Virtual influencers and mindful consumption: Dual-system evidence from Vietnam

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ABSTRACT

This study investigates how the attributes of Virtual Influencers (VIs) motivate mindful consumption in livestream commerce taking place in Vietnam through Cognitive-Affective Engagement (CAE). A structural model was designed based on Dual-System Processing, Mindfulness, and CAE theories, such that community initiatives, perceived authenticity, interactivity, and emotional value are predictors of CAE, which, in turn, predicts mindful consumption. Data for the study were obtained from 300 university students in Ho Chi Minh City and analyzed using PLS-SEM with bootstrapped indirect effects. All hypothesized paths were supported. Emotional value and interactivity proved to be the strongest antecedents of CAE, while perceived authenticity and community initiatives also exerted positive effects. CAE has a strong relationship with mindful consumption; mediation tests show that it significantly mediates the impact of all four VI attributes on mindful consumption. It indicates that System 1 cues, including emotional resonance, social connectedness, and interactive affordances, may evoke a more profound System 2 processing that channels engagement toward reflective, value-oriented choices rather than impulsive ones. Novelty lies in articulating and empirically testing CAE as the conduit between VI design cues and mindful consumption within a dual-system lens in an emerging market, with predictive checks to reinforce robustness. Practically, brands and platforms should prioritize emotionally rich storytelling, credible personas, and participatory features. Theoretically, the study broadens VI research beyond persuasion outcomes by positioning CAE as a central mechanism for sustainability-oriented intentions.

1. Introduction

Artificial intelligence is reshaping digital commerce by altering how consumers encounter brands, evaluate products, and choose. A visible manifestation is the rise of Virtual Influencers (VIs), computer-generated personas that simulate human appearance, emotion, and interaction. In livestream commerce, where immediacy, interactivity, and affect are central, VIs increasingly act as hosts, endorsers, and product presenters. Brands value their availability and controllability, which can reduce reputational risk and keep messaging aligned with brand values (Hoang, 2023; Rungruangjit et al., 2024; Yan et al., 2023). Vietnam is a fertile context given rapid e-commerce

growth, strong uptake of short-form video, and the popularity of livestream shopping among Gen Z (DataReportal, 2025; Huynh, 2025; Vietnam Law and Legal Forum, 2024). Fast diffusion of AI-mediated content and active youth participation make Vietnam a theoretically suitable and practically relevant setting to observe VI-led engagement beyond simple persuasion outcomes (DataReportal, 2025; Vietnam Law and Legal Forum, 2024). Positioned in this context, the paper foregrounds Vietnam as a high-velocity social commerce environment in which AI-mediated cues are salient and amenable to theory testing of cognitive and affective processing.

Despite rising interest, key gaps persist. Prior work emphasizes proximal outcomes such as purchase intention, trust, and credibility, while giving limited attention to the psychological mechanism through which VI attributes shape downstream behavior (Dang et al., 2024; Vo et al., 2025). A clearer account is needed of how specific cues move audiences from quick affective reactions toward deliberate evaluation that supports value-oriented choices (Hollebeek et al., 2014; Kahneman, 2011). In Vietnam, livestream studies often rely on source credibility and S-O-R lenses that cast responses as linear or primarily affective, under-specifying how intuitive and reflective processes jointly operate. Integrating Dual-System Processing clarifies when fast, affect-laden appraisals invite slower, reflective monitoring in high-velocity streams (Kahneman, 2011). Sustainability-relevant outcomes, such as mindful consumption, are underexplored in AI-mediated settings, and questions about theuthenticity and credibility of CGI personas are rarely tied to reflective, value-oriented decisions (Kumar et al., 2024; Le et al., 2024; Shamim & Azam, 2025; Zang et al., 2025). Relatedly, the authenticity paradox of VIs remains insufficiently theorized for sustainability contexts, namely how artificial agents might still be perceived as coherent and credible in ways that support reflection rather than impulse (Rungruangjit et al., 2024; Vo et al., 2025). Accordingly, this study asks two focused questions: through which internal state do salient VI design cues translate into mindful consumption, and under what authenticity-awareness conditions might these effects weaken or change?

We adopt Dual-System Processing and position Cognitive-Affective Engagement (CAE) as the core internal state linking VI design to mindful consumption. Mindful consumption is conceptualized as aware, intentional, value-consistent choices rather than impulsive or purely hedonic acquisition (Kumar et al., 2024; Zang et al., 2025). Four VI attributes salient in livestream settings and in Vietnam are examined: community-driven initiatives, perceived authenticity, interactivity, and emotional value. These attributes are theorized to trigger System 1 cues such as emotional resonance and social connectedness while also inviting System 2 appraisal, culminating in CAE that can motivate reflective, sustainability-oriented behavior. Perceived authenticity is treated as potentially conditional, insofar as awareness of artificiality may weaken authenticity-based effects, a boundary condition developed conceptually here (Rungruangjit et al., 2024; Vo et al., 2025). This positioning clarifies the paper's mechanism-first focus while acknowledging cultural and design contingencies that bound the operation of authenticity.

We test a structural model in which the four VI attributes predict CAE, which in turn predicts mindful consumption. Data come from a cross-sectional survey of university students in Ho Chi Minh City, a segment highly engaged with livestream shopping and VI content. PLS-SEM with bootstrapping assesses direct and indirect effects, enabling an integrated test of the mechanism in an emerging digital economy. While a student sample limits external validity, it is well-suited to the focal phenomenon; generalizability is treated as a scope condition. We also prespecify a parsimonious mediation test without interaction terms, reserving moderation by authenticity awareness as a conceptual boundary rather than an estimated effect, to keep the explanatory focus on the mechanism of CAE.

The study contributes in three ways. Theoretically, it extends VI research beyond persuasion by articulating and testing CAE as a psychological mechanism connecting VI attributes to mindful consumption within a Dual-System framework, while recognizing authenticity-related boundary conditions. Empirically, it provides evidence from Vietnam's livestream commerce environment where AI-mediated interactions are rapidly diffusing among Gen Z. Managerially, it offers guidance for platforms and brands on designing VI content that balances emotional expressiveness, credible personas, interactivity, and community features to support value-oriented, sustainable consumption. Together, these contributions position the paper at the intersection of digital consumer behavior and sustainable marketing, offering a mechanism-based account that is both theoretically informative and operationally actionable for livestream commerce.

2. Theoretical basis

2.1. Theoretical

This study draws on three complementary perspectives to explain how Virtual Influencer (VI) attributes in livestream commerce can shape mindful consumption through a proximal psychological state of Cognitive-Affective Engagement (CAE). First, Dual-System Processing distinguishes fast, automatic, affect-laden reactions in System 1 from slower, deliberative appraisal in System 2 (Kahneman, 2011). Livestream environments are saturated with expressive visuals, social cues, and real-time feedback, readily activating System 1. When stimuli are self-relevant, normatively charged, or invite participation, viewers engage System 2 through appraisal, reasoning, and value matching. In our context, VI attributes such as community-driven initiatives, perceived authenticity, interactivity, and emotional value are theorized as salient System 1 inputs that can precipitate deeper, reflective processing observable as CAE. This perspective treats livestreams as high-velocity contexts in which System 1 rapidly orients attention, while meaningful cues recruit System 2 to scrutinize motives and values, providing a principled bridge from initial affect to reflective appraisal (Hollebeek et al., 2014; Kahneman, 2011). Accordingly, System 1 functions as an attentional gate that orients viewers to VI cues, while System 2 consolidates those cues into value-consistent judgments that CAE captures.

Second, Mindfulness Theory frames consumption as a domain where awareness, intention, and values can guide behavior. Mindful consumption is characterized by conscious attention, self-regulation, and choices aligned with personal or ethical standards, rather than automatic or purely hedonic responses (Brown & Ryan, 2003; Kumar et al., 2024; Zang et al., 2025). Livestream commerce compresses decision time and heightens persuasive pressure, which increases the risk of impulsivity. A psychological state that binds feeling with focused attention is therefore necessary for reflective responses to emerge within this high-velocity setting. We argue that CAE provides precisely this condition by integrating emotional involvement with deliberate thought. In this study, mindful consumption captures awarenessful, value-consistent intentions observable in-stream rather than verified post-purchase behaviors, a distinction later revisited as a limitation and direction for validation. This positioning aligns mindful consumption with an intention-based outcome that is theoretically proximal to CAE, while acknowledging the need for future behavioral validation.

Third, Cognitive-Affective Engagement conceptualizes engagement as a dynamic blend of emotional energy and sustained cognitive attention directed at a focal message, brand, or media persona (Hollebeek et al., 2014). In VI-led livestreams, CAE may manifest as empathy with community initiatives, comfort derived from credible and coherent personas, enjoyment of interactive exchanges, and simultaneous scrutiny of message content and value implications. Prior work on AI-

mediated marketing indicates that authenticity cues, social connectedness, and emotionally rich storytelling foster parasocial bonds, attention, and positive responses (Le et al., 2024; Rungruangjit et al., 2024; Vo et al., 2025). Taken together, these perspectives suggest a theoretically grounded pathway in which specific VI attributes trigger System 1 reactions that escalate into a deliberative CAE state, which, in turn, supports mindful consumption. In operational terms, the model treats CAE as the proximal mediator that channels the influence of four VI attributes toward mindful consumption, enabling a mechanism-first test without proliferating interaction terms.

This integrative lens is especially appropriate in Vietnam's fast-growing livestream commerce, where Gen Z interacts intensively with short-form video, parasocial cues, and participatory features (Hoang, 2023; Huynh, 2025; Yan et al., 2023). Perceived authenticity is also viewed as conditional in VI contexts, because heightened awareness of artificiality can attenuate authenticity-based effects. We therefore regard authenticity awareness as a conceptual boundary condition: when synthetic cues become overly salient, authenticity-based pathways to CAE may weaken, a point we revisit in the discussion. Finally, we acknowledge potential adverse implications, including manipulative design or performative prosocial signaling, and address ethical safeguards and transparency practices to preserve value-consistent engagement.

2.2. Hypothesis development

Consistent with a mechanism-first, parsimonious specification, we test CAE as the proximal mediator without adding interaction terms; authenticity awareness is treated as a conceptual boundary rather than an estimated moderator. In Vietnam's high-velocity livestream commerce, these cues are salient and theoretically apt to trigger the CAE mechanism.

Community-driven initiatives by virtual influencers signal identity and shared welfare, rapidly eliciting empathic warmth and moral elevation (System 1). At the same time, their value-laden nature invites reflective appraisal of personal fit, social norms, and longer-term consequences (System 2) (Kahneman, 2011). In Vietnam's community-attuned context, such cause appeals strengthen identification, perceived credibility, and willingness to participate, sustaining emotional resonance and focused attention, the twin strands of CAE (Kahneman, 2011; Kayode, 2024; Mohammad et al., 2020; Vo et al., 2025). Evidence from digital settings shows socially impactful content deepens involvement and supports ongoing community activity, consistent with a shift from affect to appraisal that culminates in CAE. In sum, prosocial cues operate as fast, value-rich signals that orient empathy and attention while their collectivist meaning invites reflective scrutiny, thereby seeding CAE. Therefore, we hypothesize that community-driven initiatives have of positive effect on CAE.

H1: Community-driven initiatives by virtual influencers positively influence cognitive-affective engagement

Perceived authenticity sits at the core of CGI personas' credibility gap. When a virtual influencer shows coherent values, transparent motives, and stable, humanlike consistency across touchpoints, viewers experience psychological comfort and become more open to affective attachment. These cues enable engagement based on intentions and trustworthiness, and on alignment with one's beliefs, thereby binding emotion to attention and appraisal in ways that strengthen cognitive-affective engagement (Kahneman, 2011). AI-mediated marketing studies repeatedly find that perceived authenticity fosters parasocial bonding, a gateway condition that helps audiences accept rather than dismiss the message as artificial spectacle (Rungruangjit et al., 2024; Vo et al., 2025). At the same time, authenticity in VI contexts is plausibly conditional, since greater

awareness of artificiality can attenuate acceptance. We treat these contingencies as conceptual boundaries and focus our tests on the positive main effect of perceived authenticity on CAE.

H2: Perceived authenticity of virtual influencers positively influences cognitive-affective engagement

Interactivity transforms a unidirectional communication into an interactive exchange, empowering the audience. Instant messaging, acknowledgments, surveys, gifting systems, and mild gameplay create a perceived level of co-presence, raising affective engagement; when there is a responsibility to answer and the possibility of changing the result, it keeps attention and cognition engaged. This loop becomes highly effective in livestream commerce because timeliness makes participation matter socially visible, particularly among digital natives who have developed conversational platforms. Empirical studies from livestream contexts confirm that interactivity boosts attentional involvement and emotional intensity, which are precisely the dual ingredients of CAE that connect stimuli to subsequent action (Dinh et al., 2024; Hollebeek et al., 2014; Shamim & Azam, 2025). Dialogic features thus trigger rapid social presence and also sustain reflective monitoring of unfolding exchanges, jointly reinforcing CAE. Accordingly, we hypothesize that interactivity positively affects CAE.

H3: Interactivity of virtual influencers positively influences cognitive-affective engagement

Emotional value comes from narrative resonance, humor, nostalgia, beauty, and moments of awe, which instantaneously provoke feelings typical of System 1. In cases where the content bears personal meaning or moral salience, that emotion becomes a seed for deeper appraisal, further retention and consolidation, and the making of meaning characteristic of System 2. Virtual influencers can very well deliver this kind of value through expressive visuals within a coherent story architecture, using culturally tuned symbolism and relatable micro dramas that invite both feeling and thinking. Prior evidence indicates that emotionally charged messaging elevates attention and facilitates sustained engagement, aligning with the proposition that emotion can be a doorway to reflection rather than a substitute for it, which is the essence of CAE in immersive media (Hollebeek et al., 2014; Kahneman, 2011; Rungruangjit et al., 2024). Accordingly, emotional value is treated as a catalyst that couples immediate arousal with meaning-making, a precondition for CAE in high-velocity streams. Hence, we predict that emotional value positively influences cognitive-affective engagement.

H4: Emotional value of virtual influencer content positively influences cognitive-affective engagement

Cognitive-affective engagement is posited as the proximal psychological condition that converts upstream design features into mindful consumption. In fast-paced livestream environments, automaticity is the default, and scarcity cues and social proof amplify impulsive tendencies. CAE interrupts this momentum by coupling emotional connection with deliberate attention and evaluative thought, making it more likely that individuals will pause, consider consequences, and choose actions consistent with personal and ethical values. Conceptually, this account aligns with Mindfulness Theory, which views intentional, awarenessful choice as the product of attention to present experience and value congruence, and with recent work that frames mindful consumption as a reflective alternative to hedonic impulse in digital markets (Brown & Ryan, 2003; Hollebeek et al., 2014; Kumar et al., 2024; Zang et al., 2025), and in this study, the outcome captures awarenessful, value-consistent intentions in-stream rather than verified post-purchase behavior. Consequently, we propose that cognitive-affective engagement positively influences mindful consumption.

H5: Cognitive-affective engagement positively influences mindful consumption

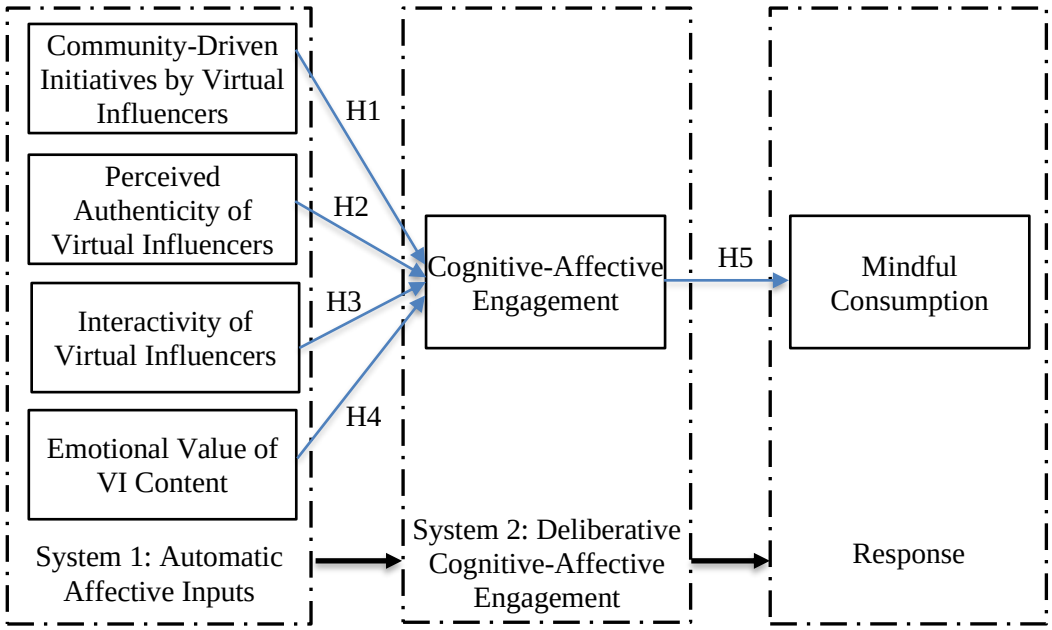
Cognitive-Affective Engagement (CAE) mediates effects in line with Dual-System Processing. Community initiatives, authenticity, interactivity, and emotional value trigger fast affective responses, but mindful consumption requires reflective appraisal and value alignment. CAE captures this transition by integrating feeling with focused thinking in a sustained state. If CAE is the central conduit, the influence of virtual influencer attributes on mindful consumption should operate primarily through this mechanism, with significant indirect effects indicating that initial emotion has been transformed into deliberate, value-oriented choice. This mediational pattern reconciles the persuasive potency of emotionally rich, interactive stimuli with the emergence of sustainability-relevant outcomes in AI-mediated contexts (Brown & Ryan, 2003; Hollebeek et al., 2014; Kahneman, 2011; Kumar et al., 2024; Zang et al., 2025). For completeness, robustness is assessed using alternative specifications and item purification to ensure the indirect pathway is not a model artifact. Hence, CAE mediates links from all four attributes to mindful consumption.

H6: Cognitive-affective engagement mediates the relationships between the four virtual influencer attributes and mindful consumption

The model treats four virtual influencer attributes as affective stimuli rapidly perceived in livestreams. Community-driven initiatives, perceived authenticity, interactivity, and emotional value trigger System 1 reactions and, when self-relevant, invite System 2 appraisal. Cognitive-affective engagement is the proximal state where emotional resonance coexists with sustained attention, translating reactions into reflective evaluation of motives, consequences, and value fit (Hollebeek et al., 2014; Kahneman, 2011). Mindful consumption is the downstream response defined by awareness, intention, and alignment with personal or ethical values (Brown & Ryan, 2003; Kumar et al., 2024; Zang et al., 2025). The model specifies paths from the attributes to CAE, from CAE to mindful consumption, and indirect effects via CAE, consistent with evidence (Rungruangjit et al., 2024; Vo et al., 2025). Figure 1 presents this conceptual structure.

Figure 1

Conceptual Model



Note. Authors' own work

3. Methodology

This study uses a cross-sectional survey and variance-based structural equation modeling to test a mechanism linking four virtual influencer attributes to Cognitive-Affective Engagement (CAE) and Mindful Consumption (MC) in Vietnam's livestream commerce. Partial Least Squares SEM was selected because it supports prediction-oriented, theory-extending work, accommodates complex latent structures, and is robust when multivariate normality is uncertain (Chin, 1998; Hair et al., 2021). We estimated a mediation-focused model without interaction terms to preserve parsimony. Indirect effects were tested by nonparametric bootstrapping, consistent with recommendations for mediation in PLS-SEM (Hair et al., 2021; Preacher & Hayes, 2008). Standardized root mean square residual was reported as a descriptive global-fit reference alongside prediction metrics (Hair et al., 2021). Primary data were collected via a structured questionnaire from university students in Ho Chi Minh City who had watched or purchased via livestreams in the prior six months, a Gen Z segment highly engaged with short-form video and VI content (Hoang, 2023; Huynh, 2025; Vo et al., 2025). A nonprobability convenience approach was used through classes, student clubs, and social media groups. Screening verified eligibility; informed consent was obtained; participation was voluntary and anonymous. After removing straight-liners, failed attention checks, and implausibly fast completions, 300 valid cases remained. A priori power analysis for four predictors with $f^2 = 0.15$, $\alpha = 0.05$, power = 0.80 indicated a minimum N of about 85; N = 300 exceeds this and the ten-times rule. External validity is scoped to young urban users. Early versus late respondents showed no nonresponse bias. Missing data were negligible; demographic skips used pairwise deletion (Hair et al., 2021).

All focal constructs were modeled reflectively and measured with multi-item Likert scales. Items followed the Section 2 domains and prior literature. Community-driven initiatives capture perceptions that a virtual influencer supports social causes, charity, or community partnerships salient in collectivist contexts (Bhattacharya & Sen, 2004; Du et al., 2010; Kayode, 2024; Mohammad et al., 2020; Vo et al., 2025). Perceived authenticity assesses whether the influencer presents a coherent, honest, and consistent persona, thereby reducing skepticism and facilitatingrust and parasocial bonding (Morhart et al., 2015; Moulard et al., 2015; Rungruangjit et al., 2024; Vo et al., 2025). Interactivity indexes perceived real-time responsiveness, acknowledgments, and participatory affordances that grant agency to viewers (Dinh et al., 2024; Liu, 2003; Mcmillan & Hwang, 2002; Shamim & Azam, 2025). Emotional value captures narrative resonance, humor, nostalgia, and aesthetic appeal (Rungruangjit et al., 2024; Sweeney & Soutar, 2001). CAE reflects co-activation of emotional involvement and focused attention (Dessart et al., 2016; Hollebeek et al., 2014). MC represents aware, intentional, value-consistent choice tendencies in AI-mediated settings and is measured at the intention level in-stream, a scope condition noted in the Discussion (Brown & Ryan, 2003; Sheth et al., 2011; Zang et al., 2025). The instrument was prepared in English and Vietnamese with translation and back-translation, expert review, and a small pilot to verify clarity and timing (Brislin, 1970). Seven-point agreement scales were used. Procedural remedies to reduce method variance included separating predictor and outcome blocks, varying the anchors, randomizing the items, and ensuring anonymity and non-evaluative framing (Podsakoff et al., 2003). Statistical checks further addressed common method bias. Harman's single-factor accounted for less than 50 percent of total variance, full collinearity VIFs were below 3.3, and a latent-marker approach yielded non-significant marker paths and did not change substantive coefficients, indicating CMB is unlikely to drive the results (Hair et al., 2021; Kock, 2015; Podsakoff et al., 2003).

Estimation followed a two-stage sequence aligned with current PLS-SEM guidance (Hair et al., 2021). The reflective measurement model was assessed by outer loadings, Cronbach's Alpha, composite reliability, rho_A, and average variance extracted with a 0.50 threshold. Discriminant validity was examined using Fornell and Larcker and heterotrait to monotrait ratios (Fornell & Larcker, 1981; Henseler et al., 2014). Collinearity was evaluated using inner and outer VIFs; values below 3.3 were considered acceptable andnformative for CMB diagnostics (Kock, 2015). Cross-loadings were examined for simple structure, and a latent-level marker sensitivity analysis confirmed the invariance of conclusions regarding discriminant validity and path significance. We also documented and archived the exact SmartPLS settings and analysis steps to facilitate reproducibility and transparency consistent with reporting recommendations (Hair et al., 2021). The structural model was evaluated using standardized coefficients, t values, and bootstrap confidence intervals based on 5,000 resamples. Explanatory power was summarized with R^2 and adjusted R^2. Local effect sizes used f^2 to gauge practical influence (Chin, 1998; Cohen, 1988). Predictive relevance was assessed using blindfolding Q^2 and PLSpredict against linear benchmarks at the indicator level, following Geisser (1975), Shmueli et al. (2019), and Stone (1974). SRMR was below common reference values and was interpreted descriptively in PLS settings. Mediation via CAE was tested using bias-corrected bootstrap intervals for products of indirect paths, and the variance accounted for was calculated as a descriptive index to aid interpretation (Hair et al., 2021; Preacher & Hayes, 2008). Robustness was examined by re-estimating the model after item purification, applying stricter HTMT thresholds, and adding demographic controls for gender, livestream use intensity, and prior familiarity with virtual influencers. Substantive conclusions were unchanged, indicating that the indirect pathway is not a model artifact (Hair et al., 2021).

Ethical considerations and data handling were carefully managed throughout the study. Participation was voluntary, with informed consent and the option to withdraw at any time. No identifying information was collected, and all analyses used de-identified records. The authors maintain data screening rules and codebooks, which can be provided upon reasonable request. De-identified datasets and analysis scripts are also available upon request to support transparency and replicability.

4. Result and discussion

4.1. Result

4.1.1. Demographic characteristics

Respondents were university students in Ho Chi Minh City who had watched or purchased via livestream commerce in the past six months. This population aligns well with Vietnam's digital market, where Gen Z shows strongdoption of short-form video and virtual-influencer content (Hoang, 2023; Huynh, 2025; Vo et al., 2025). After screening, the final sample is 73.33% female and 26.67% male. Ages cluster at 21 - 23 (45.33%), followed by 18 - 20 (34.33%) and 24 - 25 (17.00%). Reported income is mainly 01 - 05 million VND (40.00%) or dependent family (30.00%). Livestream shopping frequency is high: sometimes 36.00%, often 32.00%, usually 18.00%. Most have prior experience with virtual influencers (81.00%). The profile aligns with the study context and provides adequate variance for analysis.

Table 1

Descriptive Analysis (N = 300)

Criteria	Category	Frequency	%
Gender	Female	220	73.33%
	Male	80	26.67%
Income	Dependent family	90	30.00%
	Under 1,000,000VND	60	20.00%
	1,000,000 - 5,000,000VND	120	40.00%
	Over 5,000,000VND	30	10.00%
Age	18 - 20	103	34.33%
	21 - 23	136	45.33%
	24 - 25	51	17.00%
Frequency of Livestream Shopping	Rarely	42	14.00%
	Sometimes	108	36.00%
	Often	96	32.00%
	Very often	54	18.00%
Experience with Virtual Influencers	Yes	243	81.00%
	No	57	19.00%

Note. Survey data of the research author

4.1.2. Reliability and validity analysis

Following recommended PLS-SEM procedures, internal consistency was examined via Cronbach's Alpha and composite reliability. All constructs exceed the conservative thresholds of 0.70, indicating reliable multi-item scales (Hair et al., 2021). The highest reliabilities are observed for Community-Driven Initiatives and Cognitive-Affective Engagement, consistent with their conceptual salience in the model. These high reliability values, together with the convergent and discriminant assessments below, provide a robust foundation for structural estimation.

Table 2

Reliability Assessment

Construct	Items	Cronbach's α	Composite reliability
CDI	4	0.972	0.979
PA	4	0.922	0.942
INT	3	0.895	0.935
EV	3	0.808	0.887
CAE	6	0.967	0.973
MC	6	0.961	0.968

Note. Community-Driven Initiatives (CDI), Perceived Authenticity (PA), Interactivity (INT), Emotional Value (EV), Cognitive-Affective Engagement (CAE), Mindful Consumption (MC). Authors' calculation using SmartPLS 4 software

4.1.3. Convergent validity: AVE and outer loadings

Convergent validity was evaluated through average variance extracted and indicator loadings. All AVEs exceed 0.50, indicatinghat each construct explains more than half of the variance of its indicators (Fornell & Larcker, 1981). Outer loadings are high and statistically significant, with the majority above 0.80, supporting indicator reliability. Loadings for CDI and CAE are extreme, suggesting well-defined measurement of prosocial cues and the target engagement mechanism.

Table 3

Convergent Validity (Outer Loadings and AVE)

Construct	Item	Loading	AVE
CDI	CDI1	0.957	0.922
	CDI2	0.953	
	CDI3	0.977	
	CDI4	0.954	
PA	PA1	0.905	0.802
	PA2	0.836	
	PA3	0.937	
	PA4	0.900	
INT	INT1	0.813	0.829
	INT2	0.947	
	INT3	0.964	
EV	EV1	0.916	0.723
	EV2	0.807	
	EV3	0.825	
CAE	CAE1	0.972	0.859
	CAE2	0.865	
	CAE3	0.907	
	CAE4	0.967	
	CAE5	0.929	
	CAE6	0.918	
MC	MC1	0.898	0.837
	MC2	0.943	
	MC3	0.939	
	MC4	0.886	
	MC5	0.921	
	MC6	0.899	

Note. Authors' calculation using SmartPLS 4 software

4.1.4. Discriminant validity: Fornell-Larcker criterion

Table 4 supports discriminant validity using the Fornell-Larcker criterion: the square roots of the AVEs on the diagonal exceed all off-diagonal correlations for eachonstruct, indicating empirical distinctiveness (Fornell & Larcker, 1981). Although CAE and MC are moderately correlated, their diagonal entries are higher than the corresponding inter-construct correlations, consistent with the theorized proximity of outcomes. Complementary checks show HTMT ratios below the conservative 0.85 threshold and inner VIF values well under 3.3, ruling out problematic overlap and multicollinearity (Henseler et al., 2014; see Appendix A - online version). A latent-marker sensitivity checks yielded invariant conclusions, reinforcing both discriminant validity and the stability of subsequent path estimates.

Table 4

Discriminant Validity (Fornell-Larcker)

Construct	EV	PA	CDI	INT	CAE	MC
EV	**0.850**					
PA	0.556	**0.896**				
CDI	0.858	0.644	**0.960**			
INT	0.727	0.586	0.855	**0.911**		
CAE	0.693	0.284	0.573	0.668	**0.927**	
MC	0.847	0.346	0.611	0.566	0.843	**0.915**

Note. Authors' calculation using SmartPLS 4 software

4.1.5. Hypothesis testing and structural model results

Structural relationships were estimated with PLS-SEM using 5,000 bootstrap resamples (Hair et al., 2021). Emotional value had the most considerable standardized effect on CAE, followed by Perceived Authenticity and Interactivity, with Community-Driven Initiatives also showing a positive impact. Bootstrapped indirect effects from each VI attribute to Mindful Consumption via CAE were all significant; the mediated influence was most substantial for Emotional Value and Interactivity, aligning with the prominence of affect-rich and participatory cues in livestream contexts (Hair et al., 2021; Preacher & Hayes, 2008). Variance accounted for indices supported partial rather than complete mediation, which is theoretically coherent given the proximity of CAE and MC. Because mindful consumption is measured as intention observable in-stream rather than audited behavior, causal and behavioral sufficiency are treated as scope conditions and elaborated in the discussion.

Robustness checks using alternative HTMT cutoffs (Henseler et al., 2014), re-estimation after removing marginal-loading items, and models with demographic controls yielded invariant signs and significance. Interaction terms were not estimated; conclusions were stable across alternative specifications. Figure 2 visualizes standardized loadings and path coefficients consistent with the numerical results.

Table 5

Hypothesis Testing Results

Hypothesis	Structural path	β	T	P	Result
H1	CDI → CAE	0.573	16.12	0.000	Supported
H2	PA → CAE	0.644	19.35	0.000	Supported
H3	INT → CAE	0.586	17.87	0.000	Supported
H4	EV → CAE	0.693	20.74	0.000	Supported
H5	CAE → MC	0.843	21.59	0.000	Supported

Note. Authors' calculation using SmartPLS 4 software

Effect sizes provide insight into practical significance beyond p-values. Interactivity and Emotional Value produce strong local effects on CAE; Community-Driven Initiatives produce a moderate impact; and Perceived Authenticity yields a minor but still meaningful effect. The effect of CAE on Mindful Consumption is significant, underscoring the centrality of CAE as the proximal driver of value-oriented decisions in livestream shopping (Chin, 1998; Cohen, 1988).

Table 6

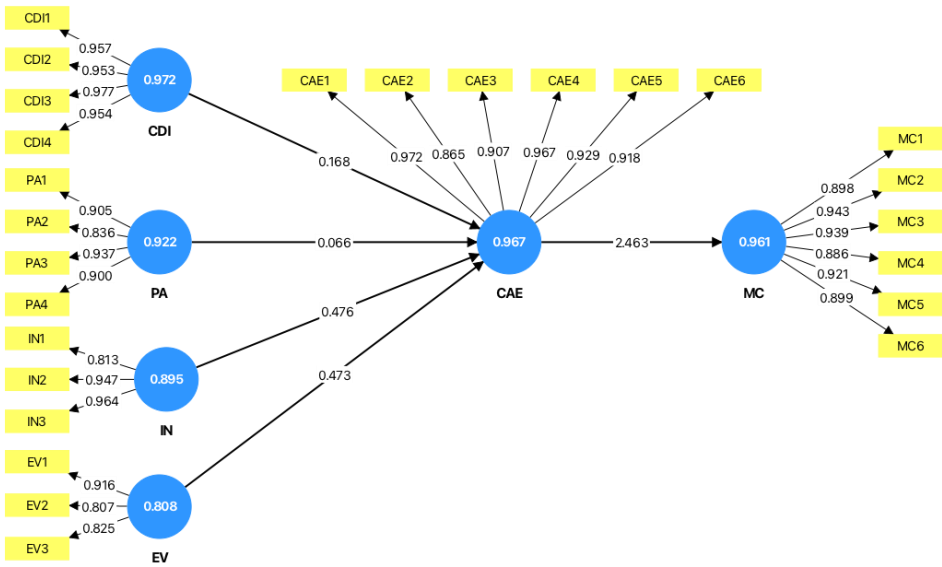
Effect Sizes (f^2)

Path	f^2	Interpretation
EV → CAE	0.473	Strong effect
INT → CAE	0.476	Strong effect
CDI → CAE	0.168	Moderate effect
PA → CAE	0.066	Small effect
CAE → MC	2.463	Powerful effect

Note. Authors' calculation using SmartPLS 4 software

Figure 2

Structural Model with Outer Loadings and Path Coefficient



Note. Authors' creation using SmartPLS 4 software

The diagram visualizes the PLS-SEM results for the proposed model, in which Community-Driven Initiatives, Perceived Authenticity, Interactivity, and Emotional Value positively predict Cognitive-Affective Engagement, and CAE predicts Mindful Consumption. All structural paths are significant at $p < 0.001$. Explained variance for the endogenous constructs is substantial (R^2_CAE = 0.693; R^2_MC = 0.712), consistent with the numerical evidence in Tables 5 and 6 and the summary in Table 8.

To make the mediation pattern transparent, Table 7 reports standardized path coefficients together with specific indirect effects via CAE (bias-corrected 95 percent confidence intervals).

Table 7

Structural Paths and Mediation via CAE

Path	β	BCa 95 percent CI	Specific indirect effect on MC via CAE	BCa 95 percent CI
Emotional value → CAE	0.784	[0.592; 0.946]	0.661	[0.488; 0.816]
Interactivity → CAE	0.781	[0.519; 1.045]	0.659	[0.443; 0.884]
Community-driven initiatives → CAE	0.540	[0.334; 0.746]	0.612	[0.474; 0.748]
Perceived authenticity → CAE	0.210	[0.092; 0.313]	0.118	[0.023; 0.230]
CAE → MC	0.843	[0.816; 0.871]	—	—

Note. Authors' calculation using SmartPLS 4 software

As shown in Table 7, the bias-corrected 95 percent confidence intervals exclude zero for all focal paths, indicating support for each hypothesis. Emotional value and interactivity have strong positive effects on CAE; community-driven initiatives have a moderate positive impact; perceived authenticity has a more negligible yet significant positive effect; and all four attributes exert a positive indirect impact on mindful consumption through CAE.

4.1.6. model fit and predictive power

Below, Table 8 indicates strong model quality. Explanatory power is substantial (R^2CAE = 0.693; R^2MC = 0.712). Predictive relevance is robust, with positive blindfolding results for CAE ($Q^2 = 0.502$) and MC ($Q^2 = 0.548$), consistent with out-of-sample logic (Geisser, 1975; Shmueli et al., 2019; Stone, 1974). Collinearity is not a concern, as the inner VIFs range from 1.72 to 3.10, within conservative thresholds (Kock, 2015). Global fit is acceptable, with SRMR for MC below 0.08 when considered alongside the complete diagnostic set (Hair et al., 2021). Overall, the metrics support a well-performing variance-based model and credible structural inferences.

Table 8

Model Fit and Predictive Indicators

Criterion	CAE	MC	Interpretation
R^2	0.693	0.712	Substantial explanatory power
Q^2	0.502	0.548	Strong predictive relevance
VIF range	1.72-3.10	-	No multicollinearity issues
SRMR	-	< 0.08	Good fit supported by combined evidence

Note. Authors' calculation using SmartPLS 4 software

4.2. Discussion

The estimates and robustness checks converge on a coherent mechanism: virtual-influencer features channel attention and affect into a deliberate appraisal, which, through that appraisal, supports mindful consumption in livestream commerce. In line with a dual-system account, emotion-laden and socially involving stimuli orient System 1 quickly, whereas self-relevance and participatory affordances recruit System 2'seflective monitoring of System 2 (Hollebeek et al., 2014; Kahneman, 2011). Cognitive-Affective Engagement (CAE) operates as the proximal state that binds feeling with focused attention, enabling value-aligned intentions (Brown & Ryan, 2003; Kumar et al., 2024). Upstream cues matter chiefly insofar as they shape CAE; results are invariant across sensitivity checks; out-of-sample prediction shows non-trivial relevance; and indirect effects remain significant under stricter diagnostics. The route from immediate affect to reflective intention can therefore be reliably elicited by specific design features embedded in VI content.

First, the dominance of Emotional Value and Interactivity as antecedents of CAE fits Vietnamese livestream commerce, where short-form storytelling, humor, and real-time dialogic cues are pervasive among Gen Z users (Hoang, 2023; Huynh, 2025; Yan et al., 2023; Yan et al., 2025). Emotion does not crowd out reflection but opens a doorway when interaction converts viewers into participants, sustaining attention and elaboration as predicted by CAE theory (Hollebeek et al., 2014). Hence, affect-rich and participatory formats can coexist with reflective orientations rather than merely fueling impulse. Practically, compact narrative arcs that culminate in on-stream decisions, quick polls that visibly change the flow, and name acknowledgments with timely replies help sustain cognitive involvement. These tactics also impose gentle structure on affective stimuli, increasing the likelihood that attention is channeled toward appraisal rather than dissipating into stimulus seeking, consistent with the observed pattern of effect sizes.

Second, the more negligible practical effect of Perceived Authenticity, compared with Emotional Value and Interactivity, aligns with an authenticity paradox for CGI personas: acceptance is conditional on value coherence and transparent disclosure and attenuates when artificiality becomes salient (Rungruangjit et al., 2024; Vo et al., 2025). Although moderation is not tested here, authenticity appears more like a threshold than a continuously amplifying signal, which explains the comparatively minor f^2. This motivates consistent persona governance and clear labeling via micro-signals such as explicit AI disclosure badges, stable persona voice, verifiable partner lists, and links to third-party validations accessible in-stream. In practice, authenticity should be operationalized through concrete transparency micro-signals, such as explicit AI disclosure badges, a stable persona voice across sessions, verifiable partner lists, and links to third-party validations that viewers can check in-stream without friction.

Third, the positive effect of Community-Driven Initiatives on CAE accords with collectivist norms and youth community participation in Vietnam, where prosocial cues elicit identification and moral elevation that sustain affect and attention (Kayode, 2024; Mohammad et al., 2020). Even with a moderate size, cause framing can steer hedonic attention toward reflective scrutiny by linking participation with shared outcomes and social approval. Credibility requires specificity, verifiability, named beneficiaries, disclosed units of impact, and real-time progress. In practice, this framing acts as a scaffold that integrates emotional narratives and interactive prompts into a purpose-oriented arc, which helps explain why community cues retain conceptual importance despite a smaller coefficient.

Fourth, the strong link between CAE and MC supports the proposition that mindful consumption, as operationalized here, is a reflective intention shaped by blended feelings and focused thought (Brown & Ryan, 2003; Kumar et al., 2024; Zang et al., 2025). Although measured as intention, its role as a proximal antecedent of sustainable choice is established, and these results offer a plausible pathway by which designable media features can support sustainability-oriented outcomes in AI-mediated settings. The magnitude suggests that small changes in CAE may produce relatively large movements in value-aligned intentions, consistent with tipping dynamics in high-involvement media contexts. Future work should trace behavior using time-delayed or platform log measures, for example, by randomizing cue bundles and tracking downstream choices to strengthen causal identification without sacrificing ecological validity.

To address the reviewer's concerns about novelty, two clarifications are in order. First, while it is unsurprising that affect and interactivity elevate engagement, our contribution is to demonstrate that these cues can be directed toward mindfulness-consistent intentions rather than impulse, and to identify CAE as the conduit that enables this shift under dual-process conditions. Importantly, predictive checks and significant indirect effects across attributes indicate that the mechanism is not merely descriptive but yields actionable forecasts for value-oriented intentions. Second, we did not test a human-influencer counterfactual, so claims about uniquely VI-driven effects are bounded. Even so, the programmability and controllability of VIs offer distinctive levers for staging emotional and participatory cues in stable, auditable ways that future experiments can directly compare with human execution. These points clarify the scope conditions and indicate where comparative designs can extend the evidence, mapping a precise route to mindful intention in an emerging-market media ecology.

Alternative explanations were considered. High inter-construct correlations are addressed by Fornell and Larcker criteria, conservative HTMT, and collinearity diagnostics, with structural results invariant across checks (Fornell & Larcker, 1981; Henseler et al., 2014; Kock, 2015). Standard method bias was mitigated and assessed, though it cannot be eliminated in cross-sectional self-reports. A further risk is pseudo mindfulness if value language masks persuasive pressure, underscoring the need for disclosure, claim-attribute alignment, and periodic audits. As a safeguard, teams should precommit to transparency standards and publish session-level checklists that document disclosures, cause mechanisms, and moderation protocols.

Taken together, the results refine theory in three ways. They situate CAE as a psychologically precise conduit from System 1 cues to System 2 appraisal in high-velocity streams; they treat authenticity as conditional for CGI personas, with awareness of artificiality as a credible moderator; and they connect engagement dynamics to mindful consumption intentions in an emerging market context where short-form, socially dense media are normative. In practice, the pattern suggests that affect and participation are the most efficient levers for elevating CAE. Still, they should be staged within transparent, value-coherent narratives and credible community frames to avoid performative prosocial signaling. Concretely, this means designing streams around compact emotional stories, instrumented interactivity that changes on-screen outcomes, and verifiable disclosures that preserve trust, thereby enabling the CAE mechanism to translate into mindful choice. These points anticipate the managerial guidance that follows, in which we translate the mechanism into actionable design recommendations for VI content, livestream features, and campaign governance.

5. Conclusions & recommendations

The findings outline a coherent pathway: emotionally rich and participatory VI features elevate Cognitive-Affective Engagement (CAE), and this proximal state aligns with mindful consumption intentions. In a dual-system view, affective cues prompt rapid appraisal, while participatory affordances invite reflective monitoring that supports value-aligned choices (Hollebeek et al., 2014; Kahneman, 2011). Emotional value and interactivity exert the most significant effects, with perceived authenticity and community initiatives adding trust-consistent contributions. Although mindful consumption is measured as intention, mindfulness theory treats intention as a proximal antecedent of sustainable choice, supporting this interpretation (Brown & Ryan, 2003; Kumar et al., 2024). Patterns are stable across validity diagnostics and sensitivity checks, and prediction-oriented evidence with significant indirect effects via CAE indicates the mechanism is not a modeling artifact. Remedies for standard-method bias were implemented, though self-report designs cannot eliminate the risk.

Managerially, design emotional value with coherence, not mere arousal. Narratives, empathic responses, and aesthetic cues should resonate culturally and remain anchored in substantiable product attributes. When emotional content is value coherent, engagement becomes a gateway to reflection rather than a cue for impulse, consistent with the structural mechanism (Hollebeek et al., 2014; Kumar et al., 2024) - engineer interactivity to sustain elaboration. Real-time polls, micro-quests, and co-creation prompts that ask viewers to compare options or reflect on use contexts convert observers into participants and extend attentive processing, especially when on-screen outcomes visibly change.

Treat authenticity for synthetic personas as a conditional threshold. Clear disclosure of virtual status, consistent voice and values, and stable persona histories preserve trust, while opacity invites skepticism that dampens the effect of perceived authenticity on engagement (Rungruangjit et al., 2024; Vo et al., 2025). Practical micro-signals include persistent AI badges, verifiable partner lists, and provenance links that open in-stream with minimal friction. Community framing offers moral scaffolding that directs emotional and interactive formats toward value-aligned orientations. Cause activations with traceable outcomes, such as donation logs or transparent challenge metrics, link participation to shared benefits and reduce performative signaling (Kayode, 2024; Mohammad et al., 2020). Operationally, a compact playbook is to (i) open with a culturally resonant micro-story linked to a verifiable attribute, (ii) trigger a 15 - 30s poll or choice that changes on-screen outcomes, (iii) disclose sponsorship/AI status with a persistent badge and link to a provenance card, and (iv) surface a live counter for any cause mechanic.

These implications extend to platforms and policy. Transparency and standardized sponsorship notices lower the likelihood that authenticity backfires when artificiality becomes salient, protecting consumers and brands (Vo et al., 2025). Light-touch safeguards can nudge reflection at key moments, for example, by offering optional information cards on durability, repairability, or provenance in high-engagement streams. Auditability also matters. Logs for scripted claims, cause pledges, and interaction logic enable reviews that detect when value language drifts toward pressure rather than thoughtful appraisal. Given Vietnam's youth-dominant, collectivist social-video culture, these safeguards and design levers are especially salient and can be deployed with current livestream toolsets.

At the same time, the boundaries of inference warrant emphasis. A student-dominant convenience sample limits generalizability, and cross-sectional self-reports constrain causal

claims. We estimated a parsimonious mediation model without interactions, given the design and power constraints. Future work should broaden sampling across age and region, adopt longitudinal or experimental designs, and incorporate behavioral traces or field outcomes to verify whether intention shifts translate into behavior. Comparative studies holding message content constant while varying the agent can establish distinctiveness between human and virtual influencers (Hollebeek et al., 2014; Kahneman, 2011; Kumar et al., 2024). A practical next step is a preregistered A or B field experiment randomizing cue bundles that combine emotion, interactivity, and authenticity disclosure, then tracking dwell time on value pages, opt-ins, and traceability clicks under real conditions.

In sum, emotionally meaningful and participatory cues are effective levers for elevating CAE, the proximal condition for mindful consumption intentions. Staged within transparent, value-coherent narratives and credible community frames, virtual influencers can support sustainability-consistent outcomes while preserving consumer trust. To safeguard these benefits, teams should institutionalize a lightweight governance checklist that includes clear AI/sponsorship labels, verifiable cause mechanics, and periodic content audits, so interventions encourage thoughtful deliberation rather than inadvertently trigger impulsive purchasing.

SCIENTIFIC CONTRIBUTION

The manuscript clearly identifies a research gap; the manuscript extends or refines existing theories; the manuscript proposes a new theoretical or analytical model; the manuscript introduces or improves research methods; the manuscript provides new datasets or empirical evidence; the manuscript presents statistically and practically significant findings; the manuscript offers policy/managerial/technological implications; the manuscript opens new directions for further research.

AUTHOR CONTRIBUTIONS

CRediT: **Truong Thi Thuy Vi**: Conceptualization, Methodology, Validation, Formal Analysis, Investigation, Data Curation, Writing - Original Draft, Supervision, Project Administration; **Khuu Minh Dat**: Methodology, Software, Investigation, Writing - Review & Editing, Visualization.

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NO CONFLICT OF INTEREST STATEMENT

All authors declare that they have no conflict of interest.

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