



**Emotional Attributes of Digital Assistants Driving
Engagement, Purchase Intentions, and Well-being**

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Abstract

Purpose – Grounded in the Stimulus-Organism-Response (SOR) model and the spillover concept, the study examines how digital assistants’ (DAs’) affective attributes shape customer engagement, which then spills over into emotional values, purchase intentions, and well-being.

Design/methodology/approach – A two-wave longitudinal survey was conducted, yielding 440 responses at Time 1 and 315 at Time 2. Partial least squares structural equation modelling (PLS-SEM) by SmartPLS 4.0 was used to verify the reliability and validity of the measurement model and test the hypothesised relationships.

Findings – The findings reveal that DAs’ aesthetics, friendliness, and playfulness significantly increase customer engagement, with effect sizes for these emotional stimuli varying from low to high. Customers’ active engagement also subsequently influences their emotional values: perceived happiness and relaxation. Together, these emotional values have a positive and significant effect on purchase intentions. The results also show that customer well-being is significantly spilled through purchase intentions. Moreover, customer engagement, emotional values, and purchase intention yield substantial serial mediation effects in the relationships between attributional stimuli and well-being.

Originality/value – The originality of this study lies in extending the SOR model to a psychological outcome (well-being) and quantitatively verifying the interrelationships in retail settings. It investigates the serial mediation of emotional attributional stimuli, presenting their activeness continuum from low to high. Besides, it offers key managerial insights into effectively utilising DA attributes to engage and evoke customers’ emotional values, thereby driving purchase intentions and, subsequently, extending the experience to well-being in technology-mediated services.

Keywords: Digital assistant, AI Attributes, Emotional values, Customer engagement, Well-being, Serial mediation

1. Introduction

Artificial intelligence (AI) enabled digital assistants (DAs) are revolutionising the service-marketing landscape, forcing scholars to rethink the customer journey from engagement with intuitive features to broader psychological outcomes (Blut *et al.*, 2024; Gao *et al.*, 2023; Sohn *et al.*, 2025). Diverse DAs like chatbots, virtual assistants, and conversational agents, equipped with advanced attributional features, are deliberately utilised as means of building customer rapport, attracting them to brands, and encouraging them to purchase through empathetic and personalised support (Guo and Luo, 2023; Hameed *et al.*, 2026; Rahman *et al.*, 2026). Thus, retailers are designing DAs to be more than just efficient. They are making them playful, friendly, and visually engaging – likeable, in other words – specifically to shape how customers *feel* while shopping, not just what they *buy*.

Research shows that DAs’ emotional attributes (e.g., warmth and playfulness) lead users to feel connected (Gelbrich *et al.*, 2021; Lee and Park, 2026; Rahman *et al.*, 2026) and alleviate the boredom of one-way online interactions. Such emotional cues create long-lasting connections with consumers, reflecting their value perceptions (Guo and Luo, 2023) and enhancing purchase decisions (Rahman *et al.*, 2026). However, the extant literature has not yet

established what happens after the purchase decisions derived by DAs. Notably, retailing research treats conversion rate and consumers' purchase intention continuance as the terminal outcomes of interest and the basis for firms' performance metrics (Gupta and Zeithaml, 2006). Consequently, past studies have unveiled the impact of technologies' attributional stimuli on customer engagement (Baabdullah *et al.*, 2022; Gao *et al.*, 2023; Huang and Rust, 2021) and value perceptions (Gao *et al.*, 2023). In continuation, a few recent studies have extended the attribute-value nexus to behavioural responses (e.g., purchase intentions) in DA settings (see Rahman *et al.*, 2025, 2026). However, customer well-being, an essential post-purchase outcome (Miranda *et al.*, 2025; Sá *et al.*, 2026), remains overlooked in this domain. Given that, it is academically and practically critical to know whether heavy investments in AI genuinely enhance customer well-being or merely optimise conversion outcomes. Acknowledging this research gap, Miao *et al.* (2022) and Rahman *et al.* (2024) have also emphasised re-examining the impact of DAs' attributes on consumer-perceived values and subsequent outcomes. Accordingly, this study asks: *How do DAs' attributional stimuli shape customer engagement, and how do engagement and emotional values spill over to well-being through purchase intentions?*

Building on the above discussion and research question, this study contributes in three ways to the current DA-based retailing literature. **First**, prior studies on AI assistants have consistently applied the general adoption-based models (e.g., Rahman *et al.*, 2024; Sharma *et al.*, 2024). However, evaluating the paths encompassing emotional cues, customer engagement, value perceptions, purchase intentions, and well-being solely through a single theoretical lens or adoption-based models is insufficient, especially for services in AI settings (Rahman *et al.*, 2024). This noteworthy research gap prompts us to integrate the Stimulus-Organism-Response (SOR) model (Mehrabian and Russell, 1974) with the spillover concept. Many past studies have relied on the SOR model (see Gao *et al.*, 2023; Rahman *et al.*, 2026) for explaining how atmospheric and environmental cues shape shopper cognition, affect, and behaviour, but have stopped at the behavioural response stage (e.g., purchase, continuance, loyalty). To our knowledge, none of these studies have extended this chain beyond purchase to well-being outcomes, despite calls for research in the AI-based retail literature (Miao *et al.*, 2022; Rahman *et al.*, 2024).

Second, past studies have reaffirmed customer engagement as an indispensable marketing concept, especially crucial in depicting its arbitration role in a technology-mediated context (Islam and Rahman, 2017; Mollen and Wilson, 2010). Evidence confirms that customer engagement is pivotal in human-computer interactions since it serves as the conduit between AI attributional stimuli and value co-creation (Gao *et al.*, 2023). Supporting this logic, scholars (Gao *et al.*, 2023; Islam and Rahman, 2017) argue that the association among attributional stimuli, value, and behavioural response goes well beyond simple direct relationships, highlighting the critical role of the mediating mechanism of customer engagement. To this end, while no prior study has explored this phenomenon, varying levels of emotional attributes along an activeness continuum from low to high may exert differential effects on customer engagement (Mollen and Wilson, 2010). Building on these gaps, this research investigates the serial mediation of customer engagement, perceived emotional values, and purchase intentions between attributional stimuli (from low to high activity) and well-being.

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Third, existing research in AI and retailing typically bundles a DA’s human-like attributes under a single ‘anthropomorphism’ construct (e.g., Sharma *et al.*, 2024), without isolating the specific experiential cues (e.g., aesthetics, friendliness, and playfulness) that retail practitioners manipulate independently in interface design decisions. However, our study examines these experiential cues separately to offer more precise guidance to retailers, identifying which human-like design levers are more effective than others at engaging consumers, rather than offering only the general conclusion that ‘more human-like’ design improves engagement.

2. Theoretical background

2.1 SOR and spillover effects

This study integrates the SOR model (Mehrabian and Russell, 1974) with the spillover concept to theorise how DA emotional attributes shape the customer journey towards broader psychological well-being. Originally, the SOR model posits that environmental stimuli are cognitively and affectively processed by the organism, producing internal states that drive behavioural responses. Herein, DAs’ aesthetics, friendliness, and playfulness act as external stimuli that consumers process into internal organismic states (i.e., engagement and perceived value) which subsequently shape purchase intention and well-being in a broader AI retailing context. While SOR offers a parsimonious account of this proximal stimulus–response chain, it is silent on whether and how such internal states extend beyond the boundary of a single encounter (Hollebeek *et al.*, 2023).

Given that, we employ the spillover concept to address this limitation. Spillover refers to “the within-person transference of psychological states and behaviour from one life domain to another” (Lu *et al.*, 2021, p. 3). In other words, it is the within-person transference of cognitive, affective, and behavioural states across life domains (Erdem and Sun, 2002). It operates through two principal pathways: an indirect route by boosting motivation and self-efficacy to improve performance, and a direct route by generalising across domains regardless of performance (Hanson *et al.*, 2006).

Coupling these two theoretical frameworks therefore yields a more complete theoretical account than either affords alone. SOR specifies the origin of consumers’ internal value states within the DA encounter, while spillover specifies the mechanism, illustrating how these internal states impact beyond intention to well-being. Here, engagement functions as the transfer mechanism linking the SOR and spillover concepts, mirroring the performance-mediated pathway that echoes prior spillover research (Edwards and Rothbard, 2000; Hanson *et al.*, 2006; Hollebeek *et al.*, 2023). Consequently, engagement triggers a spillover reaction by generalising into broader emotional states (i.e., happiness and relaxation; direct affective spillover) and further shaping purchase intention (indirect, performance-mediated spillover). Additionally, well-being is positioned as a theoretically expected extension of a spillover-augmented SOR chain (Lu *et al.*, 2021; Miranda *et al.*, 2025; Sá *et al.*, 2026), rather than a terminal outcome external to the model. By integrating both, the present model offers a more holistic theoretical lens, explaining where consumers’ organismic states originate (DA stimuli) and how far their influence extends (cross-domain spillover to well-being). Thereby, it addresses notable gaps in the extant AI and purchase intention literature (Chen *et al.*, 2023; Choi, 2025; Zourrig *et al.*, 2025), as summarised in Table 1.

[Please insert Table 1 here]

2.2.1 DA attributes to engagement

In IS settings, aesthetics generates pleasure, fun, and excitement (Taufique *et al.*, 2024), which are the fundamental motivators of human behaviour (Rahman *et al.*, 2026). Thüring and Mahlke (2007, p. 257) defined aesthetics as “the sensual experience a product entails, and to the extent to which this experience fits individual goals and preferences.” Building on the SOR model, past research suggests that DAs’ attributes are external stimuli that can act to stimulate user engagement (Baabdullah *et al.*, 2022; Islam and Rahman, 2017). Rahman *et al.* (2026) argued that products’ aesthetic appeal is visually pleasing and is easier for consumers to process cognitively, leading to increased engagement and positive responses. That is, when a product’s design is aesthetically appealing, it enhances user satisfaction, fosters emotional connections, and encourages prolonged interaction.

The concept of “friendliness” has long been examined in psychology research. It suggests that humans tend to apply social cues to nonhuman entities and consider them as social units, friends, or companions (Rahman *et al.*, 2024). DAs’ behavioural attributes, such as politeness, attentiveness, trustworthiness, and reciprocity, amplify emotional connections with users (Baabdullah *et al.*, 2022; Gelbrich *et al.*, 2021). This emotional connection then fosters deeper engagement. Nass (2005) argued that emotional stimuli like warmth, empathy, and humour are key drivers of engagement. For instance, when Apple’s Siri responds to a casual query with a touch of humour - “I’m here to help, but I’m not great at telling jokes 😊!” - it evokes a warm attachment, encouraging users to engage more frequently and intensely.

Playfulness is defined as the level of cognitive spontaneity experienced during human-DA interactions (Rahman *et al.*, 2026). It reflects that the pleasure derived from engaging in activities can change during interactions with an individual or object (Rahman *et al.*, 2026). By connecting the SOR model and spillover effects, we argue that customers’ immersive, enjoyable experiences lead to sustained engagement. In customer-DA interactions, it is often observed that, unlike querying product- or service-related information, many consumers ask funny questions, such as whether they are ‘vegan’ or have ‘boyfriends/girlfriends.’ Such playfulness in DAs through spontaneous, entertaining, and interactive responses creates intrinsic enjoyment, leading users into a flow state in which they lose track of time and engage more deeply (Baabdullah *et al.*, 2022). Based on these insights, it can be posited that DAs’ aesthetics, friendly responses, and playful interactions create immersive experiences and captivate attention, drawing customers into deep engagement, as illustrated in the following hypotheses:

H1. DAs’ aesthetics positively increase customer engagement.

H2. DAs’ friendliness positively increases customer engagement.

H3. DAs’ playfulness positively increases customer engagement.

2.2.2 Customer engagement to perceived happiness and relaxation

According to the customer engagement concept, engagement with products or services manifests mainly in three ways: cognition, emotion, and conation (Lim *et al.*, 2022; Venkat *et*

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3 *al.*, 2026). Building on this theory, Lim *et al.* (2022) noted that emotional engagement can
4 subsequently influence consumer perceptions and purchase behaviour.

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6 Based on the SOR model, we believe customer engagement serves as the gateway for
7 customers' cognitive value assessment, aligning with Gao *et al.* (2023). Supporting this view,
8 Hollebeek *et al.* (2014) attested that customer engagement is a multidimensional construct
9 comprising cognitive, emotional, and behavioural dimensions that may directly influence
10 perceived value, indicating that individuals need to engage with a product or service before
11 their value judgment. In the SOR model, we argue that psychological constructs, such as
12 engagement, can act as a duct, initiating organismic processes such as trust, satisfaction, or
13 emotional attachment. That is, active engagement evokes a perceived higher value, as Pansari
14 and Kumar (2017) found that engaged customers are prone to perceive higher value due to their
15 active participation and emotional investment in the brand.

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17 Engagement, viewed as the emotional investment in an interaction (Hollebeek *et al.*,
18 2014), fosters a sense of connection and satisfaction, enhancing users' emotional states. Van
19 Doorn *et al.* (2010) highlight that heightened engagement leads to positive affective outcomes
20 by creating a sense of fulfilment and reducing perceived effort in task completion. Similarly,
21 DAs' interactive and personalised nature has been shown to promote relaxation by alleviating
22 stress and providing seamless, user-centric experiences (Huang and Rust, 2021). Thus, in
23 human-computer retail interactions, customer engagement can be assumed to be a critical
24 antecedent of perceived emotional values (happiness and relaxation). Thereby, we posit:

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26 **H4.** Customer engagement positively increases perceived happiness.

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28 **H5.** Customer engagement positively increases perceived relaxation.

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2.2.3 *Emotional values to purchase intention*

Happiness reflects a stable sense of satisfaction and contentment, encompassing positive experiences across social, spiritual, economic, psychological, and physiological aspects of life – essentially, “how we feel about ourselves and our lives” (Choudhury and Barman, 2014, p. 17).

Understanding consumer emotions, particularly happiness, is complex but crucial for competitive advantage, especially in e-commerce (Rahman *et al.*, 2026). In DA-human interactions, consumers are likely to experience both hedonic happiness, associated with immediate pleasure, and eudaimonic happiness, related to fulfilling their broader needs through purchasing behaviour. Drawing on the SOR model and spillover effect, this study proposes that perceived happiness resulting from DAs denotes an organism that is likely to positively shape consumer buying intention (response). In line with this proposition, Zhou and Tong (2022) showed that emotional values drive purchase intentions in livestreaming e-commerce. This insight aligns with DA interactions, where emotional support increases satisfaction and encourages continued use (Gelbrich *et al.*, 2021).

Perceived relaxation is a pleasurable, low-arousal emotional state, the opposite of stress and tension (Pham and Sun, 2020). Relaxed consumers are more likely to engage with products and services abstractly or emotionally, while less relaxed consumers focus on utilitarian value (Pham and Sun, 2020). This means that relaxed consumers interacting with a DA feel more engaged and focused, while stressed consumers may focus solely on the functional aspects. Aligning with our proposed framework, previous studies have discovered that interactions with

DAs evoke positive feelings and subsequently influence purchase intentions (Pham and Sun, 2020; Sharma *et al.*, 2024; Sun and Tang, 2024). Indeed, when customers are too busy or lack product knowledge, DAs can provide personalised recommendations based on past behaviour to reduce buying anxiety or dissonance and streamline purchase decisions. Therefore, we propose the following hypothesis.

H6. Perceived happiness positively enhances purchase intentions.

H7. Perceived relaxation positively enhances purchase intentions.

2.2.4 Spillover effects of purchase intentions on well-being

Well-being refers to the extent to which technology use fulfils users' needs and enhances their quality of life. Prior research (e.g., McLean *et al.*, 2025; Miranda *et al.*, 2025; Sá *et al.*, 2026) provides mixed evidence on how well-being generated within one domain of technology engagement can spill over into other life domains. McLean *et al.* (2025) suggest AI use erodes work-life boundaries and diminishes life satisfaction, whereas others (Hollebeek *et al.*, 2023; Sá *et al.*, 2026) show that it enhances well-being by offering more personalised and responsive support. Despite these equivocal findings, affective feeling is more likely to spill over into well-being when it first leads to a positive outcome in a similar domain (Hanson *et al.*, 2006). Accordingly, we argue that positive emotions (i.e., happiness and relaxation) derived from using DA may improve well-being when that feeling leads to a satisfying purchase experience, within which purchase intention is the consolidating outcome. In other words, the effect generated through DA engagement resolves into a concrete behavioural outcome that spills over directly into consumers' overall emotional state. Thus, purchase intention functions as the behavioural bridge that carries the DA-generated effect into broader well-being. This assumption helps us to posit:

H8. Purchase intention derived from DAs has a positive effect on customers' well-being.

2.2.5 Mediation mechanism of customer engagement and perceived emotional value

Building on the SOR model, this study posits that DAs' aesthetics, friendliness, and playfulness directly elicit internal emotional and cognitive states in customers, subsequently shaping their behavioural responses. The indirect pathways therefore necessitate a deeper exploration of the psychological mechanisms that translate objective technological features into subjective customer desires (Gao and Huang, 2021).

In technology-mediated retailing, scholars (e.g., Gao and Huang, 2021; Huang and Rust, 2021) highlight customer behavioural engagement as a psychological mechanism between product stimuli and behavioural outcomes. However, the effects of such external stimuli on organisms in the SOR model change due to their nature (Mollen and Wilson, 2010). Depending on Eroglu *et al.*'s (2003) categorisation, this study shows that the aesthetics of DAs (low-arousal emotional stimuli), coupled with friendliness (medium-arousal emotional stimuli) and playfulness (high-arousal emotional stimuli), may enhance user immersion and enjoyment, thereby deepening engagement (Huang and Rust, 2021). Engaged customers derive greater emotional value from the interaction and are correspondingly more likely to form favourable purchase intentions (Festjens *et al.*, 2026; Hollebeek *et al.*, 2014; Rahman *et al.*, 2026). Within this sequence, the SOR model, thereby, offers the overarching mechanism linking DA stimuli

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3 to engagement and emotional value, with purchase intention as the terminal behavioural
4 response.

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6 The spillover concept extends the SOR chain beyond its behavioural endpoint. Rather
7 than treating purchase intention as terminal, we propose that the effect and value it encapsulates
8 generalise into customers' broader emotional state (well-being) via a direct affective pathway.
9 In the proposed model, purchase intention therefore plays a dual role: it is the terminal response
10 within the SOR chain and simultaneously the mechanism through which DA-generated value
11 spills over into well-being. So, we propose:

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15 **H9.** Customer engagement, emotional values (perceived happiness and relaxation), and
16 purchase intentions serially mediate the relationships between aesthetics, friendliness, and
17 playfulness, on the one hand, and well-being, on the other.

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21 [Please insert Figure 1 here]

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23 **3. Methods**

24 *3.1 Study context, data collection, and sample characteristics*

25 Bangladesh, an LDC, provides a gripping context due to its ongoing digital transformation,
26 with more than 130.94 million Internet users and a 9th-place ranking in mobile and Internet
27 usage worldwide (BIDA, 2024; Rahman *et al.*, 2026). Consequently, the e-commerce sector
28 has emerged as a vital economic driver, with its value rising from approximately US\$6.9 billion
29 in 2023 to nearly US\$7.5 billion in 2024, and projected to reach US\$9.8 billion by 2028 (Ali,
30 2025). Alongside personal AI-powered DAs, consumers are increasingly adopting firm-
31 operated DAs, including MyBL, bKash Chatbot, and Shikha (Rahman *et al.*, 2026). Notably,
32 the AI market is projected to grow from USD 1145 million in 2025 to USD 3906 million by
33 2030 (Statista, 2024). These figures underscore Bangladesh as a promising context for
34 exploring DA research and consumer behaviour.

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36 We employed a two-wave longitudinal survey to collect data from DA users over a 12-
37 month period. A longitudinal design was deemed appropriate because it allowed us to deeply
38 investigate whether (a) DA attributes conveyed through engagement impact emotional values
39 and subsequently shape purchase intentions (Time 1 or T1); (b) how the purchase intentions
40 derived from emotional values impact well-being over time (Time 2 or T2). Purposive and
41 snowball sampling techniques were employed to select respondents. Given the unknown
42 population of DA users in Bangladesh, both purposive and snowball sampling were deemed
43 appropriate. Before the main survey, a pilot test was conducted with 25 participants, including
44 university professors, PhD candidates, graduate students, and online merchants. Based on
45 expert feedback and pilot study results, minor adjustments (e.g., clarifying wording and
46 simplifying sentences) were made to several scale items, leading to the development of the
47 final questionnaire. The questionnaire included screening questions to ensure appropriate
48 respondent selection, enquiring about their (a) sufficient knowledge and familiarity with DAs
49 and (b) prior experience of using DAs. To reduce response bias, participant anonymity was
50 assured, and no contact information was requested. Besides, ethical clearance for this study has
51 been waived by the University of Barishal's Research and Extension Cell, as it exclusively
52 investigates consumer intentions and does not involve any human or animal experimentation.

To determine sample size, we relied on G*Power to ensure an appropriate sample size for this study. The analysis indicated a minimum required sample size of 98, based on an effect size of 0.15, a statistical power of 80%, and a significance level of 5% (Hair *et al.*, 2021). In the 1st round, 486 respondents participated in the survey. During the data-cleaning process, 12 incomplete and 34 zero-variance responses were removed. Finally, we had 440 responses for the required data analysis. In the 2nd round, we had 315 responses after removing 12 zero-variance responses. To enable comparison between the two time points, only respondents who completed the 1st round survey were retained. Following the procedure of Reinecke and Trepte (2014), respondents were asked to re-enter the same email address they had previously used. In T1, the sample (N=440) is predominantly male (58.64%) and young, with the majority aged 18–25 (57.95%), followed by 26–35 (27.05%). Most respondents are either private-sector employees (44.77%) or students (40.91%), and are highly educated (57.27% graduates and 32.05% postgraduates). In T2, the sample (N = 315) was predominantly male (69.2%) and young, with most respondents aged 18–25 (68.3%), followed by 26–35 (25.2%). The majority were highly educated, holding graduate (65.25%) or postgraduate (24.65%) degrees.

3.2 Survey instruments development

All measurement items employed by this study were adapted from previous research to confirm content validity. The selection of items was guided by previously reported reliability indicators, including Cronbach's alpha, composite reliability, or factor loadings. A five-point Likert scale, ranging from strongly agree (5) to strongly disagree (1), anchored all the measurement items.

3.3 Common method bias (CMB)

To avoid CMB, we initially used Harman's single-factor approach and found that a single component explained 42.08% of the overall variation, which falls below the recommended criterion of 50%. Then, the latent common factor (CLF) approach was used via AMOS (version 23.0); the model fit indices with and without the CLF were calculated, compared, and found to be similar, indicating that CMB is not a significant issue in this analysis. Additionally, the standardised regression weights for all items were contrasted across the two models (with and without the CLF). The differences were found to be minimal (<0.20), further confirming that CMB does not pose a major concern in this study (Rahman *et al.*, 2026).

4. Data analysis and results

The partial least squares structural equation modelling (PLS-SEM) was utilised with SmartPLS 4.0 to confirm the reliability and validity of the proposed research model. PLS-SEM was selected for its more substantial explanatory power compared to covariance-based SEM, which is particularly suitable for exploring phenomena in the early stages of development (Fornell and Larcker, 1981), like DAs' role in consumer behaviour.

4.1 Measurement model

The model's convergent validity was assessed using standardised factor loadings, composite reliability (CR), Cronbach's alpha (α), and average variance extracted (AVE). In both T1 and T2, the factor loadings were 0.657 and above, and the CR values for the constructs ranged from 0.755 and above. On the other hand, the Cronbach's alpha values ranged from 0.811 and above, exceeding the threshold of 0.70 (Hair *et al.*, 2021). Similarly, AVE values indicate that the

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3 model is reliable, exceeding the threshold for all constructs (ranging from 0.575 and above in
4 both T1 and T2), suggesting solid convergent validity.

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6 Subsequently, discriminant validity was assessed by applying the Fornell-Larcker
7 criterion. Our analysis revealed that each construct's square root of the AVE surpasses the
8 correlation with other constructs, thereby substantiating the discriminant validity of our study
9 (Fornell and Larcker, 1981).

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12 *4.2 Structural model*

13 After ensuring the reliability and validity of the measurement model, we tested the structural
14 model. Table 2 presents the path coefficients, corresponding t-values and p-values, and
15 hypothesis results. The findings suggest that H1, H2, and H3 should be accepted since
16 aesthetics (T1: $\beta = 0.191$, $t = 3.497$, $p < 0.001$; T2: $\beta = 0.185$, $t = 2.412$, $p < 0.01$), friendliness
17 (T1: $\beta = 0.204$, $t = 3.186$, $p < 0.01$; T2: $\beta = 0.296$, $t = 3.746$, $p < 0.001$), and playfulness (T1:
18 $\beta = 0.260$, $t = 4.608$, $p < 0.001$; T2: $\beta = 0.426$, $t = 7.562$, $p < 0.001$) positively and significantly
19 influenced customer engagement. Whereas customer engagement positively and significantly
20 increased perceived happiness (T1: $\beta = 0.522$, $t = 10.983$, $p < 0.001$; T2: $\beta = 0.721$, $t = 21.061$,
21 $p < 0.001$) and perceived relaxation (T1: $\beta = 0.595$, $t = 17.903$, $p < 0.001$; T2: $\beta = 0.699$, $t =$
22 19.516 , $p < 0.001$), suggesting H4 and H5 are supported. In turn, perceived happiness (T1: $\beta =$
23 0.200 , $t = 3.614$, $p < 0.001$; T2: $\beta = 0.543$, $t = 7.215$, $p < 0.001$) and perceived relaxation (T1:
24 $\beta = 0.431$, $t = 8.030$, $p < 0.001$; T2: $\beta = 0.244$, $t = 2.983$, $p < 0.01$) positively and significantly
25 evoked purchase intentions, indicating that H6 and H7 should also be accepted. The findings
26 also show that purchase intentions significantly spill over into customer well-being (T2: $\beta =$
27 0.785 , $t = 27.057$, $p < 0.001$), supporting H8.

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36 Further, to test the indirect effects, we used a bootstrapping procedure with 5,000
37 resamples, a widely recommended approach for mediation analysis. The bias-corrected
38 confidence intervals (95%) were examined to determine the statistical significance of the
39 indirect paths. As shown in Table 2, the indirect effects of aesthetics, friendliness, and
40 playfulness, mediated by customer engagement and perceived values (perceived happiness and
41 relaxation), on purchase intentions were statistically significant (T1), as was the extended link
42 to well-being (T2). Notably, playfulness has the strongest mediating effect on purchase
43 intentions through engagement and perceived happiness, followed by friendliness and
44 aesthetics. Collectively, the results underscore the pivotal role of customer engagement as a
45 mediating mechanism (H9), providing support to the attribute-value-outcome framework
46 reflected in this study.

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52 **5. Discussion and implications**

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54 *5.1 Discussions of the results*

55 The results (both T1 and T2) confirm that DAs' design attributes function as stimuli of
56 differentiated arousal intensity along an activeness continuum - aesthetics (low-active),
57 friendliness (medium-active), and playfulness (high-active) - that significantly enhanced
58 customer deep engagement (H1–H3). Building on SOR logic, this supports the premise that
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engagement operates as the organismic mechanism through which DA attributes are cognitively and affectively processed and encourage deeper service interactions, corroborating rather than extending prior studies (e.g., Gelbrich *et al.*, 2021; Huang and Rust, 2021). Notably, SOR-based engagement is not purely cognitive but substantially affect-laden, reinforcing the theoretical claim that emotional and relational stimuli meaningfully shape organismic response.

The subsequent pathway from engagement to perceived happiness and relaxation (H4–H5) further corroborates the SOR reasoning, whereby the organism's engaged state produces downstream emotional value. Specifically, engagement fostered by responsive, intuitive, and emotional interactions increases perceived happiness and relaxation, replicating the directional logic of past findings (e.g., Gelbrich *et al.*, 2021; Islam and Rahman, 2017). Customers' active emotional engagement with DAs helps alleviate informational complexity and cognitive dissonance and supports effective purchase decisions by accelerating perceived relaxation. Extending prior literature (Guo and Luo, 2023; Hollebeek *et al.*, 2014; Pham and Sun, 2020), the positive and significant relationships (H6–H7) between perceived happiness, relaxation, and purchase intention indicate that the greater the emotional value customers perceive, the stronger their purchase intentions. Taken together, these H1–H7 paths reinforce the pertinence of a conventional SOR sequence to the DA context.

However, the significant effect of purchase intentions on well-being (H8) marks a new theoretical juncture, shifting the explanatory role from SOR to spillover. Consistent with the spillover concept, the findings suggest that purchase intention, as a within-encounter behavioural response, allows the effect to transfer into broader emotional states (Edwards and Rothbard, 2000; Hanson *et al.*, 2006). This contrasts with prior studies (Lu *et al.*, 2021; McLean *et al.*, 2025), which indicate that technology use disrupts work–life boundaries and produces negative spillover effects on users' well-being, such as skill decay and mental fatigue. Thus, our finding meaningfully qualifies the mixed evidence in the technology-well-being literature. Nevertheless, this study's reported positive behavioural response-psychological outcome linkage constitutes a genuine theoretical extension, uniquely suggesting that DA use generates favourable rather than detrimental spillover by mitigating customer cognitive load and decision fatigue during purchasing.

Moreover, the results found that customer engagement, emotional values (perceived happiness and relaxation), and purchase intention serially mediate the paths from emotional attributes (aesthetics, friendliness, and playfulness) to well-being (H9). While each element in this chain builds on relationships documented in isolation elsewhere, the serial mediation model as a whole, to our knowledge, has not been tested as an integrated pathway in prior SOR-based DA research; this combination, rather than any single path within it, is what we regard as the study's second genuine extension.

5.2 Theoretical implications

Conventional SOR applications treat behavioural response (here, purchase intention) as the model's endpoint (Mehrabian and Russell, 1974), and prior research positions it as the terminal outcome of engagement and emotional values (Guo and Luo, 2023; Hollebeek *et al.*, 2014). This convention implicitly assumes that the response marks the end of the psychological process. Our findings challenge this assumption: purchase intention transmits the organism's

affective feelings onward to consumer well-being, operating as a transitional second-order response. This is not merely the addition of a downstream outcome, but rather presents a mechanism through which affective feelings are converted into lasting psychological consequences. The two-stage structure therefore enables SOR to explain not only whether a stimulus induces behaviour, but also what that behaviour means for consumers.

Engagement is typically theorised as a mediating variable linking stimuli to outcomes (Gao and Huang, 2021), yet the qualitative accomplishment of this mediation remains unresolved. The findings suggest that engagement does not merely transmit stimulus-generated arousal but rather converts graduated stimulus intensity (aesthetics to friendliness to playfulness) into qualitatively distinct emotional values. This insight repositions engagement as a transmission mechanism rather than a passive statistical conduit, advancing engagement scholarship (Hollebeek *et al.*, 2014; Pansari and Kumar, 2017).

Beyond confirming the purchase intention–well-being link, this study’s central theoretical contribution is to formalise a distinction between transaction-oriented and consumer-oriented outcomes within the spillover framework. Purchase intention captures transaction-oriented effectiveness, whereas well-being captures a consumer-oriented, life-domain consequence. By showing that these constructs are distinct yet sequentially related, this study demonstrates that transaction success is necessary but insufficient for consumer-oriented value. This reframes DA-enabled interaction value as two analytically separate levels—firm-oriented and consumer-oriented—that warrant separate theoretical treatment.

5.3 Practical implications

The study offers valuable practical insights for marketing practitioners, DA developers, and retailers, especially in the context of LDCs, as follows.

The findings confirm that DAs’ aesthetics, friendliness, and playfulness function as levers of engagement rather than passive design features. Guided by the activeness continuum, DA developers therefore treat aesthetics as critical, attention-grabbing cues (e.g., emojis or 3D images), while redirecting investment toward advancing friendliness and playfulness because apparently they have a greater impact on engagement. In emerging markets, where digital trust is fragile and price sensitivity is acute, these features do more than charm (Miao *et al.*, 2022; Rahman *et al.*, 2024). In doing so, brands may embed high emotional intelligence with localised, dialect-sensitive calibration to better understand and respond to customers, creating sustainable competitive advantages (Blut *et al.*, 2024; Rahman *et al.*, 2025).

Given that perceived happiness and relaxation are key predictors of purchase intentions, developers may optimise DA features to enhance customers’ sense of happiness and relaxation, fostering psychological well-being while purchasing online by minimising perceived risks (e.g., eeriness and information overload). A relaxed, mindful state allows individuals to distinguish between wants and needs, lessening anxiety-driven or impulsive shopping. Indeed, when a customer inquires about a desired product, DAs can provide comprehensive information and rank alternative options, enabling consumers to make well-informed decisions with reduced stress. Consequently, consumers’ purchasing burden and stress could be alleviated, making the shopping experience more enjoyable.

The study also has significant implications for customers in LDCs, wherein DA acceptance is still nascent and customer-perceived risk in online buying is high (Rahman *et al.*, 2024,

2025). Aesthetically compelling, friendly, and playful DAs may help address this concern among low-literacy populations in these regions. However, given the growing ethical concerns surrounding AI-mediated interactions (Miao *et al.*, 2022), policymakers should establish clear guidelines for organisations to disclose how customers can remain safe and secure while interacting with DAs. Since emotionally responsive DAs shape customer engagement, value, purchase decisions, and well-being, regulatory frameworks must address potential risks of emotional manipulation in AI-driven interfaces.

6. Limitations and future research directions

This study has several weaknesses. First, as the research focused solely on Bangladeshi customers, its generalisation to other regions is limited; future studies should test and verify the proposed framework across different cultural contexts. Also, the combined use of purposive and snowball sampling inherently introduces selection biases, even though the approach was adopted to effectively reach participants with relevant experience in the research context. Such selection biases may limit the generalizability of the findings. Second, we examined three emotional attributes of DAs. Here, we derived the activeness continuum (low to high) among the attributes solely from beta values; future research could verify this with rigorous statistical tests. Further research could also consider diverse attributes such as empathy and politeness. Lastly, incorporating categorical variables (e.g., age, gender, usage status) as moderators, along with a mixed-methods research design, in future research would provide greater insights into the intensity of the connections among attributes, values, and outcomes.

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Table 1. Recent literature on digital assistants (DAs) evoking purchase intentions

Authors	Relationship(s) examined	Continuum effect of attributes	Value aspect highlighted	Mediation mechanism	Extending behavioural response to psychological outcome	Key findings
Gong <i>et al.</i> (2026)	Explicit and implicit incentives → purchase intention	No	Functional value	No	No	Higher privacy transparency strengthens the impact of implicit incentives on purchase intentions by enhancing functional value.
Rahman <i>et al.</i> (2026)	Aesthetics and playfulness → customer pleasurable experience (CPE) → purchase intentions	No	Emotional value	Customer pleasurable experience	No	- The findings highlight aesthetics and playfulness as key emotional stimuli driving CPE, which in turn enhances purchase intentions. - CPE serves as a full and partial mediator between emotional stimuli and purchase intention.
Zourrig <i>et al.</i> (2025)	Humanoid Virtual Influencer (HVI) traits (anthropomorphism, animism, and warmth/competence) → sense of social presence and perception of HVI's attractiveness → willingness to follow HVI's recommendations and purchase intention	No	No	- Animism - Stereotypical judgments - Attractiveness - Willingness to follow recommendations	No	- The findings indicate that HVI anthropomorphism influences social presence through the mediating roles of animism and stereotypical evaluations of warmth and competence. - Social presence and attractiveness shape purchase intentions, with the disposition to follow HVI recommendations serving as a key mediator in this process.
Liu <i>et al.</i> (2025)	Product interactions versus social interactions used by virtual streamers → purchase intentions	No	No	- Social presence - Perceived value	No	Product-focused interactions enhance purchase intention for utilitarian products via perceived value, while social interactions boost purchase intention for hedonic products through social presence.

Rahman <i>et al.</i> (2025)	Form realism and behavioural realism → Immersive experience and perceived social presence → purchase intentions	No	• Social value	No	No	• Behavioural realism and form realism significantly increase immersive experience and perceived social presence. • Immersive experience positively affects perceived social presence and purchase intentions. • Perceived social presence also significantly increases purchase intentions.
Choi (2025)	Chatbot communication style and consumers' regulatory focus → purchase intention	No	No	• Perceived engagement	No	• Individuals with a promotion-focused orientation show higher purchase intentions when interacting with a warm-style chatbot. • Prevention-focused individuals show higher purchase intentions when interacting with a competent-style chatbot. • Perceived engagement mediates this relationship.
Sun and Tang (2024)	Avatar's form and behavioural realism → consumer purchase intention.	No	No	No	No	• Behavioural realism increases consumer purchase intention only when form realism is low. • When consumers have an exchange relationship norm orientation, behavioural realism positively affects purchase intention regardless of form realism.
Chen <i>et al.</i> (2023)	Customer service type (AI chatbot vs. human) → product type (search vs. experience) → purchase intentions	No	No	• Processing fluency • Perceived service quality	No	• The match between customer service type and product type increases consumers' purchase intentions. • This effect is mediated by processing fluency and perceived service quality. • The effect occurs only when consumers' demand certainty is low.

Guo and Luo (2023)	Intelligent features of personal assistants → Gen Z consumers' purchase intentions	No	No	No	No	• The results show that personalisation and conversational tone positively affect informational and emotional support. • While autonomy and responsiveness positively influence informational support, both informational and emotional support increase purchase intentions.
Wang <i>et al.</i> (2023)	The presence versus absence of queue wait → purchase intentions	No	No	No	No	• The presence of a queue wait, compared to its absence, increases participants' purchase intentions.
The current study	DAs' aesthetics, friendliness, and playfulness → customer engagement → perceived happiness and relaxation → purchase intentions→wellbeing	YES	• Emotional value	• Customer engagement	YES	• Aesthetics, friendliness, and playfulness of DAs significantly increase customer engagement, with varying effect sizes. • Customer engagement enhances perceived happiness and relaxation. • These emotional values positively influence purchase intention, in return, this behavioural intention spills over wellbeing. • Customer engagement and emotional values jointly create a serial mediation effect between attributional stimuli and purchase intentions.

(Source: Authors' compilation)

Table 2. Path coefficient values (Source: Authors' calculation).

Phase	Relationship	Hypothesis	Coefficients	<i>t</i> statistics	<i>p</i> values	Result
T1	AST → CE	H1	0.191	3.497	0.000	Supported
	FRD → CE	H2	0.204	3.186	0.001	Supported
	PL → CE	H3	0.260	4.606	0.000	Supported
	CE → PHP	H4	0.522	10.983	0.000	Supported
	CE → PRL	H5	0.595	17.903	0.000	Supported
	PHP → PI	H6	0.200	3.614	0.000	Supported
	PRL → PI	H7	0.431	8.030	0.000	Supported
T2	AST → CE	H1	0.185	2.412	0.008	Supported
	FRD → CE	H2	0.296	3.746	0.000	Supported
	PL → CE	H3	0.426	7.562	0.000	Supported
	CE → PHP	H4	0.721	21.061	0.000	Supported
	CE → PRL	H5	0.699	19.516	0.000	Supported
	PHP → PI	H6	0.543	7.215	0.000	Supported
	PRL → PI	H7	0.244	2.983	0.001	Supported
	PI → WB	H8	0.785	27.057	0.000	Supported
Mediation Effects						
T1	Indirect 1: AST → CE → PHP → PI		0.020	2.038	0.010	Supported
	Indirect 2: AST → CE → PRL → PI		0.049	3.177	0.015	Supported
	Indirect 3: FRD → CE → PHP → PI		0.021	2.082	0.010	Supported
	Indirect 4: FRD → CE → PRL → PI		0.052	2.686	0.019	Supported
	Indirect 5: PL → CE → PHP → PI		0.027	2.444	0.011	Supported
	Indirect 6: PL → CE → PRL → PI		0.067	3.532	0.019	Supported
T2	Indirect 1: AST → CE → PHP → PI → WB		0.057	2.196	0.014	Supported
	Indirect 2: AST → CE → PRL → PI → WB		0.025	1.705	0.044	Supported
	Indirect 3: FRD → CE → PHP → PI → WB		0.091	3.040	0.001	Supported
	Indirect 4: FRD → CE → PRL → PI → WB		0.040	2.373	0.009	Supported
	Indirect 5: PL → CE → PHP → PI → WB		0.131	5.040	0.000	Supported
	Indirect 6: PL → CE → PRL → PI → WB		0.057	2.442	0.007	Supported

For T1, R^2 values are 33.5% for CE, 27.3% for PHP, 35.4% for PRL, and 33.2% for PI; For T2, R^2 values are 70.4% for CE, 52.0% for PHP, 48.8% for PRL, 57.5% for PI, and 61.6% for WB

Note (s): Aesthetics (AST); Friendliness (FND); Playfulness (PL); Customer Engagement (CE); Perceived Happiness (PHP); Perceived Relaxation (PRL); Purchase Intention (PI); Wellbeing (WB); Statistically Significant ($p < 0.001$, $p < 0.01$, $p < 0.05$) and insignificant ($p > 0.05$)

(Source: Authors' own work)

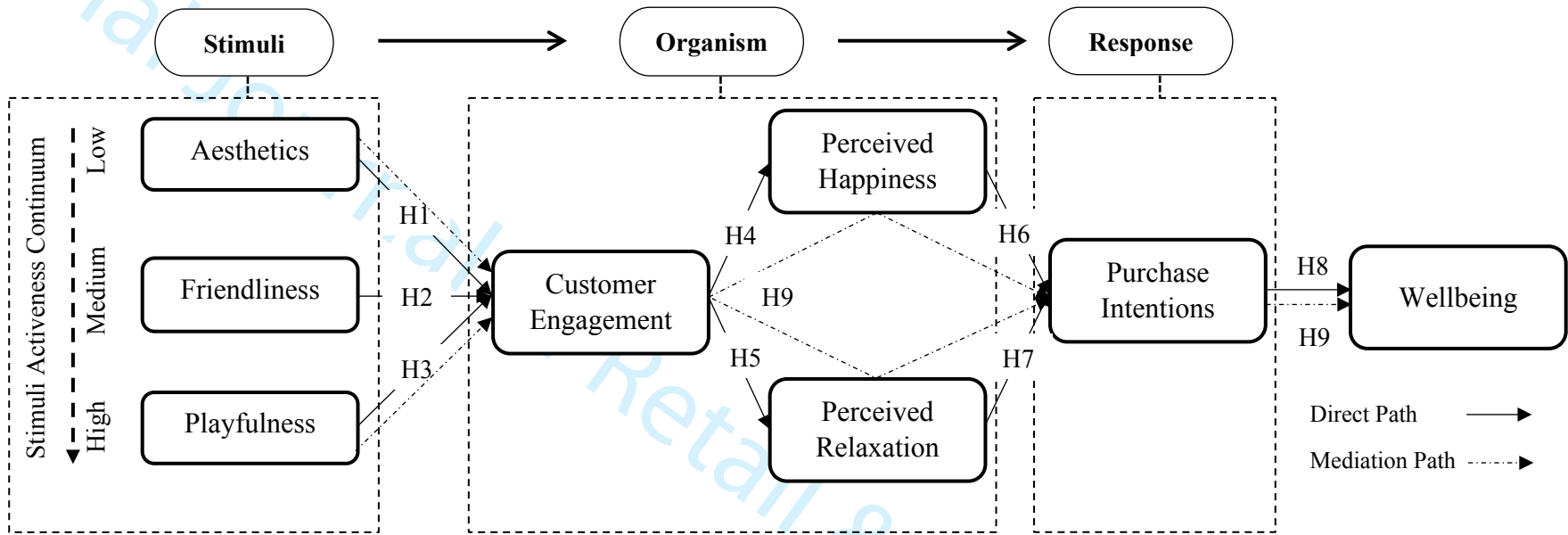


Figure 1. Proposed conceptual framework. (Source: Authors' own work)