How Live-Streaming E-Commerce Shapes Green Furniture Purchase Intentions: A Structural Equation Modeling Approach

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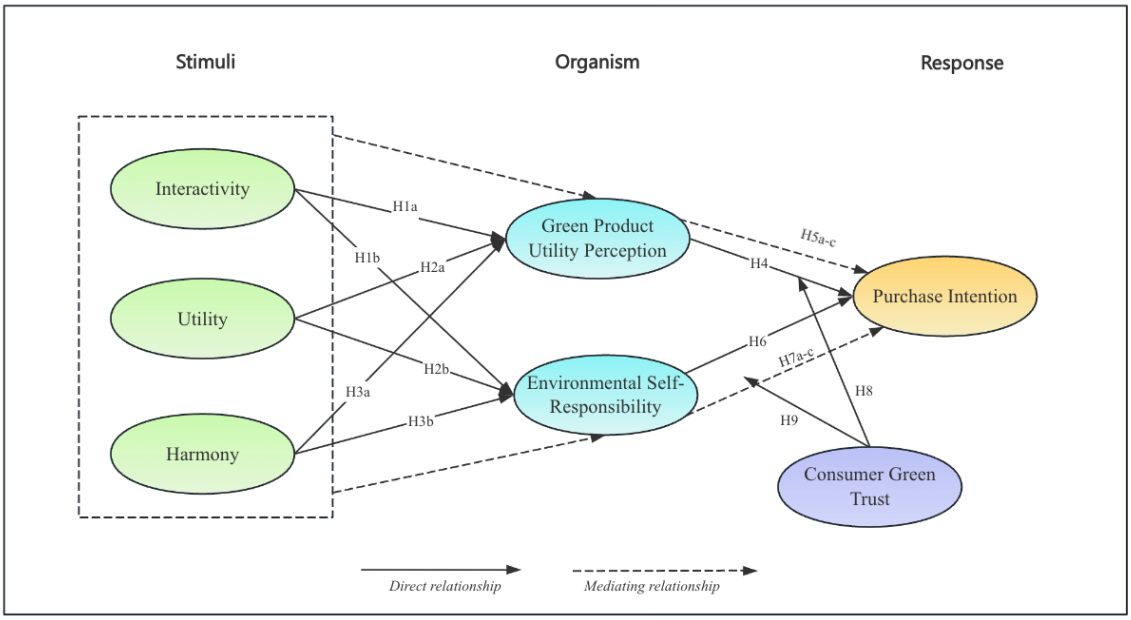
GRAPHICAL ABSTRACT



How Live-Streaming E-Commerce Shapes Green Furniture Purchase Intentions: A Structural Equation Modeling Approach

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This study investigated how live-streaming e-commerce influences consumers' purchase intentions toward green furniture. Using the Stimulus-Organism-Response (S-O-R) framework and the Sheth–Newman–Gross consumer value model, the study examined how key live-streaming features—interactivity, utility, and harmony—affect consumer perceptions. Survey data from 510 Chinese consumers were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). Results show that these features significantly enhanced green product utility perception and environmental self-responsibility, which both positively impact purchase intention. Additionally, consumer green trust negatively moderated these effects. These findings suggest that when green trust is low, consumers are more likely to rely on functional and emotional value perceptions to guide their purchasing decisions. The study provides new insights into green furniture marketing in digital contexts, emphasizing the need to balance rational and emotional appeals in live-streaming strategies. It contributes to the sustainable consumption literature by focusing on a high-involvement product and offers practical guidance for improving the effectiveness of green product promotion through interactive platforms.

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Keywords: Live-streaming e-commerce; Furniture consumption; Purchase intention; Structural equation model; S-O-R framework; SNG Theory of consumer value

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INTRODUCTION

As information technology continues to develop, live streaming platforms have become an important part of consumers' everyday shopping. In China, live streaming e-commerce has seen rapid growth, driven by platforms such as Douyin and Kuaishou, and it is expected to continue expanding, potentially surpassing USD 1 trillion by 2026 (Chen 2024). Unlike pre-recorded short videos or "live cams" without interaction, live-streaming e-commerce on platforms such as Douyin and Kuaishou involves real-time demonstrations, Q&A, and promotional activities. As shown in Fig. 1, questions appear in the form of real-time vertical comments or bullet comments. Viewers can post questions instantly *via* on-screen comments, and hosts respond immediately, making the experience highly interactive and time-sensitive. Typical live-streaming sessions on Chinese e-commerce platforms feature hosts introducing furniture functions, demonstrating assembly or durability tests, and responding in real time to questions appearing as on-screen comments. The experience often resembles live product demonstrations at trade fairs, where a

salesperson interacts dynamically with an audience. Some sessions also include live discounts, and environmental storytelling to reinforce green consumption values (Tang and Chen 2024). Consumers can engage in real-time interaction, access detailed product information, and build a deeper understanding and emotional connection with products through live-streaming e-commerce platforms (Xie *et al.* 2024). This helps narrow the psychological gap between sellers and consumers, increasing their sense of trust and satisfaction (Zhu *et al.* 2025). Green furniture refers to home furnishing products designed with ecological principles, aiming to reduce environmental impact and ensure user safety in indoor living environments (Parikka-Alhola 2008). Specifically, green furniture emphasizes the use of sustainable and non-toxic materials (such as FSC-certified wood or recycled metals), low-emission production processes, and durability as a means to reduce waste and environmental footprint across the product lifecycle. According to ISO 14024 (2018) and guidelines from the Sustainable Furnishings Council, green furniture should comply with ecological criteria in design, manufacturing, use, and disposal stages. These criteria distinguish green furniture from general furniture by integrating both functional performance and environmental value (Zhu and Niu 2022). In the home furnishing industry, green furniture is increasingly favored by consumers due to its eco-friendly features, sustainable materials, and low-carbon manufacturing processes (Xiong *et al.* 2020; Zhang *et al.* 2022). Green furniture sales are transitioning from offline stores to live streaming e-commerce, with brands such as Yuan Shi Mu Yu, Lin's Wood, and Xilinmen actively joining the trend. However, problems such as uneven service quality and a lack of product transparency have slowed its development. To address these challenges, live streaming e-commerce is enhancing service standards and tightening platform regulations, becoming a key driver in the growth of green furniture consumption.

Fig. 1. Douyin live-streaming e-commerce

Live streaming e-commerce has shown great potential in promoting the consumption of green furniture, but its platform characteristics also bring some challenges in its development. First, the content of live streams is highly homogeneous. Many hosts use similar scripts and presentation styles, lacking creativity, which can lead to furniture consumer fatigue. Second, hosts often focus too much on marketing and overlook the opportunity to raise furniture consumer awareness of environmental issues, as well as the importance of maintaining a harmonious atmosphere in the live stream. The third challenge is that many hosts lack professional skills. Research shows that hosts with fewer than 5,000 followers struggle with marketing, making them less appealing to viewers. These issues indicate that live streaming e-commerce platforms are still immature in promoting green furniture sales, which negatively impacts the furniture consumers' shopping experience (Zhou *et al.* 2023). Therefore, it is essential to explore how platform characteristics influence consumer purchasing intentions for green furniture in order to optimize live streaming strategies and improve sales effectiveness.

Although the literature has explored the impact of purchasing behavior in live e-commerce (Zheng *et al.* 2022; Deng *et al.* 2023; Joo and Yang 2023; Luo *et al.* 2024), most studies have focused on topics such as the overall model of live e-commerce and consumer behavioral experiences (Hu and Chaudhry 2020; Wongkitrungrueng and Assarut 2020; Wongkitrungrueng *et al.* 2020). Few studies have specifically examined a particular product type; for instance, Dong *et al.* (2022) investigates agricultural products. With regard to furniture purchases, Yu *et al.* (2024) analyzed the impact of short video advertisements on furniture purchase, while Yu *et al.* (2023) applied the analytic hierarchy process to identify factors influencing online furniture shopping behavior. Liang *et al.* (2024) studied how environmental awareness, health consciousness, and individual basic conditions influence consumers' intention to purchase green furniture by extending the Theory of Planned Behavior. Nonetheless, research on green furniture purchasing behavior within live-streaming e-commerce remains limited.

Most existing research has focused on these attributes within traditional retail or static e-commerce contexts, leaving a gap in understanding how they influence consumer behavior in the dynamic and interactive live streaming environments. This study addresses this gap by employing the Stimulus–Organism–Response (S-O-R) framework, the Sheth-Newman-Gross consumer value model, and structural equation modeling to investigate how live streaming characteristics influence consumers' green furniture purchase intentions in e-commerce. This study adopts the live streaming characteristics from Yu Tian's research as the external stimulus (S) and uses green product utility perception (GPUP) and environmental self-responsibility (ESR) as the organism (O) to represent functional and emotional values in consumer value; purchase intention is taken as the response (R). Furthermore, the study explores the moderating role of consumer green trust (CGT). By integrating green product utility perception (GPUP) and environmental self-responsibility (ESR) as mediators and assessing the moderating role of consumer green trust (CGT), this study offers deeper theoretical insights and practical recommendations. This enhances understanding of green consumer behavior in live e-commerce and provides valuable guidance for green furniture marketing strategies. Thus, this study's objectives are encapsulated in the following research questions:

1. How do live streaming characteristics affect consumers' purchase intentions for green furniture?
2. How do green product utility perception (GPUP) and environmental self-responsibility (ESR) mediate consumers' green furniture purchase decisions?
3. How does consumer green trust (CGT) moderate the roles of green product utility perception (GPUP) and environmental self-responsibility (ESR) in relation to purchase intention (PI)?

S-O-R Model

The S-O-R model, originally proposed by Mehrabian and Russell in 1974, has become a widely used theoretical framework in consumer behavior research. This model conceptualizes consumer behavior as a process in which external stimuli (S) from the environment influence internal cognitive and emotional states (O), which in turn lead to specific behavioral responses (R) (Chen *et al.* 2024). It is particularly effective in explaining purchase decision-making in complex, dynamic, and high-involvement shopping contexts.

In the domain of live-streaming e-commerce, the S-O-R model provides a strong foundation for understanding how platform characteristics shape furniture consumer

behavior. Live-streaming commerce, as a highly interactive marketing format, presents various stimuli—such as host engagement, product demonstrations, and emotional narratives—that can trigger consumers' internal psychological states, ultimately influencing purchase intentions. A growing number of studies have adopted this model to explore different consumer behavior patterns within live-streaming contexts. For instance, Guo *et al.* (2021) used the S-O-R framework to analyze how live-streaming features affect cross-border purchase intentions, finding that such features enhance perceived value while reducing perceived uncertainty. Lee *et al.* (2025) found that interactivity and personalized recommendations in live-streaming promoted green consumption intentions by evoking emotional resonance. Similarly, Feng *et al.* (2024) applied the model to explain impulse buying behavior, emphasizing the roles of social influence sensitivity, affective responses, and moderators such as scarcity cues and price perception. Xia *et al.* (2024) further highlighted how social cues and media cues shape impulse purchases by increasing emotional arousal and reducing uncertainty.

In the specific context of furniture marketing, Yu extended the S-O-R framework to short video advertisements, demonstrating that interactivity, entertainment, and information richness significantly affect consumers' furniture purchase intentions through the mediating role of flow experience. This study illustrates the model's applicability to high-involvement products, such as furniture, where experiential and emotional responses are critical to purchase outcomes. Therefore, it is reasonable and appropriate for this study to apply the SOR framework to investigate consumers' purchase intention of green furniture in the live-streaming environment.

SNG Theory of Consumer Value

The Sheth-Newman-Gross (SNG) theory of consumer value, introduced in 1991, identifies five key value dimensions—functional, social, emotional, conditional, and cognitive—that jointly shape consumer evaluations and purchase intentions. In recent years, this framework has been widely applied in green consumption research. Studies have shown that when choosing green products, consumers are influenced not only by functional benefits such as environmental performance but also by emotional and social values such as responsibility and recognition. For example, Rana and Solaiman (2023) highlighted the role of emotional and social values in green product decisions. Bahoo *et al.* (2024) reviewed the application of the Theory of Consumption Values in consumer behavior research and explored how its multidimensional value constructs influence purchasing decisions. Kifaya and Rama (2023) found that functional and emotional values are central to green consumption choices.

Building on this foundation, the present study adopted functional and emotional value dimensions from the SNG theory to examine green furniture purchases in the live-streaming e-commerce context. Functional value reflects consumers' evaluation of green furniture's utility, such as durability, comfort, and environmental performance. Emotional value, on the other hand, captures feelings of environmental responsibility and moral satisfaction, which are enhanced through the interactive and immersive nature of live-streaming platforms. By focusing on these two core values, this study aimed to reveal both rational and emotional mechanisms behind consumers' green purchase intentions.

Hypothesis Development

Based on the literature review, this study examined how live e-commerce characteristics influence consumers' green furniture purchase decisions through green

product utility perception (GPUP) and environmental self-responsibility (ESR) using the S-O-R (Stimulus-Organism-Response) model. In the S-O-R model, the Stimulus (S) represents external influences, specifically live-streaming characteristics such as interactivity, utility, and harmony. These live-streaming characteristics act as stimuli by facilitating consumer-host interactions, delivering product information, and fostering an emotional atmosphere. The Organism (O) component reflects the consumers' psychological responses, encompassing green product utility perception (functional value) and environmental self-responsibility (emotional value). The Response (R) represents consumers' purchase intentions. Live-streaming stimuli (*e.g.*, interactivity, utility, and harmony) influence green product utility perception (GPUP) and environmental self-responsibility (ESR), which in turn shape consumers' purchase intentions. This study hypothesizes that live-streaming stimuli significantly enhance green furniture purchase intentions by strengthening consumers' product utility perceptions and affective responses. The S-O-R model offers a robust framework for this study, enabling a deeper understanding of how diverse live-streaming stimuli contribute to green furniture purchase intentions through consumers' cognitive and affective responses. This framework informs the structural model of this study (Fig. 2), with specific hypotheses as detailed below.

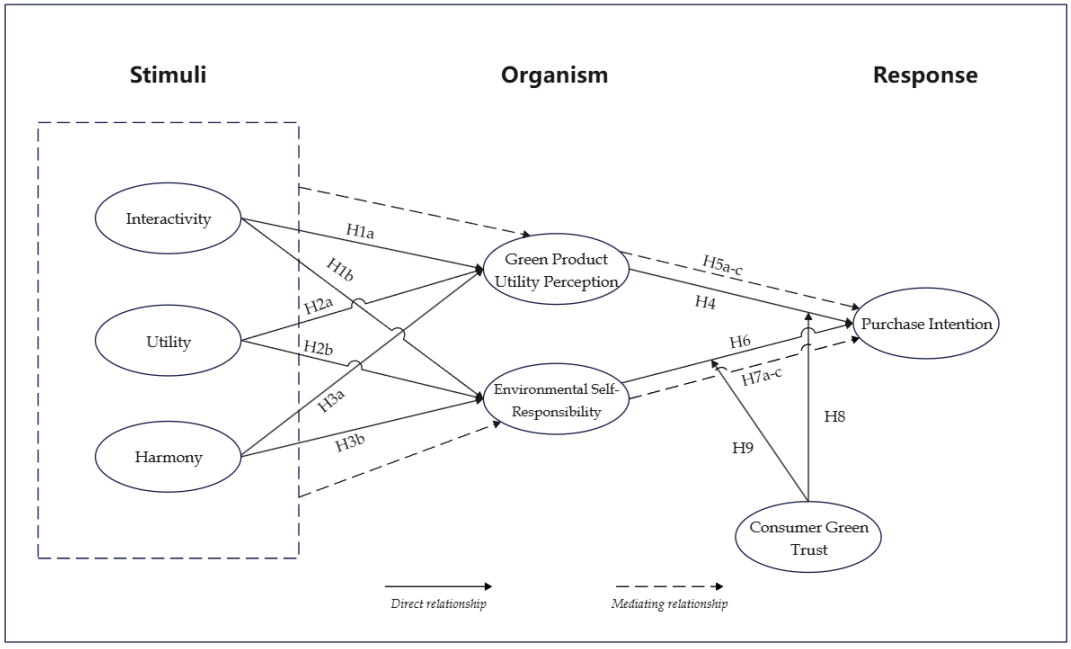

Fig. 2. Research framework

Interactivity

Interactivity in live-streaming e-commerce refers to consumers' capacity to participate in real-time exchanges with the host, the platform, and fellow viewers. This interactivity is manifested in consumers' interactions with the hosts through comments, questions, and real-time feedback, enabling them to access product information and engage in shopping decisions (Tahir and Ramli). Additionally, consumers can share experiences, post comments, or discuss with other viewers, thereby fostering a sense of community and belonging (Rehman *et al.* 2024). Live-streaming platforms enhance consumer interest and purchase intentions by offering interactive features such as likes, votes, and quizzes (Sipur and Amadi 2025). Consequently, interactivity is a pivotal factor in live e-commerce,

boosting consumer engagement, product awareness, and purchase decisions (Huafeng and Aibdiwy 2024; Santoso *et al.* 2025).

This study posits that in the context of live streaming, interactivity effectively attracts consumers into an immersive, highly engaging consumption environment, enhancing both functional and emotional values in decisions on green furniture. In this setting, consumers continuously receive detailed product information and can engage in real-time communication with hosts via bullet comments and text messages. This dynamic interchange fosters co-creation and involvement. Empirical evidence shows that higher perceived interactivity in live streaming enhances consumers' utilitarian gratification and, through immersive experiences, increases their shopping intentions (Joo and Yang 2023; X. Li *et al.* 2024). Specifically, interactivity significantly deepens understanding of green furniture's practical performance, thereby enhancing perceived product utility. Moreover, communicating environmental protection content and emotional resonance during these real-time interactions inspires consumers to engage in sustainability discussions, increasing their awareness of environmental issues (Long *et al.* 2024).

Accordingly, the following hypotheses are proposed:

H1a: Interactivity (INT) is positively related to green product utility perception (GPUP).

H1b: Interactivity (INT) is positively related to environmental self-responsibility (ESR).

Utility

In live e-commerce, utility refers to the extent to which the information and functionalities provided during live broadcasts meet the consumers' practical needs and support their purchase decisions. Specifically, utility manifests through the hosts demonstrating the product's functions, features, and applications in detail, enabling consumers to better understand its practicality (Lee and Chen 2021). Moreover, utility is evident in live broadcasts through real-time interaction and feedback, allowing consumers to quickly access key product information, improve decision-making efficiency, and accelerate the purchase decision process. Overall, utility in live-streaming enhances the consumers' knowledge and trust in the product by delivering clear, effective information and solutions, thereby facilitating purchase intentions.

In this interactive live-shopping environment, consumers can gain a deeper understanding of the practical functions, ease of use, and long-term benefits of green furniture. Through the comprehensive demonstration of product performance, design details, and environmental features during live streaming, consumers can not only obtain rich real-time information but also intuitively perceive the actual utility of green furniture through demonstrations of real-life usage scenarios. This clear presentation based on utility significantly enhances the perceived value of green furniture, improves consumers' trust and satisfaction with the product, and directly promotes the formation of their green purchase intention (Wu and Huang 2023; Zhang 2023). When consumers truly feel the comprehensive benefits of green furniture in terms of functionality, durability, and environmental protection, their awareness of environmental responsibility also increases (Zhao and Furuoka 2025). They not only recognize the positive impact of their consumption behavior on the environment but also are more willing to prioritize products with sustainable value in future consumption decisions. Therefore, the utility of green furniture can not only effectively enhance consumers' green purchase intention but also actively stimulate their environmental self-responsibility (ESR), thereby promoting their

long-term sustainable consumption behavior. Accordingly, the following hypotheses are proposed:

H2a: Utility (UTI) is positively related to green product utility perception (GPUP).

H2b: Utility (UTI) is positively related to environmental self-responsibility (ESR).

Harmony

In live e-commerce, harmony refers to the emotional bond established among consumers, hosts, and other viewers through a warm, comfortable, and emotionally resonant atmosphere. This harmonious atmosphere is achieved through the host's emotional expression, interactions, and visually coordinated product displays (Jinhui and Tarofder 2023; Fan *et al.* 2024). Harmony enhances consumer engagement and sense of belonging while increasing shopping enjoyment and trust, thereby promoting purchase intentions (Ling and Masrom 2023).

In the context of green furniture consumption, a harmonious live-streaming environment facilitates consumer immersion in the host's product presentation. When consumers learn about the product in a relaxed and pleasant environment, they will form a more positive perception of the product's functions and actual utility (Li *et al.* 2022). A harmonious environment encourages emotional connections with the product or brand, which in turn fosters greater environmental awareness among consumers. When consumers are in a relaxed and pleasant atmosphere, they are more likely to pay attention to the environmental benefits and sustainability of environmentally friendly products, thereby enhancing their sense of environmental responsibility (Yue *et al.* 2020). Accordingly, the following hypotheses are proposed:

H3a: Harmony (HAR) is positively related to green product utility perception (GPUP).

H3b: Harmony (HAR) is positively related to environmental self-responsibility (ESR).

Green Product Utility Perception

Green product utility perception (GPUP) refers to the consumers' evaluations of a green product's functionality and environmental benefits, encompassing performance aspects and positive environmental impacts (Saaidin). When consumers perceive green products as having significant environmental utility, they are more likely to consider them to be high-value options, thereby increasing purchase intentions (Kataria and Nain). The application of this construct to green furniture purchase decisions is well-justified, as green furniture prioritizes both basic functions (*e.g.*, comfort, durability) and green features (*e.g.*, eco-friendly materials, sustainable production processes) (Xie *et al.* 2024). When selecting green furniture, consumers evaluate both its quality and comfort as well as its environmental benefits. Thus, perceived green product utility effectively explains how consumers assess green furniture's functionality and environmental value, thereby influencing their purchase decisions (Li and Li, 2024). Enhancing the perceived utility of green furniture can boost consumers' purchase intentions and support the growth of the green furniture market (Mujahid *et al.* 2024; Czine *et al.* 2025). Accordingly, the following hypotheses are proposed:

H4: Green product utility perception (GPUP) is positively related to purchase intention (PI).

H5a-c: Green product utility perception (GPUP) mediates the effect of live-streaming characteristics (a: INT, b: UTI, c: HAR) on purchase intention (PI).

Environmental Self-responsibility

In the context of green consumption, environmental self-responsibility (ESR) refers to consumers' awareness of and sense of responsibility for the environmental consequences of their purchasing decisions. Consumers with strong ESR recognize the environmental impact of their consumption behavior and actively select products that promote environmental protection and sustainability. This responsibility motivates consumers to make environmentally beneficial purchasing decisions, such as opting for green products and minimizing resource waste (Mukhtar *et al.* 2024). This variable is pivotal in environmental consumption, particularly when consumers realize that their choices affect not only their personal interests but also society and the environment, thereby encouraging more positive ecological behaviors (Haipeng and Furuoka 2024).

In live e-commerce, hosts strengthen the emotional bond between consumers and society by conveying emotionally resonant messages (Liu *et al.* 2023). When consumers recognize the positive societal impact of their behavior, their ESR is activated, motivating them to actively fulfill their environmental responsibilities as integral members of society. In summary, through interactions and information acquisition during live streaming, consumers strengthen their environmental responsibility, a key affective factor influencing green furniture purchase intentions. Therefore, the study puts forward the following hypotheses:

H6: Environmental self-responsibility **(**ESR) is positively related to purchase intention (PI).

H7a-c: Environmental self-responsibility **(**ESR) mediates the effect of live-streaming characteristics (a: INT, b: UTI, c: HAR) on purchase intention (PI).

Consumer Green Trust

Green trust reflects consumers' confidence that a product's environmental claims are reliable and credible (Chen 2010). Although environmental self-responsibility (ESR) and consumer green trust (CGT) are related, they represent distinct constructs. ESR reflects consumers' internalized sense of duty toward the environment and their willingness to take personal responsibility through purchase choices. In contrast, CGT concerns consumers' confidence in the credibility of firms' environmental claims. Thus, ESR is an intrinsic motivational factor, whereas CGT is an extrinsic evaluative judgment about product claims.

Prior research suggests that green trust enhances the effectiveness of green marketing by strengthening consumers' evaluation of functional and ethical value cues (Chang and Chen 2013). However, some recent research suggests that when green trust is already high, consumers may rely less on external signals such as perceived utility or moral appeals, as they have already internalized a positive evaluation of green products (Dangelico and Vocalelli 2017). Consequently, the effects of functional value (GPUP) and emotional value (ESR) on purchase intention may be attenuated in the presence of high consumer green trust.

Accordingly, this study proposes that green trust negatively moderates the effect of GPUP and ESR on green purchase intention in the context of live-streaming e-commerce.

H8: Consumer Green Trust **(**CGT) negatively moderates the relationship between green product utility perception (GPUP) and purchase intention (PI).

H9: Consumer Green Trust (CGT) negatively moderates the relationship between environmental self-responsibility (ESR) and purchase intention (PI).

EXPERIMENTAL

Data Collection and Sampling Procedure

This study investigated consumer behavior toward green furniture, with a specific focus on purchase intentions within a live e-commerce context. Data were collected *via* an online survey administered through the Chinese platform Wenjuanxing (www.wjx.cn) between January 8 and January 22, 2025. A sample of Chinese consumers with diverse ages, genders, income levels, and live-streaming viewing habits completed the online questionnaire during the data collection period. To ensure accuracy, only respondents who had prior experience watching real-time e-commerce live-streaming sessions were included in the survey. After removing 34 responses from individuals who had never engaged with live e-commerce, 510 valid responses were retained for analysis. All survey items were rated on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Measurement items for live streaming characteristics (interactivity, utility, and harmony) were adapted from Tian and Frank (2024), while items assessing green product utility perception (GPUP) and environmental self-responsibility (ESR) were drawn from Lin *et al.* (2021) and Sun and Chen (2023). Purchase intention (PI) was measured using items from Lao (2014), and the moderating variable, consumer green trust (CGT), was assessed using five items adapted from Chen (2024).

Analytical Method

This study employed SmartPLS 4.0 software for structural model analysis. SmartPLS is a robust structural equation modeling (SEM) tool based on partial least squares (PLS) path modeling. It is particularly suitable for analyzing complex models involving small sample sizes and multiple latent constructs. Given the involvement of multiple latent constructs and complex causal relationships, SmartPLS 4.0 offers an effective means to estimate path coefficients for both reflective and formative measurement models, thereby facilitating the validation of the proposed hypotheses. One notable advantage of SmartPLS is its non-reliance on strict distributional assumptions, which makes it particularly well-suited for the present analysis. Additionally, the bootstrap method was applied to examine mediation effects. The bootstrap method is a resampling technique commonly used to evaluate the statistical significance of indirect effects. In this study, the bootstrap approach was used to assess the mediating effects of environmental self-responsibility (ESR) and green product utility perception (GPUP) on purchase intention (PI), with consumer green trust (CGT) as a moderator. This resampling technique allowed for robust estimation of indirect effects and the generation of confidence intervals to validate mediation hypotheses.

Tests of Data Validity

This study followed design- and analysis-based remedies recommended by Podsakoff *et al.* (2012) to minimize common method bias (CMB). Anonymity was guaranteed throughout the data collection process, and unrelated items were deliberately interspersed in the questionnaire to mitigate response bias and reduce artificial correlations among variables. According to Harman's single-factor test, the variance explained by a

single factor was 39.565% (Table 1), which is below the critical 50% benchmark, suggesting that the influence of common method bias was limited (Podsakoff *et al.* 2003). Bartlett's test assesses whether the correlation matrix significantly deviates from an identity matrix, thus justifying the suitability of factor analysis. According to the results, the KMO value of the dataset was 0.977 (Table 2), which surpassed the widely accepted threshold of 0.7, demonstrating strong sampling adequacy and data validity.

Table 1. Harman's Single-Factor Test

Extracted Sums of Squared Loadings		
Total	Variance	Cumulative%
10.683	39.565	39.565

Table 2. KMO and Bartlett's Test

Kaiser–Meyer–Olkin metric for sampling adequacy.		0.977
Bartlett's test of sphericity	Approx. Chi-Square	5158.738
	df	325
	Sig.	0.000

RESULTS AND DISCUSSION

Descriptive Statistics

Table 3 illustrates a fairly balanced gender distribution, with 50.6% male and 49.4% female respondents. In terms of age, the majority of participants fell within the 26 to 30 (27.1%) and 31 to 40 (25.7%) age groups. Younger consumers aged 18 to 25 accounted for 16.1%, while older consumers aged over 60 represent a smaller proportion, at 4.3%. Regarding monthly income, 37.1% of respondents reported earnings between RMB 2,000 and 5,000, and 21.6% fall within the RMB 5,000 and 8,000 range. In terms of live-streaming frequency, 69.2% of the respondents watch at least 3 to 4 times a week. As for the average viewing duration, 40.6% of the respondents watch for 30 minutes to 1 hour per session, 18.6% watch for 1 to 2 hours, and 11.2% spend more than 2 hours. (see table 3)

Reliability and Validity

Construct reliability and validity were evaluated using multiple indicators. As shown in Table 4, Cronbach's alpha values for all seven constructs exceeded the 0.7 threshold, confirming strong internal consistency. Composite reliability (CR) values were also above 0.7, and average variance extracted (AVE) values ranged from 0.528 to 0.636, surpassing the recommended 0.5 level (Leguina 2015). Additionally, item loadings for each construct exceeded 0.7, supporting convergent validity (Chin 2009). Discriminant validity was confirmed using both the Fornell-Larcker criterion and the cross-loading matrix. As shown in Table 5, the square root of the AVE for each construct was greater than its correlations with other constructs, indicating adequate discriminant validity (Kock 2015).

Table 3. Descriptive Statistics of Participants (N = 510)

Characteristics	Category	Frequency	Percentage
Gender	Male	258	50.60%
	Female	252	49.40%
Age	<18	28	5.50%
	18~25	82	16.10%
	26~30	138	27.10%
	31~40	131	25.70%
	41~50	76	14.90%
	51~60	33	6.50%
	>60	22	4.30%
Monthly Income (CNY)	Under 2000	41	8.00%
	2000~5000	189	37.10%
	5000~8000	110	21.60%
	8000~11000	70	13.70%
	11000~14000	44	8.60%
	14000~17000	29	5.70%
	17000 and above	27	5.30%
Watching frequency	everyday	39	7.60%
	5 ~ 6 times a week	132	25.90%
	3 ~ 4 times a week	182	35.70%
	4 ~ 5 times a month	79	15.50%
	2 ~ 3 times a month	50	9.80%
	Less than once a month	28	5.50%
Watching duration	<10 min	44	8.60%
	10~30 min	107	21.00%
	30~60 min	207	40.60%
	60~120 min	95	18.60%
	>120 min	57	11.20%

Table 4. Construct Reliability and Convergent Validity

	Cronbach's alpha	rho_a	CR	AVE
CGT	0.721	0.722	0.827	0.544
ESR	0.705	0.706	0.819	0.53
GPUP	0.723	0.724	0.828	0.547
HAR	0.714	0.714	0.84	0.636
INT	0.721	0.722	0.827	0.544
PI	0.702	0.703	0.817	0.528
UTI	0.727	0.729	0.83	0.549

Table 5. Discriminant Validity (Fornell-Larcker Criterion)

	CGT	ESR	GPUP	HAR	INT	PI	UTI
CGT	**0.738**						
ESR	0.69	**0.728**					
GPUP	0.71	0.674	**0.739**				
HAR	0.681	0.635	0.665	**0.797**			
INT	0.705	0.667	0.706	0.716	**0.738**		
PI	0.72	0.671	0.687	0.669	0.704	**0.727**	
UTI	0.676	0.625	0.671	0.644	0.685	0.658	**0.741**

Conceptual Model Testing

Direct effects

Based on the results, the research hypotheses were tested, and the results are summarized in Table 6. The path coefficients and corresponding p-values were used to evaluate the significance of each hypothesized relationship. H1a and H1b were supported by the data ($\beta = 0.323$, $p < 0.001$; $\beta = 0.340$, $p < 0.001$), indicating that interactivity (INT) had a significant positive influence on both environmental self-responsibility (ESR) and green product utility perception (GPUP) at the 95% confidence level. H2a and H2b were also confirmed ($\beta = 0.246$, $p < 0.001$; $\beta = 0.284$, $p < 0.001$), suggesting that utility (UTI) significantly influenced ESR and GPUP. Similarly, H3a and H3b were supported ($\beta = 0.245$, $p < 0.001$; $\beta = 0.239$, $p < 0.001$), showing that harmony (HAR) significantly enhanced both environmental self-responsibility (ESR) and green product utility perception (GPUP).

Furthermore, both environmental self-responsibility (ESR) and green product utility perception (GPUP) were found to have significant positive effects on green purchase intention (H4 and H6: $\beta = 0.166$, $p < 0.001$; $\beta = 0.122$, $p < 0.05$), indicating that consumers' perception of green product utility and their sense of environmental responsibility play key roles in shaping purchase behavior. These results demonstrate that core features of live-streaming—interactivity, usefulness of information, and atmosphere—can jointly stimulate both cognitive and emotional mechanisms, thereby enhancing consumers' intention to purchase green furniture products.

Mediating effects

Partial Least Squares Structural Equation Modeling (PLS-SEM) was conducted using SmartPLS 4.0, and the bootstrapping method with 5,000 resamples was applied to examine the mediating roles of green product utility perception (GPUP) and environmental self-responsibility (ESR) in the relationships between the live streaming characteristics—interactivity (INT), utility (UTI), and harmony (HAR)—and consumers' green furniture purchase intention (PI). The results revealed that all three live streaming characteristics exerted significant indirect effects on purchase intention (PI) through both green product utility perception (GPUP) and environmental self-responsibility (ESR) ($p < 0.05$), confirming the effectiveness of live streaming as a tool for green furniture marketing.

First, interactivity (INT) significantly influenced purchase intention (PI) through both green product utility perception (GPUP) (INT → GPUP → PI: $\beta = 0.057$, $p = 0.003$) and environmental self-responsibility (ESR) (INT → ESR → PI: $\beta = 0.039$, $p = 0.028$). This suggests that interactive live-streaming features enhance consumers' perceptions of both the functional value of green furniture and their environmental responsibility, thereby promoting purchase intention. Second, utility (UTI) also exhibited significant indirect effects *via* green product utility perception (GPUP)($\beta = 0.047$, $p = 0.002$) and environmental self-responsibility(ESR) ($\beta = 0.030$, $p = 0.021$). This indicates that when green furniture is presented as useful and practical during live-streaming sessions, consumers are more likely to recognize its value and engage in environmentally responsible consumption. Third, harmony (HAR)—representing a pleasant, immersive, and trustworthy streaming atmosphere—impacted purchase intention (PI) through green product utility perception (GPUP) ($\beta = 0.040$, $p = 0.007$) and environmental self-responsibility (ESR) ($\beta = 0.030$, $p = 0.025$). These findings suggest that a harmonious live-streaming environment not only enhances consumers' cognitive evaluation of product utility but also reinforces their emotional and moral motivations for green purchasing (Table 7).

Table 6. Direct Effect, Predictive Relevance, and Effect Size Estimation

Hypothesis	Relationship	Path coefficients	SE	T-statistics	P Values	Supported	2.5%CI	97.5%CI	f^2	R^2	
H1a	INT -> GPUP	0.34	0.042	8.029	0.000	YES	0.255	0.421	0.113	ESR	0.527
H1b	INT -> ESR	0.323	0.048	6.796	0.000	YES	0.228	0.415	0.088	GPUP	0.569
H2a	UTI -> GPUP	0.284	0.045	6.283	0.000	YES	0.197	0.378	0.095	PI	0.633
H2b	UTI -> ESR	0.246	0.05	4.955	0.000	YES	0.147	0.343	0.061		
H3a	HAR -> GPUP	0.239	0.043	5.526	0.000	YES	0.153	0.322	0.061		
H3b	HAR -> ESR	0.245	0.046	5.386	0.000	YES	0.159	0.338	0.056		
H4	GPUP -> PI	0.166	0.05	3.353	0.001	YES	0.069	0.264	0.03		
H6	ESR -> PI	0.122	0.048	2.531	0.011	YES	0.029	0.218	0.015		

Table 7. Mediation Effects and Moderating Effects

Hypothesis	Relationship	Path coefficients	SE	T-statistics	P Values	Supported	2.5%CI	97.5%CI
H5a	INT -> GPUP -> PI	0.057	0.019	2.948	0.003	YES	0.022	0.097
H5b	UTI -> GPUP -> PI	0.047	0.015	3.093	0.002	YES	0.019	0.079
H5c	HAR -> GPUP -> PI	0.04	0.015	2.711	0.007	YES	0.014	0.072
H7a	INT -> ESR -> PI	0.039	0.018	2.203	0.028	YES	0.009	0.079
H7b	UTI -> ESR -> PI	0.03	0.013	2.301	0.021	YES	0.007	0.058
H7c	HAR -> ESR -> PI	0.03	0.013	2.237	0.025	YES	0.007	0.058
H8	CGT x GPUP -> PI	-0.191	0.036	5.374	0.000	YES	-0.139	-0.004
H9	CGT x ESR -> PI	-0.073	0.035	2.093	0.036	YES	-0.264	-0.123

Moderating Effects

Further analysis examined the moderating role of consumer green trust (CGT). The results showed that consumer green trust (CGT) significantly and negatively moderated the effect of environmental self-responsibility (ESR) on purchase intention (PI) (β = -0.073, p = 0.036), and also negatively moderated the effect of green product utility perception (GPUP) on purchase intention (PI) (β = -0.191, p < 0.001), as shown in Table 7. These findings suggest that when green trust is low, consumers are more likely to rely on functional and emotional value perceptions (GPUP and ESR) to form their purchase intentions. Therefore, live streaming is particularly effective for low-trust consumers by strengthening their perceptions of product utility and environmental responsibility. Figure 3 presents the results of the model test.

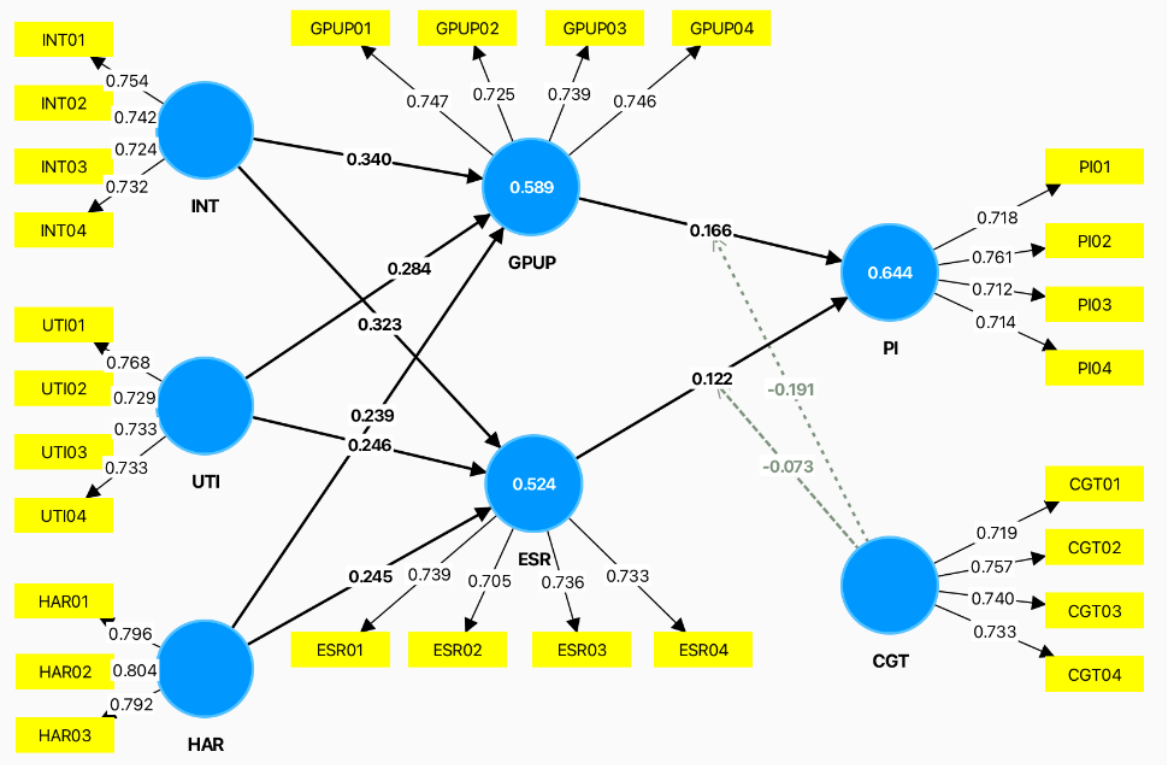

Fig. 3. Path diagram

Assessment of the structural model

Model fit was assessed using the standardized root mean square residual (SRMR), with a value of 0.068—below the 0.08 threshold—indicating good model fit (Leguina 2015). The model's explanatory power was evaluated through adjusted R^2 values, which were 0.569 (GPUP), 0.527 (ESR), and 0.633 (PI), all above the 0.35 benchmark for substantial explanatory power (Chin 2009). Multicollinearity was assessed using variance inflation factor (VIF) values, which ranged from 1.277 to 1.421, well below the threshold of 3.3 recommended by Kock (2015). These results confirm that multicollinearity is not a concern and that the model possesses strong explanatory capacity.

Table 8. Fit Indices

	Saturated Model	Estimated Mode
SRMR	0.057	0.068
d_ULS	1.213	1.731
d_G	0.422	0.462
NFI	0.786	0.777

DISCUSSION

This research investigates how live-streaming characteristics influence consumers' purchase intentions toward green furniture, with a particular focus on the mediating roles of functional value (green product utility perception) and emotional value (environmental self-responsibility), as well as the moderating role of consumer green trust (CGT). By integrating insights from green marketing and interactive commerce, this study not only affirmed the effectiveness of live-streaming e-commerce in promoting green purchasing behavior, but it also extended the application of live-streaming features to high-involvement, sustainability-oriented product categories such as green furniture. The findings are consistent with recent studies on live-streaming commerce (Huo *et al.* 2024), which emphasize the importance of interactivity and atmosphere in driving sustainable purchase behaviors. However, the present study extended this stream of research by focusing specifically on green furniture, a high-involvement durable product, rather than low-cost daily items such as agricultural products. By situating our the work within the broader applications of the S-O-R framework, the results show how both cognitive (utility) and emotional (responsibility) mechanisms jointly shape green consumption.

Green furniture, compared to daily-use green products such as food or cosmetics, involves higher price sensitivity, longer decision cycles, and a greater need for experiential understanding. In this context, live streaming serves as a powerful tool to bridge the information and trust gap, offering real-time product demonstrations and emotional engagement. The findings show that interactivity, utility, and harmony significantly influence green product utility perception (GPUP) and environmental self-responsibility (ESR). The observed effect sizes, while moderate, hold practical significance as they highlight interactivity as the strongest predictor among live-streaming features, suggesting marketers should prioritize this element. Similarly, Li *et al.* (2024) finds that a harmonious atmosphere in livestreams fosters emotional resonance and trust, both of which are critical to encouraging behaviors.

Building on these insights, the present study integrates functional and emotional drivers to construct a dual-pathway model for green purchase intentions. By introducing GPUP and ESR as mediating variables, this study contributes to the growing literature that links value perception theory with green consumer behavior. Consistent with Long *et al.* (2024), the results confirm that both functional and emotional values play critical roles in forming green purchase intention. For consumers with low levels of green trust, purchase intention is more strongly driven by their perceptions of green product utility perception (GPUP) and environmental self-responsibility (ESR), indicating that value-based evaluations play a compensatory role when trust is insufficient. In practice, this means that when consumers lack strong trust in green claims, they rely more heavily on their own perceptions of utility and responsibility to guide decisions. Conversely, when trust is high,

these perceptions play a smaller role because consumers already feel assured about product credibility.

In summary, this study provides empirical evidence that live-streaming features stimulate green purchase intentions by enhancing functional and emotional value perceptions. These insights deepen our understanding of how digital interactions can be leveraged to drive sustainable consumption, especially for complex and experience-heavy products such as green furniture. They also offer practical implications for marketers, who must tailor live-streaming strategies not only to product features but also to consumers' pre-existing trust levels and motivational drivers.

PRACTICAL IMPLICATIONS

There are various practical implications of the present work. For example, live-stream hosts can conduct interactive Q&A sessions in which consumers ask about furniture durability or eco-certifications, following which the host provides immediate clarifications. Demonstrations showing how a table made of FSC-certified wood resists scratches or how low-VOC coatings improve indoor air quality can concretely highlight product utility. Additionally, hosts can foster a harmonious atmosphere by using warm lighting, eco-themed backgrounds, and storytelling about sustainable lifestyles, which enhances consumers' environmental responsibility.

This study has multiple practical implications for practitioners in the green furniture industry, particularly those working on live-streaming marketing strategies. First, the results of this study indicate that live-streaming features—interactivity, utility, and harmony—significantly influence green furniture purchase intention. This finding provides valuable insights for live-streaming marketers in the furniture industry to tailor content and format based on the study's results. Marketers should focus on crafting content that is not only informative but also engaging and interactive. Here are some actionable recommendations:

In live-streaming sessions, incorporating positive customer reviews and shared experiences can enhance social identity, as potential buyers are more likely to trust products endorsed by other consumers, thereby increasing purchase likelihood. In addition, developing compelling storylines that integrate engaging elements such as humor, emotional narratives, or entertaining segments can make the sessions more attractive, improve viewer retention, and stimulate greater audience interaction. Furthermore, introducing interactive features, including polls, live comments, and contests, can further promote user participation and enhance the appeal of advertising content, thereby encouraging viewers to connect with the product. It is also important to note that highlighting the practical utility of green furniture, such as durability, comfort, and versatility, by demonstrating how the products fit into diverse lifestyles or address common household challenges can strengthen consumers' perception of utility and increase purchase intention (Zhang *et al.* 2023). Moreover, creating a harmonious atmosphere during live-streams through eco-friendly communication styles and relaxing background music can reinforce the environmental message, foster emotional resonance, and strengthen the link between environmental awareness and purchase behavior. Additionally, the study reveals that consumer green trust (CGT) significantly moderates the relationship between functional and emotional value perceptions and purchase intention. Specifically, for consumers with low green trust, it is essential to emphasize detailed product

information and authentic eco-stories to build trust and foster purchase intention. In contrast, for high-trust consumers, content can reinforce existing positive beliefs, minimizing the need for heavy persuasion and thus avoiding skepticism.

Finally, while this study has focused on green furniture, the insights can be extended to other green product categories, such as sustainable fashion, eco-friendly home appliances, or biodegradable packaging. E-commerce platforms should apply this model across a range of green product categories, refining their algorithmic recommendations and live-streaming training programs accordingly. Nevertheless, industry-specific factors such as brand reputation, price positioning, and after-sales services may interact with live-streaming strategies, which practitioners should take into account.

LIMITATIONS AND FUTURE RESEARCH

This study has several limitations. First, the data were collected in China using a cross-sectional design, which restricts the generalizability of the results to other cultural and institutional contexts. Second, the reliance on self-reported survey data may introduce response bias. Third, cultural factors and industry-specific practices could limit the transferability of our findings to other markets or product categories.

Future research could address these limitations by conducting cross-cultural comparative studies, adopting experimental or longitudinal designs to better capture causal dynamics, and exploring how industry characteristics shape consumer responses. Such work would help validate and extend the applicability of our findings in broader contexts.

CONCLUSIONS

1. The results confirm that both green product utility perception (GPUP) and environmental self-responsibility (ESR) significantly predict green furniture purchase intentions, emphasizing the importance of addressing both rational and emotional motivations in live-streaming content strategies.
2. Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed to assess the proposed model. All factor loadings exceeded 0.7, and reliability and validity indicators (Cronbach's α, CR, AVE) met acceptable thresholds, confirming the strong measurement model quality and alignment with theoretical constructs.
3. Interactivity (INT), utility (UTI), and harmony (HAR) all had significant positive effects on GPUP and ESR ($p < 0.001$). Both mediators positively influenced green furniture purchase intention ($\beta = 0.324$ for GPUP; $\beta = 0.306$ for ESR), supporting the dual-pathway framework combining functional and emotional value.
4. The model fit and moderation results support value-based consumer segmentation. The R^2 values for GPUP, ESR, and PI were 0.622, 0.584, and 0.672, indicating strong explanatory power. Effect sizes showed INT had the largest impact on both GPUP and ESR. Moderation analysis revealed that consumer green trust (CGT) negatively moderated the GPUP → PI and ESR → PI relationships, suggesting that consumers with lower green trust rely more on perceived value to form purchase intentions.

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Author Contributions

S.Y. was responsible for funding acquisition and project administration, formulated the overall research objectives, and completed improvements on the first draft. R.C. wrote the first draft, developed the design of the research methodology, and completed the data collection portion of the study. P.X. and provided the materials and venues for the study. L.Z. and D.L. completed the translations. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

Upon review by the Institutional Review Board of this institution, the study's experimental design and protocol were determined to be scientifically valid, fair, and unbiased. They posed no harm or risk to the subjects. The subject recruitment adhered to the principles of voluntary participation, informed consent, and safeguarded the rights, interests, and privacy of the participants. Additionally, the study's content was free from conflicts of interest and did not violate moral, ethical, or legal norms. It was in line with the ethical standards of the Declaration of Helsinki. Consequently, the Institutional Review Board approved the continued progress of this project as originally planned.

Informed Consent Statement

All subjects gave their informed consent for inclusion before they participated in this study

Data Availability Statement

The original contributions presented in this study have been included in the article; further inquiries can be directed to the corresponding authors.

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