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# How does live streaming affect tourists' intention — a psychology theory perspective

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**As a novel experiential approach, live streaming at tourist destinations has garnered significant attention and profoundly impacts tourists' travel decisions. This study aims to validate the effects of usefulness, authenticity, and interactivity of destination live streams on the decision-making process of tourists. Grounded in stimulus–organism–response (S-O-R) theory, this research identifies the usefulness, authenticity, and interactivity of destination live streams as the "stimulus," while telepresence and trust as the "organism," with tourists' travel decisions as the "response." Utilizing survey questionnaires, 274 valid data were collected and analyzed through structural equation modeling in SPSS 26.0 and Amos 28.0 software to assess the impact of destination live streams on tourists' travel decisions. The findings reveal that both interactivity and authenticity positively influence tourists' telepresence. Additionally, the usefulness, interactivity, and authenticity of these live streams also positively affect perceived trust among viewers, which subsequently enhances their travel decisions. This study highlights the usefulness, authenticity, and interactivity as external stimuli in destination live streams, elucidating their influence on tourists' travel decisions and contributing to the understanding of the live streaming phenomenon within the tourism sector.**

**Keywords** Destination, Live streaming, Travel decision, S-O-R theory

Live streaming via e-commerce platforms has emerged as a key online marketing tool and is rapidly gaining traction worldwide[1]. This approach encompasses e-commerce activities in which streamers—typically merchants or managers—showcase products and provide purchasing services through live demonstrations and real-time experience sharing[2]. In the realm of tourism, e-commerce live streaming has gained widespread acceptance on a global scale. Various countries have utilized this method for tourism promotion, exemplified by Ctrip, China's largest online travel agency, which launched the "Boss Live Session," and the Japan National Tourism Agency, which broadcast its Okinawa tourism campaign on Facebook. Similarly, Tourism Australia introduced "Live from Aus," offering live-streamed travel experiences from the country[3]. Despite the increasing significance and popularity of live streaming in tourism marketing, it remains underexplored within the tourism research landscape[3]. Additionally, several challenges persist, including the need to ensure content quality and authenticity, manage overtourism, address tourist expectations, and navigate heightened competition.

Since the introduction of live streaming features on social media platforms like Douyin (TikTok), Twitter, and Facebook in 2015, live streaming has rapidly emerged as a significant trend in the online world, driving the growth of virtual tourism[1]. Within the tourism industry, both tourists and practitioners actively promote destinations through live streaming, significantly contributing to the advancement of virtual tourism[4]. The academic community widely recognizes that live streaming has emerged as a crucial technological tool for revitalizing the tourism and hospitality sectors during the pandemic[3,5]. Xie et al. constructed a value-based marketing framework for live streaming e-commerce in tourism, exploring its application in the context of experiential product[6]. Compared with traditional tourism marketing strategies, live streaming of tourism destinations offers an effective method for training and education professionals in the tourism and hospitality sectors, while also enhancing service quality and competitiveness within these industries[7]. Another area of research in live streaming tourism centers on its influence on travelers' experiences. The real-time nature of live streaming enables tourists to connect with friends, family, and virtual communities, thereby enhancing their sense of togetherness during their travels[8]. Some scholars suggest that live video streams can act as a source of travel inspiration, introducing emotional elements into potential tourists' decision-making processes and

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expediting their choices[9]. By creating engaging scenarios, live streams ignite viewers' imaginations and stimulate their desire to travel[10]. Notably, the presentation of destinations and the interactive elements within live streams are critical in shaping the perceived authenticity of the destination's brand[11]. This sense of authenticity enhances tourists' trust in the destination, ultimately motivating their travel intentions[12]. Furthermore, the immediacy and interactivity of live streams provide viewers with a sense of instant gratification, significantly reducing the time they invest in travel planning and decision-making[13]. Most current research on tourism live streaming relies on case studies and predominantly employs qualitative methods, with a primary focus on tourism marketing. For instance, one study used Sanya as a research case[14], while another explored how Ctrip leveraged live streaming for its tourism marketing and promotional strategies[15]. Additionally, a systematic exploration of the marketing logic resulting from the integration of tourism and e-commerce live streaming was conducted through text analysis and in-depth interviews[16]. Scene theory was utilized to examine the spatial construction logic of tourism live streaming[17], while content analysis and the IPA model were employed to investigate the "Cloud Tour of the Forbidden City" live streaming series[18].

Despite the increasing number of academic studies on tourism live streaming in recent years, most studies have focused on its impact of tourists' willingness to travel. Investigations into the specific pathways and mechanisms through which destination live streaming influences travel decisions remain in their early stages. Beyond aiding the recovery of the tourism industry, destination live streaming serves as an efficient marketing channel, vividly showcasing products, attracting potential customers, and facilitating sales[19]. The vivid visual experiences and real-time interactions by live streaming not only enhance tourists' trust in a destination but also stimulate their desire to visit[11]. This study posits that investigating the travel intentions of viewers in the context of live tourism involves a complex psychological process, making the S-O-R theory—a common tool in psychological research—a fitting choice for guiding this investigation. Live streaming plays a crucial role in the marketing of physical products[20]. However, the emotional response tied to the selection of stimuli in tourism live streaming and its effect on travel intentions has been insufficiently examined. Addressing this gap can provide deeper insights into how tourists' engagement with live streams influences their travel intentions, thereby enhancing the relevance of the S-O-R theory and underscoring a noteworthy research gap that merits further exploration.

Therefore, studying the role and application of live streaming in shaping tourists' travel decisions is essential. This research provides a novel perspective on the mechanisms influencing these decisions through destination live streaming and offers valuable insights for practical application. Such insights are significant for improving service quality within the tourism industry and enhancing overall tourists satisfaction.

## Theoretical background and concepts

### Live streaming

Live streaming is an interactive communication technology that combines various media elements, including text, images, sound, and video, to enable real-time broadcast[3]. While live streaming was already widely applied in various fields, such as entertainment, music broadcasting, sports events, and esports, as early as the 1990s[21], it truly gained popularity with the rapid advancement of mobile technology and social media. The rise of mobile technology has allowed users to access and share information without spatial or temporal constraints[22], realizing real-time broadcasting and viewing while endowing live streaming with the characteristics of immediacy and simultaneity.

### Live streaming at tourist destinations

Deng et al.[4] were the first to introduce the concept of "live streaming at tourist destinations," exploring how audiences can experience virtual travel through the cameras of broadcasters and how the live streaming environment fosters multisensory engagement and shared experiences between viewers and broadcasters. In this process, broadcasters not only showcase the natural scenery and cultural attractions of a destination but also recommend carefully designed travel routes and provide detailed introductions to various tourism products and their unique features. Tourism live streaming is often perceived as a convergence of tourism and live streaming, where broadcasters utilize live streaming platforms to showcase travel locations, tourism products, activities, and related experiences to their audience. Currently, tourism live streaming is primarily classified into two models: the "live streaming + e-commerce" model, which emphasizes the online sales of tourism products through fixed locations[6], and the "live streaming + content" model, where broadcasters highlight natural landscapes, cultural history, and other aspects of a destination to attract viewers and achieve promotional goals.

### Travel decisions

Moutinho[23] defines travel decisions as the choices tourists make regarding their travel behavior, specifically the decision to embark a trip. These decisions are closely linked to travel motives, suggesting that under consistent external conditions, travel needs and motives directly lead to travel decisions, indicating a subjective internal causal relationship. Chen and Bao[24] describe travel decisions as the process in which tourists seek travel-related information prior to a trip and make choices based on their personal travel preferences. Gilbert[25] believes that travel decisions encompass all decisions made by tourists, from the initial motivation to the completion of the travel experience. Research has shown that travelers' decisions are significantly influenced by previous reviews, especially online reviews[26].

### S-O-R theory

The S-O-R theory explains how individuals respond to external environmental stimuli. Formally introduced by Mehrabian and Russell[27], this theory primarily investigates the mechanisms through which environmental stimuli influence individuals' consciousness and behavior. The S-O-R theory comprises three core components:

First, the stimulus includes all external factors that can impact an individual, where there stimuli are consciously perceived or not. Second, the organism represents the entirety of an individual's physiological and psychological characteristics, encompassing cognitive structures, emotional states, personal attitudes, values, and needs. Last, the response pertains to the behavioral reaction or changes exhibited by an organism in response to a stimulus. This response is a direct consequence of the stimulus and serves as the central focus of the S-O-R theory.

The application of S-O-R theory in live-stream has gained increasing validation. For instance, studies have shown that live streaming features significantly impact consumers' purchase intentions in the context of cross-border e-commerce[28]. Additionally, social presence has been found to affect impulse buying behavior in live streaming commerce[29], while social and media cues have been shown to stimulate impulse buying during live stream[30]. In this research, the stimulus (S) specifically refers to the usefulness, interactivity, and authenticity of destination live streaming content. The organism (O) represents the telepresence and perceived trust generated by viewers engaging with this content, while the response (R) pertains to tourists' travel decisions. Employing S-O-R theory facilitates a deeper understanding of how destination live streaming content influences tourists' decision-making processes, thereby offering theoretical support for related practices in this field. Thus, S-O-R theory is particularly relevant to this study.

## Hypothesis development

### Usefulness, telepresence, and perceived trust

The usefulness of tourism live streaming refers to the viewers' perception that the information shared during the broadcast can assist in travel planning, destination selection, and overall enhancement of the travel experience. Specifically, this usefulness is manifested through the provision of reliable information about local customs, attractions, transportation, and accommodations, which helps users make more informed travel decisions and enhancing the overall quality of their travel experience.

In the realm of virtual reality, studies have explored how immersion influences users' sense of presence during virtual experiences[31,32]. Rowley[33] emphasized that social media plays a crucial role in providing users with necessary information, thereby effectively meeting their practical needs. A positive emotional response is largely attributed to the perceived usefulness of the content provided by social media, indicating that users derive value and practical significance from the information available on these platforms. Specifically, when social media platforms effectively meet users' needs and offer tangible benefits, it fosters a greater sense of trust in the platform. Similarly, during live streaming, if a broadcaster demonstrates professionalism and provides targeted advice and information, the broadcast is considered as useful, thereby enhancing viewers' trust in the content. Based on the preceding discussion, the following hypotheses are proposed:

H1a: Usefulness has a positive influence on telepresence.

H1b: Usefulness has a positive influence on perceived trust.

### Authenticity, telepresence, and perceived trust

In this context, authenticity refers to tourists' perception and evaluation of the visual content presented in destination live streaming. This evaluation encompasses not only the realness of landscapes, facilities, and other objective elements depicted in the live stream, but also the perceived authenticity of the travel experiences and atmosphere.

Cao et al.[34] proposed that the authenticity of short videos enhances individuals' positive perceptions of destination brands and increases immersion. Similarly, Kim et al.[35] found that higher perceived authenticity in virtual tourism leads to more immersive and engaging experiences for tourists. During live streaming, viewers can access real product information and interact through comments. They observe other viewers' decisions as well as the broadcaster's expressions and gestures, which adds to the authenticity of the experience. This immersive interaction helps viewers feel the presence of others and perceive the broadcaster as a real person rather than an indifferent robot, thereby enhancing social presence. Tourism live streaming provides viewers immersive experiences of cultural landscapes, natural scenery, and local cuisine at tourist destinations, evoking pleasure and curiosity while fostering trust in the destination. Based on the above discussion, the following hypotheses are proposed:

H2a: Authenticity has a positive influence on telepresence.

H2b: Authenticity has a positive influence on perceived trust.

### Interactivity, telepresence, and perceived trust

Interactivity refers to users' perception of interaction through actions, such as following, liking, commenting, and sharing. In the context of destination live streaming, interactivity encompasses the extent of real-time communication, feedback, and participation between viewers and broadcasters on the live streaming platform. This interactivity is characterized by broadcaster's timely responses to viewers' questions, solving their concerns, and encouraging viewer participation through comments, likes, and participation in interactive elements like polls and giveaways.

During live streaming, broadcasters utilize real-time audio and video to elaborate on products and promptly address viewers' inquiries, fostering a highly interactive environment that enables consumers to obtain the desired information more accurately and efficiently. Compared with text-based communication, voice and video effectively convey the broadcaster's emotions and attitudes, shaping their broadcaster's image and fostering a psychological connection with viewers. This interaction and emotional resonance enhance consumers' social presence[36] and foster a sense of identification and trust in both the broadcaster and the promoted products. Based on the above discussion, the following hypotheses are proposed:

H3a: Interactivity has a positive influence on telepresence.

H3b: Interactivity has a positive influence on perceived trust.

### Telepresence and travel decisions

Given the experiential nature of tourism products, the telepresence created by live streaming offers viewers with a virtual travel experience, effectively compensating for their inability to travel physically[37]. In online environments, social presence fosters a sense of comfort for users[38], making them more inclined to make purchase decisions in such a cozy atmosphere. An enhanced social presence enables consumers to access more information, rendering the purchasing process more transparent and reducing uncertainties, ultimately increasing their intention to purchase[39]. Moreover, the instantaneous and interactive nature of live streaming allows broadcasters to engage in personalized and prompt exchanges with viewers regarding travel experiences or products, significantly reducing the time spent on trip planning and travel decision-making[13]. Additionally, a high level of social presence diminishes the perceived distance between consumers and broadcasters, alleviating uncertainties in the purchase decision-making process and ultimately prompting purchasing behavior[40]. Based on the above discussion, the following hypotheses are proposed:

H4: Telepresence has a positive influence on tourists' travel decisions.

### Perceived trust and travel decisions

Perceived trust is deemed a critical concern for consumers in both online and live streaming contexts. Live streaming videos serve as a form of travel inspiration for potential tourists, introducing irrational elements that can expedite their decision-making process[9]. By constructing immersive scenarios, live streaming prompts viewers to imagine and "pre-experience" their journey, fostering positive perceptions of the destination and igniting their travel desires[10]. Notably, the way destinations are presented and the interactive segments included during live streaming plays a pivotal role in shaping the authenticity of destination brands[11]. This authenticity further enhances tourists' trust in the destination, thereby motivating their travel intentions[12]. Trust is crucial in the commodity reservation process on travel live streaming platforms, as it alleviates consumer doubts and anxieties, providing a solid foundation for positive purchase intentions. Moreover, consumers' trust in both the broadcaster and the platform significantly influences their purchasing decisions within the live streaming environment. Based on the above discussion, the following hypothesis is proposed:

H5: Perceived trust has a positive influence on tourists' travel decisions.

### Conceptual model

By emphasizing the cognitive and emotional processing of external stimuli, this study applies the S-O-R theory to deepen the understanding of how live destination streams influence tourists' decision-making processes, providing theoretical support for practical applications in live tourism broadcasting. The conceptual model identifies "usefulness," "interactivity," and "authenticity" as stimuli (S), recognizing these elements as the key factors that attract audiences to live streams. These features represent the external aspects of live streaming that influence audience perceptions—whether through providing valuable information, engaging participation, or presenting authentic experiences. "Telepresence" and "perceived trust" are categorized as organisms (O) because they capture the viewers' emotional and cognitive states. Telepresence represents the immersive experience of "being there," while perceived trust reflects the confidence viewers develop in the content. These internal psychological mechanisms are triggered by the live stream's stimuli, aligning with the S-O-R theory's emphasis on cognitive and emotional processing. Finally, "travel decision" is framed as the response (R), representing the ultimate behavioral outcome—the decision to visit the destination. This reflects how processed stimuli influence real-world actions, completing the loop in the S-O-R theory's conceptual framework. The selection of these variables is essential for analyzing how live streaming affects tourists' decision-making through both emotional and cognitive responses, eventually leading to behavioral outcomes.

Therefore, drawing upon the literature review, S-O-R theory, and the research hypotheses proposed previously, this study establishes a conceptual model that examines the impact of destination live streaming on tourists' travel decisions. The model incorporates three independent variables: usefulness, interactivity, and authenticity as the stimuli (S); telepresence and perceived trust as the organisms (O); and travel decisions as the response (R), as depicted in Fig. 1.

## Methodology

### Research strategy

Step 1: This study primarily utilizes a questionnaire survey method to gather the necessary data. An online questionnaire was specifically designed and distributed to the target population. After collecting the responses, rigorous processing and screening were performed using methods such as filter questions and response duration to ensure the authenticity and reliability of the data. These questionnaire responses serve as the primary source of information for this research. Based on an extensive literature review in the initial stage, the questionnaire content was further adjusted and optimized to meet the research needs, resulting in a questionnaire scale suitable for the study's topic.

Step 2: The questionnaire was created and distributed using the Wenjuanxing platform, and it was disseminated through various channels, such as WeChat and Xiaohongshu. The collected primary data were systematically analyzed using SPSS 26.0 and Amos 28.0 software. Initially, during the pretest phase, reliability and validity tests were conducted to ensure the robustness of the formal survey. Subsequently, the questionnaire data regarding tourists' travel decision-making in the context of live streaming tourism were subjected to data cleaning. Descriptive statistics were then conducted on the basic information of the respondents, including gender, age, income, time spent using internet-enabled mobile devices, and frequency of watching live streaming related to tourism destinations. This study employed a snowball sampling technique to gather participants. To mitigate sample bias, key demographic variables such as gender, age, education level, monthly income, daily internet usage, and frequency of watching tourism live streams were carefully managed. After recruiting participants, a

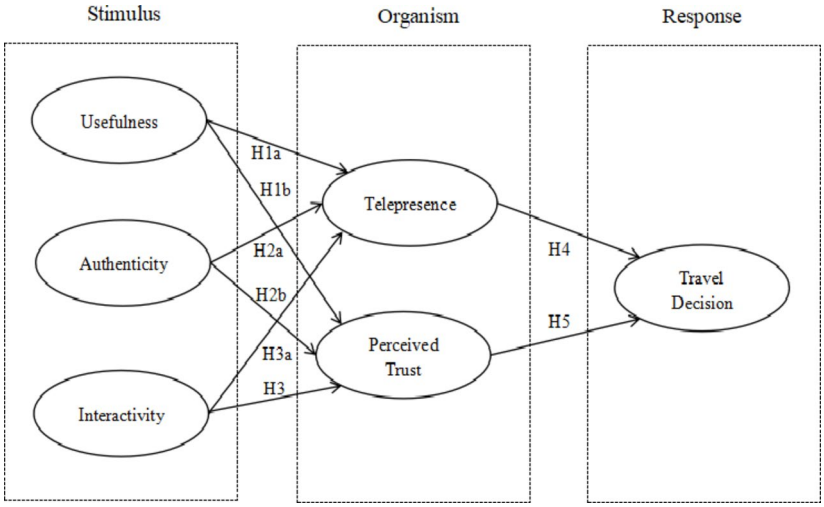


**Fig. 1**. Conceptual model.

quota-based approach was implemented to ensure balanced representation across these demographic factors. This strategy ensured that underrepresented groups, such as older adults or low-frequency viewers, were included in realistic proportions. Subsequently, factor analysis and correlation analysis were conducted on the formal data. Furthermore, structural equation modeling (SEM) was used to perform fit tests and hypothesis testing, verifying and analyzing the theoretical hypotheses proposed in this study, ultimately leading to the formulation of the final research conclusions.

### Questionnaire design

Based on a comprehensive review of relevant literature and the specific focus on destination live streaming, the questionnaire items were carefully adapted and validated for this unique context. Each measurement item was derived from established scales in previous studies but adjusted to ensure its relevance to the current research topic. For instance, items measuring usefulness were adapted from existing studies on online content usefulness[41], ensuring their application to live streaming in tourism. Similarly, the constructs of authenticity and interactivity were adapted from validated scales used in both tourism and live stream research[37]. Additionally, the constructs of telepresence[42], perceived trust and travel decisions[43] were tailored specifically for tourism live streaming, drawing on prior research in similar experiential digital contexts. The measurement items are as follows: QA1, QA2, QA3, and QA4 correspond to usefulness; QB1, QB2, and QB3 correspond to authenticity; QC1, QC2, and QC3 correspond to interactivity; QD1, QD2, QD3, QD4, and QD5 correspond to telepresence; QE1, QE2, and QE3 correspond to perceived trust; and QF1, QF2, and QF3 correspond to travel decisions.

To ensure the validity and applicability of the questionnaire in this specific context, a preliminary pilot test was conducted. Adjustments were made to refine the wording of the item, ensuring they resonated with respondents in a tourism live streaming scenario. Each of the six key variables was measured using 3 to 5 items to maintain consistency with established scales while balancing comprehensive measurement with the risk of response fatigue. A five-point Likert scale was employed, ranging from "1" (strongly disagree) to "5" (strongly agree), facilitating nuanced responses while keeping the survey concise and manageable. This approach not only aligns with established theoretical frameworks but also addresses the unique dynamics of live streaming in tourism, ensuring the questionnaire's relevance and rigor.

## Results

### Pilot study

To maintain the rigor of the research, a pilot study was initially conducted to evaluate the scale. The target group for this presurvey consisted of consumers consumers who had watched tourism live streams on platforms such as WeChat and Xiaohongshu. The questionnaire was distributed online, and 74 responses were collected. After screening, 67 valid responses were obtained, resulting in an effective rate of 90.54%.

Cronbach's α coefficient is a crucial indicator of reliability. A coefficient exceeding 0.7 indicates a high level of reliability for the scale[44]. In this study, the Cronbach's α coefficients for all variables were greater than 0.8, meeting the measurement standards and indicating that the scale is reliable. Validity primarily reflects the degree of correspondence between the scale's measurement results and the intended goals, as well as the effectiveness of the various measurement indicators within the scale. The overall Kaiser-Meyer-Olkin value was 0.931, with values for each variable exceeding 0.7, indicating good validity[45]. Additionally, the overall and individual variables' Bartlett's test of sphericity showed significance at 0.000, well below the 0.05 threshold, confirming the suitability of the data for factor analysis.

## Data collection

The formal study used online surveys for data collection via the Wenjuanxing platform to improve efficiency and expand the coverage of questionnaire collection while simplifying the data processing workflow. To minimize self-selection bias, specific screening criteria were integrated. The first criterion required respondents to have previously watched live tourism streams. The second involved a time-check mechanism to ensure thoughtful responses: respondents were required to spend at least 90 s completing the questionnaire, based on the number of questions. This approach ensured that respondents met the study's criteria and provided more deliberate, reflective answers. Finally, 319 questionnaires were collected, with 274 valid responses, resulting in an effective rate of 85.89%.

## Descriptive statistical analysis

The demographic attributes of the surveyed participants include gender, age, education level, and monthly income, while the behavioral characteristics include internet usage duration and the frequency of watching tourism live streams. The specific results are presented in Table 1.

From a gender perspective, females accounted for a slightly higher proportion than males. In terms of age, the majority of respondents were middle-aged and young adults, representing the main segment of the surveyed group and closely aligning with the active user base of mobile internet. Regarding education level, the respondents generally possess a high level of education, which enhances their ability to comprehend and respond to the questionnaire effectively, thereby securing the accuracy and reliability of the research data. Additionally, respondents with higher education levels typically possess stronger thinking and analytical abilities, facilitating a more in-depth analysis of the impact of destination live streaming on tourists' travel decisions. In terms of monthly income, a significant portion of the respondents earns below 6,000 yuan, accounting for 60.9%. This demographic reflects a "pyramid" distribution pattern with the current socioeconomic structure, where middle- and low-income groups constitute a larger proportion, while the high-income group is relatively smaller. Regarding internet usage, most respondents demonstrate regular internet habits. Lastly, the frequency of watching tourism live streams indicates a broad audience base among the surveyed participants.

## Normal distribution test

The standard for normal distribution generally defines that the absolute value of skewness should be below 3 and kurtosis below 10[46]. In this study, SPSS 26.0 statistical software was employed to conduct a comprehensive analysis of the data related to 21 items. The analysis results shown in Table 2 reveal that the absolute values of

| Demographic variable | Items | Frequency | Percentage (%) |
|---|---|---|---|
| Gender | Male | 117 | 42.70% |
| | Female | 157 | 57.30% |
| Age | Under 19 years old | 31 | 11.31% |
| | 20–29 years old | 89 | 32.48% |
| | 30–39 years old | 91 | 33.21% |
| | 40–49 years old | 48 | 17.52% |
| | 50 years old or above | 15 | 5.47% |
| Education Level | High school or below | 16 | 5.84% |
| | Junior college | 99 | 36.13% |
| | Bachelor's degree | 151 | 55.11% |
| | Graduate degree or above | 8 | 2.92% |
| Monthly Income | 4,000 and below | 71 | 25.91% |
| | 4,001–6,000 yuan | 96 | 35.04% |
| | 6,001–8,000 yuan | 53 | 19.34% |
| | 8,001–10,000 yuan | 26 | 9.49% |
| | 10,001–15,000 yuan | 15 | 5.47% |
| | Above 15,000 yuan | 13 | 4.74% |
| Daily Internet Use | Less than 2 h | 75 | 27.37% |
| | 2–4 h | 89 | 32.48% |
| | 4–6 h | 50 | 18.25% |
| | 6–8 h | 41 | 14.96% |
| | 8 h or more | 19 | 6.93% |
| Frequency of Watching Tourism Live Streams | Rarely | 5 | 1.82% |
| | Occasionally | 14 | 5.11% |
| | Sometimes | 54 | 19.71% |
| | Often | 105 | 38.32% |
| | Very Often | 96 | 35.04% |

**Table 1**. Sample descriptive statistics ($N = 274$). Source: Organized by the authors.

| Variable | Items | Mean standard error | Standard deviation | Variance | Skewness | Kurtosis |
|---|---|---|---|---|---|---|
| Usefulness | QA1 | 0.07 | 1.151 | 1.324 | −0.276 | −0.89 |
| | QA2 | 0.071 | 1.173 | 1.376 | −0.339 | −0.895 |
| | QA3 | 0.073 | 1.216 | 1.479 | −0.304 | −1.000 |
| | QA4 | 0.073 | 1.212 | 1.47 | −0.249 | −1.131 |
| Authenticity | QB1 | 0.071 | 1.177 | 1.386 | −0.288 | −1.088 |
| | QB2 | 0.068 | 1.125 | 1.267 | −0.189 | −0.961 |
| | QB3 | 0.07 | 1.151 | 1.325 | −0.294 | −0.85 |
| Interactivity | QC1 | 0.068 | 1.134 | 1.285 | −0.358 | −0.988 |
| | QC2 | 0.066 | 1.099 | 1.207 | −0.408 | −0.804 |
| | QC3 | 0.071 | 1.17 | 1.369 | −0.428 | −0.875 |
| Telepresence | QD1 | 0.069 | 1.146 | 1.313 | −0.299 | −0.994 |
| | QD2 | 0.072 | 1.186 | 1.408 | −0.217 | −1.167 |
| | QD3 | 0.07 | 1.165 | 1.357 | −0.31 | −1.021 |
| | QD4 | 0.07 | 1.151 | 1.325 | −0.432 | −0.796 |
| | QD5 | 0.074 | 1.217 | 1.482 | −0.328 | −1.035 |
| Perceived Trust | QE1 | 0.072 | 1.195 | 1.429 | −0.308 | −1.042 |
| | QE2 | 0.076 | 1.25 | 1.562 | −0.405 | −0.92 |
| | QE3 | 0.073 | 1.213 | 1.472 | −0.415 | −0.924 |
| Travel Decision | QF1 | 0.074 | 1.22 | 1.488 | −0.365 | −1.087 |
| | QF2 | 0.072 | 1.186 | 1.406 | −0.384 | −0.957 |
| | QF3 | 0.075 | 1.239 | 1.535 | −0.46 | −0.947 |

**Table 2**. Descriptive statistics of relevant variables. Source: Organized by the authors.

| Variables | Pearson correlation | | | | | | VIF values |
|---|---|---|---|---|---|---|---|
| | Usefulness | Authenticity | Interactivity | Telepresence | Perceived trust | Travel decision | |
| Usefulness | 1 | | | | | | 1.882 |
| Authenticity | 0.558** | 1 | | | | | 1.810 |
| Interactivity | 0.522** | 0.527** | 1 | | | | 1.720 |
| Telepresence | 0.493** | 0.549** | 0.550** | 1 | | | 1.862 |
| Perceived trust | 0.592** | 0.518** | 0.482** | 0.570** | 1 | | 1.884 |
| Travel decision | 0.556** | 0.547** | 0.538** | 0.541** | 0.566** | 1 | - |

**Table 3**. Correlation analysis and VIF values. Note: **Indicates a significant correlation at the 0.01 level (two-tailed).

kurtosis and skewness for each variable item were below 10 and 3, respectively, indicating compliance with the criteria for normal distribution. Therefore, the data in this study meet the requirements for normal distribution, allowing for the next phase of research.

## Model multicollinearity test

Pearson correlation is often used to detect multicollinearity. If two independent variables have a very high Pearson correlation (greater than + 0.8 or -0.8), it suggests that multicollinearity may be present between them. Additionally, incorporating the Variance Inflation Factor (VIF) provides a more rigorous assessment. Typically, a VIF $\leqq 3$ indicates the absence of multicollinearity[47,48]. As shown in Table 3, at a significance level of $p < 0.01$, the six variables - usefulness, authenticity, interactivity, telepresence, perceived trust, and travel decisions - exhibit significant positive correlations. Further observation reveales that the correlation coefficients among these six variables are all below 0.8, while the VIF values are $\leqq 3$, effectively ruling out the possibility of multicollinearity.

## Exploratory factor analysis

After confirming that the overall data meet the normal distribution criteria, Kaiser-Meyer-Olkin (KMO) and Bartlett's tests of sphericity were conducted using SPSS 26.0 to assess the suitability for factor analysis. The overall KMO value of the questionnaire was 0.980, and Bartlett's test of sphericity was significant ($p = 0.000$), indicating that factor analysis is appropriate. Subsequently, KMO values and Bartlett's test of sphericity were conducted for each of the six variables. The results indicated that all six variables had KMO values exceeding 0.7, with the corresponding statistical values for Bartlett's test of sphericity significantly below 0.001 ($p = 0.000$). These findings strongly validate the suitability of the current study for factor analysis[45].

Exploratory factor analysis was conducted using SPSS 26.0 software, employing the principal component analysis method to extract factors. During the factor rotation process, factors with eigenvalues greater than 1 and all elements with factor loadings above 0.5 were retained. The results revealed that a total of six common factors were successfully extracted, cumulatively explaining 75.42% of the variance, significantly exceeding the 50% threshold. This indicates the good performance of these factors[49]. After orthogonal rotation, the factor loadings of the items in each dimension ranged from 0.696 to 0.811, with all factor loadings exceeding 0.5[50], thereby further validating the effectiveness of the factor extraction. Moreover, the extracted common factors corresponded to the measurement items of each dimension in the survey questionnaire, aligning perfectly with the measurement dimensions. This correspondence proved that all the items used in this survey met the relevant requirements, indicating that the item settings of each variable were reasonable and exhibited strong structural validity.

Cronbach's α coefficient was used to quantitatively assess the reliability level of the questionnaire. The overall sample data reached a high Cronbach's α coefficient of 0.942, indicating a very high level of reliability for the questionnaire. Additionally, the Cronbach's α coefficients for each variable item exceeded 0.8, indicating high reliability for each variable[44]. This outcome demonstrates the thoughtful design of the questionnaire and reflects the strong reliability and stability of the scale.

## Confirmatory factor analysis

The study employed Amos 28.0 data analysis software to conduct tests for convergent and discriminant validity, thereby assessing the structural validity of the questionnaire.

*Confirmatory factor analysis (stimulus)*

First, a confirmatory factor analysis was performed on the usefulness, interactivity, and authenticity of destination live streaming (stimulus). The results are shown in Fig. 2.

The model's fit indices indicate CMIN/DF = 1.370 (1 < 1.370 < 3), GFI = 0.969 (> 0.9), CFI = 0.992 (> 0.9), and RMSEA = 0.037 (< 0.05). These indices meet the established standards[51], demonstrating a good fit between the data and the model.

The standardized factor loadings for each item range from 0.777 to 0.822, all exceeding the threshold of 0.6 and reaching significance levels ($p < 0.01$). Furthermore, composite reliability (CR) and average variance extracted (AVE) for each variable were analyzed to assess the convergent validity of the measurement dimensions. The results show that the CR values for each variable are above 0.8, surpassing the standard of 0.7, and the AVE values are above 0.6, exceeding the standard of 0.5[50]. These findings collectively indicate good convergent validity for the variables in this study, as presented in Table 4.

The square root of the AVE values for each dimension is significantly greater than their correlation coefficients with any other dimension, indicating strong discriminant validity among the dimensions. This allows for effective conceptual distinction, as shown in Table 5.

*Confirmatory factor analysis (Organism–response)*

Subsequently, a confirmatory factor analysis was conducted for telepresence, perceived trust, and travel decisions (organism–response). The results are illustrated in Fig. 3.

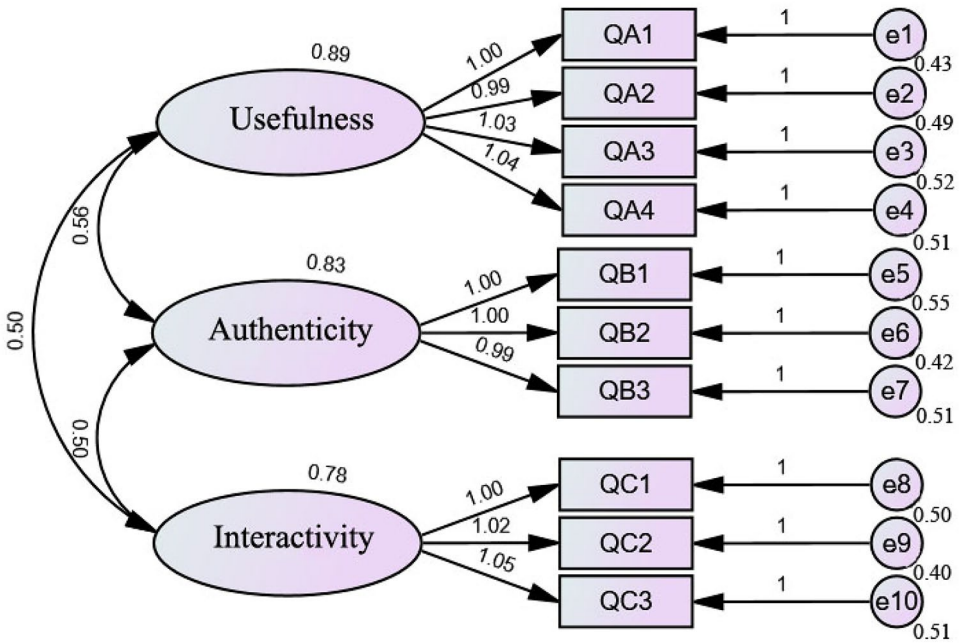


**Fig. 2**. Confirmatory factor analysis (stimulus).

| Variable | Items | Standardized factor loading | AVE | CR |
|---|---|---|---|---|
| Usefulness | QA1 | 0.822 | 0.6537 | 0.8831 |
| | QA2 | 0.8 | | |
| | QA3 | 0.803 | | |
| | QA4 | 0.809 | | |
| Authenticity | QB1 | 0.777 | 0.6275 | 0.8348 |
| | QB2 | 0.815 | | |
| | QB3 | 0.784 | | |
| Interactivity | QC1 | 0.781 | 0.6365 | 0.84 |
| | QC2 | 0.819 | | |
| | QC3 | 0.793 | | |

**Table 4**. Convergent validity (stimulus).

| Variable | Usefulness | Interactivity | Authenticity |
|---|---|---|---|
| Usefulness | **0.6537** | | |
| Interactivity | 0.604 | **0.6275** | |
| Authenticity | 0.646 | 0.623 | **0.6365** |
| AVE Square Root | 0.809 | 0.792 | 0.798 |

**Table 5**. Discriminant validity (stimulus). Bold represents the AVE value for each variable.

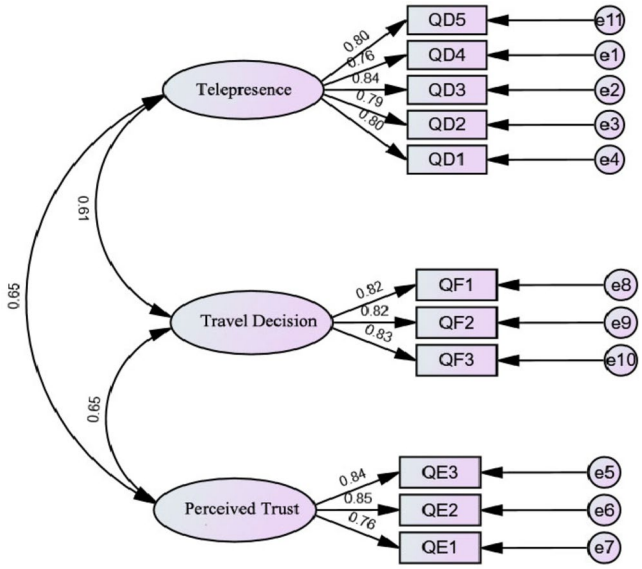


**Fig. 3**. Confirmatory factor analysis (Organism–response).

The model's fit indices indicate CMIN/DF = 1.240 (1 < 1.240 < 3), GFI = 0.968 (> 0.9), CFI = 0.994 (> 0.9), and RMSEA = 0.030 (< 0.05). All indices meet the established standards[51], indicating a good fit between the data and the model.

The standardized factor loadings for each item range from 0.758 to 0.848, all exceeding the threshold of 0.6 and reaching significance levels ($p < 0.01$). Furthermore, CR and AVE for each variable were analyzed to assess the convergent validity of the measurement dimensions. The results show that the CR values for each variable are above 0.85, surpassing the standard of 0.7, and the AVE values are above 0.6, exceeding the standard of 0.5[50]. These findings collectively demonstrate good convergent validity for the variables in this study, as presented in Table 6.

The square root of the AVE values for each dimension (shown in bold along the table diagonals) is significantly greater than their correlation coefficients with any other dimension. This indicates good discriminant validity of the measurement variables used in this study, as shown in Table 7.

| Variable | Items | Standardized factor loading | AVE | CR |
|---|---|---|---|---|
| Telepresence | QD1 | 0.799 | 0.6368 | 0.8975 |
| | QD2 | 0.794 | | |
| | QD3 | 0.838 | | |
| | QD4 | 0.759 | | |
| | QD5 | 0.798 | | |
| Perceived Trust | QE1 | 0.758 | 0.667 | 0.857 |
| | QE2 | 0.848 | | |
| | QE3 | 0.841 | | |
| Travel Decision | QF1 | 0.817 | 0.6719 | 0.86 |
| | QF2 | 0.816 | | |
| | QF3 | 0.826 | | |

**Table 6**. Convergent validity (Organism–response).

| Variable | Telepresence | Perceived trust | Travel decision |
|---|---|---|---|
| Telepresence | **0.6368** | | |
| Perceived trust | 0.648 | **0.667** | |
| Travel decision | 0.609 | 0.653 | **0.6719** |
| AVE square root | 0.798 | 0.817 | 0.820 |

**Table 7**. Discriminant validity (Organism–response). Bold represents the AVE value for each variable.

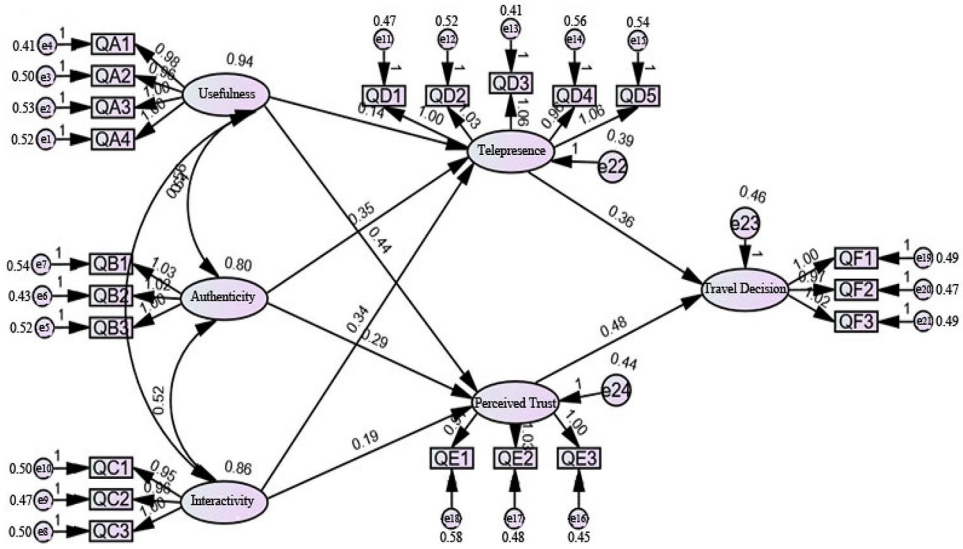


**Fig. 4**. The result of structural equation model.

## SEM analysis

### SEM model fit test

Based on the previous analysis of the questionnaire's reliability and validity, along with asystematic examination of the correlations among variables, the quality of the sample data is deemed high, enabling subsequent empirical model testing. Therefore, this study used Amos 28.0 software to construct a structural equation model to test the research hypotheses. The structural equation structure is shown in Fig. 4.

CMIN/DF = 1.316 (1 < 1.316 < 3), RMSEA = 0.034 (< 0.05), GFI = 0.924 (> 0.9), CFI = 0.984 (> 0.9). These indices meet the established standards[51], indicating a good fit between the data and the model.

### Hypothesis testing results

The hypothesis testing results are shown in Table 8. Only H1a is not supported (β-value = 0.147, p-value = 0.063 > 0.05), while all other hypotheses are supported.

| Hypothesis | Relationships | | | β-value | S.E. | C.R. | *p*-value | Results |
|---|---|---|---|---|---|---|---|---|
| H1a | Usefulness | -> | Telepresence | 0.147 | 0.074 | 1.857 | 0.063 | Not Supported |
| H1b | Usefulness | -> | Perceived Trust | 0.428 | 0.085 | 5.214 | *** | Supported |
| H2a | Authenticity | -> | Telepresence | 0.338 | 0.089 | 3.894 | *** | Supported |
| H2b | Authenticity | -> | Perceived Trust | 0.259 | 0.096 | 3.047 | 0.002** | Supported |
| H3a | Interactivity | -> | Telepresence | 0.347 | 0.08 | 4.243 | *** | Supported |
| H3b | Interactivity | -> | Perceived Trust | 0.176 | 0.086 | 2.223 | 0.026* | Supported |
| H4 | Telepresence | -> | Travel Decision | 0.335 | 0.074 | 4.898 | *** | Supported |
| H5 | Perceived Trust | -> | Travel Decision | 0.492 | 0.071 | 6.805 | *** | Supported |

**Table 8**. Hypothesis testing results. Note: *** indicates significance at the 0.001 level (two-tailed); ** at the 0.01 level (two-tailed); * at the 0.05 level (two-tailed).

## Discussion

### Theoretical implications

This study enriches the S-O-R theory by applying it to the emerging field of live streaming in tourism, extending its traditional use beyond general online consumer behavior models. While S-O-R has been used in various digital contexts, this research specifically examines how destination live streams, as digital stimuli (usefulness, authenticity, and interactivity), trigger emotional (telepresence) and cognitive responses (perceived trust) in potential tourists, ultimately influencing their travel decisions. By focusing on tourism, the study explores how live streams create immersive, real-time experiences that differ from typical e-commerce platforms. Including live streaming as a digital experience in tourism provides new insights into the theory, enhancing the understanding of how real-time engagement can impact decision-making in experiential services and potentially transforming how destinations communicate with their audiences. This broadens the applicability of S-O-R theory, emphasizing its relevance in the evolving digital landscape of the tourism sector.

Importantly, the study fills gaps in existing literature by revealing how seemingly practical attributes, such as "usefulness," can evoke emotional responses like telepresence, thereby expanding the applicability of S-O-R theory. Typically, telepresence is linked to immersive, emotional experiences rather than information-driven attributes. However, this study demonstrates that usefulness, when combined with perceived trust, can also enhance travel intention. This challenges the conventional boundary of the S-O-R theory by suggesting that utility-based stimuli are not exclusively cognitive but can also emotionally engage tourists within virtual environments. This finding adds nuance to our understanding of how tourists' psychological engagement is shaped through live streaming.

Moreover, the study contributes to the live streaming literature by highlighting its role in reshaping tourist behavior and decision-making, particularly in the context of digital transformation in tourism. Unlike traditional online behavior models, this study integrates tourism-specific constructs like destination authenticity and interactivity, offering a novel perspective on how tourism experiences are mediated digitally. These insights provide a groundwork for future studies to explore the unique ways in which digital interactions and perceived trust in live streaming impact consumer behavior within highly experiential markets like tourism.

### Practical implications

*Enhancing the usefulness, authenticity, and interactivity of tourism live streaming*

For usefulness Tourism managers can tailor live streaming content by leveraging market segmentation to identify tourists' specific needs, such as information on local attractions, dining options, or cultural experiences. For instance, the popular food brand Wendy's conducted a live stream on the Twitch platform, offering potential customers practical insights into the dining experience and tailoring their offerings to meet customer needs[52]. This targeted niche content can make live streams more valuable and relevant compared to generic overviews.

For authenticity Managers should collaborate with local guides, artisans, or community members during live streams to showcase genuine, behind-the-scenes experiences that reflect the cultural heritage and daily life of the destination. For instance, a live stream that captures a local festival from preparation to celebration can evoke a sense of authenticity, avoiding overproduction while maintaining a raw and engaging atmosphere. An example of this strategy can be seen in the successful virtual music festival Splendour XR held in Australia, which utilized the open-world platform Sansar to create a three-dimensional virtual recreation of the real festival site[53]. By reducing artificial enhancements and portraying the destination as it truly is, tourism managers can foster greater trust and emotional connection with the audience.

For interactivity Beyond basic Question &Answer sessions, managers could implement live polls, interactive quizzes, or real-time voting on travel activities to deepen viewer engagement. For example, in the Melbourne Remote Control Tourist campaign, viewers interacted to guide the activities of the live-stream hosts[3]—such as visiting museums and tasting pepper and wine— motivating them to stay active throughout the tourism live streaming, thereby enhancing overall participation and interaction.

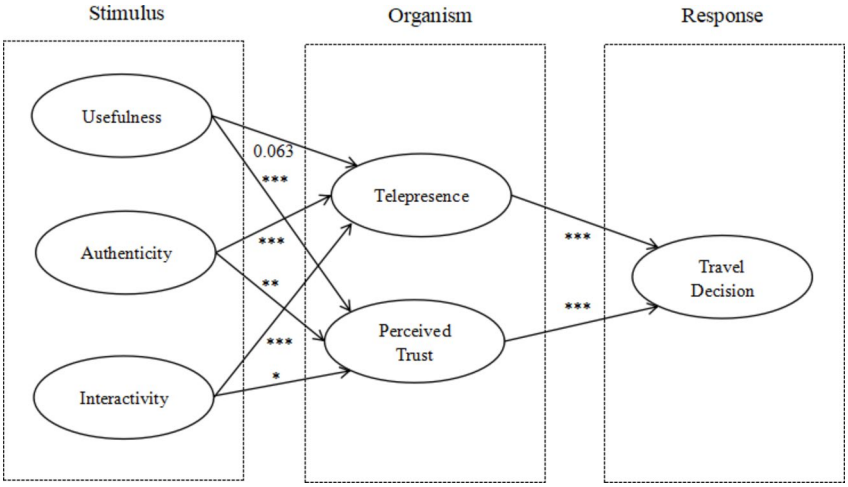


**Fig. 5**. The final research model.

*Creating telepresence and establishing trust*

For telepresence To create a stronger sense of "being there," tourism managers could incorporate advanced technologies such as 360-degree cameras or drone footage to provide viewers panoramic views of the destination. Successful experiences from the live streaming and virtual reality industries can be drawn upon: performers are pre-recorded on stages at the Alexandra Palace in London or in studios in Los Angeles for 360° virtual reality broadcasts[54], offering viewers an immersive experience that allows them to "look around" and feel more immersed in the environment. This approach creates a more dynamic and engaging experience compared to standard live streams, making tourists feel as though they are virtually exploring the destination in real-time.

For trust Tourism managers should prioritize transparency by featuring authentic testimonials from real tourists who have visited the destination, along with live interactions with locals sharing their personal experiences. Additionally, collaborating with verified influencers or respected travel bloggers can help build credibility. For instance, China's largest online travel company, Ctrip, launched a live stream hosted by Chairman James Liang, called the "Boss Live Session." By leveraging his personal reputation, Liang was able to build viewers' trust in the products, leading to $3.84 million in accommodation pre-bookings within just one hour[55]. This honest representation ensures that viewers perceive the content as trustworthy, positively influencing their travel decisions.

## Limitations and future research

Current research on destination live streaming is still in the initial exploratory stage. Although this study provides relatively scientific and stable conclusions, limitations exist due to the researcher's capabilities and the fact that different tourists prioritize different aspects of destination live streaming content.

First, as a product of live streaming technology, destination live streaming incorporates many new technological elements. While this study initially explores the usefulness, authenticity, and interactivity of destination live streaming, future research could expand by incorporating additional characteristics of destination live streaming for deeper analysis.

Second, while this study emphasizes investigating tourists' travel decisions, it is important to recognize that travel decision-making is a multifaceted concept encompassing considerations such as travel time, destination, and mode of transportation. Therefore, future research should explore the specific impacts of destination live streaming on these subdimensions to gain a more comprehensive understanding of its role in influencing tourists' travel decisions.

Third, while the relationship between telepresence and travel decisions is intuitive, it warrants a more critical examination. Future research could investigate potential moderating variables that may influence this relationship, such as viewers' prior familiarity with the destination or their individual travel preferences. Understanding these factors could provide deeper insights into how telepresence affects travel decision-making, leading to more nuanced conclusions about the impact of live streaming on tourism.

## Conclusions

This study focused on live streaming at tourist destinations within the S-O-R theory, identifying the usefulness, authenticity, and interactivity of live streaming as external stimuli (S), with tourists' telepresence and perceived trust as organisms (O), ultimately examining the final response (R), namely, tourists' travel decisions. The final research model is shown in Fig. 5.

(1) Appropriate Theoretical Support: S-O-R theory has been widely applied in the tourism industry, supported by substantial literature, including successful cases in live streaming tourism, such as the formation of tourists' interaction willingness in live streaming[56], tourists's pre-experience with VR devices[57], and users' intentions to reuse intelligent value-added services[58]. Therefore, this theory is broadly applicable and high-

ly explanatory in the context of live streaming tourism. Similarly, this study, guided by of S-O-R theory, achieved satisfactory results, indicating that the research had strong theoretical support.

(2) Research Finding 1: While the usefulness of destination live streaming was found to have no significant effect on telepresence, authenticity and interactivity demonstrated significant positive effects on telepresence. This finding is particularly innovative. The positive impact of authenticity and interactivity on telepresence aligns with previous research results[37]. However, in this study, the lack of a significant enhancement of telepresence by usefulness may stem from the fact that viewers more easily experience telepresence when they observe real travel scenes through live streaming. In contrast, while useful information can capture viewers' attention, the usefulness of live content does not directly determine whether viewers will feel immersed. Factors such as prior familiarity with the destination may influence telepresence: highly familiar audiences might find repetitive information less engaging, reducing telepresence, while unfamiliar audiences may find practical information more stimulating. Similarly, personal interest levels play a role: highly interested viewers may engage deeply regardless of practicality, whereas low-interest viewers may remain disengaged even with useful content. These factors can mediate the relationship between usefulness and telepresence. Those watching destination live streams prioritize emotional experiences and visual enjoyment over mere information acquisition. Consequently, compared to the authenticity and interactivity of destination live streaming, usefulness does not significant affect telepresence.

(3) Research Finding 2: The usefulness, authenticity, and interactivity of destination live streaming all positively affect tourists' perceived trust. However, usefulness has a more significant impact on perceived trust compared with authenticity and interactivity. This finding aligns with previous research[59–61], indicating its relevance within the context of this study. When the live stream provides useful information, viewers perceive the experience as valuable, which enhances their trust in the content. When viewers believe this information helps them better understand and choose travel destinations, that trust extends to the destination itself. Although authenticity is an important feature of live streaming, viewers may prioritize the practical value of the information when perceiving trust. Even if the live content genuinely reflects the destination, if it does not significantly aid decision-making, viewers may not develop strong trust in the live stream. While interactivity can enhance viewer participation, it does not necessarily lead to increase trust in the content; viewers may focus more on the usefulness of the information itself rather than the level of interaction with the broadcaster or other viewers.

(4) Research Finding 3: Telepresence and perceived trust significantly positively affect tourists' travel decisions. This finding aligns with previous research[37,62], although these results derive from different conceptual models and research subjects. When viewers experience a sense of presence through sensory elements such as visuals and sounds during a live stream, their interest and curiosity about the destination significantly increase. Additionally, when viewers develop trust in the travel destination through live content, they are more likely to choose it for their next trip. Perceived trust originates from various sources, including the authenticity of live content, the broadcaster's professionalism, and feedback from other tourists during interactions. When these factors collectively influence viewers, they perceive the destination as reliable and trustworthy, which in turn prompts positive travel decisions.

## Data availability

Data is provided within the supplementary information files.

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## Author contributions
Conceptualization, N.B.; methodology, X.J.; software, Y.L.; validation, Y.L.; formal analysis, Y.L. ; investigation, K.W.; resources, D.Z. ; data curation, T.L.; writing—original draft preparation, N.B.; writing—review and editing, Y.L.; visualization, Y.L.; supervision, Y.L.; project administration, N.B. All authors reviewed the manuscript.

## Declarations

## Competing interests
The authors declare no competing interests.

## Human ethics statement
This study confirmed that all methods were conducted in accordance with relevant guidelines and regulations, the questionnaire protocol was approved by the licensing committee in Shandong Women's University, and informed consent was obtained from all respondents.

## Additional information
**Supplementary Information** The online version contains supplementary material available at https://doi.org/10.1038/s41598-025-85741-5.

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