The Rise of AI-Generated Influencers: Cybersecurity, Trust and the Future of Social Media Marketing in Morocco

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Article Info	Abstract
	This study analyzes the impact of artificial intelligence-generated virtual influencers on consumer trust and purchase intention in the context of digital marketing in Morocco. By mobilizing the theoretical frameworks of authenticity, brand trust and perceived cybersecurity risk, the research examines how the type of influencer (virtual versus human) shapes consumer attitudes and behaviors. A quantitative survey was conducted among 230 Moroccan social network users, measuring perceived authenticity, brand trust, purchase intention, influencer type and perceived cybersecurity risk. The results reveal a strong positive relationship between perceived authenticity and brand trust, as well as between brand trust and purchase intention. Human influencers are perceived as significantly more authentic than their virtual counterparts. Above all, the analysis shows that the perception of cybersecurity risk moderates the effect of influencer type on purchase intention: as security concerns increase, so does the preference for human influencers. These results underline the need for marketing professionals to integrate issues of digital trust, transparency and security into the design of their campaigns with virtual influencers. The study contributes to a better understanding of the challenges and opportunities associated with AI-driven marketing in specific cultural contexts, and opens up prospects for future research into digital ethics and consumer-perceived risk management.

Introduction

In the age of accelerated digital transformation, influencer marketing is undergoing an unprecedented transformation, driven by the emergence of unprecedented players: virtual influencers designed by artificial intelligence. On social networks, these digital avatars are already collaborating with international brands, captivating millions of followers and appearing in increasingly sophisticated campaigns. Their ability to create innovative, personalized and ubiquitous content, while freeing themselves from human constraints, intrigues as much as it questions. For companies, this phenomenon opens up new strategic horizons, offering the possibility of scripting tailor-made messages and addressing audiences previously difficult to reach. In this context, the boundary between reality and virtuality is becoming blurred, upsetting the consumer's traditional points of reference. The arrival of these virtual entities is more than just a technological feat: it goes to the heart of the notions of authenticity, proximity and trust that structure the relationship between brands and their audiences. In markets where the culture of human connection and the value of transparency remain central, as is the case in Morocco, the introduction of AI influencers elicits a range of reactions, from fascination to mistrust. At the same time, the omnipresence of AI in content creation raises growing issues of cybersecurity, digital risk management and ethics.

This new landscape then poses a series of major questions that will be at the heart of this study: Are virtual influencers perceived as credible and authentic as their human counterparts? What mechanisms help or hinder Moroccan consumers' acceptance of these new players? To what extent does the perception of cybersecurity risks influence the trust placed in AI-led campaigns? These are just some of the questions this research aims to answer, based on a rigorous empirical analysis and a detailed reading of the cultural dynamics at work.

State of the art

Influence marketing is rooted in the theory of meaning transfer, according to which the influencer acts as a vector of meaning for the brand, helping to build its identity (McCracken, 1989). This capacity to influence is closely linked to the credibility of the source, a dimension recognized as decisive in the public's acceptance of the message, as shown by the pioneering work on persuasion (Hovland, 1951). This thinking has been taken further by the elaboration probability model, which highlights the importance of cognitive processes and commitment in the processing of marketing messages (Petty, 1986). In today's digital context, the notion of perceived authenticity is becoming a central lever for establishing a lasting relationship between the influencer and his or her audience (Beverland, 2005). Moreover, online trust is becoming an essential prerequisite for any commercial

interaction on the Internet, conditioning the effectiveness of influencer campaigns (Gefen, 2000). What's more, the alignment of values between influencer, brand and consumer is crucial to fostering loyalty, as confirmed by analyses of brand equity (Heath, 2001). More recently, the advent of artificial intelligence has profoundly renewed the field of influencer marketing, opening up new prospects for the automation and personalization of strategies through the use of virtual agents (Kaplan, 2010). However, this rapid transformation also raises major ethical questions, particularly with regard to transparency and accountability in the use of AI in the service of digital marketing (Floridi, 2016).

In this dynamic, recent research highlights the accelerating use of AI-generated virtual influencers, profoundly disrupting paradigms of authenticity, trust and security on social networks (Guerreiro, 2023). These mutations are accompanied by growing ambivalence on the part of consumers: while some express curiosity about virtual agents, others express increasing distrust of the veracity of the content being broadcast (Moustakas, 2020). The effectiveness of campaigns mobilizing AI influencers thus largely depends on the ability to maintain an appearance of authenticity and a certain emotional closeness with the audience (Jin, 2021). This observation underlines the need to enhance transparency and develop verification mechanisms, in order to limit the risks of manipulation and misinformation, as indicated by the work of Alshaikh (2022). With this in mind, blockchain is being explored as an innovative solution for guaranteeing the traceability and reliability of digital influencers' interventions (Kowalski, 2022). Furthermore, cultural specificities, particularly in contexts such as Morocco, play a predominant role in acceptance or resistance to these new influencer profiles, with local norms largely structuring the reactions of young adults (Barros, 2023). Faced with this rapid development, regulation and awareness-raising appear essential to accompany the integration of AI into digital marketing, while ensuring consumer protection (Lim, 2022). Finally, cybersecurity is emerging as a central issue, requiring the implementation of automated detection methods for deepfakes and AI-generated content to preserve the integrity of brands and the trust of audiences (Cai, 2021).

On an international scale, virtual influencers generated by artificial intelligence have established themselves as a structuring phenomenon within the digital marketing ecosystem, overturning the traditional boundaries of brand communication (Guo, 2023). These digital entities, designed by specialized companies, now interact with millions of followers and collaborate with world-renowned brands, blurring the distinction between real and virtual (Hou, 2022). Several studies point out that the growing appeal of these influencers stems in particular from their ability to generate content without geographical or human constraints, offering brands unprecedented flexibility in terms of communication (Kim, 2021). However, this virtualization of marketing raises new questions about the public's perception of authenticity and trust, issues considered central to the effectiveness of

influencer strategies (Jin, 2021). In this context, researchers are pointing out that the success of campaigns integrating AI influencers relies largely on the quality of their design, the sophistication of the storytelling and the ability to generate empathy among audiences (Guerreiro, 2023). What's more, regulating content produced by artificial intelligence appears to be a major challenge, both for platforms and public authorities, in a rapidly evolving digital environment (Lim, 2022). Moreover, analysis of marketing strategies reveals a constant adaptation of practices to integrate these virtual agents into the communication devices of global brands (Cai, 2021). Moreover, academic debate is increasingly focusing on the ethical implications inherent in the rise of these artificial personalities, particularly with regard to the transparency and responsibility of industry players (Alshaikh, 2022).

In the Moroccan context, the adoption of virtual influencers remains at an emerging stage, although the interest shown by marketing professionals and brands in these innovations is clearly growing (Barros, 2023). The first experiments, mostly driven by technology companies or international communications agencies, reflect both curiosity about this new paradigm and a certain caution about their cultural acceptability (Benkirane, 2022). Indeed, empirical studies show that the perception of authenticity and cultural proximity are still decisive criteria for the acceptance of Moroccan audiences, which explains the relatively slow progress of the phenomenon compared to other markets (El Azhari, 2021). For example, Juiher et al (2023a) highlighted that a comparison between content disseminated by virtual and physical influencers reveals a marked difference in perceived authenticity and audience engagement. On the other hand, the use of artificial intelligence to identify and rank micro-influencers without recourse to paid tools is beginning to become part of the emerging practices of local agencies (Juiher et al., 2023b). More recently, Juiher et al. (2024) have pointed out that the acceptance of virtual influencers for the promotion of local products remains highly dependent on cultural and trust factors, which vary according to generation and socio-economic background. Despite these reservations, a growing fringe of young urban Moroccans, particularly active on Instagram and TikTok, is showing an openness to digital innovation and an interest in new narrative formats carried by AI (Afifi, 2021). Moreover, the introduction of these virtual entities directly questions national regulation and personal data protection systems, in a context where legislation remains in a phase of adaptation in the face of the complex challenges of the digital age (CNDP, 2022). Moreover, recent industry reports attest to the fact that Moroccan agencies are gradually beginning to integrate AI solutions to analyze campaign engagement and performance, paving the way for wider adoption of virtual influencers in the years ahead (We Are Social, 2023). Finally, the literature as a whole highlights that the success of these initiatives will be conditioned by players' ability to design content that respects the cultural and social codes specific to the Moroccan context (Barros, 2023).

The rise of virtual influencers is creating major cybersecurity challenges, which can be observed on an international scale as well as in the Moroccan market. On the one hand, the proliferation of deepfakes and the widespread use of AI-generated content facilitate the creation of fictitious identities that are particularly difficult for unsuspecting users to detect (Cai, 2021). This ability to manipulate an influencer's appearance, voice or speech exposes brands to increased risks of fraud, campaign hijacking and reputational damage (Alshaikh, 2022). Indeed, several research studies point out that the use of synthetic videos and bots in digital marketing amplifies consumers' vulnerability to misinformation and online scams (Kim, 2021). In the face of these threats, the literature recommends the development of advanced technical solutions, such as automated detection of suspicious content using deep learning, or source authentication based on blockchain technology (Guerreiro, 2023). It also seems necessary to promote close collaboration between platforms, agencies and public authorities in order to establish safety standards suited to the age of AI influencers (Lim, 2022). On the regulatory front, although Moroccan legislation is still evolving, national authorities are already insisting on strengthening personal data protection and combating digital identity theft (CNDP, 2022). Finally, several Moroccan experts are calling for ongoing training for digital marketing professionals to anticipate and effectively manage cybersecurity incidents that could affect consumer confidence (Kettani, 2022). At the same time, the emergence of virtual influencers generated by artificial intelligence is profoundly challenging the notion of trust and authenticity within the relationship between brands, content creators and consumers (Jin, 2021). Research findings show that perceived authenticity remains a key determinant of the success of influencer marketing campaigns, especially in environments where cultural proximity and emotional engagement are particularly valued (Beverland, 2005). However, the virtualization of identities and the possibility of artificially generating opinions, recommendations or testimonials reinforce the risk of manipulation and credibility erosion (Guerreiro, 2023). In this regard, Kim (2021) observes that consumers are paying increasing attention to transparency regarding the origin and nature of content, demanding clear and ethical communication from brands on the use of AI. In the Moroccan context, Juiher and Ouaddi (2023) highlight the innovative potential of AI, while emphasizing the importance of integrating local cultural codes in order to overcome resistance linked to the perception of authenticity. Thus, recent literature recommends a hybrid approach, reconciling human authenticity and technological innovations, as the optimal strategy for preserving audience trust while leveraging the opportunities offered by artificial intelligence in influencer marketing (Lim, 2022).

Despite the rapid growth of virtual influencers in international digital marketing, the scientific literature highlights a lack of in-depth empirical studies on their real impact with Moroccan consumers, particularly in comparison with human influencers. This gap particularly concerns the

way in which the presence of these new players affects trust, perceived authenticity, perception of cybersecurity risks and purchase intention, fundamental dimensions in a cultural context where proximity and credibility are particularly valued. The central research question is therefore as follows:

To what extent does the presence of virtual influencers on social networks, and the consideration given to cybersecurity issues, impact the trust and purchase intention of Moroccan consumers, in comparison with human influencers, in the current context of accelerated digital transformation?

To answer this question, four hypotheses are formulated: (H1) The perceived authenticity of an influencer, whether virtual or human, has a positive effect on consumer brand trust; (H2) Consumer brand trust has a positive effect on purchase intention; (H3) The type of influencer (virtual or human) significantly influences consumer perceived authenticity; (H4) The type of influencer (virtual or human), moderated by perceived cybersecurity risks, significantly influences consumer purchase intention.

Methods

To answer this question and test the hypotheses we formulated, we opted for a quantitative approach, particularly well-suited to the study of customer perceptions of virtual and human influencers. Indeed, the key variables in this research, such as perceived authenticity, brand trust, purchase intention and perception of cybersecurity risks, can all be measured using standardized scales validated in the literature (for example, Likert scales for trust or purchase intention). This methodological choice not only makes it possible to collect objective data from a large sample of Moroccan consumers, but also to apply statistical analyses to identify significant relationships between the variables studied. The use of a quantitative study thus offers the possibility of generalizing results and establishing rigorous comparisons between perceptions of virtual and physical influencers, while integrating emerging dimensions linked to cybersecurity in digital marketing. It is also a relevant tool for capturing current trends and assessing the real impact of these new practices in the specific context of the Moroccan market, which is undergoing a major digital transformation.

To ensure methodological transparency, this study employed a convenience sampling method through online distribution of the questionnaire via social media platforms and professional networks. This approach was deemed appropriate given the exploratory nature of the research and the target population of Moroccan social media users. The final sample consisted of 230 valid responses, which is consistent with recommended thresholds for quantitative studies using structural equation modeling (SEM) and moderation analysis. According to methodological guidelines, a

minimum ratio of 5–10 respondents per estimated parameter is generally required to achieve adequate statistical power and reliability (Hair et al., 2019). With 230 participants, the sample size satisfies these criteria, allowing for robust testing of the proposed relationships while acknowledging that larger samples would further enhance the generalizability of the findings.

Participants were recruited through an online survey disseminated via social media platforms (Facebook, Instagram, LinkedIn) and professional networks in Morocco, using a convenience sampling approach. The call for participation specifically targeted Moroccan social media users aged 18 and above, ensuring that respondents had prior exposure to influencer marketing content. This procedure enabled the collection of a diverse sample reflecting different age groups, genders, and socio-economic backgrounds within the Moroccan context. This method of distribution has the advantage of reaching a wide audience of Moroccan consumers, from a variety of demographic and geographic profiles, while ensuring rapid and anonymous participation. The questionnaire comprises several sections enabling the main variables to be measured using closed Likert scale items, thus facilitating the quantification of perceptions. Once data collection was complete, all responses were digitally coded to guarantee the reliability and consistency of statistical processing.

The measurement instruments were developed based on validated scales from prior research in the fields of influencer marketing and consumer behavior. Perceived authenticity of the influencer was assessed using a 5-item Likert scale adapted from Beverland (2005) and Jin (2021), capturing dimensions such as sincerity, credibility, and originality. Brand trust was measured with 4 items derived from Gefen (2000) and Guerreiro (2023), focusing on perceptions of reliability, integrity, and confidence in the promoted brand. Purchase intention was operationalized through a 3-item scale adapted from Kim (2021), measuring the likelihood of consumers purchasing a product or service recommended by the influencer. Finally, perceived cybersecurity risk was evaluated with 4 items inspired by Alshaikh (2022) and Lim (2022), covering concerns about privacy, data security, and susceptibility to digital fraud. All items were measured on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). Prior to analysis, reliability tests (Cronbach's alpha) confirmed the internal consistency of the constructs, with all values exceeding the recommended threshold of 0.70.

The data thus structured were imported into SPSS software to perform the appropriate statistical analyses, such as descriptive analysis, correlation, regression and tests of differences in means between groups. The use of SPSS ensures the analytical rigor of the study, and objectifies the relationships between perceived authenticity, trust, purchase intention and perception of cybersecurity risks as a function of influencer type.

Results

This section presents the empirical findings of the quantitative analyses conducted to test the study's hypotheses. Descriptive statistics and correlations were first examined to assess the strength and significance of the relationships between the main constructs, including perceived authenticity, brand trust, purchase intention, and perceived cybersecurity risk. Group statistics and independent samples t-tests were then applied to compare differences in perceived authenticity between human and virtual influencers. Finally, regression analyses, including a moderation test, were performed to evaluate the predictive effects of influencer type, authenticity, and cybersecurity risk on consumer purchase intention. The following tables summarize the key results obtained.

		Perceived authenticity of the influencer	Trust in the brand
Perceived authenticity of the influencer	Pearson Correlation	1	.778**
	Sig. (2-tailed)		.000
	N	230	230
Trust in the brand	Pearson Correlation	.778**	1
	Sig. (2-tailed)	.000	
	N	230	230
**. Correlation is significant at the 0.01 level (2-tailed).			

Table 1. Pearson Correlation between Perceived Authenticity and Brand Trust

Statistical analysis reveals a high Pearson correlation between perceived influencer authenticity and brand trust ($r = 0.778$, $p < 0.001$), indicating a strong and statistically highly significant positive association between these two variables. This level of correlation suggests that perceived authenticity acts as a major lever in the trust-building dynamic within influencer marketing campaigns. This result is in line with the work of Beverland (2005) and Jin (2021), who identify authenticity as a central legitimacy criterion for influencers, particularly in digital environments characterized by strong competition and a proliferation of sponsored content. More specifically, a high perception of authenticity on the part of the public helps to build greater trust in the associated brand, thus facilitating acceptance of the marketing message and predisposition to engagement. This dynamic is all the more marked in the context of virtual influencers, where consumer expectations of sincerity and transparency are particularly high. The importance of this link is also explained by the rise of misinformation and manipulation in the digital ecosystem, making the perception of authenticity more decisive than ever in maintaining lasting relationships between brands and their audiences. In short, the strength of the observed correlation testifies to the structural weight of perceived authenticity in the genesis of brand trust, while underlining the need for digital marketing practitioners to invest in strategies aimed at reinforcing the credibility and transparency of their ambassadors, whether human or virtual.

		Trust in the brand	Intention to purchase
Trust in the brand	Pearson Correlation	1	.793**
	Sig. (2-tailed)		.000
	N	230	230
Intention to purchase	Pearson Correlation	.793**	1
	Sig. (2-tailed)	.000	
	N	230	230
**. Correlation is significant at the 0.01 level (2-tailed).			

***Table 2.** Pearson Correlation between Brand Trust and Purchase Intention*

Pearson correlation analysis reveals a strong and highly significant positive association between brand trust and purchase intention (r = 0.793, p < 0.001). This result highlights that trust is a key determinant of purchase behavior in the context of influence marketing, confirming the contributions of Gefen (2000) and Beverland (2005) on the central role of trust in converting intentions into concrete actions. The high level of correlation observed suggests that consumers with a high degree of brand trust are much more likely to express a positive purchase intention towards promoted products or services. This dynamic is particularly relevant in the digital age, where the multiplication of commercial messages and the complexity of the media ecosystem make consumers more demanding when it comes to brand reliability. The strength of the link measured is also explained by the growing importance of social proof and recommendations perceived as authentic in the purchasing decision process. In the specific case of campaigns conducted with influencers (whether human or virtual), the trust established through transparent and consistent communication considerably reinforces audiences' propensity to consider an act of purchase. Thus, statistical analysis corroborates theoretical models postulating that online trust is more than just an attitude, but acts as a fundamental behavioral lever in contemporary digital marketing.

Type of influencer	N	Mean	Std. Deviation	Std. Error Mean
Virtual (1)	123	3.53	1.096	.099
Human	107	3.83	1.094	.106

***Table 3.** Group Statistics for Perceived Authenticity by Influencer Type*

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
Perceived authenticity of the influencer Equal variances assumed	.068	.794	-2.094	228	.037	-.303	.145	-.589	-.018
Equal variances not assumed			-2.095	223.719	.037	-.303	.145	-.589	-.018

***Table 4.** Independent Samples t-Test for Perceived Authenticity by Influencer Type*

Analysis by independent samples t-test reveals a statistically significant difference in perceived authenticity according to influencer type (t(228) = -2.094, p = 0.037). Specifically, human influencers had a mean perceived authenticity of 3.83 (SD = 1.094), while virtual influencers had a lower mean of 3.53 (SD = 1.096). The mean difference of -.303 (95% CI [-0.589; -0.018]) suggests that Moroccan consumers attribute a significantly higher level of authenticity to human influencers than to their virtual counterparts. This result highlights the persistence of a certain skepticism towards digital entities, despite the rise of artificial intelligence technologies in influencer marketing. It concurs with the work of Jin (2021) and Guerreiro (2023), who show that the human dimension remains an essential differentiating criterion in the evaluation of authenticity, particularly in contexts where trust and cultural proximity are valued. The gap observed indicates that, to generate the same level of engagement, virtual influencers face the additional challenge of convincing as to their sincerity and social anchoring, even as their potential for personalization and innovation remains recognized by industry players.

	N	Minimum	Maximum	Mean	Std. Deviation
Perceived cybersecurity risk	230	1	5	3.07	1.358
Valid N (listwise)	230				

Table 5. Descriptive Statistics for Perceived Cybersecurity Risk

In order to study the moderating effect of perceived cybersecurity risk on the relationship between influencer type and purchase intention, we proceeded in several methodological steps. Firstly, we calculated the mean of the "Perceived cybersecurity risk" variable in order to center this variable around its mean value, enabling a more accurate interpretation of interactions in the regression model. This was achieved by subtracting the overall mean (M = 3.07) from each individual value, generating a new centered variable (CyberRisk_C). Next, we created an interaction term by multiplying the centered variable by the categorical variable "Type of influencer" (1 = Virtual, 2 = Human). Finally, a multiple linear regression was run with purchase intention as the dependent variable, and type of influencer, centered perception of cybersecurity risk and interaction term as predictors. This approach enables empirical testing of the hypothesis that the impact of influencer type on purchase intention varies according to the perceived level of cybersecurity risk, in line with current methodological recommendations for moderation analysis.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.390a	.152	.141	1.257

a. Predictors: (Constant), Interaction, Type of influencer, CyberRisk_C

Table 6. *Model Summary for Regression Predicting Purchase Intention*

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	64.081	3	21.360	13.527	.000b
Residual	356.880	226	1.579		
Total	420.961	229			

a. Dependent Variable: Intention to purchase

b. Predictors: (Constant), Interaction, Type of influencer, CyberRisk_C

Table 7. *ANOVA Results for Moderation Model (Dependent Variable: Purchase Intention)*

Coefficient[sa]

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1 (Constant)	3.554	.423		8.405	.000
Type of influencer	-.083	.281	-.031	-.295	.768
CyberRisk_C	-1.570	.320	-1.572	-4.906	.000
Interaction	.823	.206	1.270	3.989	.000

a. Dependent Variable: Intention to purchase

Table 8. *Coefficients of Regression Model Predicting Purchase Intention*

Linear regression analysis incorporating the interaction term reveals a significant moderating effect of perceived cybersecurity risk on the relationship between influencer type and purchase intention (B_interaction = 0.823, p < 0.001). The overall model is significant (F(3, 226) = 13.53, p < 0.001), explaining around 15% of the variance in purchase intention (R² = 0.152). In more detail, the insignificant coefficient of influencer type taken in isolation (B = -0.083, p = 0.768) indicates that it has no direct effect on purchase intention, while focused perception of cybersecurity risk has a negative and highly significant effect (B = -1.570, p < 0.001). However, the positive and significant coefficient of the interaction (B = 0.823, p < 0.001) attests to the fact that the effect of influencer type on purchase intention varies according to the perceived level of cybersecurity risk: the higher this risk, the greater the differential effect between virtual and human influencers.

In other words, as the perception of cybersecurity risk increases, the preference for one type of influencer over the other, in terms of purchase intention, becomes more pronounced. This result confirms the relevance of taking digital security concerns into account when developing influencer marketing strategies, particularly when the use of virtual influencers is envisaged. These observations are in line with recent work highlighting the importance of trust and transparency in digital environments highly exposed to the risks of manipulation and fraud (Alshaikh, 2022; Lim, 2022).

The results of this study offer robust empirical support for the conceptual model and the hypotheses

tested. Firstly, the analyses demonstrate a strong and significant association between perceived authenticity of the influencer and consumer trust in the brand, confirming the foundational role of authenticity in influencer marketing. Similarly, trust in the brand was shown to be a powerful predictor of purchase intention, underscoring its importance in driving consumer behavior in the digital context. The comparison of perceived authenticity across influencer types revealed that human influencers are still perceived as more authentic than virtual influencers, despite the growing adoption of AI-generated entities in marketing campaigns. Importantly, the moderation analysis highlights the nuanced impact of cybersecurity risk perception on the effectiveness of influencer marketing. While influencer type alone does not exert a direct effect on purchase intention, its interaction with perceived cybersecurity risk significantly alters consumer responses, indicating that concerns about digital security can amplify or diminish the influence of virtual versus human endorsers. Collectively, these findings not only validate the theoretical framework but also reveal the complexity of consumer attitudes in the era of digital and AI-driven marketing. The results provide a solid empirical basis for the ensuing discussion, where the broader implications for research, practice, and policy will be explored.

Beyond corroborating the established pathway from perceived authenticity to brand trust and purchase intention (Beverland, 2005; Gefen, 2000), the Moroccan setting reveals context-specific mechanisms that qualify global findings. First, strong relational norms and a preference for interpersonal proximity amplify the authenticity penalty borne by virtual influencers relative to human counterparts (Jin, 2021; Juiher & Ouaddi, 2024). Second, Morocco's multilingual media ecology (Arabic–French–Amazigh) renders linguistic and idiomatic cues salient indicators of credibility, which synthetic agents reproduce less consistently (Afifi, 2021). Third, religion- and season-sensitive consumption cycles (e.g., Ramadan) heighten expectations of sincerity and transparency in sponsored content. Fourth, the elevated salience of cybersecurity and privacy in everyday digital life increases risk sensitivity toward AI-generated content, helping to explain the significant moderation observed for perceived cybersecurity risk (Alshaikh, 2022; Lim, 2022; CNDP, 2022). Finally, smartphone-dominant access and uneven digital literacy encourage reliance on simple trust heuristics (e.g., human presence, local cultural cues), further differentiating reactions to virtual versus human sources (Afifi, 2021). Collectively, these features indicate that acceptance of AI-generated influencers in Morocco is shaped by local relational norms, language ecology, seasonality, and risk perceptions rather than merely replicating global patterns, thereby offering a culturally grounded contribution to the literature.

Conclusion

This study examined how the type of influencer (virtual vs. human) shapes Moroccan consumers' perceptions and behaviors through the lenses of authenticity, brand trust, purchase intention, and perceived cybersecurity risk. Empirically, we found a strong link between perceived authenticity and brand trust ($r = 0.778$, $p < .001$) and between brand trust and purchase intention ($r = 0.793$, $p < .001$). Human influencers were rated as more authentic than virtual influencers ($\Delta M = 0.303$; $t(228)=-2.094$, $p = .037$). Crucially, cybersecurity risk moderated the effect of influencer type on purchase intention (interaction $B = 0.823$, $p < .001$), such that higher perceived risk strengthened the preference for human endorsers (model $F(3,226)=13.53$, $p < .001$; $R^2 = .152$). These results underscore that trust and authenticity remain foundational in digital influence, and that risk perceptions condition the acceptance of AI-driven endorsements in Morocco. Theoretically, the findings extend influencer marketing research by integrating cybersecurity risk as a boundary condition on endorsement effectiveness, and by evidencing contextual mechanisms that qualify global patterns within Morocco's socio-cultural and linguistic environment. Managerially, practitioners should (i) make authenticity cues conspicuous, especially for virtual agents; (ii) communicate transparently about AI generation and data security; and (iii) localize narratives and language to match Moroccan audience expectations, particularly during high-salience periods (e.g., Ramadan).

This work has limitations that temper generalization. First, convenience sampling via online channels limits population representativeness, skewing toward digitally active users. Second, while $n = 230$ is adequate for the reported tests, it is borderline for more complex SEM and high-order moderation with extensive controls, which may reduce power for detecting small effects. Third, the cross-sectional design constrains causal inference. Fourth, the model omitted potentially relevant covariates (e.g., digital literacy, prior deepfake exposure, privacy concerns, religiosity/seasonality sensitivity, value alignment, parasocial interaction). Finally, reliance on self-reports in a single wave raises the possibility of common method bias.

Future studies should (1) use probability-based or stratified sampling to improve representativeness across regions, age, and language communities; (2) increase sample sizes and estimate full SEM measurement models (CFA, invariance testing; HTMT) to examine more complex pathways and multiple moderators with sufficient power; (3) adopt longitudinal and field-experimental designs (e.g., randomized exposure to human vs. virtual influencers with/without AI disclosure and security cues) to strengthen causal claims; (4) incorporate additional constructs, digital literacy, prior exposure to synthetic media, privacy/security concerns, religiosity/seasonality cues, value alignment, parasocial

interaction, influencer familiarity, platform expertise, as mediators or moderators; (5) triangulate surveys with behavioral traces (click-throughs, dwell time, wish-listing, confirmed purchases) to validate intention–action links; and (6) run cross-market comparisons (e.g., Maghreb/MENA) and multi-group analyses within Morocco to isolate cultural-linguistic mechanisms. Pre-registration and a priori power analysis are recommended to calibrate samples for small but practically meaningful moderation effects.

Overall, the evidence indicates that while AI expands creative and operational possibilities, trust, authenticity, and perceived security remain decisive for consumer response. In Morocco, these levers are filtered through local relational norms and language ecologies, suggesting that effective deployment of virtual influencers requires culturally tuned design and credible risk-reduction signals.

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