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A Study On The Impact Of Tiktok Food E-Commerce Live Streaming On Consumers' Impulse Buying Behavior

Yue He, Liyi Liu, Yanqun Hu
Business School, Lingnan Normal University, Zhanjiang 524048 China

Abstract:
Based on the Stimulus-Organism-Response (SOR) model, this study aims to investigate the impact of food safety, price promotion, and time pressure on consumers' impulse buying behavior, as well as the mediating roles of pleasure and concentration in these relationships. Empirical analysis reveals that food safety, price promotion, and time pressure all positively influence consumers' impulse buying behavior, while also enhancing their feelings of pleasure and concentration. Further analysis indicates that pleasure and concentration serve as mediators between food safety, price promotion, time pressure, and impulse buying behavior. These findings contribute to the theoretical understanding of consumer behavior and provide a theoretical foundation for enterprises to design effective marketing strategies. By strengthening food safety management, implementing rational pricing promotion, and creating a sense of time pressure, businesses can stimulate consumers' impulse buying behavior and bolster their market competitiveness.

Key Word: *E-commerce Live Streaming; Pleasure; Concentration; Impulse Buying Behavior; SOR Model*

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I. Introduction

Driven by the digital wave, innovative models continue to emerge in the field of e-commerce. As one of the most prominent developments, e-commerce livestreaming is profoundly reshaping consumers' shopping habits and purchasing behaviors. With the widespread adoption of mobile internet and the rise of short-video platforms, TikTok owing to its massive user base and strong social dissemination capabilities, has become a key arena for e-commerce livestreaming. This is especially evident in the food industry, where e-commerce livestreaming on TikTok has developed rapidly. As a daily necessity characterized by high-frequency consumption and a broad consumer base, food products demonstrate substantial potential and vitality in the e-commerce livestreaming market.

TikTok food e-commerce live streaming attracts numerous consumers through its distinctive format. Hosts create an immersive shopping experience by presenting products vividly, explaining details thoroughly, and interacting with viewers in real time. Meanwhile, marketing tactics such as limited-time promotions and coupon distribution further stimulate consumers' desire to purchase. However, this emerging shopping model has also given rise to a series of noteworthy phenomena, among which impulsive buying behavior stands out particularly. Although impulse buying behavior already exists in traditional retail settings, its manifestations and influencing factors are likely more complex in the specific context of TikTok food e-commerce live streaming.

This study aims to investigate the underlying mechanisms through which TikTok food e-commerce live streaming influences consumers' impulse buying behavior. Specifically, based on the Stimulus-Organism-Response (SOR) model, it analyzes how various factors within the TikTok food e-commerce live streaming context—such as food safety, price promotion, and time pressure—affect consumers' psychological and behavioral responses, ultimately leading to impulse buying behavior. The research seeks to comprehensively reveal the intrinsic relationship between TikTok food e-commerce live streaming and consumers' impulse buying behavior. At the theoretical level, this study enriches the theoretical framework of consumer behavior. Current research on consumers' impulse buying behavior in e-commerce livestreaming environments remains relatively limited, particularly regarding the specific context of TikTok food e-commerce live streaming. This study addresses this theoretical gap and provides new perspectives and a foundational basis for subsequent related studies. At the practical level, the findings offer significant guidance for food sellers on the TikTok platform, merchants can optimize their e-commerce livestreaming strategies to enhance engagement, effectiveness, and sales performance by understanding the factors that drive consumers' impulse buying behavior.

II. Theoretical Basis And Literature Review

SOR Model

The Stimulus-Organism-Response (SOR) model posits that environmental stimuli (S) trigger a series of internal reactions within the organism (O), which in turn activate corresponding behavioral responses (R). Marketing scholars have adopted the SOR model to explain variations in consumer behavior resulting from various marketing stimuli(Donovan *et al.*, 1994, Eroglu *et al.*, 2005, Madzharov *et al.*, 2015). The core framework of the SOR model consists of three key stages: external stimuli (Stimulus), the organism (Organism), and the behavioral response (Response). In the context of consumer behavior research, stimuli serve as critical elements that trigger consumer actions by activating sensory channels, thereby eliciting cognitive and behavioral intentions. The organism represents the individual consumer unit, whose components typically include need systems, behavioral motivations, perceptual response patterns, attitudinal tendencies, cognitive learning processes, and memory storage systems. Behavioral responses are closely linked to the dynamic outcomes of cognitive processing; they not only reflect the consumer's decision-making logic but also manifest the transformation of psychological activities into concrete actions, such as purchase decisions, brand commitment, and word-of-mouth communication.

Based on the SOR model, this study proposes that in the context of TikTok food e-commerce live streaming, factors such as food safety, price promotion, and time pressure can be regarded as external stimuli. The organism is embodied in the psychological processes that consumers undergo when exposed to these marketing stimuli. The response, meanwhile, refers to the impulse buying behavior that results from the combined effects of the external stimuli and the psychological effect.

TikTok Food E-commerce Live Streaming

A growing number of food enterprises and merchants are utilizing the TikTok platform to conduct e-commerce livestreaming activities. Through influencer' vivid explanations and demonstrations, they showcase the features, taste, and consumption methods of various food products to consumers, attracting considerable attention and driving purchases. The format of TikTok food e-commerce live streaming not only facilitates the promotion and sales of food items but also strengthens brand communication and user interaction. It offers advantages such as real-time interactivity, strong visual appeal, and the ability to quickly build trust. The interactivity and sense of participation inherent in food e-commerce livestreaming can satisfy consumers' psychological needs for social engagement and entertainment. Such interactive experiences enhance consumers' identification with the products, increase their attention, and boost purchase intention—characteristics that clearly distinguish it from traditional media.

Live streaming commerce has been proven to be an effective method for promoting product sales (Xin *et al.*, 2023). Research indicates that live-streaming social platforms create a mediated space and relational network where brand creators interact with viewers, which not only aids in brand building but also effectively enhances user loyalty (Meisner and Ledbetter, 2022). Previous studies have examined the antecedents of purchase intention in e-commerce livestreaming from multiple perspectives, including IT support (Yan *et al.*, 2023), consumer values (Hou *et al.*, 2023), streamers' characteristics (Yang *et al.*, 2023), and product categories (Park and Lin, 2020). Moreover, a substantial body of research has explored the outcomes of purchase intention in e-commerce livestreaming, confirming a positive correlation between purchase intention and actual purchasing behavior (Elshaer *et al.*, 2024).

In the context of food e-commerce livestreaming, continuous advancements in information technology have amplified its influence on consumers' daily lives. The growing consumer concern for food safety and environmental protection has significantly increased the proportion of green agricultural products featured in e-commerce livestreaming (Wang *et al.*, 2024). Research indicates that social media influencers' intimate self-disclosure, environmental concern, and spending self-control positively affect sustainable food purchase intention, mediated by social and epistemic values (Wu *et al.*, 2023).

Flow Experience

Flow experience is a psychological concept proposed by the Hungarian psychologist Mihaly Csikszentmihalyi in the 1970s. It refers to a state in which an individual becomes fully immersed and engaged in a specific activity, often exhibiting a high degree of concentration (Abuhamdeh and Csikszentmihalyi, 2012, Abuhamdeh *et al.*, 2015). Widely regarded as a positive psychological state, flow is understood by some scholars as the experience an individual undergoes when completely absorbed in an activity—a process often accompanied by feelings of pleasure (Csikszentmihalyi, 1975, Ghani and Deshpande, 1994). Pleasure and concentration are considered essential components of flow experience. Research indicates that when consumers interact with websites, they can experience a sense of enjoyment and exploratory interest, accompanied by strong feelings of control, concentration, and pleasure (Kim and Li, 2009). Pleasure can enhance consumers' curiosity and concentration, leading them to temporarily lose self-awareness, become fully immersed in the consumption

experience, and even experience a distortion in the perception of time—often feeling that time passes quickly (Finneran and Zhang, 2005). Webster and Trevino suggested that during human–computer interaction, users' immersive state can be explained by perceived control, concentration, curiosity, and intrinsic interest (Webster *et al.*, 1993). Mahfouz et al. further proposed control, concentration, and pleasure as three dimensions of flow experience (Mahfouz *et al.*, 2020). Drawing on flow experience theory, this study investigates whether pleasure and concentration—as key dimensions of flow—mediate the influence of TikTok food e-commerce live streaming on consumers' impulse buying behavior.

Impulse Buying Behavior

Impulse buying behavior is characterized as a spontaneous, emotional, and hedonic form of unplanned consumer decision-making (Sengupta and Zhou, 2007). Research further emphasizes that its essence lies in consumers' immediate purchase actions triggered by situational cues without prior planning, standing in clear contrast to rational and planned conventional purchases (Kacen and Lee, 2002). In the online context, consumer impulse buying behavior refers to a temporally uncontrolled and instantaneous purchasing response stimulated by various factors in the digital environment, where strong impulse buying intention serves as a key driver of such behavior (Beatty and Elizabeth Ferrell, 1998). For consumers, external environmental stimuli on e-commerce platforms—such as information recommendations, system interactions, and community influence—often lead not only to searches for planned items but also to purchases that deviate from the intended shopping list, thereby generating impulse buying intention. Empirical analysis by Dittmar revealed that approximately half of consumers' in-store purchase experiences can be classified as impulse buying behavior (Dittmar *et al.*, 1995). Similarly, Vazquez found that parasocial interaction exerts a significant influence on impulse buying behavior (Vazquez *et al.*, 2020). Furthermore, research demonstrated that when celebrities promote products on social media, their charisma and trustworthiness shape consumers' perceptions of the products, thereby increasing the likelihood of impulse buying behavior (Li *et al.*, 2022).

III. Research Model And Hypotheses

Research Model

This study constructs a theoretical model based on the SOR model, with food safety, price promotion, and time pressure as independent variables, pleasure and concentration as mediating variables, and consumer impulse buying behavior as the dependent variable. The theoretical framework of this study is illustrated in Figure 1:

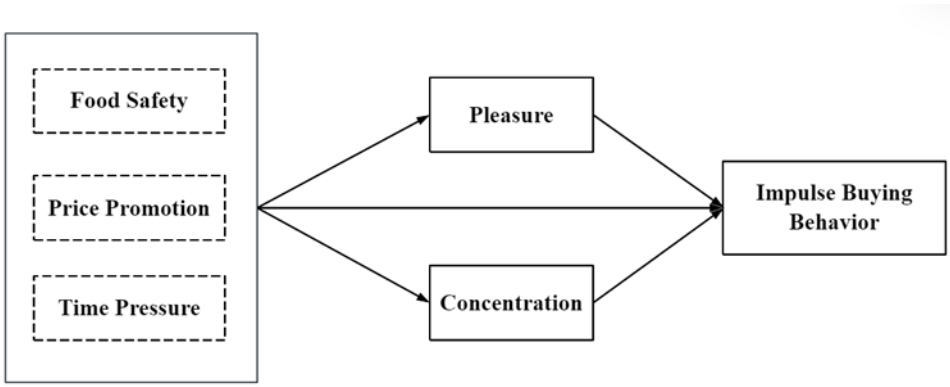

Figure 1 Theoretical Model

Research Hypotheses

The Impact of TikTok Food E-commerce Live Streaming on Impulse Buying Behavior Among Consumers

In today's consumer market, multiple factors interact to influence purchasing decisions, particularly with regard to impulse buying behavior. From the perspective of food safety, consumers' heightened focus on personal health has made it a key determinant in purchase evaluations. When consumers observe authoritative safety certifications—such as organic labels or rigorous quality inspection reports—they develop a sense of trust in the product's quality. This trust mitigates concerns about health risks, reducing the need for repeated deliberation over safety during the shopping process. As a result, consumers become more readily captivated by the product in the moment, thereby promoting impulse buying behavior.

Price promotion also serves as a significant driver of impulsive consumption. Common promotional tactics such as discounts, spend-and-save offers, and free gifts allow consumers to perceive a direct reduction in purchasing costs. Research indicates that price promotion can effectively stimulate consumers' purchase desire

and rapidly boost product sales (Kim and Krishnan, 2019). Consumers inherently seek value for money; when they realize a product can be acquired at a lower price, it creates a perception of obtaining extra benefit. For example, when a normally high-priced branded cosmetic is offered at a substantially reduced price, consumers may feel they would "lose out" by not purchasing it immediately. This perception of a "good deal" quickly ignites their desire to buy, prompting a purchase decision without thorough deliberation.

Time pressure also subtly influences consumers' impulse buying behavior. Often referred to as time poverty or time scarcity, time pressure describes the experience of having to complete a task within a limited timeframe, where the resulting anxiety urges consumers to accelerate their decision-making process (Maruping *et al.*, 2014). In today's fast-paced modern life, consumers frequently operate under busy schedules. When they encounter time constraints during shopping—such as limited-time sales or coupons nearing expiration—they are placed in a tense decision-making environment. Within these restricted time windows, consumers are unable to calmly compare different brands or products as they normally would. Research indicates that time pressure, combined with product discounts and brand effects, constitutes an opportunity cost for consumers and heightens their perception of potential decision loss (Aminilari and Pakath, 2005). To seize the immediate opportunity and avoid missing out on a deal that may not recur, consumers tend to simplify their decision process. Relying on immediate impressions and intuitive feelings, they make quick purchase decisions, thereby triggering impulse buying behavior.

In summary, the three factors—food safety, price promotion, and time pressure—positively influence consumers' impulse buying behavior through distinct mechanisms: alleviating concerns, providing perceived benefits, and creating a sense of urgency and respectively. Therefore, we can propose the following hypothesis:
H1a: Food safety positively influences consumers' impulse buying behavior;
H1b: Price promotion positively influences consumers' impulse buying behavior;
H1c: Time pressure positively influences consumers' impulse buying behavior.

The Impact of TikTok Food E-commerce Live Streaming on Consumer Pleasure and Concentration

Within the consumption context, the three factors—food safety, price promotion, and time pressure—affect consumers' psychological experience, including pleasure and concentration, in distinct ways. From the perspective of food safety, when consumers confirm that the food they intend to purchase is safe and reliable—for instance, by seeing clear traceability information or authoritative quality certifications—they develop a sense of reassurance. This reassurance effectively alleviates concerns about product quality, subsequently translating into feelings of pleasure. At the same time, food safety can positively influence consumers' concentration. In the absence of safety concerns, consumers are able to devote more attention to other aspects of the food, such as its taste and nutritional value. Their concentration increases, allowing them to focus more fully on savoring and appreciating the positive experience the food offers, rather than being distracted by worries about potential health risks.

Price promotion also serves as an important factor shaping consumers' psychological state. When consumers encounter promotional activities such as discounts, spend-and-save offers, or complimentary gifts, they perceive a tangible benefit. This perception of gaining a bargain evokes a sense of satisfaction and pleasure—much like acquiring a long-desired item at a lower price, which makes them feel they have made a savvy transaction. Moreover, price promotion can capture consumers' attention and heighten their concentration, directing it more intensely toward the promoted items. Consumers often scrutinize promotional terms, compare discounts across products, and ensure they maximize the available benefits. Throughout this process, their concentration is actively engaged.

Time pressure likewise exerts a distinctive influence on consumers' pleasure and concentration. When faced with time constraints—such as flash sales or impending promotion deadlines—consumers experience a sense of urgency. This urgency can stimulate excitement, and when they successfully complete a purchase within the allotted time, a feeling of accomplishment from overcoming the challenge emerges, thereby generating pleasure. Simultaneously, time pressure compels consumers to quickly focus their attention, enhancing concentration as they filter out distractions to make rapid purchase decisions. Within the limited timeframe, they concentrate on selecting products, evaluating prices and quality, striving to make the optimal choice before time runs out.

In summary, food safety, price promotion, and time pressure can all positively influence consumers' pleasure and concentration. Accordingly, the following research hypotheses are proposed:
H2a: Food safety positively influences consumers' pleasure;
H2b: Price promotion positively influences consumers' pleasure;
H2c: Time pressure positively influences consumers' pleasure.
H3a: Food safety positively influences consumers' concentration;
H3b: Price promotion positively influences consumers' concentration;
H3c: Time pressure positively influences consumers' concentration.

Mediation effect

From the perspective of food safety, when consumers perceive that the food they purchase is safe and reliable—such as having authoritative certifications or clear quality inspection reports—it generates a sense of pleasure in their psychology. This pleasure stems from the reassurance about their own health protection, putting consumers in a cheerful mood. At the same time, food safety also leads consumers to focus their attention highly on the food, as they do not need to worry about safety issues and can gain a deeper understanding of other characteristics of the food. Pleasure and concentration further influence impulse buying behavior. A pleasant mood lowers consumers' decision threshold, making them more inclined to make a purchase immediately; high concentration allows consumers to perceive the attractiveness of the product more comprehensively, thereby leading to quick purchase decisions without thorough rational consideration. Therefore, pleasure and concentration may play a mediating role between food safety and impulse buying behavior.

For price promotion, when consumers encounter promotional activities such as product discounts, spend-and-save offers, or gift giveaways, they intuitively perceive economic benefits, which in turn generates pleasurable emotions. Moreover, price promotion attracts consumers' attention, making them focus on studying the promotion rules and the cost-effectiveness of the products. Driven by pleasure, consumers are more likely to act impulsively, while concentration helps them quickly identify attractive promotional products, ultimately driving them to make impulse purchase decisions. Thus, pleasure and concentration may play a mediating role between price promotion and impulse buying behavior.

For time pressure, when consumers face situations such as limited-time flash sales or upcoming activity deadlines, they experience a tense and stimulating emotion. If they successfully complete a purchase within the time limit, they gain a sense of pleasure from overcoming a challenge. At the same time, time pressure forces consumers to quickly concentrate their attention, eliminate external distractions, and rapidly assess the value of the product. This pleasure makes consumers more willing to seize the immediate opportunity to make a purchase, while concentration ensures they can make a relatively suitable choice within the limited time, thereby triggering impulse buying behavior. This shows that pleasure and concentration may play a key mediating role between time pressure and impulse buying behavior.

In summary, whether it is food safety, price promotion, or time pressure, they may all have a significant impact on consumers' impulse buying behavior through pleasure and concentration. Therefore, the following research hypotheses are proposed:

H4a: Pleasure mediates the relationship between food safety and impulse buying behavior;
H4b: Pleasure mediates the relationship between price promotion and impulse buying behavior;
H4c: Pleasure mediates the relationship between time pressure and impulse buying behavior;
H5a: Concentration mediates the relationship between food safety and impulse buying behavior;
H5b: Concentration mediates the relationship between price promotion and impulse buying behavior;
H5c: Concentration mediates the relationship between time pressure and impulse buying behavior.

IV. Research Design

Research Design

This study employed a questionnaire survey method, specifically distributing the survey through the Wenjuanxing online platform. A pilot survey was first conducted, and the questionnaire was further refined based on the pilot results before proceeding to the formal survey. A total of 342 questionnaire responses were collected. To ensure the scientific validity and representativeness of the sample, a screening question ("How many times per month do you purchase food products after watching TikTok food e-commerce live streaming?") was included in the questionnaire prior to its formal distribution to identify the target population. The sample scope was limited to consumers who are familiar with and have previously purchased food products via TikTok food e-commerce live streaming.

Measurement of Variables

To ensure the validity of the questionnaire measurements, the initial questionnaire for this study was appropriately revised based on established, mature scales while incorporating the specific context of TikTok food e-commerce live streaming. The questionnaire consists of two parts: Part One covers demographic characteristics and related background information, including gender, age, education level, income, and whether the respondent has purchased food through TikTok food e-commerce live streaming. Part Two contains the measurement scales for consumers' impulse buying behavior in the context of TikTok food e-commerce live streaming. This section measures the following variables: independent variables, including food safety, price promotion, and time pressure, with corresponding items designed for different scenarios; mediating variables, namely pleasure and concentration (Koufaris, 2002); and the dependent variable, impulse buying behavior (Zhang *et al.*, 2023). All items were designed based on literature support and the research context to ensure the content validity of the scales.

V. Data Analysis And Results

Descriptive statistical analysis

Analysis of the sample data reveals that among the participants, in terms of gender, females accounted for 58.48% and males for 41.52%, showing a relatively balanced distribution. Regarding age, consumers aged 18–23 constituted 46.78%, indicating that younger individuals are more active in impulse buying behavior of food via TikTok food e-commerce live streaming. In terms of education, 44.74% of the consumers held a bachelor's degree. With respect to monthly income, 33.04% earned between 1,000 and 3,000 RMB, suggesting that consumers with lower income levels may be more prone to impulse buying behavior when buying food through TikTok food e-commerce live streaming. The above information demonstrates that the data collected in this survey possess strong representativeness and credibility. The specific distribution of the data is presented in Table 1 below.

According to the research model and hypotheses proposed above, SPSS22.0 was used to analyze the obtained questionnaire data, including reliability and validity analysis, factor analysis, ANOVA, etc.

Table 1 Descriptive Statistics Analysis

Item	Category	Frequency	Percentage
Gender	Male	142	41.52%
	Female	200	58.48%
Age	Under 18	47	13.74%
	18-23	160	46.78%
	24-29	86	25.15%
	30 and above	49	14.33%
Educational Background	High school or below	76	22.22%
	Associate degree	83	24.27%
	Bachelor's degree	153	44.74%
	Master's degree or above	30	8.77%
Monthly Income	Below ¥1,000	52	15.20%
	¥1,000-¥3,000	113	33.04%
	¥3,000-¥5,000	107	31.29%
	Above ¥5,000	70	20.47%
Monthly spending on food purchased through TikTok food e-commerce live streaming	Under ¥100	92	26.9%
	¥101–300	112	32.7%
	¥301–500	90	26.3%
	Over ¥500	48	14%
Number of times per month watching TikTok food e-commerce live streaming and subsequently purchasing food	1-2 times	122	35.7%
	3-4 times	107	31.3%
	5-8 times	83	24.3%
	More than 8 times	30	8.8%

Reliability and Validity Analysis

The results of the reliability analysis are presented in Table 2 below. The Cronbach's α coefficients for the seven variables—food safety, price promotion, time pressure, pleasure, concentration, and impulse buying behavior—all exceeded 0.7, confirming the reliability and stability of each variable scale and effectively ensuring the quality of the research data.

Table 2 Reliability Analysis

Variable	Number of Items	Cronbach's α Coefficient
Food Safety	3	0.758
Price Promotion	3	0.792
Time Pressure	3	0.801
Pleasure	3	0.834
Concentration	3	0.813
Impulse Buying Behavior	3	0.796

In this study, the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's test of sphericity were used to examine the suitability of the questionnaire for factor analysis. The results tested with SPSS 25.0 showed a KMO value of 0.9 and a significance (p) value of 0.000, both of which met the criteria for factor analysis.

Principal component analysis was applied to extract factors from the questionnaire. The results indicated that the model constructed in this study has good explanatory power. As shown in Table 3, the factor loading coefficients for all variables were greater than 0.4, with no evidence of cross-loading across factors. This indicates strong correlations between the items and their corresponding factors, meeting the requirements for scale reliability and validity.

Table 3 Rotated Component Matrix

Variable	Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Food Safety	A1						0.765
	A2						0.816
	A3						0.64
Price Promotion	B1					0.815	
	B2					0.707	
	B3					0.649	
Time Pressure	C1	0.754					
	C2	0.781					
	C3	0.795					
Pleasure	D1			0.781			
	D2			0.765			
	D3			0.768			
Concentration	E1		0.781				
	E2		0.812				
	E3		0.792				
Impulse Buying Behavior	F1				0.822		
	F2				0.807		
	F3				0.756		

Correlation Analysis

Pearson correlation analysis was employed to examine the degree of association between two or more variables. The correlation coefficients ranged from 0.409 to 0.595, indicating moderate to strong correlations among these variables. A higher correlation coefficient reflects a closer relationship between the variables. Table 4 displays the linear relationships among the variables: food safety, price promotion, time pressure, pleasure, concentration, and impulse buying behavior.

Table 4 Correlation Analysis of Variables

	Food Safety	Price Promotion	Time Pressure	Pleasure	Concentration	Impulse Buying Behavior
Food Safety	1					
Price Promotion	0.496**	1				
Time Pressure	0.454**	0.524**	1			
Pleasure	0.436**	0.486**	0.444**	1		
Concentration	0.407**	0.457**	0.387**	0.419**	1	
Impulse Buying Behavior	0.397**	0.431**	0.387**	0.417**	0.287**	1
At the 0.01 level (two-tailed), the correlation is significant.						

Regression Analysis

The Linear Regression Analysis of the Impact of TikTok Food E-commerce Live Streaming on Consumers' Impulse Buying Behavior

As shown in Table 5 below, the adjusted R^2 of the model exceeds 0.2, and the significance level is below 0.05, indicating that the model possesses significant overall explanatory power. The variance inflation factor (VIF) for each variable is below 5, suggesting an acceptable level of multicollinearity among the variables. Moreover, the Durbin–Watson (D-W) statistic is close to 2, confirming the absence of autocorrelation and the independence of the sample data. Food safety ($\beta = 0.191$, $p < 0.01$), price promotion ($\beta = 0.227$, $p < 0.01$), and time pressure ($\beta = 0.166$, $p < 0.01$) all exhibit significant positive correlations with consumers' impulse buying behavior. Thus, the three research hypotheses—H1a, H1b, and H1c—are supported.

Table 5 Linear Regression Analysis of Impulse Buying Behavior and Variables

	Non-standardization coefficient		Standardized Coefficients	t	p	VIF
	B	Std. Error	Beta			
Constant	1.29	0.23		5.599	0.000	
Food Safety	0.193	0.058	0.191	3.343	0.001	1.466
Price Promotion	0.24	0.066	0.227	3.657	0.000	1.729
Time Pressure	0.163	0.056	0.166	2.898	0.004	1.483
R^2	0.252					
Adjusted R^2	0.243					
F	28.325, $p<0.05$					
D-W value	2.053					

The Linear Regression Analysis of the Relationship Between TikTok Food E-commerce Live Streaming and Consumers' Pleasure

As shown in Table 6, the adjusted R^2 of the model exceeds 0.2 and the significance level is below 0.05, indicating that the model demonstrates significant overall explanatory power. The variance inflation factor (VIF) for each variable is lower than 5, suggesting an acceptable level of multicollinearity among the variables. The Durbin–Watson (D-W) statistic is close to 2, confirming the absence of autocorrelation and the independence of the sample data. Food safety ($\beta = 0.149$, $p < 0.01$), price promotion ($\beta = 0.161$, $p < 0.01$), and time pressure ($\beta = 0.195$, $p < 0.01$) all exhibit significant positive correlations with consumers' pleasure. Therefore, the three research hypotheses—H2a, H2b, and H2c—are supported.

Table 6 Linear Regression Results of TikTok Food E-commerce Live Streaming on Consumers' Pleasure

	Non-standardization coefficient		Standardized Coefficients	t	p	VIF
	B	Std. Error	Beta			
Constant	0.592	0.217		2.73	0.007	
Food Safety	0.158	0.054	0.149	2.892	0.004	1.466
Price Promotion	0.178	0.062	0.161	2.886	0.004	1.729
Time Pressure	0.199	0.053	0.195	3.759	0.000	1.483
R^2	0.392					
Adjusted R^2	0.384					
F	54.208, $p<0.05$					
D-W value	2.141					

The Linear Regression Analysis of the Impact of TikTok Food E-commerce Live Streaming on Consumers' Concentration

According to Table 7, the adjusted R^2 of the model exceeds 0.2 and the significance level is below 0.05, indicating that the model demonstrates significant overall explanatory power. The variance inflation factor (VIF) for each variable is lower than 5, suggesting an acceptable level of multicollinearity among the variables. The Durbin–Watson (D-W) statistic is close to 2, confirming the absence of autocorrelation and the independence of the sample data. Food safety ($\beta = 0.158$, $p < 0.01$), price promotion ($\beta = 0.196$, $p < 0.01$), and time pressure ($\beta = 0.141$, $p < 0.01$) all exhibit significant positive correlations with consumers' concentration. Therefore, the three research hypotheses—H3a, H3b, and H3c—are supported.

Table 7 Linear Regression Results for the Impact of TikTok Food E-commerce Live Streaming on Food Consumers' Concentration

	Non-standardization coefficient		Standardized Coefficients	t	p	VIF
	B	Std. Error	Beta			
Constant	0.736	0.234		3.147	0.002	
Food Safety	0.17	0.059	0.158	2.888	0.004	1.466
Price Promotion	0.219	0.067	0.196	3.294	0.001	1.729
Time Pressure	0.146	0.057	0.141	2.56	0.011	1.483
R^2	0.308					
Adjusted R^2	0.300					
F	37.552, $p<0.05$					
D-W value	1.734					

Mediation Analysis

Testing the Mediating Role of Pleasure

The results in Tables 8 and 9 show that food safety not only has a direct positive effect on impulse buying behavior (total effect $\beta = 0.403$, $p < 0.01$), but also indirectly promotes impulse buying behavior by enhancing pleasure ($\beta = 0.461$, $p < 0.01$ for the path to pleasure, and $\beta = 0.289$, $p < 0.01$ for the indirect effect). After controlling for pleasure, the direct effect of food safety remains significant ($\beta = 0.269$, $p < 0.01$), with a Bootstrap 95% confidence interval of (0.164, 0.375) that does not include zero. The indirect effect is 0.133, and its 95% confidence interval (0.073, 0.204) also excludes zero. Food safety thus influences impulse buying behavior both directly (accounting for 66.75% of the total effect) and indirectly through pleasure (accounting for 33.00% of the total effect). These results indicate that, in TikTok food e-commerce live streaming, food safety can directly stimulate consumers' impulse buying behavior and also indirectly promote such behavior by enhancing consumers' pleasure.

Table 8 Testing the Mediating Effect of Pleasure on the Relationship Between Food Safety and Impulse Buying Behavior

	Impulse Buying Behavior		Pleasure		Impulse Buying Behavior	
Variable	β	t	β	t	β	t
Constant	2.161**	11.339	1.998**	10.243	1.584**	7.595

Food Safety	0.403**	7.979	0.461**	8.931	0.269**	5.023
Pleasure					0.289**	5.695
R^2	0.158		0.190		0.231	
Adjusted R^2	0.155		0.188		0.227	
F-value	63.658**		79.761**		50.990**	

Table 9 Analysis of the Mediating Effect of Pleasure Between Food Safety and Impulse Buying Behavior

	Effect Size	Standard Error (SE)	Bootstrap 95% CI		Proportion of Total Effect
			Lower Bound	Upper Bound	
Total Effect	0.403	0.050	0.303	0.502	
Direct Effect	0.269	0.054	0.164	0.375	66.75%
Indirect Effect	0.133	0.033	0.073	0.204	33.00%

As shown in Tables 10 and 11, price promotion exerts a significant positive influence on impulse buying behavior ($\beta = 0.457$, $p < 0.01$). Price promotion also shows a significant positive effect on consumers' pleasure, with a regression coefficient of 0.536 ($p < 0.01$), and indirectly drives impulse buying behavior through pleasure ($\beta = 0.260$, $p < 0.01$). The indirect effect value is 0.140, and its Bootstrap 95% confidence interval (0.069, 0.208) does not include zero, confirming the existence of the mediating pathway. After controlling for pleasure, the direct effect of price promotion on impulse buying behavior remains significant ($\beta = 0.317$, $p < 0.01$), with its Bootstrap 95% confidence interval (0.205, 0.429) excluding zero. The findings indicate that price promotion can both directly stimulate impulse buying behavior (accounting for 69.37% of the total effect) and indirectly promote it by enhancing consumers' pleasure (accounting for 30.63% of the total effect).

Table 10 Testing the Mediating Effect of Pleasure on the Relationship Between Price Promotion and Impulse Buying Behavior

	Impulse Buying Behavior		Pleasure		Impulse Buying Behavior	
Variable	**β**	**t**	**β**	**t**	**β**	**t**
Constant	1.951**	9.928	1.709**	8.598	1.506**	7.190
Price Promotion	0.457**	8.820	0.536**	10.241	0.317**	5.540
Pleasure					0.260**	5.026
R^2	0.186		0.236		0.243	
Adjusted R^2	0.184		0.233		0.238	
F-value	77.787**		104.873**		54.300**	

Table 11 Analysis of the Mediating Effect of Pleasure Between Price Promotion and Impulse Buying Behavior

	Effect Size	Standard Error (SE)	Bootstrap 95% CI		Proportion of Total Effect
			Lower Bound	Upper Bound	
Total Effect	0.457	0.052	0.355	0.558	
Direct Effect	0.317	0.057	0.205	0.429	69.37%
Indirect Effect	0.140	0.035	0.069	0.208	30.63%

As shown in Tables 12 and 13, time pressure exerts a significant positive influence on impulse buying behavior ($\beta = 0.379$, $p < 0.01$). Time pressure indirectly promotes impulse buying behavior by increasing consumers' pleasure ($\beta = 0.454$, $p < 0.01$ for the path to pleasure, and $\beta = 0.293$, $p < 0.01$ for the subsequent influence on impulse buying behavior). The indirect effect value is 0.133, and its Bootstrap 95% confidence interval (0.078, 0.207) does not include zero, confirming the existence of the mediating pathway. After controlling for pleasure, the direct effect of time pressure on impulse buying behavior remains significant ($\beta = 0.246$, $p < 0.01$), with its Bootstrap 95% confidence interval (0.143, 0.348) excluding zero. The findings indicate that time pressure can both directly promote impulse buying behavior (accounting for 64.91% of the total effect) and indirectly promote it by enhancing consumers' pleasure (accounting for 35.09% of the total effect).

Table 12 Testing the Mediating Effect of Pleasure on the Relationship Between Time Pressure and Impulse Buying Behavior

	Impulse Buying Behavior		Pleasure		Impulse Buying Behavior	
Variable	**β**	**t**	**β**	**t**	**β**	**t**
Constant	2.276**	12.511	2.058**	11.156	1.673**	8.229
Price Promotion	0.379**	7.736	0.454**	9.145	0.246**	4.703
Pleasure					0.293**	5.725
R^2	0.150		0.197		0.225	
Adjusted R^2	0.147		0.195		0.220	
F-value	59.845**		83.622**		49.110**	

Table 13 Analysis of the Mediating Effect of Pleasure Between Time Pressure and Impulse Buying Behavior

	Effect Size	Standard Error (SE)	Bootstrap 95% CI		Proportion of Total Effect
			Lower Bound	Upper Bound	
Total Effect	0.379	0.049	0.283	0.475	
Direct Effect	0.246	0.052	0.143	0.348	64.91%
Indirect Effect	0.133	0.033	0.078	0.207	35.09%

In summary, the proposed hypotheses H4a, H4b, and H4c are supported, indicating that pleasure plays a mediating role between food safety, price promotion, time pressure, and impulse buying behavior.

Testing the Mediating Role of Concentration

As shown in Tables 14 and 15, food safety not only has a direct positive effect on impulse buying behavior (total effect $\beta = 0.403$, $p < 0.01$), but also indirectly promotes impulse buying behavior by enhancing consumers' concentration ($\beta = 0.435$, $p < 0.01$ for the path to concentration, and $\beta = 0.143$, $p < 0.01$ for the indirect effect). The indirect effect value is 0.062, and its Bootstrap 95% confidence interval (0.018, 0.114) does not include zero, confirming the existence of the mediating pathway. After controlling for concentration, the direct effect of food safety on impulse buying behavior remains significant ($\beta = 0.341$, $p < 0.01$), with its Bootstrap 95% confidence interval (0.233, 0.448) excluding zero. The results indicate that food safety mainly promotes impulse buying behavior through its direct effect (accounting for 84.61% of the total effect), while also exerting an indirect promotional influence by enhancing consumers' concentration (accounting for 15.38% of the total effect).

Table 14 Testing the Mediating Effect of Concentration on the Relationship Between Time Pressure and Impulse Buying Behavior

	Impulse Buying Behavior		Concentration		Impulse Buying Behavior	
Variable	**β**	**t**	**β**	**β**	**t**	**β**
Constant	2.161**	11.339	1.943**	9.707	1.884**	8.835
Price Promotion	0.403**	7.979	0.435**	8.211	0.341**	6.227
Concentration					0.143**	2.789
R^2	0.158		0.165		0.177	
Adjusted R^2	0.155		0.163		0.172	
F-value	63.658**		67.413**		36.352**	

Table 15 Analysis of the Mediating Effect of Concentration Between Food Safety and Impulse Buying Behavior

	Effect Size	Standard Error (SE)	Bootstrap 95% CI		Proportion of Total Effect
			Lower Bound	Upper Bound	
Total Effect	0.403	0.050	0.304	0.502	
Direct Effect	0.341	0.055	0.233	0.448	84.61%
Indirect Effect	0.062	0.024	0.018	0.114	15.38%

As shown in Tables 16 and 17, price promotion exerts a significant positive influence on impulse buying behavior ($\beta = 0.457$, $p < 0.01$). Price promotion indirectly promotes impulse buying behavior by enhancing consumers' concentration ($\beta = 0.511$, $p < 0.01$ for the path to concentration, and $\beta = 0.107$, $p < 0.05$ for the subsequent influence on impulse buying behavior). The indirect effect value is 0.055, and its Bootstrap 95% confidence interval (0.001, 0.108) does not include zero, confirming the existence of the mediating pathway. After controlling for concentration, the direct effect of price promotion on impulse buying behavior remains significant ($\beta = 0.402$, $p < 0.01$), with its Bootstrap 95% confidence interval (0.288, 0.515) excluding zero. The findings indicate that price promotion mainly promotes impulse buying behavior through its direct effect (accounting for 87.96% of the total effect), while also exerting an indirect promotional influence by enhancing consumers' concentration (accounting for 12.04% of the total effect).

Table 16 Testing the Mediating Effect of Concentration on the Relationship Between Price Promotion and Impulse Buying Behavior

	Impulse Buying Behavior		Concentration		Impulse Buying Behavior	
Variable	**β**	**t**	**β**	**Variable**	**β**	**t**
Constant	1.951**	9.928	1.653**	8.085	1.773**	8.305
Price Promotion	0.457**	8.820	0.511**	9.486	0.402**	6.933
Concentration					0.107**	2.072
R^2	0.186		0.209		0.196	
Adjusted R^2	0.184		0.207		0.192	
F-value	77.787**		89.978**		41.417**	

Table 17 Analysis of the Mediating Effect of Concentration Between Price Promotion and Impulse Buying Behavior

	Effect Size	Standard Error (SE)	Bootstrap 95% CI		Proportion of Total Effect
			Lower Bound	Upper Bound	
Total Effect	0.457	0.052	0.355	0.558	
Direct Effect	0.402	0.058	0.288	0.515	87.96%
Indirect Effect	0.055	0.027	0.001	0.108	12.04%

As shown in Tables 18 and 19, time pressure not only exerts a direct positive effect on impulse buying behavior (total effect $\beta = 0.379$, $p < 0.01$) but also indirectly promotes it by enhancing concentration ($\beta = 0.400$, $p < 0.01$ for the path to concentration, and $\beta = 0.153$, $p < 0.01$ for the subsequent influence on impulse buying behavior). The indirect effect value is 0.061, and its Bootstrap 95% confidence interval (0.021, 0.110) does not include zero, confirming the existence of the mediating pathway. After controlling for concentration, the direct effect of time pressure on impulse buying behavior remains significant ($\beta = 0.317$, $p < 0.01$), with its Bootstrap 95% confidence interval (0.215, 0.420) excluding zero. The results indicate that time pressure mainly promotes impulse buying behavior through its direct effect (accounting for 83.64% of the total effect), while also exerting an indirect promotional influence by enhancing consumers' concentration (accounting for 16.09% of the total effect).

Table 18 Testing the Mediating Effect of Concentration on the Relationship Between Time Pressure and Impulse Buying Behavior

	Impulse Buying Behavior		Concentration		Impulse Buying Behavior	
Variable	**β**	**t**	**β**	**Variable**	**β**	**t**
Constant	2.276**	12.511	2.100**	10.941	1.955**	9.350
Price Promotion	0.379**	7.736	0.400**	7.75	0.317**	6.049
Concentration					0.153**	3.011
R^2	0.150		0.150		0.172	
Adjusted R^2	0.147		0.148		0.167	
F-value	59.845**		60.062**		35.165**	

Table 19 Analysis of the Mediating Effect of Concentration Between Time Pressure and Impulse Buying Behavior

	Effect Size	Standard Error (SE)	Bootstrap 95% CI		Proportion of Total Effect
			Lower Bound	Upper Bound	
Total Effect	0.379	0.049	0.283	0.475	
Direct Effect	0.317	0.052	0.215	0.420	83.64%
Indirect Effect	0.061	0.023	0.021	0.110	16.09%

Hypothesis Testing

The results of the assumptions are summarized as follows:

Table 20 Summary of Assumption Results

Assumption	Assumption Content	Result
H1a	Food safety positively influences consumers' impulse buying behavior.	supported
H1b	Price promotion positively influences consumers' impulse buying behavior.	supported
H1c	Time pressure positively influences consumers' impulse buying behavior.	supported
H2a	Food safety positively influences consumers' pleasure.	supported
H2b	Price promotion positively influences consumers' pleasure.	supported
H2c	Time pressure positively influences consumers' pleasure.	supported
H3a	Food safety positively influences consumers' concentration.	supported
H3b	Price promotion positively influences consumers' concentration.	supported
H3c	Time pressure positively influences consumers' concentration.	supported
H4a	Pleasure mediates the relationship between food safety and impulse buying behavior.	supported
H4b	Pleasure mediates the relationship between price promotion and impulse buying behavior.	supported
H4c	Pleasure mediates the relationship between time pressure and impulse buying behavior.	supported
H5a	Concentration mediates the relationship between food safety and impulse buying behavior.	supported
H5b	Concentration mediates the relationship between price promotion and impulse buying behavior.	supported
H5c	Concentration mediates the relationship between time pressure and impulse buying behavior.	supported

VI. Conclusion And Suggestions

Conclusion

This study focuses on the impact of food safety, price promotion, and time pressure on consumers' impulse buying behavior, while also exploring the mediating roles of pleasure and concentration. Through rigorous empirical analysis, the following key conclusions are drawn:

First, the results clearly demonstrate that food safety, price promotion, and time pressure all exert a positive influence on consumers' impulse buying behavior. This suggests that when consumers perceive food as highly safe, they are more inclined toward impulse buying behavior. The implementation of price promotion activities—such as discounts and spend-and-save offers—can stimulate consumers' desire to buy and encourage impulse buying behavior. Similarly, the presence of time pressure, as in flash-sale scenarios, can prompt consumers to make impulse purchase decisions within a short period.

Second, food safety, price promotion, and time pressure all positively influence consumers' pleasure. Safe food provides psychological reassurance and satisfaction, thereby generating pleasurable emotions. The perceived benefit from price promotion makes consumers feel they have obtained extra value, which enhances their pleasure. Time pressure, by creating a sense of urgency and excitement, can also lead to pleasurable experiences when a purchase is successfully completed. Meanwhile, these three factors likewise positively influence consumers' concentration. Food safety concerns prompt consumers to pay closer attention to food-related information, thereby increasing their concentration on the product. Price promotion captures consumers' concentration, directing their focus toward product pricing and discount offers. Time pressure compels consumers to concentrate on making purchasing decisions within a limited timeframe, intensifying their focus on the buying process.

Finally, pleasure plays a mediating role in the relationships between food safety, price promotion, time pressure, and impulse buying behavior. This indicates that food safety, price promotion, and time pressure influence consumers' impulse buying behavior by affecting their pleasure. Similarly, concentration also serves a mediating role in these relationships. Food safety, price promotion, and time pressure affect consumers' concentration, and changes in concentration, in turn, influence impulse buying behavior.

Research Implications

This study provides a comprehensive understanding of the relationships between food safety, price promotion, time pressure, and consumers' impulse buying behavior, as well as the significant roles of pleasure and concentration within these relationships. These findings offer valuable references for further research on consumer behavior and hold important guiding implications for enterprises in formulating marketing strategies and improving sales performance, demonstrating both theoretical and practical significance.

Theoretical Significance

This study provides an in-depth examination of how food safety, price promotion, and time pressure influence consumers' impulse buying behavior, thereby adding new insights to the existing body of consumer behavior theory. While prior research has often focused on the impact of single factors on purchasing behavior, this investigation integrates multiple factors to comprehensively reveal the intrinsic relationships between these variables and consumers' impulse buying behavior. This approach leads to a deeper and more holistic understanding of the mechanisms underlying impulse buying behavior occurrence. Furthermore, the study finds that pleasure and concentration mediate the relationships between food safety, price promotion, time pressure, and impulse buying behavior. This discovery offers a fresh perspective and empirical support for the application of mediating variables (i.e., pleasure and concentration) in consumer behavior research, enriching theories concerning the role of psychological factors in purchase decision-making and further refining the theoretical framework of consumer behavior. It also assists scholars in understanding the psychological mechanisms of consumer behavior at a more micro-level. In addition, the research not only examines the direct effects of each factor on impulse buying behavior, but also investigates their indirect effects through psychological factors such as pleasure and concentration. This multifactor interactive approach deepens the understanding of how consumer behavior is shaped by the combined influence of external and internal factors, offering new research ideas and methodologies for future related studies.

Practical Significance

Implications for Food Enterprises. (1) Strengthen food safety management. Since food safety positively influences consumers' impulse buying behavior, pleasure, and concentration, food enterprises should attach great importance to food safety issues, strengthening quality control in production, processing, transportation, and other stages to ensure the safety of food. By improving food safety standards, enterprises can enhance consumers' trust and preference for their products, stimulate consumers' impulse buying desire, and thereby increase product sales and market share. (2) Use price promotion strategies appropriately. Price promotion can positively influence consumers' impulse buying behavior and psychological state. Enterprises can develop reasonable price promotion

plans based on market demand and product characteristics. For example, regularly carrying out activities such as discounts, spend-and-save offers, and giveaways can attract consumers' attention, enhance their pleasure and concentration, and promote impulse buying behavior. (3) Create a time-pressure atmosphere. Time pressure also has a positive impact on consumers' impulse buying behavior and psychological state. Enterprises can use methods such as limited-time flash sales and limited-quantity supply to create a time-pressure atmosphere, prompting consumers to make purchase decisions in a short time. At the same time, enterprises can emphasize the timeliness of activities through online and offline promotions to strengthen the impact of time pressure on consumers.

Guidance for Marketing Activities. (1) Accurately target customer groups. Understanding how food safety, price promotion, and time pressure affect different consumer groups helps enterprises accurately target customers. For example, for consumers who pay more attention to food safety, enterprises can emphasize the safety advantages of products; for price-sensitive consumers, increase price promotion efforts; for consumers seeking novelty and excitement, create a time-pressure atmosphere. (2) Optimize marketing communication content. Based on the research results, enterprises can highlight information such as food safety, price discounts, and limited-time activities in marketing communications to attract consumers' attention and stimulate their purchase desire. At the same time, through promotional activities, they can guide consumers to experience pleasure and concentration, improving the effectiveness of marketing activities.

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Conflicts of interest

All authors disclose no actual or potential conflicts of interest including any financial, personal, or other relationships with other people or organizations that could inappropriately influence (bias) their work.

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