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Anthropomorphism and Brand Love in E-Retailing: Examining Consumer Engagement and Technology Self-Efficacy through the S-O-R Lens

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Abstract

The rapid growth of e-retailing has intensified the challenge of fostering stronger emotional connections with consumers. This study investigates how consumers develop a passion for e-retail brands by exploring the role of anthropomorphism in shaping brand love. Specifically, we explore how anthropomorphic cues on e-retail platforms influence brand love through consumer brand engagement, while considering the moderating effect of consumers' technology self-efficacy. Within the framework of the Stimulus-Organism-Response (S-O-R) model, we employed purposive non-random sampling, and structural equation modeling was used to analyze the research findings. The sample size of the research was 309, and data were collected through a self-administered survey using a questionnaire. The findings show that brand anthropomorphism has a significantly positive effect on brand love, with a P value < 0.05. Furthermore, consumer brand engagement partially mediates the relationship between anthropomorphism and brand love, while technology self-efficacy significantly strengthens this link, with statistically significant P values. These findings extend existing literature by applying the S-O-R framework to a novel context, highlighting how boundary conditions shape consumer responses. The study also provides practical implications for marketing managers, suggesting that humanizing e-retail platforms can enhance consumer engagement and foster more profound emotional attachment, ultimately cultivating a more passionate consumer base.

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Keywords: Anthropomorphism, Consumer brand engagement, Brand love, and Technology Self-efficacy.

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INTRODUCTION

Artificial intelligence, social media platforms, and diverse e-retailing interfaces have intensified global competition (Zhou et al., 2023). These developments have not only reshaped consumer perceptions of brand offerings but also redefined modes of interaction, particularly influencing consumer engagement and commitment toward e-retail brands (Wilson et al., 2024). The latest statistics indicate that global e-commerce revenue has exceeded \$ 42 billion and is projected to grow by 19.5% by 2030 (Statista, 2025a). This change in paradigm underlines the significance of the consumer experience journey and necessitates in-depth research into psychological variables such as anthropomorphism and brand love (Gomes et al., 2025). Digitalization has necessitated those consumers invest in relationships with e-retail brands, rather than evaluating available products or services alone, and it has increased the need for researchers and marketers to understand the factors that strengthen consumer brand bonds. In a seminal study, Fournier (1998) highlights that brand love is one of the strongest factors in fostering sustainable brand consumer relationships. Previous research and future calls have continuously positioned brand

love as the ultimate goal for marketers in both physical and retail contexts (Nguyen & Ngo, 2023; Ritta Setiyati, 2025). In the era of e-retailing, anthropomorphism has emerged as a crucial factor in reducing abstraction and intangibility issues, thereby building deeper consumer connections (Aggarwal & McGill, 2012). It is highlighted that, by attributing human-like traits to digital platforms and brands, consumers can enhance consumer engagement and attachment towards e-brands (Sonmez et al., 2024). Humanized Artificial Intelligence (AI)-enabled applications and websites can transform artificial interactions into more relatable interactions with humans, in terms of language, brand identity, and visual cues (Hermann, 2022). Studies indicate that consumers tend to have innate desires for social interaction and affiliation, and brands need to deploy anthropomorphism to create relatable brand personas strategically (Dabiran et al., 2024; Van Esch et al., 2019).

Humanization process does not only affect the superficial cues like aesthetics, but it also influences the emotional and cognitive factors related to brand love. Brand love is defined as a long-term and deeply connected relationship with the brand (Nguyen & Ngo, 2023). It is also highlighted as an intensified interpersonal relation that extends beyond consumer attitude, ensuring a high level of advocacy and loyalty among consumers (Ahuvia et al., 2014). As a result, it is a significant area of research in both academic and applied research streams, and it helps to attain strong and long-lasting brand/market equity (Joshi & Garg, 2021). Latest developments in growing artificial intelligence have led to an increased adoption of interactive interfaces like chatbots to mediate human-machine interactions and improve customer service (Janson, 2023). The AI-powered agents have natural language, and an empathetic response is positively moderating the two-way interaction, which includes recommendations and discussions about the products, instead of only queries (Rohit et al., 2024). These meaningful interactions are only possible when consumers feel the human presence and can rely on the source. Humanization process or anthropomorphism can be the medium that reduces the difference between digital platforms and consumers (Dabiran et al., 2024).

Despite the significant nature of brand love in consumer behavior, its antecedents remain underexplored in the context of e-retail platforms. Specifically, previous investigations on the excessively connected digital environments shed light on the role of anthropomorphism as an existential cue in shaping brand love for digital platforms, but how this can be a stimulus to generate strong emotional bonds for AI-enabled retail platforms is an underdeveloped area and has not been explored (Swaminathan et al., 2020). Marketers need to understand how human-like features can create brand love for E-retail platforms (Delgado-Ballester et al., 2019; Nguyen & Ngo, 2023). Previous studies have studied anthropomorphism and brand love in various contexts, together and from different perspectives, but limited attention is paid to a detailed framework that can connect these two variables underpinning consumer engagement with technology-enabled retail environments (Alhawas et al., 2023; Joo & Guèvremont, 2024).

Furthermore, it is studied that brand-level constructs such as anthropomorphism shape consumer attitude and perceptions. Still, research on consumer-level variables such as technology self-efficacy and consumer brand engagement is limited. The previous studies are insufficient to understand the detailed mechanism of moderation and mediation of TSE and CBE, respectively (Abu Farha et al., 2024). Thus, these points highlight theoretical and contextual gaps in existing literature. To address the identified gaps, this research employs the S-O-R framework to examine the relations

among anthropomorphized e-retail brands (stimulus), consumer and brand interaction, and the emotional state of consumers' minds (organism), and brand love (response) (Aslam & Luna, 2021; Horáková et al., 2022). Precisely, the current research investigates the influence of E-retail anthropomorphism affecting consumer brand engagement (Ferreira, 2020) and brand love (Rauschnabel et al., 2015). In addition, it investigates the intervening role of consumer brand engagement in the association between anthropomorphism and brand love (Verma, 2021), as well as the moderating effect of technology self-efficacy on the relationship among anthropomorphism and consumer brand engagement (Rahman et al., 2023). The focal point of this study is to explicate the emotional processes that drive consumer warmth and commitment to anthropomorphized brands, mainly in e-retail contexts, within the context of the S-O-R framework. This framework shows the emotional depth consumers can develop with E-retail platforms; it advances the current level of consumer relations above the mere satisfaction or loyalty levels (Nguyen et al., 2023). These types of bonds are not limited to the level of fulfilment but force consumers to become promoters for brands and become a defensive mechanism also (Shimul & Phau, 2022).

Based on this, the present research adds value to both theory and practice. Theoretically, it encompasses knowledge on e-retail brand love by using the S-O-R framework within the causal study by integrating anthropomorphism, technology self-efficacy, and brand engagement (Gupta et al., 2023). As a result, it shifts the focus of research towards long-lasting sustainable bonds instead of the attitude or intentions level of consumer study (Alanadoly & Salem, 2022). It also proposes e-retail anthropomorphism as a novel antecedent of brand love in the E-retail context (Abu Farha et al., 2024), highlighting its function as a digital brand cue that augments consumer brand engagement (Rahman et al., 2023; Sashittal et al., 2023). Furthermore, the implication of the S-O-R model in e-retailing extends the contextual scope beyond service industries, including tourism, hospitality, etc., while also integrating the concepts of consumer psychology and digital marketing (Harrigan et al., 2021; Riivits-Arkonsuo et al., 2015).

Lastly, this research also focuses on the mediation and moderation variables in the development of brand love, which are also underexplained in previous studies (Bourdeau et al., 2024; Ma et al., 2023). At the Managerial level, the findings of this research guide marketers to reshape their digital strategies with respect to interface, branding, and engagement strategies. The current research helps E-commerce to build a strong consumer base in this intense competition.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

This section includes the definitions of the concepts and hypotheses development under the insight of the S-O-R framework,

Anthropomorphism

In today's digital environment, it is crucial to understand the digital brand cues that increase consumer brand engagement for relevant applications and websites (Verma, 2021). This study highlights brand anthropomorphism as a digital brand cue, and it is defined as attributes of human traits to digital platforms that stimulate emotional and cognitive responses, thereby fostering engagement and encouraging brand love (Joo & Guèvremont, 2024). Anthropomorphism involves elements such as human voices, facial expressions, or personalized names that develop emotional

resonance, reinforce perceptions of social presence, and mitigate psychological distance (Malhotra & Ramalingam, 2023). By humanizing digital interactions, the relationship between consumers and digital platforms is strengthened, fostering a higher level of consumer advocacy (Klein & Martinez, 2022).

Under different perspectives, it has also been found that in a virtual environment, the careful and sophisticated adoption of anthropomorphism can lead to an increased level of consumer engagement (Wang et al., 2024). It is also mentioned that anthropomorphism related to digital brands may increase consumer trust by using familiar figures and features that appear real and live (Ali & Sheeraz, 2023). Figures 1 and 2 depict some features used by a few brands to activate the schema of the human mind, which helps increase their attachment to the brand and fosters brand love among consumers.



Figure 1:
The Animal is anthropomorphized in logo and name



Figure 2: An emotion is anthropomorphized in logo

Thus, features in branding, conversational agents, and other features of apps increase the real feel of E-retail platforms, and they can be used to achieve a higher place in humans' cognition and emotions (Hussain, 2025).

Consumer Brand Engagement

Within the S-O-R framework, the "organism" represents consumers' internal states shaped by cognitive and emotional responses to stimuli. In this study, consumer brand engagement is implied as the mediator that connects anthropomorphism (stimulus) to the cause brand love (response). Consumer-brand engagement reflects the depth of a consumer's psychological and behavioral investment in a brand (Harrigan et al., 2021; Yasin et al., 2020). It plays a central role in shaping brand evaluations and fostering emotional attachment (Harrigan et al., 2021).

Guided by the S-O-R framework, anthropomorphic cues in digital retail environments, such as human-like voices, names, emojis, or personalities, stimulate consumers' emotions and cognition, thereby strengthening their engagement with the brand (Ham et al., 2023). While the effect of anthropomorphism on engagement has been explored in tourism and social media (Mehran et al., 2020), its influence within e-retail platforms remains underexplored (Machado et al., 2019). By reducing psychological distance and creating a sense of social presence, anthropomorphic features encourage consumers to interact more deeply with e-retail platforms, thereby enhancing their engagement and emotional attachment (Abu Farha et al., 2024; Lim et al., 2021). Based on the literature and theory implications, it can be hypothesized that:

H1: Anthropomorphism is significantly and positively related to consumer brand engagement in the e-retailing context.

Brand Love

Brand love reflects a deep emotional attachment characterized by passion, loyalty, and commitment toward a brand (Nguyen & Ngo, 2023). It emerges when consumers engage meaningfully with brands and develop enduring affective bonds (Joshi & Garg, 2021; Rauschnabel et al., 2024). While much of the existing research has examined brand love in offline contexts (Chiengkul & Junla, 2024; Junaid et al., 2019), digital branding has increasingly emphasized its importance as a key relational outcome. Brand love often mediates the relationship between engagement and favorable behaviors such as loyalty and advocacy (Nguyen & Ngo, 2023; Shin & Back, 2019). In the virtual environment, anthropomorphic design plays a significant role in fostering brand love by humanizing channels, enhancing empathy, and reducing the psychological distance between the e-brand and consumers (Nguyen et al., 2023). By developing emotional resonance, anthropomorphism not only strengthens consumer engagement but also transforms it into brand love, thereby elevating brand value and consumer attachment (Abu Farha et al., 2024; Zhang et al., 2022). According to the S-O-R framework, anthropomorphism serves as a brand stimulus, engaging the consumer's mind both emotionally and mentally. This fosters a devoted consumer response, characterized by brand love towards the e-retailing brand (Türkdemir et al., 2023).

Intensified competition among e-retailers forces all brands to ensure they can increase consumer trust and evoke emotional attachment to sustain long-term consumer relationships (Hussain, 2025). Based on this reasoning and empirical evidence, the study hypothesizes that:

H2: Consumer brand engagement with e-retail platforms significantly affects brand love.

H3: Consumer brand engagement mediates the relationship between anthropomorphism and brand love.

H4: Anthropomorphism has a significant impact on brand love for E-retailing.

Moderator: Technology Self-Efficacy

Technology self-efficacy refers to an individual's belief in their ability to effectively use and interact with technology (Lee, 2021). It influences how consumers navigate digital platforms, engage with features, and build trust in online transactions (Fan et al., 2020). Individuals with higher self-efficacy are more open to anthropomorphic interfaces and respond with stronger engagement (Alanadoly & Salem, 2022; Fan et al., 2020). As S-O-R theory suggests, self-efficacy acts as an organismic moderator, shaping how stimuli, such as anthropomorphism, are interpreted and internalized (Van Esch et al., 2021; Vander Schee et al., 2020). For example, AI-enabled features are more likely to enhance engagement when users perceive themselves as technologically capable.

A recent study also suggests that users' gender and self-efficacy can influence their attitude towards anthropomorphic technology; specifically, male versions are found to be more attractive, particularly among those with low self-efficacy (Gupta & Nagar, 2025). Technological contexts cannot be separated from brands, which is why consumer brand relationships are dependent on consumers' self-efficacy in using

technology and engaging more effectively with digital platforms (Lourenco et al., 2024). Accordingly, this study proposes:

H5: Technology self-efficacy moderates the relationship between anthropomorphism and consumer brand engagement.

METHODOLOGY

Data Collection and Sampling

This research investigates brand love and consumer brand engagement within the context of e-retailing platforms and mobile applications. The study is contextualized within the rapid global expansion of mobile commerce, which is projected to surpass USD 3 trillion by 2027 (Statista, 2025a). Pakistan provides a particularly relevant context, given its fast-growing e-retail sector, fueled by the addition of 22 million new internet users in 2022 and an active base of 35 million digital shoppers, a figure expected to expand by 24.3% by 2027 (Statista, 2025b). The study specifically targeted Pakistani consumers who actively shop through leading retail platforms in their access. A purposive sampling approach was adopted to ensure respondents had relevant experience with e-retailing. To qualify, participants were required to confirm that they had made at least one online purchase within the last three months, thereby ensuring that responses came from active users.

It is a cross-sectional research study, where data collection was conducted over the same time period with varying respondents. It took almost 4-6 months to gather all the data. The questionnaire was kept brief and straightforward to minimize social desirability bias. A total of 450 individuals were contacted through digital channels (WhatsApp, Gmail, LinkedIn, Instagram, and Facebook), yielding 400 completed surveys. After screening for incomplete, duplicate, or inconsistent responses, 309 valid cases remained. Following the "10M rule" for sample adequacy, the final sample size of 309 was deemed sufficient. To enhance response quality, the survey included icebreaker questions, logic filters in Google Forms to avoid missing data, and assurances that there were no right or wrong answers (Mehmood et al., 2024). Additional checks for outliers and irregular patterns were performed, and Podsakoff et al.'s (2012) recommendations were applied to limit response bias. The demographic profile is presented in Table 1. The majority of respondents were male (71.2%), aged between 26 and 40 years (66.6%), and reported that 100% of them were aware of the e-retailing options. Most participants regularly used retail applications (74.8%), with a preference for mobile apps (70.9%) over websites. The Kaiser-Meyer-Olkin (KMO) statistic yielded a value of 0.902, indicating the dataset's suitability for further analysis.

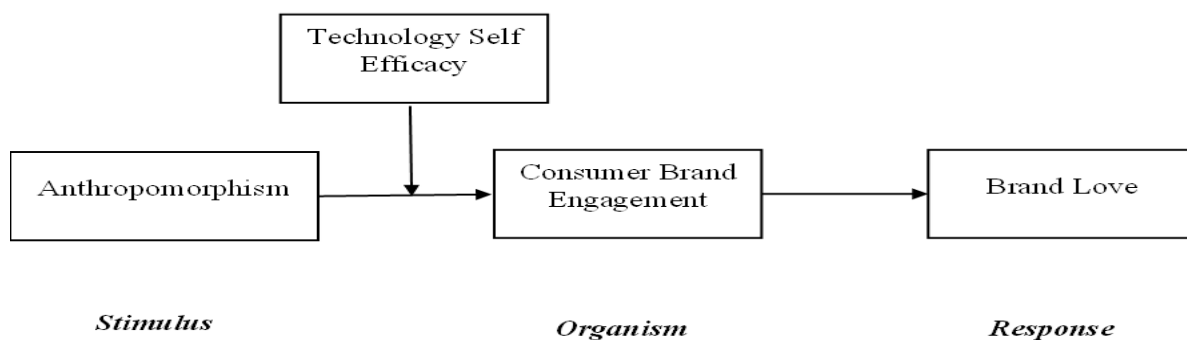


Figure 3.
Theoretical Framework of the Study.

Table 1.

Details of Respondents.

Variable	Level	Frequency	Percentage
Gender	Male	220	71.2
	Female	89	28.8
Age	18-25	204	66
	26-40	104	33.7
	41-60	1	0.3
	Above 60	0	0.0
E-purchase	Regularly	231	74.8
	Occasionally	6	1.9
	Rarely	18	5.8
	Sometimes	51	16.5
	Not by choice	3	1
Purchase platform	Apps	219	70
	Website	73	25.6
	Others	17	5.5
Education Level	Undergraduates	45	14.5
	Graduates	100	32.36
	Post Graduates	140	45.30
	Others	24	7.7

Instrument of the study

The survey instrument comprised closed-ended questions adapted from validated scales, ensuring both conceptual rigor and contextual relevance. Content validity was established through expert review, and a pilot test with 75 responses confirmed reliability, requiring no modifications. Table 2 reports the measurement items, factor loadings, composite reliability (CR), Cronbach's alpha (CA), average variance extracted (AVE), and variance inflation factors (VIF). All indicators satisfied recommended thresholds, supporting construct reliability and validity.

Table 2.

Constructs with Sources, Reliability, and Validity of Constructs.

	FL	CR	CA	AVE	VIF
Anthropomorphism (AP) (Lim et al., 2021)		0.885	0.848	0.724	1.135
There is a sense of human contact with the application I use.	0.726				
These applications have a personal touch when I interface with them.	0.660				
There is a human-like warmth associated with these applications.	0.797				
These applications show human-like sensitivity towards me.	0.769				
I feel my mind is inside the world created by applications when I use them.	0.651				
When I shop from these apps, I feel I have visited someplace instead of just seeing it.	0.715				
Browsing these applications gives me the feel of the real world instead of the computer world.	0.739				
Consumer Brand Engagement (CBE) (Lim et al., 2021)		0.919	0.904	0.700	2.601
I would like to know about the shopping applications.	0.541				
I like the events associated with shopping applications.	0.602				
I enjoy learning about shopping applications.	0.643				
Anything related to these applications grabs my attention.	0.689				
I spend time visiting these applications.	0.732				
I am highly involved in retail applications.	0.725				

A Study on S-O-R Framework Perspective in E-Retailing Rafique, A, et al., (2025)

I am passionate about these retail apps.	0.757				
My days will not be the same without these applications.	0.714				
I find time regularly to check the application.	0.793				
I love talking about retail applications with others.	0.783				
I use the apps when I am with my friends.	0.693				
I like to explore the applications along with my friends.	0.679				
Brand Love (BL) (Mehran et al., 2020)		0.918	0.892	0.808	2.365
This e-retail brand and all the products offered on these applications are excellent.	0.659				
I am passionate about e-retail brands.	0.829				
I am very attached to e-retail brands.	0.845				
The e-retail brands are wonderful.	0.821				
The e-retail brand makes me very happy.	0.862				
I love e-retail brands.	0.813				
Technology Self-Efficacy (TSE) (Huang & Kao, 2021)			0.726	0.631	0.681
Even if I have no prior experience with retail applications, I will be able to use them.	TSE1	0.802			
I can use any new retail application without any help.	TSE2	0.807			
If there are guiding instructions with an application, it will be easy to use that application.	TSE3	0.750			

Notes: CR = Composite reliability, AVE = Average Variance Extracted, VIF = Variance Inflation Factor, CA= Cronbach's Alpha

Herman's Single Factor and Common Method Bias Issue

All items were rated on a five-point Likert scale, aligned with their respective constructs. To reduce potential common method variance, respondents were assured of anonymity and confidentiality. Harman's single-factor test revealed that a single factor explained only 33.853% of the variance, which is below the 50% threshold. The VIF values ranged between 1.5 and 2.5, well within acceptable limits. These results indicate that common method bias was not a concern in the study (Hair Jr et al., 2020; Podsakoff et al., 2012).

RESULTS AND DISCUSSIONS

Model fitness and Discriminant Validity

WARPL PLS was the tool used to test the measurement model, assess reliability and validity, and evaluate model fitness. Factor loadings for all constructs were above 0.7, with Cronbach's alpha and composite reliability ranging from 0.7 to 0.9, indicating strong reliability (Hair et al., 2019). The average variance extracted (AVE) was above 0.50, confirming convergent validity. Discriminant validity was verified as the square root of AVE exceeded inter-construct correlations, and HTMT ratios were below 0.90. Overall, the constructs demonstrated strong reliability and validity. Refer to Tables 3a and 3b for reference. Other model fitness indicators are also mentioned in Table 3b, including SMAR = 0.083 (<0.1), Std Chi-Square = 15.023, and $P < 0.01$. $CR=0.943 > 0.7$, Statistical Suppression ratio = $0.829 > 0.7$.

Table 3a.
Discriminant validity of variables.

Variable	1	2	3	4
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1	Anthropomorphism	0.724			
2	Consumer brand engagement	0.467	0.700		
3	Brand Love	0.453	0.698	0.808	
4	Technology Self-Efficacy	0.074	0.141	0.188	0.681

The bold values represent the square root of the AVE of constructs, and diagonal values are correlations.

Table 3b.
HTMT Matrix.

Variable	1	2	3
1. Anthropomorphism			
2. Consumer brand engagement	0.541		
3. Brand Love	0.525	0.777	
4. Technology self-efficacy	0.280	0.335	0.325

Acceptable at best level <0.85,

Structural Equational Modeling

To test the study's hypotheses, Structural Equation Modelling (SEM) was performed (Kong et al., 2022). The study's findings reveal significant relationships among key variables. Anthropomorphism ($\beta = 0.438$, $P < 0.001$) has a positive and significant effect on consumer brand engagement (CBE). This suggests that human-like attributes on digital platforms can enhance consumer engagement with an e-brand.

Further findings showed that CBE significantly influenced brand love ($\beta = 0.718$, $P < 0.001$), which in turn strongly predicted evangelistic behavior ($\beta = 0.620$, $P < 0.001$). This research also examined direct, indirect, and mediating effects. CBE mediated the relationship between anthropomorphism and brand love ($\beta = 0.168$, $P < 0.001$). The direct effect of anthropomorphism on brand love is also significant and positive ($\beta = 0.272$, $p < 0.001$). It indicates a partial mediation. Indirect effect of anthropomorphism on brand love is significant ($\beta = 0.127$, $p < 0.001$). The total effect of anthropomorphism on brand love is 0.439. Based on these findings, H1, H2, H3, and H4 are supported. Overall, these results underscore the importance of engaging digital stimuli in fostering stronger consumer relationships and fostering brand love.

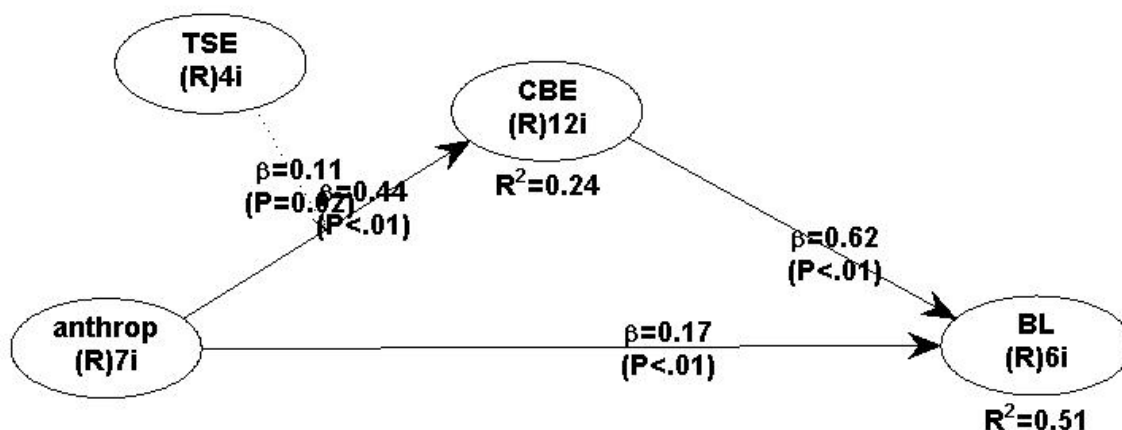


Figure 4.
Research Framework with Path Coefficients and P-Values

These values support the mediation model, and Table 4 represents the relevant values with their effect sizes and standard errors.

The hypothesis proposing that technology self-efficacy moderates the relationship between anthropomorphism and consumer brand engagement (H5) is supported ($\beta = 0.113$, $P < 0.001$), suggesting that higher technology self-efficacy (TSE) strengthens this association. It means that if consumers can use technology effectively, the impact of anthropomorphism will be more substantial on CBE.

Table # 4.

Hypothesis testing with coefficient values.

Hypothesis	Path	Coefficient value (β)	Standard Error	Effect Size	Status
H1	AP $\rightarrow$ CBE	0.438*	0.053	0.209	Supported
H2	CBE $\rightarrow$ BL	0.620*	0.052	0.435	Supported
H3	AP $\rightarrow$ CBE $\rightarrow$ BL (Mediation effect)	0.168*	0.056	0.206	Supported
H4	AP $\rightarrow$ BL (Direct Effect)	0.272*	0.039		Supported

Significant level $P < 0.001^*$; $P < 0.05^{**}$

Table 5 represents the moderation effect, including the effect size and standard error.

Table # 5.

Moderation testing.

Hypothesis	Path	Coefficient value (β)	Standard Error	Effect Size	Status
H3a	TSE AP $\rightarrow$ CBE	0.132*	0.040	0.046	Supported

Significant level $P < 0.001^*$

Figure 5 shows the moderation effect of technology self-efficacy.

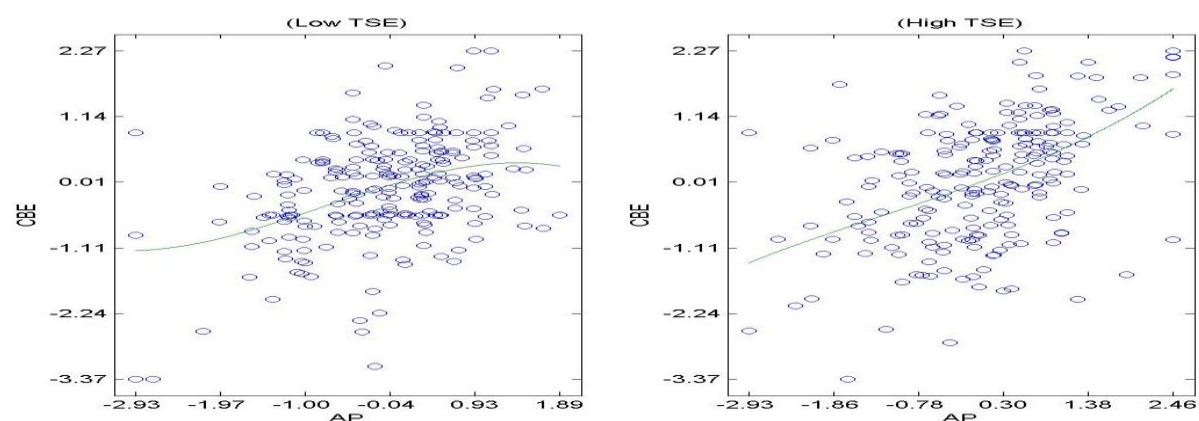


Figure 5.

DISCUSSION

The current research aimed to examine the multifaceted relationship between anthropomorphism, technology self-efficacy, consumer brand engagement, and brand love within technology-embedded retailing platforms. This study applied the S-O-R framework and empirical findings derived from Structural Equation Modeling analysis. These findings largely supported the proposed hypotheses, giving valuable insights into how humanization of digital platforms can foster consumer brand engagement and emotional connection, like brand love, among e-brand consumers.

The results of the study confirm that consumers perceive human-like qualities as a medium to trust, encouraging their active involvement and connection with e-platforms (Ferreira, 2020). It is highlighted in literature that brands that act as social actors naturally have higher interaction and psychological association with the users (Delgado-Ballester et al., 2019). It is also believed that consumers build better intimacy and enthusiasm for brands that have a human-like feel in multiple contexts (Torres et al., 2022; Türkdemir et al., 2023). These findings support hypothesis 1, which is accepted as anthropomorphism positively influences CBE ($\beta=0.438$, $p<0.001$; Effect Size=0.209).

Similarly, findings show that CBE positively affects brand love ($\beta=0.620$, $p<0.001$; Effect Size=0.435). This underscores the vital role of CBE in cultivating brand love. It resonates with the previous findings, which suggested that a deep cognitive and emotional interaction with a brand is foundational for long-term emotional bonds (Gupta et al., 2023; Lourenco et al., 2024). It is also studied that when consumer invest their affective, conative, and cognitive resources into interaction with a brand, they are more likely to develop passion, attachment, and commitment characterized as brand love (Verma, 2021). Brand love is often a consequence of meaningful brand engagement (Joshi & Garg, 2021). These findings support the aim of the study, too, which focused on finding how anthropomorphism as a stimulus drives brand love for E-retail platforms through CBE.

Furthermore, CBE is partially mediating the relationship between anthropomorphism and Brand love ($\beta=0.168$, $p<0.001$; Effect Size=0.206). This is a valuable finding supporting the mechanism explained through the S-O-R framework. It supports the sequential nature where the organism (consumer brand engagement) processes the stimulus (anthropomorphism) in response (brand love). It indicates that CBE is serving as a significant pathway through which anthropomorphism influences brand love (Türkdemir et al., 2023). It explains that attributing human characteristics translates into a deeper emotional connection that lasts longer than loyalty or a positive intention (Nguyen & Ngo, 2023). It also fulfills the gap highlighted, which covers the under-researched stimuli for brand love in the e-retail context, and also gives a new application of the S-O-R framework in a new context.

The study also found a significant direct effect of anthropomorphism on brand love. It means that in a few contexts, where shopping/experience is not involved, humanization of E-brands can directly make brands more lovable, fostering deeper emotional indulgence. This supports the 4th hypothesis of the study, which states that Anthropomorphism positively influences Brand Love (Direct Effect: $\beta=0.272$, $p<0.001$) (Nguyen et al., 2023; Nguyen & Ngo, 2023). These dual pathways, direct and mediated, highlight the robust role of anthropomorphism in developing brand love among consumers for E-brands. The last and 5th hypothesis is about the moderation of technology self-efficacy, which is also supported, showing that TSE moderates the relation between Anthropomorphism and CBE positively. It means that if consumers are more proactive in using technology, then humanization of e-platforms will have a higher effect on CBE towards the e-platforms.

Literature highlights that greater comfort and confidence in interacting with technology create human attribution in brands even more compelling and reachable (Lee, 2021), thereby enhancing the consumer's willingness and aptitude to engage vigorously with anthropomorphized brands in digital retailing environments (Gupta & Nagar, 2025). This posits that the effectiveness of humanizing brands in fostering engagement partly depends on the consumer's individual skill and comfort with technological interfaces (Gong et al., 2020; Van Esch et al., 2021). All of these

findings are relevant to the previous aim and highlight gaps in the study. All of these findings are relevant to the previous aim and highlight gaps in the study. All of these study highlights how the S-O-R framework can explain the process by which anthropomorphism can lead to brand love for e-retail apps through positive moderation of TSE and mediation of CBE. It does not extend the S-O-R framework, but it applies it in a new context to see how humanized digital platforms can increase the emotional connection for e-retail platforms.

CONCLUSION

Theoretical Contributions, Limitations, and Future Directions

This research contributed theoretically by addressing various gaps in prior literature. The following contributions are discussed. Firstly, successful integration of anthropomorphism, brand engagement, technology self-efficacy, and brand love in light of the Stimulus-Organism-Response framework, we provide an interesting and comprehensive model for understanding consumer behavior in E-retail and technology-related contexts. Although the S-O-R framework has been applied in various consumer settings (Aslam & Luna, 2021; Huddleston et al., 2023). Its specific application to describe the fascinating interplay between e-brand cues as anthropomorphism, consumer brand engagement as an internal organismic state, and brand love as a response, offers a novel theoretical lens. It shows a new application of the S-O-R framework, which is still under research by various researchers (Bourdeau et al., 2024).

Secondly, the confirmed mediation of CBE and moderation of TSE advances the current knowledge by explaining the underlying mechanism in the significant development of brand love. Prior research referred to these relations, but our research offers empirical evidence of the specific pathway, clarifying how human attribution to inhuman platforms can build brand love by first developing active engagement (Ferreira, 2020; Gomes et al., 2025) and then solidifying the affective bond (Verma, 2021). This mechanism explains a consumer journey towards anthropomorphized e-retailing platforms with a new lens. Finally, direct and indirect relation with significant evaluation adds anthropomorphism as an influential antecedent, enriching the current literature of brand love.

The findings of this study describe practical strategies for marketing practitioners and brand managers. As the study suggests a substantial impact of anthropomorphism, marketers should strategically instill their e-platforms / e-brands with human-like attributes in their websites, applications, advertising, and customer service interactions (Ali & Sheeraz, 2023). This can also include humanized language, designing empathetic AI interfaces (Zhu et al., 2023), or developing brand mascots, humanized logos that convey a personality feel (Blut et al., 2021).

Furthermore, humanizing an e-brand is not enough; the humanization must translate into opportunities for consumers to engage and bond with the brand. E-platforms must be designed in a way that they provide emotional, cognitive, and behavioral engagement to consumers. Ultimately, with an understanding of this mechanism, revised branding strategies for retail contexts can be developed to attain the emotionally connected consumers. Although this research offers valuable information, there are certain limitations that should be acknowledged. The cross-sectional design is not ideal for causal studies; future research could benefit from longitudinal studies to observe the development of these relationships over different

time spans. Similarly, experimental studies can be used to test how anthropomorphic platforms can be better than non-anthropomorphic platforms in reference to a causal study. Many strategies were adopted to reduce the common method bias; however, it cannot be neglected in self-reported data. The sample consisted of only consumers from Pakistan; future researchers can collect data from multiple contexts for better generalizability. Additionally, exploring the impact of different forms of anthropomorphism (e.g., visual, verbal) and their varying effectiveness across different product categories or cultural contexts would be a promising avenue for future studies.

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