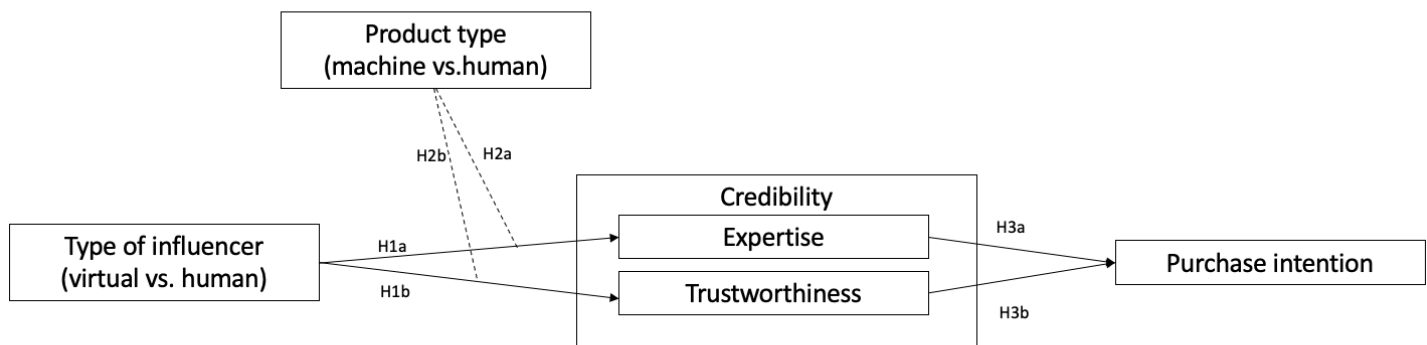
In the context of influencer marketing, the relationship between credibility and purchase intention has been extensively investigated. Credibility is a significant factor that influences

consumers' attitudes and perceptions towards promoted products or services (Shamim & Islam, 2022). According to studies, consumers are more likely to intend to purchase products promoted by credible influencers. When consumers perceive an influencer as credible, they are more likely to trust their recommendations and value the promoted product. In turn, this increases the probability of purchase intention (Kim & Park, 2023; Belanche et al., 2021).

Consistent with other studies, Saima & Khan (2020) found positive correlation between influencer credibility and purchase intent in their study. The conclusion of the study was that the perceived credibility of the influencer had a significant impact on consumers' intent to purchase the promoted product. Similarly, Martin-Consuegra et al. (2018) discovered that the credibility of an influencer had a direct and positive impact on consumers' intent to purchase the promoted product. Overall, the connection between credibility and purchase intent is a crucial aspect of influencer marketing's success. Ensuring that the influencer is perceived as credible by the target audience can have a substantial impact on the consumers' intent to purchase the promoted products or services (Sesar et al., 2022). Therefore, it is assumed that there is a positive relationship between credibility and purchase intention:

H3(a/b). Perceived a) expertise and b) trustworthiness will positively influence purchase intention.

Based on the cited studies and theories, the conceptual model (see Figure 1) illustrates the predicted paths. In conclusion, one moderator is predicted to influence the relationship between the type of influencer and source credibility, which then is expected to have an impact on the purchase intention of consumers. The type of product (machine properties vs. human properties) moderates the perceived credibility of the type of influencer by the consumers, indicating that machine property product promotions by virtual influencers are perceived as more credible meanwhile human property product promotions by human influencers are perceived as more credible. In addition, it is anticipated that credibility will have an influence on consumers' purchase intent. In the following section, the methodologies used to test the hypotheses are explained.

Figure 1*Conceptual model*

Method

Experimental design

A 2 (influencer type: virtual vs. human) x 2 (product type: human property vs. machine property) between-subjects design was used to test the hypotheses for this study. This study aimed to investigate the effect of influencer type on credibility as moderated by product type. Additionally, the effect of credibility on purchase intention has been investigated. Participants are randomly assigned to one of the four conditions, and their purchase intention and perceived credibility were measured.

Participants

A total of 130 participants, whom were active social media users, were recruited for this study (30 participants per condition). The ages of the participants ranged from 18 to 65 ($M = 31.48$, $SD = 11.49$). Gender distribution was roughly balanced across the conditions ($N_{male} = 55$, $N_{female} = 79$). The participants were recruited using online channels and asked to take an online survey where they then were randomly assigned to one of the four conditions. Participants in this study were kept fully anonymous, and only their gender and age were obtained.

Stimuli

The stimuli for this study consisted of a fake Instagram post that either promoted a vocal

lesson course or a programming course (see Appendix C, D, E, F). The reasoning for choosing Instagram as the stimuli platform is due it being a prominent platform in the field of influencer marketing (Haenlein et al., 2020). In both human and virtual influencer condition, the same virtual human post was presented however, the profile description was different. For the virtual influencer condition the participants was told that the post was posted by an virtual influencer, and for the human influencer condition the participant was told it was a human influencer. This was to control the possible confounding effects of perceived attractiveness that could have been endangered by the differences in appearance. Furthermore, for the machine property condition a programming course advertisement will be used and for the human property product a vocal lesson course advertisement will be used. A pretest was performed towards 16 participants to ensure the validity of manipulation (Programming course: $M = 4.19$, $SD = 1.64$; Vocal lesson course: $M = 1.75$, $SD = 1.07$). The score close to 1 indicates “human” properties and the score close to 7 indicates “machine” properties.

Procedures

The participants for the online survey were recruited online. The survey began with a brief introduction to the study, followed by a request for participant consent. The participants were then shown an Instagram post in which a human or virtual influencer advertised a vocal lesson course or a programming course. Participants were assigned to one of four different posts randomly. Upon viewing the post, participants were asked to answer questions assessing the influencer's expertise, trustworthiness and their purchase intention. After completing the questionnaire, participants were asked to answer some demographic questions and were thanked for their participation in the study. The participants were also provided with further information regarding the research's purpose and asked not to discuss the survey or research with other participants who would be participating in the same study.

Measures

The questionnaire was divided into two sections: scales to evaluate the study's key variables

and questions regarding the demographic characteristics of respondents. Age, gender, influencer familiarity, product involvement and attractiveness were included as control variables. Manipulation checks for the product type and influencer type were also included. In this research, the dependent variable, together with the moderating, mediating, and controlling variables, were examined using the following items.

Dependent variable

Purchase intention was measured by using a seven-point Likert scale (e.g., "I intend to sign up for the course advertised by the influencer") with 5 items. The study utilized a scale from Pavlou (2003) to assess purchase intention. The original questions from Pavlou's study were modified to align with the current research focus. The reliability of the scale was found to be satisfactory, with a Cronbach's alpha value of .73.

Mediating variable

To measure the perceived credibility of the influencers featured in the stimuli, two different dimensions were used: expertise and trustworthiness. Participants were asked to indicate their level of agreement with statements for expertise and trustworthiness with a seven-point Likert scale (1 = strongly disagree to 7 = strongly agree). For both dimensions (trustworthiness and expertise), the scale developed by Ohanian (1990) was used. This scale allowed for a full examination of the perceived credibility of the influencers and its ability influence purchase intention for the two product types. The scale's reliability for expertise was deemed satisfactory, as indicated by a Cronbach's alpha value of .94. Similarly, the measure of trustworthiness demonstrated a comparable level of reliability, with a Cronbach's alpha value of .71.

Control variables

The participants' familiarity with virtual influencers and social media influencers in general was measured with a seven-point Likert scale (1= "not familiar at all" to 7 = "extremely familiar") and the perceived attractiveness of the influencer (i.e., "The influencer in the Instagram post is attractive"). Additionally, product involvement was measured as well as control variable by using

Prendergast (2010) scale. Age and gender were also measured using a three-point scale (i.e., “What is your gender?”: Man, Woman, or Non-binary) for gender and an open-ended question (i.e., “What is your age?”) for age. See appendix G for the full survey.

Manipulation Check

To ensure that the participants were successfully manipulated, manipulation check items were included in the survey. Participants were asked to rate on a seven-point Likert scale the identity of the influencer they saw in the advertisement (1 = virtual to 7 = human) and about the product that was being promoted (1 = machine property to 7 = human property).

Data Analysis

The collected data will be analyzed using the statistical software SPSS. Firstly, a descriptive statistics is conducted to summarize the demographic characteristics of the sample and the primary factors of interest, which are influencer type, product type, credibility, and purchase intention. The PLS-SEM technique with the WarpPLS 8.0 software (Kock, 2020) was utilized to examine the measurement model's validity and the significance of the structural paths presented in the research model. PLS-SEM has a number of advantages over other conventional latent model techniques. First, PLS-SEM is less sensitive to sample size requirements as it doesn't need data normality assumptions (Kock et al., 2017; Marcoulides & Saunders, 2006). Second, it allows for the examination of a complicated research model assumed for an experimental study (Gupta, 2014). Lastly, it allows for the testing of causal relationships between variables (Streukens et al., 2010).

Results

Measurement Validity

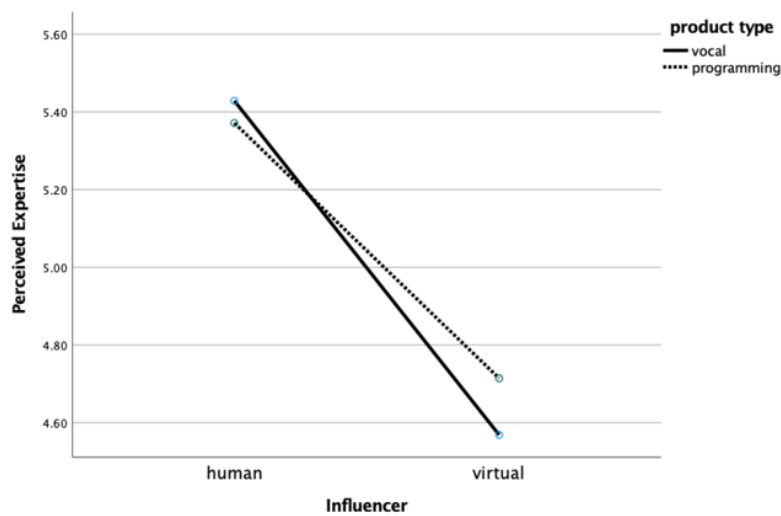
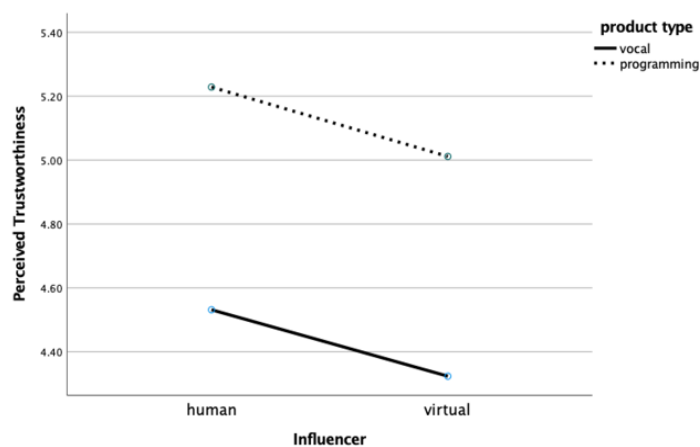
Before testing the hypotheses, the validity was assessed of the measurement model through PLS-SEM. As suggested by Kock (2020), the item loadings of reflective indices with a p-value less than .001 indicate sufficient reliability in a PLS-SEM measurement model. All the variables measured in this study were reflective indicators. The PLS-SEM findings upheld the construct validity of the measures: all constructs were greater than .50 and the significance level was less than .001

(see Appendix A). Additionally, as described in the section on measures, the internal consistency reliability of all the constructs was satisfactory, as they were greater than .70.

Hypotheses Testing

PLS-SEM was used to validate the significance of the structural model's hypothesized causal paths. Appendix B illustrates the path coefficients. H1(a/b) proposed that participants who are exposed to virtual influencers will report a greater perception of a) expertise and b) trustworthiness compared to the participants who are exposed to human influencers. Inconsistent with the prediction of H1a, the results of PLS-SEM showed that participants who were exposed to virtual influencers ($M = 4.64$, $SD = 1.58$) had reported a significantly lower perception of expertise compared to human influencers ($M = 4.96$, $SD = 1.32$), $\beta = .15$, $p < .05$. Additionally, participants who were exposed to virtual influencers ($M = 4.67$, $SD = 2.38$) reported a significantly lower level of trustworthiness compared to human influencers ($M = 4.89$, $SD = 1.50$), $\beta = .15$, $p < .05$. Thus, while the results were statistically significant, H1(a/b) were not supported.

H2(a/b) posited that product type will moderate the relationship between the influencer type and perceived a) expertise and b) trustworthiness when there is a match between the product and an influencer type. The results showed that product type significantly moderated the effects of influencer type on the perceived expertise and trustworthiness, $\beta = .33$, $p < .01$ and $\beta = .33$, $p < .01$, respectively. The product type, together with influencer type explained 38% of the variance in the perceived expertise ($R^2 = .38$) and 33% of the variance in the perceived trustworthiness ($R^2 = .33$). However, the moderation plot demonstrated that participants reported a significantly higher perception of expertise and trustworthiness when exposed to a human influencer compared to a virtual influencer, regardless of the product type conditions (human vs. machine). Thus, H2(a/b) is not supported (for more details see Figure 2 & 3).

Figure 2*Moderation effect of Product Type on Perceived Expertise***Figure 3***Moderation effect of Product Type on Perceived Trustworthiness*

H3 proposed that a) perceived expertise and b) perceived trustworthiness will positively influence purchase intention. Inconsistent with the prediction of H3a, results indicated that the relation between perceived expertise and purchase intention was not significant ($\beta = 0.04, p = .32$) and therefore H3a was not supported. In support of H3b, results showed a significant association between perceived trustworthiness and purchase intention ($\beta = .14, p < .05, R^2 = .40$). Thus, H3b was supported. Appendix B presents the holistic view of the PLS-SEM results.

Control Variables

In addition to investigating the main variables of interest, this study also considered the potential influence of control variables. Control variables are factors that can impact the relationship between the variables being studied, and they are included in the analysis to ensure that the observed effects are not confounded by these external factors (Nielsen, 2018)). Upon analysis, certain control variables were found to be statistically significant, revealing their impact on the study's outcomes. Product involvement, attractiveness, and familiarity emerged as significant predictors. Product involvement showed a significant association with expertise ($\beta = .51, p < .01$), trustworthiness ($\beta = .46, p < .01$) and purchase intention ($\beta = .28, p < .01$). Moreover, results showed a significant association between attractiveness and purchase intention ($\beta = .24, p < .01$). And lastly, familiarity showed a significant association with purchase intention as well ($\beta = .28, p < .01$).

Model Fit

The goodness of fit of our research model was tested by checking the average path coefficient (APC), average R-squared (ARS), average variance inflation factor (AVIF) and average full collinearity VIF (AFVIF) computed by WarpPLS 6.0 (Kock, 2020). Kock (2020) demonstrates that the validity of a structural model can be ensured when the significance level of APC and ARS is less than .05 ($p < .05$) and the values of AVIF and AFVIF are equal or less than 3.3. Results from PLS-SEM supported the validity of our research model: APC = .24, $p < .001$; ARS = .36, $p < .001$; AVIF = 1.46; and AFVIF = 1.58

Discussion

General discussion of findings

The primary objective of this study was to investigate the way virtual influencers are perceived in contrast to human influencers within the domain of influencer marketing, specifically within the scope of social media ads. Additionally, the study explored whether these perceptions of trustworthiness and expertise could be influenced by the type of product and whether consumers' intentions to purchase might be affected by their evaluations of influencers' expertise and

trustworthiness. While the results did not support all the hypotheses, they have sparked intriguing reflections that warrant further consideration.

The first hypothesis predicted that virtual influencers will be perceived as more credible, with greater levels of expertise and trustworthiness, than virtual influencers. Contrary to the predictions and previous research findings (Matsui et al., 2019), indicating that virtual influencers may exhibit higher levels of expertise and trustworthiness compared to human influencers and therefore more credible, the results of this study present a different pattern. The study findings reveal a surprising outcome, indicating that human influencers are seen as more credible in comparison to their virtual counterparts. The different outcomes observed in this study can potentially be explained by several feasible factors that are supported by the existing literature. According to Moustakas et al. (2020), a possible concern with virtual influencers is their limited exposure to genuine experiences with the products and services they promote, which could lead to customer skepticism. The mentioned skepticism might include doubts regarding the trustworthiness and expertise of virtual influencers, particularly in relation to their endorsement of certain products. Additionally, it is important to consider the specific environment in which virtual influencers function and the probable lack of real-life interactions they possess. These factors can significantly influence customers' impressions of their trustworthiness and expertise (Ozdemir et al., 2023). Additional insights can be derived from a study conducted by Uzunoğlu (2014), whereby it was discovered that the relatability of influencers has a notable impact on individuals' perceptions of trustworthiness and expertise. According to Conti et al. (2022), the credibility of virtual influencers may be compromised due to their perceived lack of connection with real-world events, which in turn hampers their capacity to develop relatability with customers. The ability of consumers to establish a deep connection with virtual influencers may be hindered by the absence of authentic human attributes, thereby impacting their judgments of trustworthiness and expertise (Nissen, 2021).

The second hypothesis aimed to investigate whether the type of product has a moderating effect on the relationship between the type of influencer and the perceived trustworthiness and

expertise. The hypothesis posited that virtual influencers endorsing products with machine properties would generate higher levels of expertise and trustworthiness, whereas human influencers endorsing products with human properties would be linked to higher levels of expertise and trustworthiness. The findings derived from the study, however, provided very little validation for this hypothesis. While the findings partially supported the hypothesis, indicating that human influencers did generate greater levels of trustworthiness and expertise than virtual influencers in both human property and virtual property product categories, the hypothesis as a whole was not fully confirmed. The results revealed a complex scenario in which human influencers consistently demonstrated higher levels of perceived trustworthiness and expertise compared to virtual influencers. This pattern was observed regardless of whether the products being promoted had human or machine properties. According to recent findings by Hassan et al. (2021), it has been observed that the extent to which influencers express authenticity considerably affects consumers' perceptions of expertise and trustworthiness. The underlying authenticity of human influencers, derived from their genuine interactions and experiences, presents a challenge for virtual influencers attempting to emulate such qualities (Conti et al., 2022). The relationship between authenticity and relatability may potentially influence customers' perceptions of human influencers as being more credible. Additionally, the occurrence of cognitive dissonance (Festinger's, 1957) may be a factor in this situation due to unexpected reversal effects. Consumers might have perceived a misalignment between the products promoted by virtual influencers and their own beliefs. This contrasts with the study's initial prediction, wherein it was anticipated that consumers would perceive virtual influencers as credible when endorsing a product with machine properties, aligned with their beliefs influenced by machine heuristics. Virtual influencers promoting products potentially create an inconsistency between the virtual nature of the influencer and the physical reality of the product, which may result in a conflict in terms of trustworthiness and expertise. This dissonance, rooted in the perceived mismatch between influencer type and product type, could underscore the findings that human influencers consistently outperformed virtual influencers.

Furthermore, the third hypothesis anticipated that perceived trustworthiness and expertise will have a positive effect on purchase intention (Martin-Consuegra et al., 2018; Sesar et al., 2020). The findings indicated that purchase intention was positively affected by perceived trustworthiness, however perceived expertise was not and therefore partially supporting the hypothesis. The lack of statistical significance regarding the effect of expertise on purchase intention can be understood from a range of studies. One plausible explanation can be attributed to the distinctive characteristics of the products being promoted. According to a study conducted by Smith and Martinez (2020), the perceived relation of an influencer's expertise to the endorsed product is of significant importance. If customers think that the influencer possesses a high level of expertise that is closely related to the technical elements or functionality of the product, this expertise may have a greater effect on their intention to make a purchase. Nevertheless, in situations where the influencer's area of expertise does not align directly with the product being promoted, such as with more broad or non-technical goods, the impact of expertise on the intention to purchase may be reduced (Till et al., 1998). Furthermore, the complexity of the product itself may be a contributing factor to the observed absence of statistical significance regarding expertise (Wiedemann, 2021). Another contributing factor could stem from consumers perceiving influencers as individuals who are ordinary individuals, in contrast to traditional celebrity endorsers (Wiedmann et al., 2010). Since influencers share their everyday lives and engage in personal interaction, it can foster a sense of proximity. This could result in consumers seeing the endorsements by the influencers as opinions and non-expert advice and therefore not perceiving expertise (Huang et al., 2006).

Theoretical and Practical Implications

The findings of this study have substantial theoretical and practical implications. The recognition of trustworthiness having a positive influence on purchase intention highlights a significant mechanism that is consistent with other studies in this field (Shamim & Islam, 2022; Andersson & Sobek, 2020). The confirmation of the positive impact of trustworthiness provides theoretical support for the comprehension of how influencer qualities influence consumer behavior.

Moreover, it has been found that the type of product plays a moderating role in the association between influencers and the perception of their expertise and trustworthiness.

In addition to its theoretical contributions, this study provides practical insights that have the potential to significantly change influencer marketing efforts. The empirical findings clearly demonstrate that human influencers generate higher levels of trustworthiness and expertise, which supports the study done by Nissen (2021). The greater level of trustworthiness in turn positively influences the intention to make a purchase, which is also aligned with (Shamim & Islam, 2022). The practical implications of this finding highlight the need to ensure that the selection of influencers is in line with the intended goal. The utilization of human influencers as endorsers presents the possibility of more impactful marketing efforts due to their natural relatability, authenticity, and perceived trustworthiness. Through the strategic utilization of human influencers' capacity to interact with consumers on an individualized basis, brands may cultivate more robust relationships and cultivate heightened levels of consumer trust, ultimately resulting in increased purchase intention.

This study also found that the control variables: product involvement, attractiveness and familiarity were statistically significant. Product involvement demonstrated a positive significant relationship with expertise, trustworthiness and purchase intention. These results are consistent with the study conducted by Woodside and Chebat (2001) emphasizes that individuals with a greater degree of product involvement have a heightened inclination to thoroughly engage with the information and endorsements related to the product. The increased level of involvement could lead to a stronger perception of trustworthiness and expertise for the influencers who endorse the product (Belanche et al., 2021). The credibility of influencers is enhanced in the eyes of consumers when there is a perceived alignment between the influencer's genuine interest in the recommended product and the consumer's own level of involvement (Shan et al. 2018). These enhanced perceptions eventually have a positive effect on individuals' intention to make a purchase (Martin-Consuegra et al., 2018; Belanche et al., 2021). These results highlights the concept that customers with a deeper involvement in a product are inclined to place trust in influencer recommendations,

which emphasize trustworthiness and expertise in their assessment, and increasing purchase intention.

Moreover, attractiveness demonstrated a positive relationship with purchase intention, which aligns with the research conducted by Aguilar (2021), which emphasizes the significance of attractiveness as a peripheral cue in shaping consumer attitudes and behaviors. It is well observed that consumers tend to hold more favorable perceptions of those who possess appealing physical attributes. The phenomenon can be explained by the "halo effect" which suggest that a specific good trait, such as attractiveness, acts as a symbolic halo and therefore casting a positive light on the rest of the traits as well (Talamas, 2016). This perception may extend to the products that these individuals endorse (Wiedmann, 2021). Thus, consumers have a tendency to link attractive endorsers with favorable product characteristics and are more likely to indicate a desire to make a purchase (Brahim, 2020).

Additionally, influencer familiarity also demonstrated a significantly positive effect on purchase intention. Previous research found that consumers often have a tendency to form a preference for entities or individuals that they are familiar with (Donnelan et al., 2020). In the contexts of influencer endorsements, it has been found that customers have a greater tendency to purchase a product when they possess a level of familiarity with the source of endorsement (Belanche et al., 2021). This phenomenon can be explained by the "mere exposure effect" which suggest that the brains is capable to process stimulus more easily when encountering it again, fostering a sense of trust, and therefore rated more positively (Donnellan et al., 2020). The findings of this current study can also be explained by the elaboration likelihood model which proposed that peripheral cues, such as familiarity, can exert a significant influence on consumer attitudes in situations where individuals lack a strong motivation to engage in information processing (Richard et al. 1986). In the context of influencer endorsements, individuals may depend on peripheral cues, such as familiarity, as a rapid cognitive shortcut to facilitate their purchase choices.

The insights presented shed light on the theoretical and practical insights in regards to influencer-consumer dynamics. The identification of trustworthiness as a crucial factor in association with purchase intention, along with the observed effect of the control variables, gives a deeper understanding of consumer behavior within the context of influencer marketing. These findings have the potential to fundamentally change both theoretical frameworks and practical strategies within this constantly developing landscape.

Limitations and Future Directions

While the study yielded significant findings, it is essential to acknowledge several limitations that present opportunities for future research. Notably, the significance of trustworthiness in relation to purchase intention provided a key insight, highlighting the crucial role of this aspect within the construct of credibility. However, it is important to highlight that expertise, despite being another component of credibility, did not demonstrate a significant effect on purchase intention. This inconsistency raises questions about the relative influence of these components and calls for replicating this study to validate these observations in different contexts. To get a deeper understanding of this discrepancy, future research should not only replicate the study but also introduce an additional component, such as attractiveness, as suggested by Kim and Park (2023) and Brahim (2020). Exploring the interplay between these components of credibility and their influence on purchase intention could give a better understanding of consumer behavior. Especially since this study found that attractiveness did have a significant relationship with purchase intention.

Moreover, the study's findings on product involvement as a determinant of purchase intention provides valuable insights, and presents an opportunity for further research. While product involvement's positive impact is established (Woodside & Chebat, 2001), future research could consider incorporating product involvement as a variable within the context of influencer marketing. Investigating how different levels of product involvement interact with influencer endorsements, and subsequently impact purchase intention, could yield better insights. This investigation would not only

contribute to a deeper understanding of consumer decision-making but also enhance the applicability of findings in real-world marketing scenarios.

To enhance the insights of this study, future research could extend its methodology to include qualitative measurements. Through utilization of interviews, researchers could have an in-depth understanding of attitudes and perceptions towards both virtual and human influencers. Qualitative interviews would provide participants with the opportunity to elaborate on their assessments of virtual and human influencers' expertise, trustworthiness, and the overall impact on their purchase decisions. This approach would help researchers to capture participants' thoughts, suggestions, and criticisms, and therefore offering a comprehensive perspective that quantitative methods alone might not reveal. Incorporating qualitative data would not only enrich the study's conclusions but also provide actionable insights for influencer marketing strategies. In sum, it's important to take into account these limitations since they could potentially influence the quality of the study's outcomes. Further investigation is warranted to achieve more reliable and definitive conclusions.

Conclusion

In this study, the perceptions of virtual influencers compared to human influencers in social media advertisements were explored. Moreover, it was investigated how consumers' purchase intentions were influenced by their perceptions of expertise and trustworthiness. Furthermore, it was taken into account how the type of product might moderate consumer perceptions in this context. The findings suggest that human influencers are perceived as more credible (perceived trustworthiness and expertise) than virtual influencers, even with the product type moderating the perceptions. Evidence also suggests that perceived trustworthiness has a positive effect on purchase intention. Additionally, it was found that control variables attractiveness, familiarity with influencers and product involvement have a positive effect on purchase intention. The impact of product involvement extended further by demonstrating a positive significant relationship with both expertise and trustworthiness. The findings of this study add to the existing body of knowledge by

demonstrating that the level of perceived trustworthiness play a critical role when it comes to purchase intention.

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Appendix A

Table 1

Item loadings of reflective indicators.

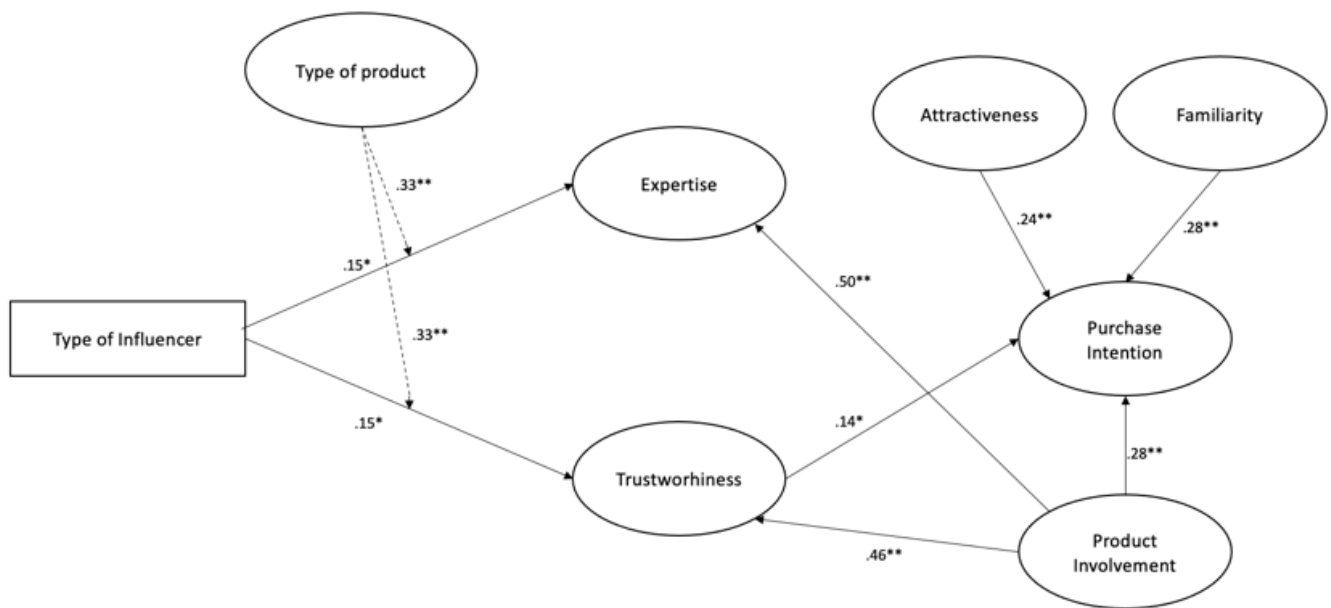
IT	IL	PE	IL	PT	IL	PI	IL	PT	IL	A	IL	PIV	IL	F	IL
IT1	1.00***	PE1	.90***	PT1	.89***	PI1	.92***	PT1	1.00***	A1	1.00***	PIV1	.87***	F1	.89***
	.	PE2	.90***	PT2	.94***	PI2	.97***					PIV2	.84***	F2	.89***
		PE3	.87***	PT3	.95***	PI3	.93***					PIV3	.79***		
		PE4	.78***	PT4	.48***	PI4	.56***					PIV4	.89***		
		PE5	.91***	PT5	.94***	PI5	.95***					PIV5	.68***		
		PE6	.93***									PIV6	.89***		
												PIV7	.87***		
												PIV8	.76***		
												PIV9	.84***		
												PIV10	.66***		

Note. IT

= Influencer Type, PE = Perceived Expertise, PT = Perceived Trustworthiness, PI = Purchase intention, PT =Product Type, A =Attractiveness, PIV = Product Involvement, F =Familiarity, IL = Item Loading. *** $p < .001$

Appendix B

PLS-SEM results: path coefficients



Appendix C

Stimulus: Instagram posts of Rui for the virtual condition with the machine property product.





ruuui_li 

281
Posts

127K
Followers

4,562
Following

RUI
All about "Virtual Human" Rui
 TRAVEL | LIFESTYLE 
 VLOG 
 ALL ABOUT RUI
 instabio.cc/ruicoverly



ruuui_li 

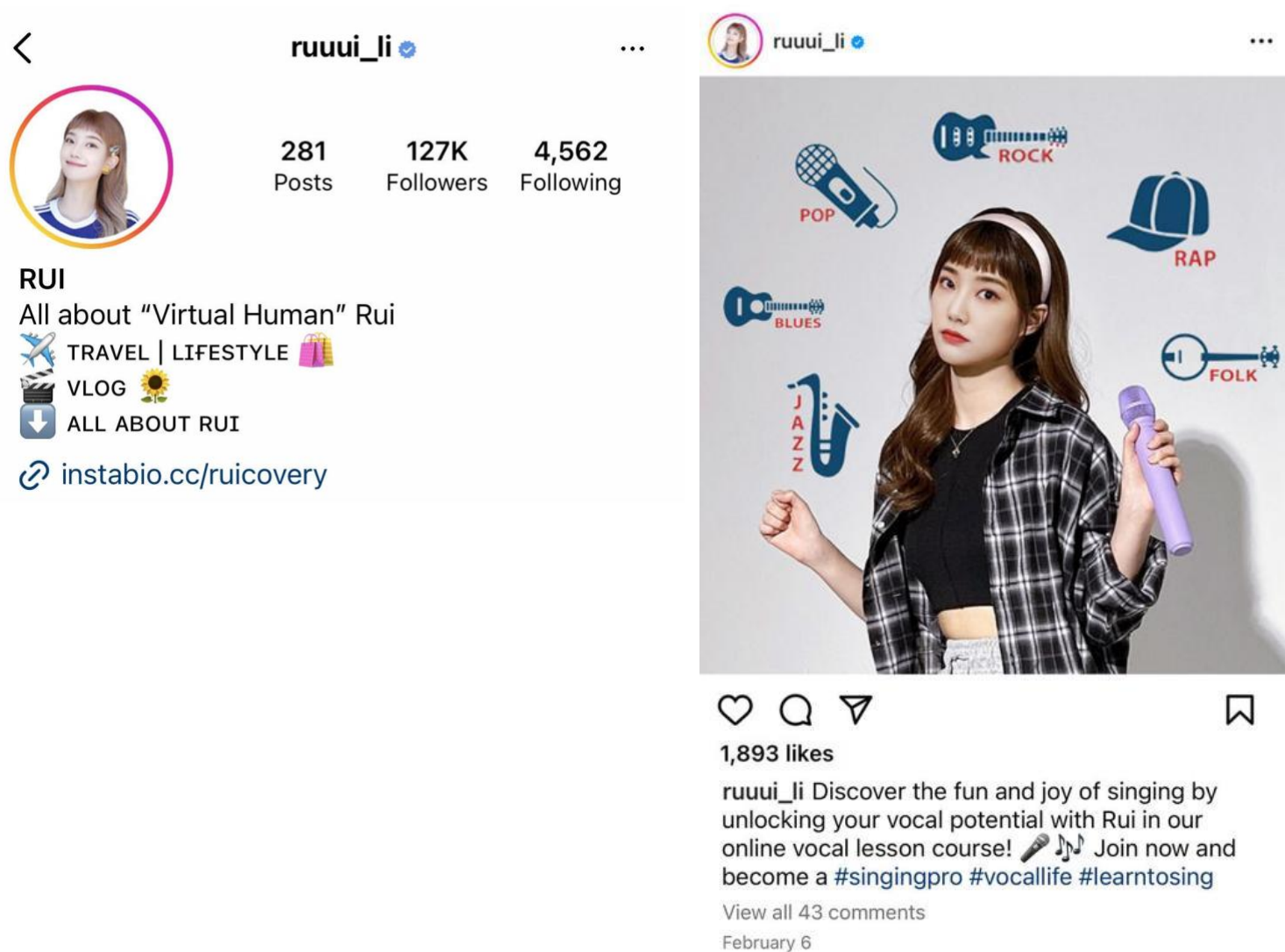




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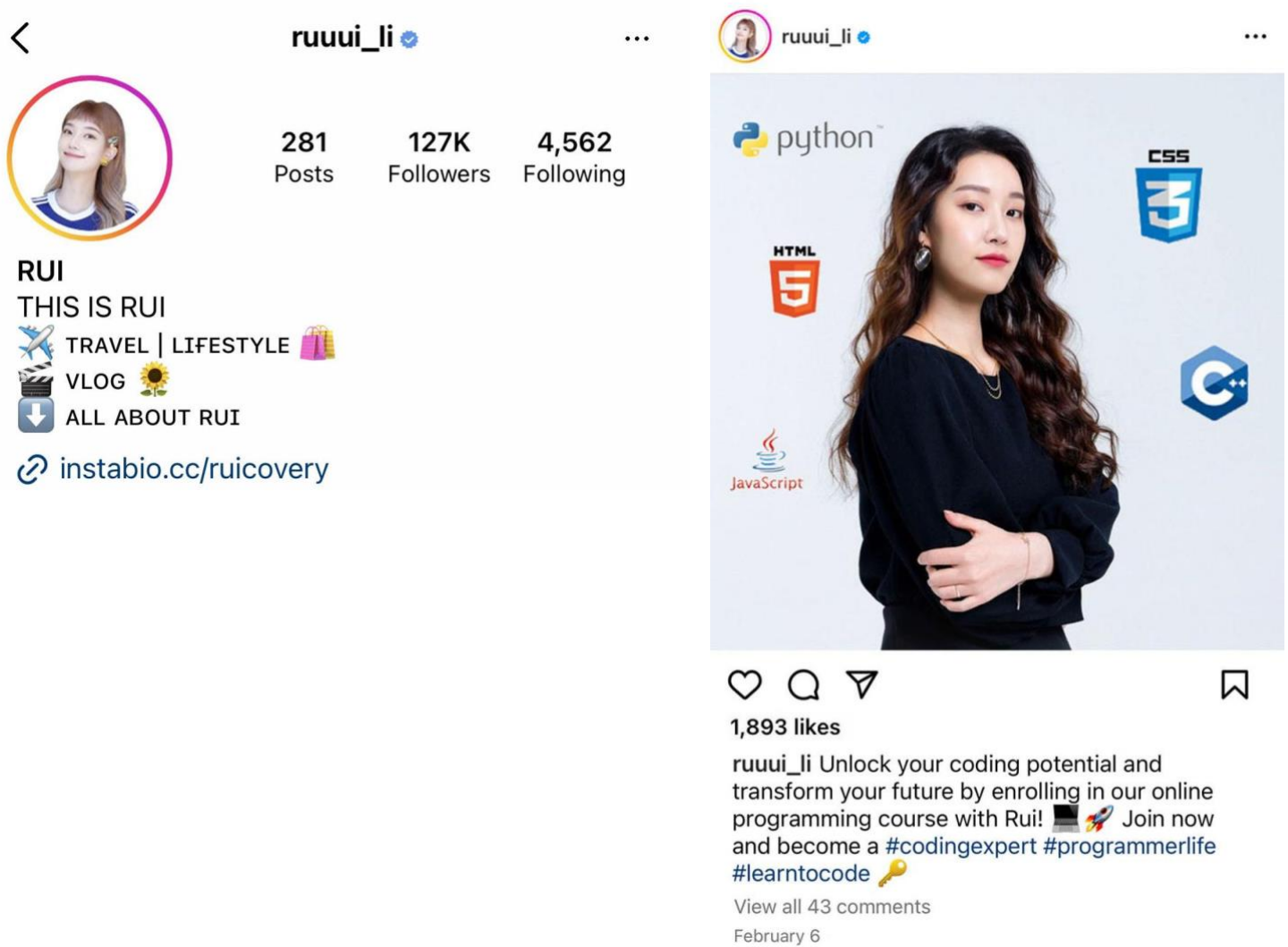
Appendix D

Stimulus: Instagram posts of Rui for the virtual condition with the human property product.



Appendix E

Stimulus: Instagram posts of Rui for the human condition with the machine property product.



Appendix F

Stimulus: Instagram posts of Rui for the human condition with the human property product.





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281
Posts

127K
Followers

4,562
Following

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Appendix G

The measures for the virtual and human condition and the vocal/programming lesson course

Purchase intention

- | | |
|-----|---|
| PI1 | I intend to sign up for the course advertised by the influencer. |
| PI2 | I am likely to sign up for the course advertised by the influencer. |
| PI3 | I have a high interest of the course promoted by the influencer. |
| PI4 | I will never sign up for the course promoted by the influencer. |
| PI5 | I will probably sign up for the course promoted by the influencer. |
-

Perceived expertise

Please choose the most appropriate answer that best describes your thoughts about the influencer in promoting the vocal/programming lesson course.

- | | |
|-----|---------------------------------|
| PE1 | Expert – not an expert |
| PE2 | Experienced - inexperienced |
| PE3 | Knowledgeable - unknowledgeable |
| PE4 | Qualified - unqualified |
| PE5 | Skilled - unskilled |
-

Perceived trustworthiness

Please choose the most appropriate answer that best describes your thoughts about the influencer in promoting the vocal/programming lesson course.

- | | |
|-----|---------------------------|
| PT1 | Dependable - undependable |
| PT2 | Honest - dishonest |
| PT3 | Reliable – unreliable |
| PT4 | Sincere – insincere |
-

PT5 Trustworthy - untrustworthy

Attractiveness

Please choose the most appropriate answer that best describes your experience after seeing the influencers' Instagram post. The influencer is..

A1 Attractive – unattractive

Manipulation

Please choose the most appropriate answer that best describes your experience after seeing the influencers' Instagram post. The promoted vocal/programming lesson course has more .. properties

M1 Human – machine

Please choose the most appropriate answer that best describes your experience after seeing the influencers' Instagram post. The influencer looks..

M2 Human – virtual

Product involvement

Please choose the most appropriate answer that best describes your thoughts about the vocal/programming lesson course promoted by the influencer.

PIV1 Important – unimportant

PIV2 Boring- interesting

PIV3 Relevant – irrelevant

PIV4 Exciting- unexciting

PIV5 Means nothing – means a lot to me

PIV6	Appealing – unappealing
PIV7	Fascinating – mundane
PIV8	Worthless – valuable
PIV9	Involving – uninvolved
PIV10	Not needed - needed

Familiarity

Are you familiar with virtual influencers?

F1 Not very much – very much

Do you know much about social media influencers?

F2 Not very much – very much

Note. The survey question about the previous experiences of consumers was slightly different in the influencer type and product type conditions. Overall, the survey questions were the same in all four conditions.