RBGN REVISTA BRASILEIRA DE GESTÃO DE NEGÓCIOS
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ISSN 1806-4892
e-ISSN 1983-0807

OPEN ACCESS

ARTICLE

Negative Online Word-of-Mouth and Consumers' Product Attitudes: a Nonlinear Relationship

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Abstract

Purpose – Word-of-mouth (WOM) valence refers to the favorable impact of positive WOM on marketing outcomes. However, studies have shown that negative WOM can have a greater influence. Therefore, this study aims to explore the impact of negative online WOM (OWOM) on marketing.

Theoretical framework – Drawing from the perspectives of psychology and communication, and using the sender-message-channel-receiver (SMCR) communication process theory, we construct a moderated mediation model to explore the mechanism and threshold of WOM recipients' product involvement in reversing the impact of WOM valence on product attitude.

Design/methodology/approach – SPSS 22.0 and SmartPLS 3.0 were used to empirically analyze the survey data from a sample of 1,107 consumers.

Findings – Our study reveals a nonlinear relationship between negative OWOM recipients' product involvement and consumer product attitude, mediated by risk perception and moderated by sender characteristics and WOM characteristics. The relationship shows a U-shaped curve between product involvement and product attitude, and an inverted U-shaped curve between product involvement and risk perception. Risk perception mediates the relationship between product involvement and product attitude, which varies with the strength of the sender-recipient relationship and the amount of negative WOM. Sender professionalism moderates both the U-shaped and the inverted U-shaped curves.

Practical & social implications of research – From a practical standpoint, our findings have implications for the management of OWOM marketing for fresh agricultural products.

Originality/value – Our study provides a more nuanced understanding of the impact of negative WOM on consumer attitudes, challenging the one-sided focus on strengthening positive WOM valence in the context of the Internet.

Keywords: Negative online word-of-mouth, recipient characteristics, fresh agricultural products, product attitude, product involvement.

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How to cite:
Gao, F., Qi, W., & Cui, Z. (2024). Negative online word-of-mouth and consumers' product attitudes: a nonlinear relationship. *Revista Brasileira de Gestão de Negócios*, *22*(1), e20230095. https://doi.org/10.7819/rbgn.v26i01.4249

Received on:
May/05/2023
Approved on:
Mar/05/2024

Responsible editor:
Prof. Dr. Sebastian Molinillo

Reviewers:
Hamid Alizadeh; Philippe Almeida

Evaluation process:
Double Blind Review

This article is open data

Revista Brasileira de Gestão de Negócios

https://doi.org/10.7819/rbgn.v26i01.4249

1 Introduction

French social psychologist Gustave Le Bon (1908) described the masses as a "rabble" and believed that individuals in a group are easily influenced by the collective consciousness, leading to irrational behavior. The Internet has transformed how people share information and purchase goods (Gil et al., 2020). The Internet enables rapid dissemination and diffusion of public evaluations, creating influential online word-of-mouth (OWOM) that can most likely shape consumers' product attitudes.

Studies have revealed WOM valence, which means that positive WOM generally has a positive impact on marketing effectiveness (Casaló et al., 2020). Research has found that WOM valence also applies to social media, and that social media has even strengthened it. Positive WOM in social media can help improve brand attitudes (Choi et al., 2020).

Usually, a corporate or brand reputation is built over time through the accumulation of positive WOM. A single instance of positive WOM cannot rapidly enhance an image. In contrast, the impact of negative WOM is so strong that consumers may develop an instant aversion to a product. Does this mean that only positive WOM has a positive effect? Does negative WOM always have a negative impact? In fact, WOM valence sometimes fails or even reverses in social media, where positive WOM can have a negative impact. Specifically, positive publicity from brand users can sometimes lead to negative perceptions of the brand among consumers. For instance, in the case of luxury brands, social media WOM can sometimes be perceived as bragging by its recipients (Chen et al., 2020), which may lead to negative attitudes toward the products (Packard et al., 2016).

This prompts us to consider whether negative WOM can have positive effects. In other words, will consumers develop positive attitudes toward the product after being exposed to negative WOM? Consumers generally consider negative OWOM to be more critical and credible, and tend to rely more on negative information when making purchase decisions (Gong et al., 2018). Marketers are taking advantage of the significant impact and rapid spread of negative WOM to quickly increase brand awareness among consumers and then clarify and refute any negative rumors to reverse the negative WOM. Internet marketing practice has revealed that WOM valence sometimes fails or reverses, and negative OWOM can benefit product attitudes. However, research on the positive effects of negative WOM is limited.

Healthy eating has become a prominent trend since 2021, with consumers increasingly paying attention to products that make nutritional and health claims (Duarte et al., 2021). In the digital age, understanding the mechanism by which negative OWOM influences consumers' product attitudes has become a critical issue in marketing activities for fresh agricultural products.

How does negative OWOM affect the product attitude of fresh produce consumers? Can negative OWOM positively influence fresh produce consumers? What factors drive consumers to maintain positive attitudes toward fresh produce even when exposed to negative OWOM? How should marketers of fresh agricultural products deal with negative OWOM? Unfortunately, quantitative research on this topic is scarce. Therefore, drawing from the perspectives of psychology and communication, and using the sender-message-channel-receiver (SMCR) communication process theory, this paper constructs a moderated mediation model to explore the mechanism and threshold of WOM recipients' product involvement in reversing the impact of WOM valence on product attitude.

The remainder of this article is arranged as follows. First, we present the theoretical background on negative OWOM. Second, we describe our research model and hypotheses. Next, we present the research methodology and results. Finally, we discuss the implications of the findings.

2 Theoretical background and hypotheses

Negative OWOM is defined as negative comments about companies or products shared by past, current, or potential consumers through online communication platforms (Lee & Song, 2010). Existing studies, primarily focusing on the perspective of WOM recipients, have verified the negative impact of negative OWOM on consumer behaviors, including brand attitudes, product attitudes, purchase intentions, and dissemination intentions (Lee et al., 2008; Song & Wang, 2011; Azemi et al., 2020). Scholars have explored the impact mechanism of negative OWOM on consumer behavior and attitudes from various perspectives: information source (Tu & Luo, 2017), information dissemination characteristics, receiver characteristics (Mehrolia et al., 2021), and consumer perception or emotion (Han et al., 2021).

However, most existing studies focus on only one of the dimensions mentioned above. Therefore, it can be difficult to demonstrate the comprehensive

mechanism through which negative OWOM affects consumer behavior. The sender-message-channel-receiver (SMCR) communication process theory, as proposed by David Berlo in 1960, breaks down the communication process into four fundamental components: information source, message, channel, and audience. The SMCR theory describes the dissemination process: the sender encodes the intended message, which is then transmitted to the receiver through a chosen channel, and finally the receiver decodes and understands the information. However, multi-factor analyses based on SMCR remain limited. Moreover, most studies tend to investigate simple linear relationships, with comparatively less effort to explore the potential "double-edged sword" effect of negative OWOM. This paper aims to fill these research gaps by addressing three fundamental questions: First, does a nonlinear relationship exist between the characteristics of negative WOM recipients and their product attitudes? Second, if such a relationship exists, what is the mediation mechanism responsible for transmitting it? Finally, what situational factors might moderate this mediation mechanism?

According to the stimulus-organism-response (SOR) theory, recipient, sender, and message characteristics are considered external stimuli in the context of negative OWOM, with recipient risk perception as the organism and consumer product attitude as the response. This study constructs a moderated mediation model with consumer risk perception as the mediating variable and sender characteristics (i.e., professionalism and strength of relationship with recipients) and WOM characteristics (i.e., amount and timeliness) as moderating variables. It systematically investigates the disparities in product attitude changes among fresh agricultural produce consumers under different information dissemination scenarios and explores the underlying mechanisms driving such differences.

2.1 Recipient characteristics and risk perception

Product involvement refers to the degree to which consumers attach importance to products (Zaichkowsky, 1986). Consumers with high involvement tend to be more cautious in their purchase decisions, taking the time to gather relevant product information to reduce decision risk. Product involvement is a crucial factor in shaping the impact of WOM on consumers. Research suggests that the higher the degree of involvement of the WOM recipient, the better they can assess the authenticity of the message and the less likely they are to be swayed by negative information. Nevertheless, some scholars have found that excessive involvement in advertising and marketing information prevents consumers from receiving WOM (Lovett et al., 2019). Excessive involvement may create an illusion of "knowing everything" about the product, leading to reduced risk perception. Therefore, it is speculated that under the stimulus of negative OWOM, risk perception improves with increased product involvement, but it may subsequently decrease with excessive involvement.

A lack of trust significantly increases consumers' risk perception (Liu et al., 2019). Numerous studies have found a strong correlation between trust and risk perception (Bronfman & Vázquez, 2011; Vainio et al., 2017). Some scholars have reported a negative correlation (Gill et al., 2005), while others have raised doubts about the role of trust in shaping danger perception. The latter believed that the correlation between trust and risk perception is weak (Smith & Mayer, 2018). When individuals are confident in their ability to assess risks, they may not feel the need to rely on others' assessments, rendering trust irrelevant. In such a situation, there may be no correlation between perceived risk and trust (Siegrist & Cvetkovich, 2000). Therefore, some scholars posit that the observed correlation between trust and risk perception depends on the individual's level of knowledge, perception of problem salience, and the method used to measure trust (Earle, 2010). This study suggests that in the context of negative OWOM for fresh agricultural products, recipients are prone to rely on negative WOM as their trust in the information source grows, ultimately increasing their risk perception. However, excessive trust may lead to an overly optimistic outlook, reducing the perceived risk and potentially leading to uncritical assessments, as recipients may overestimate the problem-solving capabilities of the other party while underestimating possible risks (Gervais et al., 2011).

Therefore, the study proposes the following hypotheses:

H1: Recipient characteristics have an inverted U-shaped relationship with risk perception.

H1a: Recipients' product involvement has an inverted U-shaped relationship with risk perception.

H1b: Recipients' trust propensity has an inverted U-shaped relationship with risk perception.

2.2 Recipient characteristics and product attitude

Product involvement encompasses not only the awareness and initial impression of the product, but also consumers' subsequent demand and preference for the product (Hu & Zhang, 2021). This demand and preference vary with different degrees of product involvement. Moreover, product involvement has short-term or long-term effects on consumers' psychology and behavior (Mitchell et al., 1997). Consumers' low involvement with fresh agricultural products may indicate a limited demand for these products, thereby reducing the impact of negative WOM on their product attitudes. As product involvement increases, consumers with limited knowledge of the products become more susceptible to negative WOM, leading to a less positive attitude toward the product. According to social judgment theory, the higher people's involvement in a particular issue, the less likely they are to accept opposing opinions. For example, for some luxury brand products that are priced significantly above their intrinsic value, even changing the brand owner will not affect consumers' attitudes (Du et al., 2019). Some studies even show that product involvement of negative OWOM recipients positively affects their consumption attitudes. Therefore, consumers with high levels of product knowledge and strong product demand may be less susceptible to negative WOM and more likely to maintain a positive attitude toward the product.

McKnight et al. (1998) and Kramer (1999) define *trust propensity* as the general inclination to depend on others based on extended socialization. Studies have shown that consumers' trust in themselves and in marketers positively affects product involvement, subsequently shaping brand trust (Liu et al., 2018). Augmented trust will increase consumers' loyalty (Garepasha & Aali, 2020). Moreover, trust has a significant positive effect on satisfaction (Al-Ansi et al., 2019). People with low trust propensity are less susceptible to negative WOM because they rely less on others. Conversely, individuals with high trust propensity are more receptive to WOM, even from unfamiliar sources (Coppola et al., 2004). However, excessive trust may lead to an overestimation of others' problem-solving ability and an underestimation of negative OWOM effects, resulting in consumers maintaining an optimistic product attitude (Gervais et al., 2011).

The study thus proposes the following hypotheses:

H2: Recipient characteristics have a U-shaped relationship with product attitude.

H2a: Recipients' product involvement has a U-shaped relationship with product attitude.

H2b: Recipients' trust propensity has a U-shaped relationship with product attitude.

2.3 Mediating effect of risk perception

Previous studies have shown that risk perception has negative effects on consumers' attitudes and willingness to adopt innovative products or services (Featherman & Pavlou, 2003). Tuu and Olsen (2009) also observed that customers' risk perception of seafood meals influenced their satisfaction in Vietnamese restaurants. In addition, satisfaction can significantly influence consumers' future behavior and attitude toward certain products or services.

Consumers are more likely to form negative attitudes and reduce adoption intentions when risk is perceived. Recipient characteristics have an inverted U-shaped relationship with risk perception, and risk perception negatively affects product attitude. Therefore, risk perception can mediate the relationship between recipient characteristics and product attitude. Specifically, the characteristics of negative WOM recipients increase perceived risks and generate negative attitudes. However, excessive product involvement and trust propensity may lead to an underestimation of actual risks, resulting in the recipient maintaining a positive product attitude.

Therefore, the following hypotheses are proposed:

H3: Risk perception mediates the U-shaped relationship between recipient characteristics and product attitude.

H3a: Risk perception mediates the U-shaped relationship between product involvement and product attitude.

H3b: Risk perception mediates the U-shaped relationship between trust propensity and product attitude.

2.4 Moderating effect of sender characteristics

Relationship strength refers to the natural relationship customers have with others, ranging from

strong and primary to weak and secondary (Brown & Reingen, 1987). The closer the relationship, the stronger the persuasion effect (Gilly et al., 1998) and the more significant the impact on perceptions. WOM is a two-way behavior that connects the message senders and recipients; the strength of the relationship between the two parties is a crucial factor that affects the psychological state of the recipients. On the one hand, relationship strength reinforces the facilitating role of recipient characteristics in risk perception. The closer the relationship, the easier it is for the recipient to develop a sense of trust and intimacy (Gilly et al., 1998) and to be more aware of the various risks the message conveys (Zeithaml et al., 1996). In this regard, relationship strength has a significant positive impact on risk perception, and this effect is more pronounced among people with stronger relationships (Brown & Reingen, 1987). On the other hand, we infer that relationship strength amplifies the inhibitory effect of recipient characteristics on risk perception. In the context of high relationship strength, excessive product involvement and trust propensity can easily lead fresh agricultural product consumers to overlook the impact of negative OWOM.

Dholakia (2001) proposed that professionalism, an essential component of information credibility, can affect risk perception. Consumers with high professionalism are better equipped to make accurate evaluations of products. Recipients tend to seek advice from professionals, perceiving the information they provide as reliable, and are more susceptible to having their product evaluations influenced by them. On the one hand, the sender professionalism reinforces the positive effect of recipient characteristics on risk perception. Some studies have demonstrated the significant positive impact of negative OWOM senders' professionalism on recipients' risk perception (Mitchell et al., 1997; Bansal & Voyer, 2000). On the other hand, we infer that professionalism reinforces the inhibitory effect of recipient characteristics on risk perception. In a highly professional environment, recipients with high demand, high involvement, or excessive trust in fresh agricultural products tend to underestimate the risk of negative OWOM.

The study thus proposes the following hypotheses:

H4: Sender characteristics reinforce the inverted U-shaped relationship between recipient characteristics and risk perception.

H4a: Sender-recipient relationship strength reinforces the inverted U-shaped relationship between product involvement and risk perception.

H4b: Sender-recipient relationship strength reinforces the inverted U-shaped relationship between trust propensity and risk perception.

H4c: Sender professionalism reinforces the inverted U-shaped relationship between product involvement and risk perception.

H4d: Sender professionalism reinforces the inverted U-shaped relationship between trust propensity and risk perception.

2.5 Moderating effect of WOM characteristics

Online communication has accelerated the spread of negative WOM. An increase in negative WOM continuously reinforces consumers' risk perceptions. On the one hand, the quantity and timeliness of WOM strengthen the positive effect of recipient characteristics on risk perception. Some studies have indicated a significant and positive correlation between the volume of negative WOM and consumers' perceived risks while making decisions (Liu, 2006). Some others are skeptical about the psychological impact of the timeliness of WOM on consumers. For instance, Ren (2010) argued that the latest WOM is not necessarily new due to the online forwarding function, and therefore the impact of WOM timeliness on purchase intention is not always apparent. Our conclusion is that for consumers of time-limited and periodic fresh agricultural products, more recent product information reflects the true product situation, increasing consumer trust and risk perception. On the other hand, the quantity and timeliness of WOM can strengthen the inhibitory effect of recipient characteristics on risk perception. An excessive amount of negative WOM, especially if it is recent, can temporarily hinder the judgment of recipients with high product involvement and trust. In such cases, they may doubt the credibility of the negative WOM, perceiving it as a deliberate marketing tactic and consequently underestimating the associated risks.

Therefore, the following hypotheses are proposed:

H5: WOM characteristics reinforce the inverted U-shaped relationship between recipient characteristics and risk perception.

H5a: The amount of WOM reinforces the inverted U-shaped relationship between product involvement and risk perception.

H5b: The amount of WOM reinforces the inverted U-shaped relationship between trust propensity and risk perception.

H5c: The timeliness of WOM reinforces the inverted U-shaped relationship between product involvement and risk perception.

H5d: The timeliness of WOM reinforces the inverted U-shaped relationship between trust propensity and risk perception.

2.6 Moderating effect of sender characteristics and WOM characteristics on the mediating role of risk perception

Based on the above discussion, this paper establishes a moderated mediation model to explore the relationship between recipient characteristics and product attitudes (Figure 1). Risk perception plays a mediating role in the relationship between recipient characteristics and product attitude; the mediating effect is moderated by sender characteristics and WOM characteristics. Specifically, sender characteristics and WOM characteristics can strengthen the inverted U-shaped relationship between recipient characteristics and risk perception, which ultimately reinforces the indirect impact of recipient characteristics on product attitude. Therefore, the research hypotheses are as follows:

H6a: Sender-recipient relationship strength reinforces the mediating role of risk perception between recipient characteristics and product attitude.

H6b: Sender professionalism reinforces the mediating role of risk perception between recipient characteristics and product attitude.

H6c: The amount of WOM reinforces the mediating role of risk perception between recipient characteristics and product attitude.

H6d: The timeliness of WOM reinforces the mediating role of risk perception between recipient characteristics and product attitude.

3 Research method

3.1 Experimental design

This study employed a situational experiment approach, requiring four steps for the respondents to complete the questionnaire: filling in personal information, conducting a preliminary measurement of product attitudes before the situational experiment, being randomly grouped, and completing the situational experiment. We designed the four indicators of sender characteristics and WOM characteristics as dichotomous variables, which generated eight text documents. Each document contains identical background information: "Suppose you were browsing WeChat Moments and read some negative comments about lychee (e.g., excess heat-related inflammation, drunk driving, and delayed menstrual cycles). Nonetheless, this is the market season for lychees, and their price falls within an acceptable range." The experiment consisted of four parts that examine how the four sender characteristics and WOM characteristics influence the relationship between

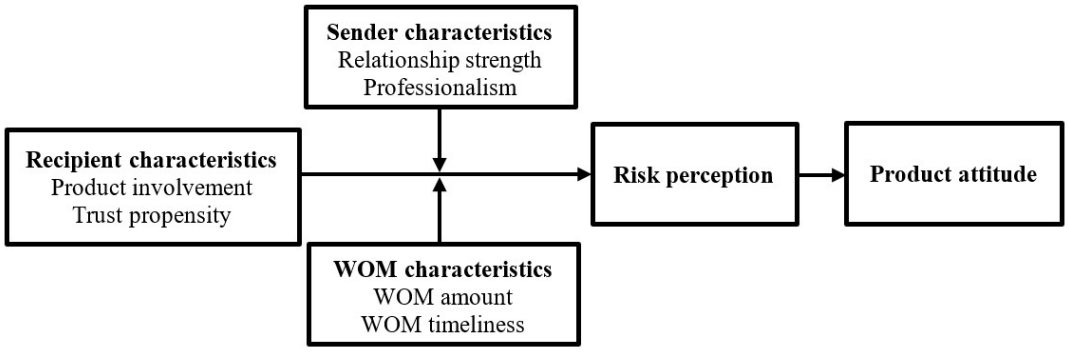

Figure 1. Conceptual framework

negative OWOM recipients' characteristics and consumer product attitude, respectively. The first part tests the effect of sender professionalism on the relationship; Text 1 and Text 2 define the senders as "friends with a background in agriculture or lychee" and "friends without such expertise," respectively. The second part examines how the strength of the sender-recipient relationship influences the relationship; Text 3 and Text 4 describe the senders as "best friends in the company" and "new colleagues," respectively. The third part examines how the amount of WOM affects the relationship; Text 5 and Text 6 describe the senders as "several friends" and "one friend," respectively. Finally, the fourth part tests the effect of the timeliness of the WOM on the relationship; Text 7 and Text 8 do not mention the senders, but define the time of the information release as "recently" and "last year," respectively.

To ensure randomized grouping and to minimize experimental errors, we placed the eight text documents in different orientations: east, west, south, north, southeast, southwest, northeast, and northwest. Respondents were asked to select an orientation according to their personal preferences and then read the corresponding text document before filling out the questionnaire.

3.2 Variables

We measured the variables using a maturity scale, as detailed in Table 1. The continuous variables were measured using a 5-point Likert scale, with responses ranging from "1=strongly disagree" to "5=strongly agree." The categorical variables were measured in a dichotomous way. Two indicators were used to measure sender characteristics: the strength of the sender-recipient relationship and the sender's professionalism. Two other indicators were used to measure WOM characteristics: the amount of WOM and the timeliness of WOM. Recipient characteristics were measured from two perspectives: product involvement and trust propensity. Finally, we included several demographic and behavioral variables as control factors, such as gender, age, education, occupation, monthly income, and time

Table 1
Variables and definitions

Variable	Statements
Recipient characteristics Product involvement	Lychee is a fruit I often pay attention to.
	Lychee makes my life more flavorful.
	My family and I always taste some lychees when they are in season.
	I always see lychees being sold in the shopping places I frequently visit during the lychee season.
	My relatives and friends all buy and taste some lychees when they are in season.
	I have devoted some effort to researching lychees.
Recipient characteristics Trust propensity	I tend to trust others unless there is a reason that I cannot trust them.
	I usually place trust in people or things, even if I know little about them.
	I believe that human nature is generally good and trustworthy.
	I believe that people are generally reliable.
	I am usually willing to trust product information provided by others.
	I am usually willing to judge a product based on information provided by other consumers.
Risk perception	Eating lychee will harm my health.
	Buying lychee is a waste of money.
	My family and friends disapprove of my buying lychee.
	Buying lychee makes me anxious, as I am concerned about the potential health risks associated with consuming it.
Product attitude A Product attitude B	I (still) believe that lychee is a safe fruit.
	I (still) find lychee to be a delicious fruit.
	I (still) feel something is missing if I do not eat lychee during the summer.
	I (still) like lychee very much.
	I (still) trust the quality of lychee.
	I (still) want to buy lychee.
	I am (still) willing to recommend buying lychee to others.

Note: "Product attitude A" and "product attitude B" are the product attitude before and after the situational experiment, respectively, which applies to the remainder of the paper. The contents in brackets are product attitude B.

spent on the Internet and browsing WeChat Moments, according to previous studies. To ensure the accuracy and feasibility of our questionnaire, we conducted a pre-investigation with a sample of undergraduate and graduate students. We distributed 118 questionnaires and received 92 valid responses, resulting in an effective response rate of 77.96%. We then revised the scale and finalized the questionnaire based on the data analysis results of the pre-investigation.

3.3 Data collection and sample description

The data for this study were collected through a survey questionnaire (See Supplementary Data 1 – Questionaries). A total of 1,513 questionnaires were returned (See Supplementary Data 2 – database). Responses from participants who completed the survey in less than 2 minutes or provided regular pattern answers were excluded from the final analysis, leaving 1,107 valid questionnaires. The valid return rate was 73.17%. Table 2 shows the demographic characteristics of the respondents.

3.4 Homogeneity of variance test

In order to address the issue of homogeneous variance, the questionnaire was designed as different modules, and Harman's single-factor test method was used for testing. Principal component analysis was performed on all items, and the results showed that the variance explained by the first unrotated common factor was only 27.584%. There was no phenomenon of a single factor explaining the majority of the variance, indicating that there was no serious problem of homogenous variance in this study.

4 Results

4.1 Descriptive statistics and reliability and validity analysis

This study used SmartPLS 3.0 to conduct confirmatory factor analysis on the four variables - product attitude B, product involvement, trust propensity, and risk perception. The analysis was repeated after deleting items with low factor loadings. The results are shown in Table 3. The reliability of the questionnaire was tested using Cronbach's α and composite reliability (CR) values. The results showed that the Cronbach's α coefficient and CR for all four variables were greater than 0.7, indicating high internal consistency reliability and combination reliability. All average variance extracted (AVE) values were greater than 0.5, indicating good convergent validity. The correlation coefficients of each variable were below 0.7, suggesting no significant multicollinearity between the variables. Lastly, the square root of the AVE value for each factor (in bold) exceeded its correlation coefficient, indicating good discriminant validity.

Table 2
Demographics of respondents

Variables	Percentage (%)	Variables	Percentage (%)
Gender		*Occupation*	
Male	49.9	Business	36.9
Female	50.1	Student	26.6
Age (years)		Public servant	13.6
Under 25	46.3	Self-employed	11.6
26-35	26.9	Other	11.3
36-45	13.9	*Education*	
46 and over	12.9	Non-degree holder	35.8
Daily online time (hours)		Bachelor's degree	44.6
Fewer than 2	16.4	Postgraduate degree	19.6
2 to 4	35.0	*Monthly income (RMB)*	
4 to 6	23.1	3,000 or less	37.7
6 to 8	12.2	3,001 to 5,000	30.4
8 to 10	7.0	5,001 to 7,000	14.3
More than 10	6.3	More than 7,000	17.6

Table 3
Results on reliability, convergent validity, and discriminant validity (N=1,107)

	Mean	SD	*Cronbach's α*	*CR*	*AVE*	1	2	3	4
1. Product attitude	3.38	0.80	0.880	0.907	0.624	**0.787**			
2. Product involvement	3.34	0.89	0.828	0.877	0.589	0.545	**0.768**		
3. Trust propensity	3.34	0.88	0.702	0.783	0.558	0.158	0.208	**0.747**	
4. Risk perception	2.25	0.90	0.834	0.889	0.668	-0.232	-0.167	-0.066	**0.817**

Note: SD: standard deviation; CR: composite reliability; AVE: average variance extracted. The value in bold on the diagonal of the last four columns represents the square root of the AVE of each variable, and the values off the diagonal are the correlation coefficients.

Table 4
Regression results: professionalism as a moderating variable (N=213)

	Risk perception			Product attitude					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Gender	0.013	0.003	0.010	-0.048	-0.030	-0.051	-0.030	-0.027	-0.037
Age	0.019	0.049	0.037	-0.002	-0.107	-0.045	-0.107	-0.076	-0.054
Education	-0.107	-0.079	-0.074	0.07	0.074	0.067	0.074	0.054	0.046
Occupation	0.153	0.171*	0.164*	0.026	-0.034	0.041	-0.034	-0.03	-0.02
Monthly salary	0.008	0.002	0.006	-0.006	-0.031	-0.005	-0.031	0.002	-0.001
Daily online time	0.086	0.078	0.083	0.103	0.106	0.088	0.106	0.074	0.057
Time spent browsing Moments	0.02	0.041	0.036	-0.113	-0.072	-0.064	-0.072	-0.074	-0.068
Lychee-planting area	0.096	-0.001	0.004	-0.135	-0.028	-0.125	-0.028	-0.001	-0.006
Product involvement		0.05	-0.054		-0.163		-0.163	-0.162	0.06
Product involvement²		-0.274***	-0.062		0.417***		0.417***	0.417***	0.079
Trust propensity		0.041	0.03		0.024		0.024	0.036	0.052
Trust propensity²		0.047	0.033		0.007		0.007	0.02	0.039
Risk perception						-0.185**	-0.081		-0.036
professionalism		-0.155*	0.029					0.215***	-0.069
Product involvement × professionalism			0.098						-0.211
professionalism² × professionalism			-0.325**						0.486***
Trust propensity × professionalism			0.058						-0.004
Trust propensity² × professionalism			0.071						0.018
R^2	0.047	0.123	0.125	0.044	0.174	0.034	0.174	0.221	0.236
F	1.26	9.799	14.996	1.187	44.536	7.485	44.536	29.714	65.104
$\triangle R^2$	0.047	0.024	0.027	0.044	0.174	0.034	0.174	0.046	0.236

Note: ²Variables were measured by squared; R^2: R-squared, coefficient of determination; $\triangle R^2$: adjusted R-squared; F: F-value; ***p<0.001; **p<0.01; *p<0.05.

4.2 Hypotheses testing

4.2.1 *Experiment 1: The influence of sender professionalism on the relationship between recipient characteristics and product attitude*

Stepwise regression was used to test this research hypothesis. The regression results are shown in Model 5 in Table 4. The square of product involvement (β=0.417, p<0.001) significantly affects product attitude, indicating a U-shaped relationship between product involvement and product attitude. The square of trust propensity (β=0.007, p>0.05) does not significantly affect product attitude. Model 2 shows that the square of product involvement (β=-0.274, p<0.001) has a significant negative impact on risk perception, indicating an inverted U-shaped relationship between product involvement and risk perception. These results support Hypothesis H1a. The

square of trust propensity (β=0.047, p>0.05) has no significant effect on risk perception, thereby rejecting Hypothesis H1b.

The mediating role of risk perception between recipient characteristics and product attitude was examined. Model 6 shows that risk perception (β=-0.185, p<0.01) has a significant negative impact on product attitude. In Model 7, the square of product involvement, the square of trust propensity, and risk perception were included in the regression. Risk perception (β=-0.081, p>0.05) has no significant impact on product attitude. Comparing Model 7 with Model 5, the squares of product involvement and trust propensity do not change, meaning that risk perception does not mediate the U-shaped relationship between product involvement and product attitude. Therefore, Hypotheses H2a and H2b are not supported.

The moderating effect of sender professionalism was also tested. Model 3 shows that the interaction term (β=-0.325, p<0.01) between the square of product involvement and professionalism has a significant negative impact on risk perception, indicating that professionalism strengthens the inverted U relationship between product involvement and risk perception. As depicted in Figure 2, a higher level of professionalism is associated with a more pronounced inverted U-shaped curve between product involvement and risk perception, while a lower level of professionalism results in a flatter curve. These results validate Hypothesis H3c by verifying the moderating role of professionalism in the relationship between product involvement and risk perception. Model 9 shows that the interaction term (β=0.486, p<0.001) between the square of product involvement and professionalism has a significant positive impact on product attitude, indicating that professionalism strengthens the U-shaped relationship between product involvement and product attitude. As depicted in Figure 3, a higher level of professionalism leads to a more prominent U-shaped curve between product involvement and product attitude, while a lower level of professionalism flattens this curve. This proves the moderating effect of professionalism on the U-shaped relationship between product involvement and product attitude, thus supporting Hypothesis H3d.

4.2.2 *Experiment 2: The influence of sender-recipient relationship strength on the relationship between recipient characteristics and product attitude*

Stepwise regression was conducted to test the research hypotheses, and the regression results are shown in Table 5. Model 5 shows that the square of product involvement (β=1.411, p<0.001) has a significant positive impact on product attitude, indicating the U-shaped relationship between product involvement and product attitude. The square of trust propensity (β=-0.033, p>0.05) has no significant effect on product attitude. Model 2 shows that the square of product involvement (β=-0.112, p<0.05) has a significant negative impact on risk perception, suggesting an inverted U-shaped relationship between product involvement and risk perception and thus supporting Hypothesis H1a. The square of trust propensity (β=0.022,

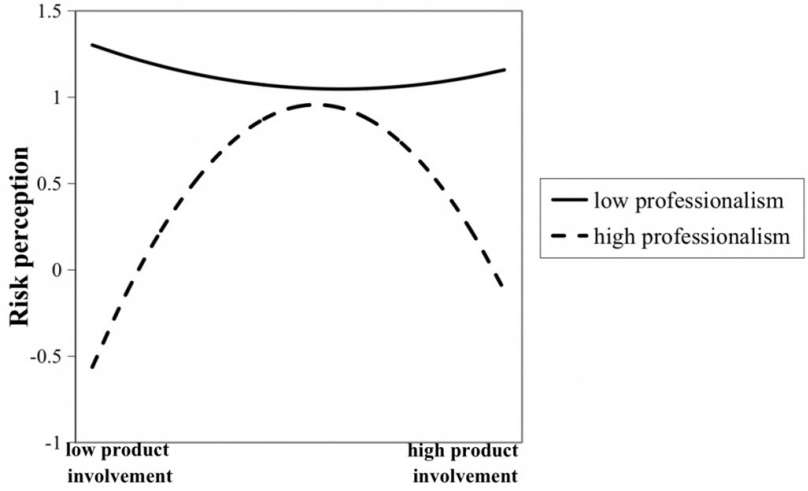

Figure 2. The moderating effect of professionalism on the relationship between product involvement and risk perception

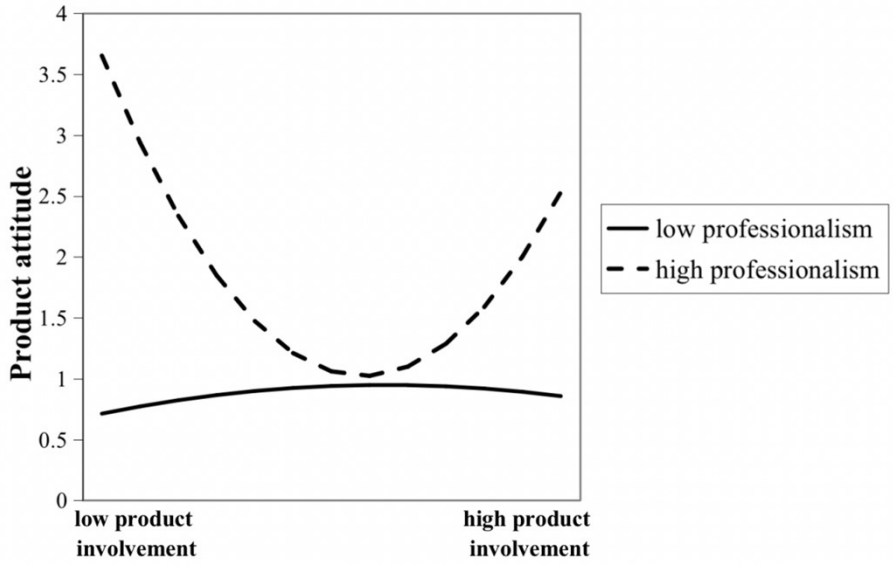

Figure 3. The moderating effect of professionalism on the relationship between product involvement and product attitude

Table 5
Regression results: relationship strength as a moderating variable (N=331)

	Risk perception			Product attitude				
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
Gender	0.012	0.018	0.023	0.01	-0.036	0.006	-0.037	-0.034
Age	-0.063	-0.051	-0.062	0.102	0.034	0.118*	0.022	0.01
Education	0.068	0.077	0.09	-0.172	-0.103*	-0.16**	-0.089*	-0.100*
Occupation	-0.175	-0.189**	-0.164**	0.059	0.036	0.040	0.011	0.013
Monthly salary	0.016	0.007	-0.008	0.032	0.061	0.032	0.006	-0.098*
Daily online time	-0.065	-0.043	-0.032	-0.083	-0.044	-0.099	-0.05	-0.034
Time spent browsing Moments	0.068	0.061	0.077	0.114	0.092*	0.109*	0.098*	0.075
Lychee-planting area	0.083	0.077	0.082	-0.144	-0.062	-0.127*	-0.053	-0.078
Product involvement		0.54	0.027		-0.824***		-0.743**	-0.300
Product involvement^2		-0.112*	-0.005		1.411***		1.312***	0.989***
Trust propensity		0.031	0.044		-0.045		-0.041	-0.031
Trust propensity^2		0.022	0.035		-0.033		-0.029	-0.014
Risk perception						-0.215***	-0.156***	-0.120**
Relationship strength			-0.100					0.630***
Product involvement × Relationship strength			-0.183**					-0.641***
professionalism^2 × Relationship strength			0.017					0.439
Trust propensity × Relationship strength			-0.033					-0.014
Trust propensity^2 × Relationship strength			-0.005					-0.068
R^2	0.06	0.048	0.069	0.111	0.427	0.144	0.451	0.475
F	2.553	8.287	12.079	5.003	60.76	10.921	53.299	48.832
$\triangle R^2$	0.06	0.012	0.026	0.111	0.008	0.012	0.007	0.009

Note: ^{2}Variables were measured by squared; R^2: R-squared, coefficient of determination; $\triangle R^2$: adjusted R-squared; F: F-value; ***p<0.001; **p<0.01; *p<0.05.

p>0.05) has no significant effect on perceived risk, thus rejecting Hypothesis H1b.

We then examined the mediating role of risk perception between recipient characteristics and product attitude. Model 6 shows that risk perception (β=-0.215, p<0.001) has a significant negative impact on product attitude. After adding the square of product involvement, the square of trust propensity, and risk perception for regression in Model 7, risk perception (β=-0.156, p<0.001) still has a significant negative impact on product attitude, while the impact of the square of product involvement (β=1.312, p<0.001) decreased compared to Model 5. These findings support the mediating role of risk perception in the U-shaped relationship between product involvement and product attitude, thus verifying Hypothesis H2a, while not supporting Hypothesis H2b.

To test the robustness of the above results, this study conducted a bootstrap test of the mediating effect of risk perception using the Process plug-in (Hayes, 2013). The sample size was set at 5,000 and the confidence interval was set at 95%. The results are shown in Table 6. The bootstrap confidence interval of the indirect effect does not include 0, indicating that the mediating effect of risk perception is significant, which again verifies Hypothesis H2a.

We also tested the moderating effect of relationship strength. Model 3 reveals that the interaction term (β=0.017, p>0.05) of the square of product involvement and relationship strength has no significant effect on risk perception, suggesting that relationship strength does not moderate this relationship. Thus, Hypothesis H3a is not supported. Furthermore, Model 8 shows that the interaction term of the square of product involvement and professionalism (β=0.439, p>0.05) has no significant impact on product attitude, indicating that the relationship strength has no moderating effect between product involvement and product attitude.

4.2.3. *Experiment 3: The impact of negative WOM characteristics on the relationship between recipient characteristics and product attitude*

The stepwise regression results are shown in Table 7. It can be seen from Model 5 that the square of product involvement (β=0.668, p<0.001) has a significant positive impact on product attitude, indicating a U-shaped relationship between product involvement and product attitude. The square of trust propensity (β=-0.022, p>0.05) has no significant effect on product attitude.

Table 6
Mediating effect analysis

	Effect	SE	CI	Relative effect
Total effect	0.0986***	0.0042	[0.0904,0.1068]	
Direct effect	0.0951***	0.0042	[0.0869,0.1033]	96.45%
Indirect effect	0.0035***	0.0011	[0.0017,0.0058]	3.55%

Note: The standard error (SE) is estimated by bootstrapping 5,000 times. The confidence interval (CI) is 95%. ***p<0.001.

Model 2 shows that the square of product involvement (β=-0.202, p<0.001) has a significant negative impact on risk perception, suggesting an inverted U-shaped relationship between product involvement and risk perception and thus supporting Hypothesis H1a. The square of trust propensity (β=-0.046, p>0.05) has no significant effect on perceived risk, thus rejecting Hypothesis H1b.

We then examined the mediating role of risk perception between recipient characteristics and product attitude. As shown in Model 6, risk perception (β=-0.337, p<0.001) has a significant negative impact on product attitude. Adding the square of product involvement, the square of trust propensity, and risk perception to the regression in Model 7 weakens the impact of the square of product involvement (β=0.626, p<0.001) on product attitude, but maintains the significant negative impact of risk perception (β=-0.198, p<0.001) on product attitude compared to Model 5. Therefore, risk perception plays a mediating role in the U-shaped relationship between product involvement and product attitude, which verifies Hypothesis H2a. However, Hypothesis H2b is not validated.

The robustness test of the mediating effect of risk perception was carried out using the Process plug-in. The sample size was set at 5,000, and the confidence interval was set at 95%. The results are shown in Table 8. The bootstrap confidence interval of the indirect effect does not include 0, indicating that the mediating effect of risk perception is significant, which again verifies Hypothesis H2a.

We also tested the moderating effect of the amount of WOM. As shown in Model 3, the interaction term (β=-0.115, p>0.05) of the square of product involvement and the WOM amount has no significant effect on risk perception, indicating that the amount of WOM has no moderating effect on this relationship and thus not supporting H4a. Model 8 reveals that the interaction term (β=-0.056, p>0.05) of the square of product involvement and professionalism has no significant impact on product attitude, suggesting that the relationship strength does not

Table 7
Regression results: the amount of WOM as a moderating variable (N=319)

	Risk perception			Product attitude				
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
Gender	0.000	-0.013	-0.034	0.010	0.039	0.009	0.034	0.034
Age	0.104	0.134*	0.106	0.076	-0.030	0.026	0.005	0.005
Education	-0.183**	-0.136*	-0.167**	0.189	0.061	0.079	0.021	0.021
Occupation	-0.005	-0.006	0.028	0.014**	-0.007	0.012	0.006	0.006
Monthly salary	-0.158**	0.023**	-0.123*	-0.035	-0.012	-0.077	-0.038	-0.038
Daily online time	-0.015	-0.011	-0.032	0.030	0.074	0.027	0.061	0.061
Time spent browsing Moments	0.084	0.084	0.088	-0.028	-0.034	0.002	-0.024	-0.024
Lychee-planting area	-0.027	-0.063	-0.069	-0.143**	-0.022	-0.153**	-0.036	-0.036
Product involvement		0.563	0.498		-0.109		0.045	0.045
Product involvement^2		-0.202***	-0.181**		0.668***		0.626***	0.626***
Trust propensity		-0.033	-0.053		0.020		0.005	0.005
Trust propensity^2		-0.046	-0.064		0.022		0.003	0.003
Risk perception						-0.337***	-0.198***	-0.198***
The amount of WOM			0.150**					-0.033
Product involvement × The amount of WOM			0.088					-0.040
professionalism^2 × The amount of WOM			-0.115					-0.056
Trust propensity × The amount of WOM			-0.175					-0.016
Trust propensity^2 × The amount of WOM			-0.135					-0.005
R^2	0.085	0.117	0.125	0.030	0.447	0.134	0.484	0.484
F	3.582	10.394	11.242	1.374	255.961	24.485	148.216	148.216
$\triangle R^2$	0.085	0.013	0.015	0.030	0.447	0.023	0.037	0.037

Note: ^{2}Variables were measured by squared; R^2: R-squared, coefficient of determination; $\triangle R^2$: adjusted R-squared; F: F-value; ***p<0.001; **p<0.01; *p<0.05.

Table 8
Mediating effect analysis

	Effect	**SE**	**CI**	**Relative effect**
Total effect	0.0958***	0.0057	[0.0846,0.1070]	
Direct effect	0.0898***	0.0058	[0.0784,0.1013]	93.74%
Indirect effect	0.0060***	0.0024	[0.0019,0.0111]	6.26%

Note: The standard error (SE) is estimated by bootstrapping 5,000 times. The confidence interval (CI) is 95%. ***p<0.001.

moderate the relationship between product involvement and product attitude.

4.2.4 *Experiment 4: The impact of negative WOM timeliness on the relationship between recipient characteristics and product attitude*

The research hypotheses were tested using stepwise regression. The results show that neither product involvement (β=0.076, p>0.05), nor the square of product involvement (β=0.057, p>0.05), nor trust propensity (β=0.058, p>0.05), nor the square of trust propensity (β=0.052, p>0.05) have a significant impact on risk perception. Product involvement (β=-0.621, p<0.05), the square of product involvement (β=1.150, p<0.05), and trust propensity (β=0.148, p<0.05) have a significant impact on product attitude, while the impact of the square of trust propensity (β=-0.268, p>0.05) is insignificant. Hypotheses H4c and H4d were not verified.

5 Conclusion and implications

5.1 Conclusion

There is a U-shaped relationship between negative OWOM recipients' product involvement and product attitude, and the influence of trust propensity on product attitude is insignificant. Stimulated by negative OWOM, the increase in product involvement gradually weakens

consumers' positive attitude towards fresh agricultural products; however, excessive product involvement gradually strengthens this attitude.

There is an inverted U-shaped relationship between negative OWOM recipients' product involvement and risk perception, and the influence of trust propensity on product attitude is insignificant. Upon receiving negative OWOM, consumers' product involvement initially increases their risk perception; however, with further increases in product involvement, their risk perception gradually decreases. Risk perception mediates the relationship between product involvement and product attitude, which varies with the strength of the communicator-receiver relationship and the amount of negative OWOM.

Sender professionalism actively moderates the U-shaped relationship between product involvement and product attitude and the inverted U-shaped relationship between product involvement and risk perception. On the other hand, relationship strength, WOM amount, and the WOM timeliness have no moderating effect on the relationship between recipient characteristics and product attitude.

5.2 Theoretical contribution

First, this study enriches the theoretical research on OWOM by comprehensively demonstrating the mechanism by which negative OWOM affects consumer behavior. It innovatively explores the nonlinear relationship between the three factors of WOM, senders, messages, and recipients, as well as their interactions, and product attitude on a specific social media platform. This theoretical approach enriches the OWOM classification by going beyond the traditional classifications based on WOM characteristics (e.g., channel, effect, source, emotional tendency, and persuasiveness).

Second, this study provides a new analytical perspective for exploring the impact of negative OWOM on product attitudes toward fresh agricultural products, an area that has seldom been examined. Previous research on negative OWOM primarily focuses on its impact on purchase intentions, purchase decisions, and re-dissemination willingness, while neglecting the influence on consumers' product attitudes, especially toward fresh agricultural products. Our research fills the gap by constructing a theoretical approach to examine the product attitude of consumers of fresh agricultural products, expanding the theoretical framework of the impact of negative OWOM on consumer behavior, and providing a theoretical basis for research on the construction and maintenance of OWOM.

Third, this study extends the well-established theory of risk perception to the field of fresh agricultural products and combines it with the communication process theory to explore the mediating role of risk perception in the impact of negative OWOM on product attitude. This enriches the risk perception research by extending the application of risk perception theory to more product categories.

5.3 Implications for practice

Based on the above conclusions, this study presents the following implications for practice. First, marketers should prioritize monitoring negative OWOM and take appropriate measures to address it promptly due to its significant adverse impact on consumer product attitudes. For example, marketers can seek technical and informational support from research teams and institutes specializing in fresh agricultural products and invest resources in monitoring and addressing OWOM in a timely manner. Second, since product involvement can reduce risk perceptions and thus promote positive product attitudes, marketers can leverage this by inviting authoritative researchers of fresh agricultural products to publicly address negative OWOM and disseminate relevant knowledge on social media. This can rectify the product's reputation and reduce consumers' risk perceptions, thereby fostering positive consumer attitudes toward fresh agricultural products.

References

Al-Ansi, A., Olya, H. G. T., & Han, H. (2019). Effect of general risk on trust, satisfaction, and recommendation intention for halal food. *International Journal of Hospitality Management*, *83*, 210-219. http://dx.doi.org/10.1016/j.ijhm.2018.10.017.

Azemi, Y., Ozuem, V., & Howell, K. E. (2020). The effects of online negative word-of-mouth on dissatisfied customers: A frustration-aggression perspective. *Psychology and Marketing*, *37*(4), 564-577. http://dx.doi.org/10.1002/mar.21326.

Bansal, H. S., & Voyer, P. A. (2000). Word-of-mouth processes within a services purchase decision context.

Journal of Service Research, *3*(2), 166-177. http://dx.doi.org/10.1177/109467050032005.

Bronfman, N. C., & Vázquez, E. L. (2011). A cross-cultural study of perceived benefit versus risk as mediators in the trust-acceptance relationship: Perceived benefit versus risk as mediators in the trust-acceptance relationship. *Risk Analysis*, *31*(12), 1919-1934. http://dx.doi.org/10.1111/j.1539-6924.2011.01637.x. PMid:21605152.

Brown, J. J., & Reingen, P. H. (1987). Social ties and word-of-mouth referral behavior. *The Journal of Consumer Research*, *14*(3), 350. http://dx.doi.org/10.1086/209118.

Casaló, L. V., Flavián, C., & Ibáñez-Sánchez, S. (2020). Influencers on instagram: Antecedents and consequences of opinion leadership. *Journal of Business Research*, *117*, 510-519. http://dx.doi.org/10.1016/j.jbusres.2018.07.005.

Chen, F., Liu, S. Q., & Mattila, A. S. (2020). Bragging and humblebragging in online reviews. *Annals of Tourism Research*, *80*, 102849. http://dx.doi.org/10.1016/j.annals.2019.102849.

Choi, Y. K., Seo, Y., Wagner, U., & Yoon, S. (2020). Matching luxury brand appeals with attitude functions on social media across cultures. *Journal of Business Research*, *117*, 520-528. http://dx.doi.org/10.1016/j.jbusres.2018.10.003.

Coppola, N. W., Hiltz, S. R., & Rotter, N. G. (2004). Building trust in virtual teams. *IEEE Transactions on Professional Communication*, *47*(2), 95-104. http://dx.doi.org/10.1109/TPC.2004.828203.

Dholakia, U. M. (2001). A motivational process model of product involvement and consumer risk perception. *European Journal of Marketing*, *35*(11-12), 1340-1362. http://dx.doi.org/10.1108/EUM0000000006479.

Du, R. Y., Joo, M., & Wilbur, K. C. (2019). Advertising and brand attitudes: Evidence from 575 brands over five years. *Quantitative Marketing and Economics*, *17*(3), 257-323. http://dx.doi.org/10.1007/s11129-018-9204-6.

Duarte, P., Teixeira, M., & Costa e Silva, S. (2021). Healthy eating as a trend: Consumers' perceptions towards products with nutrition and health claims. *Revista Brasileira de Gestão de Negócios*, *23*(3), 405-421. http://dx.doi.org/10.7819/rbgn.v23i3.4113.

Earle, T. C. (2010). Trust in risk management: A model-based review of empirical research. *Risk Analysis*, *30*(4), 541-574. http://dx.doi.org/10.1111/j.1539-6924.2010.01398.x. PMid:20522197.

Featherman, M. S., & Pavlou, P. A. (2003). Predicting e-services adoption: A perceived risk facets perspective. *International Journal of Human-Computer Studies*, *59*(4), 451-474. http://dx.doi.org/10.1016/S1071-5819(03)00111-3.

Garepasha, A., & Aali, S. (2020). Dynamics of online relationship marketing: Relationship quality and customer loyalty in Iranian banks. *Revista Brasileira de Gestão de Negócios*, *22*(1), 140-162. http://dx.doi.org/10.7819/rbgn.v22i1.4043.

Gervais, S., Heaton, J. B., & Odean, T. (2011). Overconfidence, compensation contracts, and capital budgeting. *The Journal of Finance*, *66*(5), 1735-1777. http://dx.doi.org/10.1111/j.1540-6261.2011.01686.x.

Gil, R., Korkmaz, E., & Sahin, O. (2020). Can free-shipping hurt online retailers? *Quantitative Marketing and Economics*, *18*(3), 305-342. http://dx.doi.org/10.1007/s11129-020-09225-8.

Gill, H., Boies, K., Finegan, J. E., & McNally, J. (2005). Antecedents of trust: Establishing a boundary condition for the relation between propensity to trust and intention to trust. *Journal of Business and Psychology*, *19*(3), 287-302. http://dx.doi.org/10.1007/s10869-004-2229-8.

Gilly, M. C., Graham, J. L., Wolfinbarger, M. F., & Yale, L. J. (1998). A dyadic study of interpersonal information search. *Journal of the Academy of Marketing Science*, *26*(2), 83-100. http://dx.doi.org/10.1177/0092070398262001.

Gong, S., Li, Q., Zhao, P., & Ren, Z. W. (2018). Marketing communication in the digital age: Internet advertising, Internet word-of-mouth and mobile game sales. *Nankai Business Review*, *2*, 28-42.

Han, J., Wang, D., & Yang, Z. (2021). A Study on the influence mechanism of forced participation on consumers' negative word-of-mouth. *Journal of Business Research*, *6*, 1-8.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach.* New York: The Guilford Press.

Hu, Z., & Zhang, L. (2021). Brand image, product involvement and customer loyalty of e-commerce platform. *Journal of Commercial Economics*, *10*, 87-90.

Kramer, R. M. (1999). Trust and distrust in organizations: Emerging perspectives, enduring questions. *Annual Review of Psychology*, *50*(1), 569-598. http://dx.doi.org/10.1146/annurev.psych.50.1.569. PMid:15012464.

Le Bon, G. (1908). *The crowd: A study of the popular mind.* London: T. Fisher Unwin. http://dx.doi.org/10.1037/10878-000.

Lee, J., Park, D.-H., & Han, I. (2008). The effect of negative online consumer reviews on product attitude: An information processing view. *Electronic Commerce Research and Applications*, *7*(3), 341-352. http://dx.doi.org/10.1016/j.elerap.2007.05.004.

Lee, Y. L., & Song, S. (2010). An empirical investigation of electronic word-of-mouth: Informational motive and corporate response strategy. *Computers in Human Behavior*, *26*(5), 1073-1080. http://dx.doi.org/10.1016/j.chb.2010.03.009.

Liu, Y. (2006). Word of mouth for movies: Its dynamics and impact on box office revenue. *Journal of Marketing*, *70*(3), 74-89. http://dx.doi.org/10.1509/jmkg.70.3.074.

Liu, L. L., Lee, M. K. O., Liu, R. J., & Chen, J. (2018). Trust transfer in social media brand communities: The role of consumer engagement. *International Journal of Information Management*, *41*, 1-13. http://dx.doi.org/10.1016/j.ijinfomgt.2018.02.006.

Liu, Y., Su, X., Du, X., & Cui, F. (2019). How social support motivates trust and purchase intentions in mobile social commerce. *Revista Brasileira de Gestão de Negócios*, *21*(4), 839-860. http://dx.doi.org/10.7819/rbgn.v21i5.4025.

Lovett, M. J., Peres, R., & Xu, L. (2019). Can your advertising really buy earned impressions? The effect of brand advertising on word of mouth. *Quantitative Marketing and Economics*, *17*(3), 215-255. http://dx.doi.org/10.1007/s11129-019-09211-9.

McKnight, D. H., Cummings, L. L., & Chervany, N. L. (1998). Initial trust formation in new organizational relationships. *Academy of Management Review*, *23*(3), 473-490. http://dx.doi.org/10.2307/259290.

Mehrolia, S., Alagarsamy, S., & Solaikutty, V. M. (2021). Customers response to online food delivery services during COVID- 19 outbreak using binary logistic regression. *International Journal of Consumer Studies*, *45*(3), 396-408. http://dx.doi.org/10.1111/ijcs.12630. PMid:33362434.

Mitchell, V. W., Yamin, M., & Pichene, B. (1997). A cross-cultural analysis of perceived risk in British and French CD purchasing. *Journal of Euromarketing*, *6*(1), 5-24. http://dx.doi.org/10.1300/J037v06n01_02.

Packard, G., Gershoff, A. D., & Wooten, D. B. (2016). When boastful word of mouth helps versus hurts social perceptions and persuasion. *The Journal of Consumer Research*, *43*(1), 26-43. http://dx.doi.org/10.1093/jcr/ucw009.

<ths>Ren, Q. (2010). *An empirical study on the influence of online word-of-mouth on consumer purchase decision* [Unpublished master dissertation]. Zhejiang Normal University.

Siegrist, M., & Cvetkovich, G. (2000). Perception of hazards: The role of social trust and knowledge. *Risk Analysis*, *20*(5), 713-719. http://dx.doi.org/10.1111/0272-4332.205064. PMid:11110217.

Smith, E. K., & Mayer, A. (2018). A social trap for the climate? Collective action, trust and climate change risk perception in 35 countries. *Global Environmental Change*, *49*, 140-153. http://dx.doi.org/10.1016/j.gloenvcha.2018.02.014.

Song, Y., & Wang, X. (2011). Analysis of the influence of negative word-of-mouth on purchase intention: Based on the comparison of traditional word-of-mouth and Internet word-of-mouth. *Research on Financial and Economic Issues*, *12*, 22-27.

Tu, H., & Luo, P. (2017). The influence of consumer anger on travel intention and negative word-of-mouth:

An empirical study based on the unethical events in the destination. *Tourism Science*, *2*, 42-54.

Tuu, H. H., & Olsen, S. O. (2009). Food risk and knowledge in the satisfaction- repurchase loyalty relationship. *Asia Pacific Journal of Marketing and Logistics*, *21*(4), 521-536. http://dx.doi.org/10.1108/13555850910997571.

Vainio, A., Paloniemi, R., & Varho, V. (2017). Weighing the risks of nuclear energy and climate change: Trust in different information sources, perceived risks, and willingness to pay for alternatives to nuclear power. *Risk Analysis*, *37*(3), 557-569. http://dx.doi.org/10.1111/risa.12640. PMid:27350103.

Zaichkowsky, J. L. (1986). Conceptualizing involvement. *Journal of Advertising*, *15*(2), 4-34. http://dx.doi.org/10.1080/00913367.1986.10672999.

Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1996). The behavioral consequences of service quality. *Journal of Marketing*, *60*(2), 31-46. http://dx.doi.org/10.1177/002224299606000203.

Supplementary Material

Supplementary material accompanies this paper: https://doi.org/10.7910/DVN/W5ZYH7
Supplementary Data 1 – Questionaries
Supplementary Data 2 – Database

Financial support:
This work was supported by the special fund for China Agriculture Research System [no. CARS-32-14].

Open Science:
Gao, Fei; Qi, Wen'e; Cui, Ziyun, 2024, "Supplementary Data - Negative online word-of-mouth and consumers' product attitudes: A nonlinear relationship", https://doi.org/10.7910/DVN/W5ZYH7, Harvard Dataverse, V1

Conflicts of interest:
The authors have no conflicts of interest to declare.

Plagiarism analysis:
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