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The influence of reward qualifying conditions on participation in online referral programs

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ABSTRACT

Online referral reward programs (RRPs) incentivize customers to promote products within their digital social networks by offering rewards, yet these programs often face persistently low participation. This research examines how online RRP qualifying conditions—specifically, whether rewards depend solely on the referrer's own actions or require assistance from others—shape customers' willingness to engage. Drawing on psychological reactance theory, the study investigates both the direct impact of assistance-based conditions and the mediating role of psychological reactance, as well as whether the timing of the reward offer (pre-vs. post-consumption) moderates these effects. Three scenario-based online RRP experiments conducted in gym, meal-kit, and coffee-shop contexts show that assistance-based conditions heighten reactance and reduce engagement, while post-consumption timing attenuates this reactance-driven decline. The findings advance understanding of consumer responses to online RRPs and provide actionable guidance for designing more effective digital referral strategies.

1. Introduction

Referral reward programs (RRPs) are a popular marketing strategy that incentivizes existing customers to recommend products to others in their social networks by offering rewards for successful referrals (Peng et al., 2023; Li et al., 2021). These programs are widely adopted across various industries, including banking, finance, telecommunications, hospitality, education, fashion, and beauty (Hollebeek et al., 2016; Jin and Huang, 2014; Xu et al., 2023). Many well-known e-commerce platforms, such as Amazon, Dropbox, and Uber, have launched their RRPs (Jin et al., 2024). Although RRPs have been shown to be effective in driving customer acquisition and improving business performance (Garnefeld et al., 2013; Ramaseshan et al., 2017), they often fall short of expectations due to low levels of customer engagement (Gershon et al., 2020). The strategies of referral programs are still in the early stage of research (Zhan et al., 2023). So an understanding of the mechanism of rewards programs is necessary as poorly designed or implemented rewards programs can adversely affect firm performance (Sharma and Verma, 2014).

To boost customer engagement with RRPs, existing research has extensively examined how various reward attributes influence customers' willingness to make referrals. This includes the reward type (Zhang et al., 2019), reward amount and distribution (Ryu and Feick, 2007), reward-product congruence (Peng et al., 2023), the disclosure of reward information (Xu et al., 2023), and referral contexts (private and public communication environments) (Zhan et al., 2023; Carroni et al., 2020). A key aspect, however, remains under explored: that customers often need to meet specific conditions to qualify for referral rewards. These conditions include an assistance threshold, like acquiring a certain number of new customers (Ryu and Feick, 2007; Schmitt et al., 2011), inviters are rewarded only if they sufficiently bring in a certain number of referrals (Lobel et al., 2017), or a non-assistance threshold, like promoting their referrals on personal or third-party social media platforms (Haenlein and Libai, 2017). As a result, it remains unclear how different qualifying conditions affect customers' willingness to recommend products.

Qualifying conditions attached to referral rewards can act as barriers to customers trying to earn rewards, potentially triggering psychological reactance i.e. feelings of a perceived threat to their freedom possibly promoting hostile emotions. This is especially likely in the social media

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context, where the widespread use of digital tools has significantly increased customers' freedom to make referrals, without assistance from others. Such conditions may mediate the impact of the programme on customers' willingness to recommend. While existing research has explored the role of psychological reactance during the recommendation acceptance phase, between recommenders and recipients (Sciandra, 2019), it remains unclear whether it also occurs during the recommendation participation phase between firms and recommenders.

Additionally, the timing of RRPs—specifically, whether they are introduced before or after product consumption—can influence customers' motivation to refer. However, this aspect has received limited attention in prior research (Ryu and Feick, 2007). While most studies focus on RRPs introduced after consumption, customers may also encounter these programmes before making a purchase. For example, Didi (China's equivalent of Uber) employs pre-purchase RRPs by offering incentives—such as discounts for social sharing or inviting friends—before a transaction takes place. Similarly, Pinduoduo, a major Chinese e-commerce platform, offers cash rewards and coupons to new users through RRPs. Merchants on Meituan, China's leading food delivery platform, also provide discount vouchers to first-time users, encouraging them to promote the store via their WeChat Moments.

The rise of social media has transformed personal consumption into a socially driven experience, often referred to as social shopping (Chen and Shen, 2015). As a result, an increasing number of firms have adopted online RRPs, underscoring their growing importance for marketing success (Jung et al., 2021). Despite this trend, limited research has examined online RRPs delivered specifically through social media platforms. This study addresses this gap, making several key contributions:

First, we offer a novel perspective on customer engagement with RRPs by examining the reward qualifying conditions, thereby enhancing current understanding and providing actionable insight for strategic design and implementing more effective RRPs. Second, we identify and explore the role of psychological reactance as a key mediator of reward conditions, advancing the current body of knowledge on the psychological underpinnings of RRP participation (Ramaseshan et al., 2017). Third, in response to Ryu and Feick's (2007) call, we investigate the moderating influence of RRP timing on the link between reward conditions and referral willingness, providing a nuanced view of RRPs utility from the recommenders' standpoint and guidance for marketers. Finally, by concentrating on online RRPs via social media, this research addresses the pressing need for businesses to craft effective digital marketing strategies in the dynamic digital and social media environment.

The paper is structured as follows: Section 2 reviews the relevant literature and develops the hypotheses. Section 3 describes the research methodology, presents the results, and discusses the findings. Section 4 highlights the theoretical contributions and managerial implications, and Section 5 outlines the study's limitations and suggests directions for future research.

2. Literature review and hypotheses development

2.1. RRP reward structures: effort, assistance, and participation

Traditional word-of-mouth (WOM) marketing relies on spontaneous consumer behavior without explicit incentives (Brooks Jr, 1957; Dichter, 1966). As firms increasingly recognized the strategic value of WOM, RRPs emerged to formalize and incentivize referrals, transforming them into controllable marketing instruments (Wang et al., 2018). The proliferation of digital platforms further amplified this shift: online RRPs allow firms to leverage customers' social networks to convert social capital into economic value (Jung et al., 2021; Van den Bulte et al., 2018). Empirical evidence underscores their effectiveness in customer acquisition, retention, and positive post-purchase evaluations—even in service failure contexts (Haenlein and Libai, 2017; Kuang et al., 2022; Sciandra, 2019; Peng et al., 2023).

Despite these benefits, customers' willingness to participate remains limited (Dose et al., 2019; Wirtz et al., 2019a, 2019b), prompting research into design features that influence engagement. Among these features, reward qualifying conditions—the specific actions required to earn rewards—play a central role. These conditions range from low-effort tasks that individuals can complete independently (e.g., sharing links or posting reviews) to assistance-based tasks that require the cooperation of others (e.g., friend registrations or purchases) (Bertini and Aydinli, 2020).

Exchange theory provides a cost–benefit framework for understanding these behaviors. Consumers evaluate whether the expected rewards compensate for non-monetary costs such as time, effort, and social risk (Gatignon and Robertson, 1986; Bertini and Aydinli, 2020; Jin and Huang, 2014). Low-effort tasks generally enhance participation, whereas assistance-based conditions elevate both effort and social costs, thereby reducing engagement. These conditions may also increase reputational risk if acquaintances perceive referrals as self-serving or commercially motivated (Wirtz et al., 2013).

Beyond observable cost–benefit trade-offs, internal psychological mechanisms shape referral behavior. Self-perception theory suggests that the requirement to obtain others' assistance can induce feelings of pressure or exploitation, diminishing intrinsic motivation and lowering the perceived value of rewards (Bem, 1965, 1972; Wirtz et al., 2013). From a motivational systems perspective, consistent and attainable rewards foster approach motivation, whereas increasing effort or uncertainty activates avoidance tendencies, further discouraging participation (Corr, 2013).

Although prior research has examined reward design and dual-incentive structures (Dose et al., 2019; Wang and Ding, 2022), the role of qualifying conditions—particularly assistance-based thresholds—in shaping willingness to participate in online RRPs remains insufficiently understood. This gap is critical given the prevalence of assistance-based mechanisms in contemporary digital referral campaigns.

Hypothesis 1. (H1): Assistance-based reward conditions (vs. no assistance required) negatively affect customers' willingness to participate in online RRPs. Specifically, the higher the assistance threshold for earning rewards, the lower the customer's willingness to engage.

2.2. Consumer psychological reactance

Psychological reactance, grounded in Brehm's (1966) theory, refers to the motivational state that emerges when individuals perceive restrictions on their behavioral freedom. This construct has been extensively examined in persuasive communication (Burgoon et al., 2002) and frequently appears in marketing contexts where messages are perceived as intrusive, overly personalized, or coercive—often producing message avoidance, resistance to persuasion, or even negative WOM (Amarnath and Jaidev, 2021).

Reactance comprises both cognitive and affective components (Dillard and Shen, 2005). Cognitive appraisals involve recognizing and interpreting threats to autonomy, while affective responses—such as anger or hostility—reflect attempts to restore that autonomy (Chen et al., 2019). Although scholars acknowledge this dual structure, few studies examine these components separately (Song et al., 2022). Within RRPs, qualifying conditions that restrict how and when rewards can be earned can activate these processes.

Assistance-based qualifying conditions require recommenders to leverage their social capital to obtain rewards (Xu et al., 2023). Such conditions may heighten concerns about how acquaintances judge one's motives (Verlegh et al., 2013) and diminish autonomy by making reward attainment dependent on others' actions. When customers perceive an imbalance between their non-monetary efforts and the rewards offered, feelings of being controlled or exploited may arise

(Kivetz, 2005; Bertini and Aydinli, 2020). These perceived threats to freedom trigger psychological reactance, potentially leading to disengagement or negative WOM (Amarnath and Jaidev, 2021). In contrast, conditions that do not require assistance tend to be viewed as non-intrusive and thus reduce perceptions of control and mitigate reactance (Wu et al., 2025).

Although opting out of RRPs may help restore autonomy, it also entails forgoing potential rewards, which can evoke frustration or resentment toward the firm (Clee and Wicklund, 1980). Assistance-based conditions—particularly those perceived as "enforced duties"—heighten these negative affective reactions (Bertini and Aydinli, 2020). On social media, where commercial solicitations intermingle with personal connections, such conditions may appear even more intrusive, further amplifying perceived freedom threats (Morimoto and Macias, 2009).

Overall, psychological reactance plays a central mediating role in consumer responses to RRPs. When assistance requirements threaten autonomy, the resulting negative cognitions and hostile emotions reduce consumers' willingness to participate. While prior research has largely examined reactance from the referee's perspective (e.g., referral acceptance; Sciandra, 2019), limited attention has been paid to how qualifying conditions elicit reactance in the referrer. This gap is especially salient in social media–based RRPs, where interactions are public, relational, and inherently pressure-laden.

Accordingly, we propose:

Hypothesis 2. Psychological reactance mediates the relationship between online RRP qualifying conditions and customers' willingness to refer. Specifically:

- **H2a**: Assistance-based RRP conditions (vs. no assistance required) are more likely to trigger psychological reactance, thereby reducing willingness to refer.
- **H2b**: Higher assistance thresholds intensify psychological reactance, further decreasing willingness to refer.

2.3. RRPs timing: pre vs. post consumption

Pre- and post-consumption represent distinct stages in the consumer decision-making process (Jiang et al., 2018), and consumers respond differently to marketing messages depending on the stage in which they occur (Woimant and Steils, 2025). These distinctions are especially important for experiential offerings, where consumers lack the ability to evaluate quality before purchase (Nelson, 1974), resulting in low familiarity and trust (Ramkumar and Jin, 2019). Consequently, firm-provided information becomes particularly influential at the pre-consumption stage (Reimers and Waldfogel, 2021). Although digital channels provide rapid access to information, the overall customer experience still unfolds across pre- and post-consumption stages (Bolton et al., 2018), making timing a critical element of marketing strategy (Darbanian et al., 2025).

The first research stream examines the effectiveness of firm-initiated promotions at different time points and how these effects vary across products and channels. For example, Darbanian et al. (2025) show that pre-holiday promotions are particularly effective for new products, whereas frozen goods are less sensitive to timing. In online contexts, Tian et al. (2024) document "trough effects" in consumer browsing behavior before and after major promotional events and reveal differences between PC and mobile platforms. Although this stream provides managerial guidance on resource allocation, it relies heavily on secondary data or modelling, revealing little about consumers' psychological processes across stages.

A second stream embeds promotional timing within the consumer journey and examines stage-specific psychological mechanisms and behavioral responses (Arce-Urriza et al., 2025; Li and Atkinson, 2020; Santos and Gonçalves, 2021). For example, resource-scarce consumers seek broader discounts pre-purchase (Fan et al., 2019), and pride-evoking ads are more persuasive for them (Salerno and Escoe, 2020). Jung and Mittal (2020) demonstrate that political identity affects both pre-consumption information processing and post-consumption behaviors such as satisfaction expression and WOM. More recent work on live-streaming shows that high pre-purchase engagement boosts purchase intention but lowers post-purchase satisfaction due to cognitive–affective imbalance (Fan et al., 2025). This stream highlights that timing effects differ by stage, offering more consumer-centric insights than the first stream.

Despite the advances in both streams, the timing of RRPs remains understudied. Existing RRP research focuses on reward design, incentive structures, or referral acceptance, but rarely examines when RRPs should be offered along the consumer journey. Most empirical RRP work focuses on either pre- or post-consumption, typically assuming post-purchase referrals are normatively superior (Wirtz et al., 2019a). Yet pre-consumption RRPs may stimulate early engagement (Ryu and Feick, 2007), and premature advocacy can provoke scepticism or reactance (Friestad and Wright, 1994; Haenlein and Libai, 2017). No research systematically compares pre- and post-consumption RRP timing or examines how timing shapes referrers' psychological responses. This gap creates an opportunity to extend consumer journey research into the domain of RRPs.

At the pre-consumption stage, consumers experience uncertainty and elevated risk perceptions (Chen et al., 2023). Without firsthand experience, referrals lack credibility and may seem self-serving. Assistance-based RRP conditions amplify these concerns by imposing social effort and autonomy loss, making pre-consumption consumers more prone to psychological reactance (Morimoto and Macias, 2009). Post-consumption consumers, by contrast, possess direct experience, reducing uncertainty and enhancing confidence when recommending products. Their referrals serve to validate their own purchase decisions (Jin and Huang, 2014), carry greater authenticity, and therefore elicit less reactance. Accordingly:

Hypothesis 3. Online RRP timing moderates the effect of psychological reactance: reactance-mediated effects are weaker at the post-consumption stage than at the pre-consumption stage.

To comprehensively test our proposed model, we conducted three scenario-based experiments, each with a distinct objective (see Table 1). Study 1 (Gym context) established the baseline effect of assistance-based reward conditions on psychological reactance and referral willingness (H1–H2) in a post-consumption setting. Study 2 (Meal Kit context) replicated these findings in a pre-consumption scenario and further differentiated assistance conditions by requiring friend registrations (versus likes in Study 1), thereby extending generalizability to privacy-sensitive behaviors. Study 3 (Coffee Service context) introduced the critical moderator of RRP timing (pre-versus post-consumption), testing H3's boundary condition through a 3×2 factorial design not previously employed.

It is important to clarify how the three theoretical perspectives—exchange theory, self-perception theory, and psychological reactance theory—provide conceptual grounding for the model. Psychological reactance theory serves as the core explanatory lens, while exchange theory and self-perception theory function as complementary perspectives that clarify the antecedents of reactance. These three theories operate as parallel explanatory lenses, rather than forming a sequential mechanism. Exchange and self-perception theories highlight factors that may influence reactance, but they serve as parallel conceptual foundations rather than sequential precursors. Specifically, exchange theory explains customers' cost–benefit evaluations of participation, self-perception theory captures internal evaluations of one's behavior and its social implications, and psychological reactance theory explains the motivational response to perceived threats to autonomy. Each perspective illuminates a distinct facet of behavior,

Table 1
Experiment design summary.

Experiment	Context	Key Manipulation	Unique Contribution	Typical RRP Target User Profile
Study1	Service based consumption: Gym	Assistance type (likes: no vs. 44 vs. 88)	Baseline test of H1-H2 in post-consumption	Has service-oriented consumption needs, often engaging in membership-based business models
Study2	Subscription-based consumption: Meal Kit	Assistance type (registrations vs. shares)	Validated mechanism in pre-consumption + privacy concerns	Has subscription-based daily consumption needs, emphasizing convenience
Study3	Everyday consumption: Coffee shop	Timing (pre/post) × Assistance (0/33/66 likes)	Revealed H3's moderation effect	Has high-frequency daily consumption needs, focusing on product or service experience

providing a comprehensive understanding of why assistance-based referral conditions reduce willingness to participate.

The three scenario-based studies follow a cumulative logic rather than a repetitive one. Study 1 establishes the main effect of assistance requirements on participation (H1), Study 2 identifies psychological reactance as the mediating mechanism (H2a–H2b), and Study 3 tests a boundary condition by examining RRP timing (H3). Together, these studies incrementally build a coherent narrative linking assistance-based conditions, reactance, and participation, while also demonstrating the robustness and contextual generalizability of the findings.

Fig. 1 illustrates the proposed relationships. The following empirical analysis section presents the research methodology used to test the hypotheses and summarizes the key findings.

3. Research methodology and key findings

A scenario-based experimental approach was employed to test the proposed hypotheses, offering key advantages over surveys and retrospective studies, which can be used to establish causal relationships by systematically controlling variables (Bryman, 2016). Scenario experiments can reduce recall bias, enhance internal validity, and enable controlled manipulation of variables, helping to mitigate potential confounding effects. This method has been shown to be effective in prior RRP research (Xu et al., 2023; Dose et al., 2019; Kuang et al., 2024), and this method can also examine the role of psychological reactance effectively (Song et al., 2022).

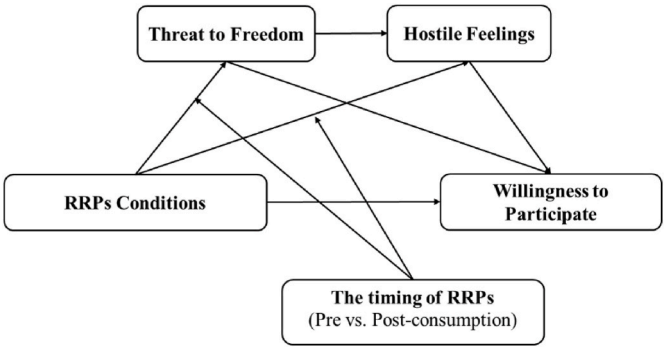

Fig. 1. Theoretical model.

To validate the theoretical model, three scenario-based experiments were conducted. And each experiment was set in a different service context to enhance the generalizability of the findings. And to ensure diverse representation, all participants are recruited via non-probability sampling from Credamo (https://www.credamo.com/), a platform commonly used in online consumer behavior research and offers a broader and more varied sample compared to traditional recruitment methods (Chen et al., 2025), and numerous prior RRP-related consumer behaviors research has been conducted on this platform (Jin et al., 2024; Zhan et al., 2023). A random assignment was employed in three scenario-based experiments to reduce self-selection bias. Following Chen et al. (2025), all participants are provided the experiment introduction with an overview of the study' s objectives and confidentiality policies, emphasizing voluntary participation and the right to withdraw at anytime without penalty.

As summarized in Table 1, Study 1 tested Hypotheses 1 and 2 in a gym setting. Study 2 replicated and extended these findings using a Meal Kit delivery service scenario, further manipulating the independent variable. Study 3 employed a coffee shop scenario to examine the moderating effect proposed in Hypothesis 3 (see Table 2 for demographic details).

3.1. Study 1

Study 1 employed a one-factor, between-subjects scenario-based experiment to examine the influence of the reward qualifying conditions on consumers' willingness to participate in RRPs.

3.1.1. Method: experimental scenario

Study 1 uses a service scenario-based experimental methodology adapted from Dose et al. (2019), originally conducted in a gym setting within the service industry, and tailored to the Chinese context. With

Table 2
Demographic details.

Construct	Item	Study 1(*N* = *236*)	Study 2(*N* = *244*)	Study 3(*N* = *599*)
		Attrition Rate = 12.6 %	Attrition Rate = 9.6 %	Attrition Rate = 9.24 %
		Reasons for participant exclusion:*Failed the attention check questions included in each sub-experiment.*		
Gender	Male	145	128	394
	Female	91	116	205
Age	<20	18	14	33
	21–30	126	132	277
	31–40	73	70	234
	41–50	13	19	30
	51–60	6	7	23
	61 or older	0	2	2
Education	elementary school or below	0	0	0
	junior high school	1	3	2
	senior high/ vocational/ technical school	9	7	20
	associate degree	16	25	48
	Bachelor's degree	174	176	434
	Master's degree	33	31	90
	doctoral degree	3	2	5
Income	below 1999¥	28	20	54
	2000-4999¥	58	49	103
	5000-7999¥	54	79	151
	8000-10999¥	48	56	144
	11000¥ or above	48	40	147

rising health awareness in China, the fitness industry is growing rapidly, making referral marketing a key strategy for customer acquisition. In this market, RRPs are commonly implemented through WeChat — the dominant social media platform in China (Lien and Cao, 2014) — which enables instant messaging, sharing, and multimedia communication. These RRPs typically offer uniform, low-value incentives (e.g., 10 % discounts), reflecting the low cost and ease of information dissemination via social media (Jin and Huang, 2014; Ryu and Feick, 2007).

We presented the participants with relevant information about "Active Gym", a fictional fitness centre offering a full-service programme for a monthly fee of RMB 300. The gym features modern equipment, including weight machines, free weights, and cardio machines, as well as a variety of classes such as Pilates, strength training, and boxing. Then we asked the participants to imagine having had a positive experience at this gym.

Participants were randomly assigned to either a control group or one of two intervention groups and were introduced to the RRP. In the control group (no assistance required), participants were told they could earn a voucher worth RMB 30 simply by sharing Active Gym's promotional content on their WeChat Moments, with no additional conditions. In the intervention groups (low/high assistance required), participants were informed that they would need to share the same post and receive at least 44 (low threshold) or 88 (high threshold) likes from their WeChat contacts in order to qualify for the reward.

3.1.1.1. Measurement

3.1.1.1.1. Scale adaptation and measurement. To ensure cultural relevance and linguistic accuracy, all measurement scales were adapted to the Chinese context using a rigorous translation and back-translation procedure.

3.1.1.1.2. Mediating variables. Psychological reactance was measured using items adapted from Bertini and Aydinli (2020). Perceived threat to freedom was assessed with three items on a continuous sliding scale ranging from 0 (strongly disagree) to 100 (strongly agree). Hostile emotional responses were measured with two items on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree).

3.1.1.1.3. Dependent variable. Referral propensity — the likelihood of consumers recommending the product — was measured using a single item adapted from Jin and Huang (2014), rated on a sliding scale from 0 (extremely unlikely) to 100 (extremely likely).

3.1.1.1.4. Control variables. To account for alternative influences on referral behavior, perceived social costs (PSC) and perceived reward value (PRV) were included as control variables. PSC was measured using a five-item scale adapted from Jin and Huang (2014), which included one reverse-coded item. Although reverse-coded items can help mitigate response biases such as acquiescence or response inertia (Churchill Jr, 1979; Nunnally, 1978), they may also reduce internal consistency, disrupt dimensionality, and interfere with participants' actual response judgments (Cronbach, 1950; Falthzik and Jolson, 1974). In particular, reverse-coded items often show lower consistency with other items measuring the same construct and may introduce systematic measurement noise due to misinterpretation. This issue is especially relevant for East Asian samples: Wong et al. (2003) found that scales containing both positively and negatively worded items can confuse respondents from these populations.

In our experiments, we consistently observed low factor loadings for the reverse-coded PSC item. Removing this item improved reliability and validity metrics across all sub-studies. Subsequent confirmatory factor analysis (CFA) and measurement invariance tests confirmed that deleting the item did not compromise the construct's validity or reliability. Consequently, all subsequent analyses used a refined four-item PSC scale, excluding the reverse-coded item.

PRV was measured with a two-item scale adapted from Dose et al. (2019). Including these control variables allowed for a more robust test of the proposed hypotheses across all studies.

3.1.1.2. Participants and design. Prior to the experiment, we conducted an a priori sample size estimation using G*Power, a freely available tool widely used for calculating statistical power and effect size across various tests, particularly in psychological research. The parameters were set as follows:

- Test family: F tests
- Statistical test: ANOVA: Fixed effects, omnibus, one-way
- Effect size (f): 0.25 (medium effect)
- α error probability: 0.05
- Power (1–β): 0.80
- Number of groups: 3

The analysis indicated that a total sample of 159 participants would be required. A total of 270 participants were randomly recruited through Credamo, a widely used Chinese crowdsourcing platform similar to Amazon Mechanical Turk (Liang et al., 2024; Song et al., 2023). Credamo is frequently employed in online experimental research, including studies focused on RRPs (Wang and Ding, 2022; Xu et al., 2023). To ensure authenticity and prevent opportunistic behaviours such as bot use, all participants were verified through real-name registration and Chinese national ID validation.

Participants were first presented with contextual information describing the experimental setup and then directed to a consent form. Although our experimental design is straightforward and includes only a limited number of related items, we included an attention check at the beginning of the study to exclude participants who did not properly engage with the experimental stimuli. The question was as follows:

'In the previous scenario, what was the value of the voucher offered by Active Gym? Did it require assistance from others? If yes, how many "likes" were needed? Please provide your answer in the following format: __ yuan; (not) required; __ likes [fill in the blanks].'

To maintain data quality, responses with incorrect identification inputs were excluded from the final analysis, yielding a valid sample of 236 participants (145 female), with 84.3 % aged between 21 and 40. All verified participants received compensation for their participation. After excluding unqualified samples, we tested for demographic balance across the groups. A one-way ANOVA confirmed that the three experimental conditions did not differ significantly in terms of gender ($F(2, 233) = 0.296$, $p > .1$), age ($F(2, 233) = 0.418$, $p > .1$), education level ($F(2, 233) = 1.48$, $p > .1$), or income ($F(2, 233) = 0.097$, $p > .1$). These results indicate that the random assignment was successful, and the groups were comparable on key demographic variables at baseline. Therefore, the observed sample attrition is unlikely to be due to systematic biases related to these characteristics.

The Cronbach's α and composite reliability (CR) values of all latent variables measured in the study exceeded the recommended threshold of 0.70 (Hair et al., 2022), and all average variance extracted (AVE) values exceeded 0.50 (Sarstedt et al., 2022), and we conducted CFA, the results of which are provided in Appendix A, and all outcomes met the established standards, indicating satisfactory reliability and validity. Furthermore, the measurement-model fit indices meets the criteria ($\chi 2/df = 2.402 < 5$, $CFI = 0.977 > 0.9$,$GFI = 0.928 > 0.9$, $NFI = 0.961 > 0.9$, $TLI = 0.967 > 0.9$, $RMSEA = 0.077 < 0.1$).

As all latent variables were measured using questionnaires, common method variance (CMV) could potentially bias the results. To address this, we used the heterotrait–monotrait ratio (HTMT) and HTMT Inference to assess discriminant validity. HTMT was selected as the primary method because the study's serial mediation mechanism—psychological reactance—includes two highly correlated constructs: perceived threat to freedom (TF) and hostile feelings (HF). Traditional methods, such as the Fornell–Larcker criterion and cross-loading tests, have limitations in distinguishing highly correlated constructs and may yield misleading

conclusions (Henseler et al., 2015). HTMT provides more accurate, robust verification of factor structure and greater sensitivity in such cases. HTMT results showed all latent variable values < 0.9, and subsequent HTMT Inference tests confirmed no confidence intervals included 1—validating clear discriminant validity across the four latent variables. We further employed cross-loading as a supplementary test, the results revealed that each indicator loaded more strongly on its target construct than on others (see Appendix A for detailed results).

To validate responses, participants were asked specific questions about the experimental setup, like the number of vouchers provided and whether the vouchers required 'likes' from others. Substantial errors in these responses indicated that participants may not have read the material carefully and were excluded from the analysis. The authenticity of the experimental scenario was assessed using a 7-point scale (1 = strongly disagree, 7 = strongly agree). Demographic data were collected, including gender, age, and other relevant characteristics.

The study included one control group (no assistance required) and two intervention groups: low assistance required and high assistance required. A summary comparison between these groups is provided in Fig. 2, while detailed analyses of the results are presented in Table 3.

4. Results

ANOVA results revealed significant differences in participants' perceptions of the assistance required across the groups ($M_{no} = 3.59$, $M_{low} = 5.13$, $M_{high} = 5.92$, $F(2, 233) = 51.95$, $p < .001$), indicating successful manipulation of the RRP conditions. Regarding the perceived scenario authenticity, no significant differences were found across the groups ($M_{no} = 6.04$, $M_{low} = 6.07$, $M_{high} = 6.08$, $F(2, 233) = 0.52$, $p > .1$), supporting the validity of the experimental design.

Main Effect ANOVA results revealed a significant main effect across the groups ($WTP_{no} = 70.76$, $WTP_{low} = 57.29$, $WTP_{high} = 37.46$; $F(2, 233) = 30.717$, $p < .001$, $\eta_p^2 = .209$). Furthermore, the independent variable also exerted a significant influence on the mediator variables ($F_{X\rightarrow TF}(2,233) = 19.033$, $p < .001$, $\eta_p^2 = .14$; $F_{X\rightarrow HF}(2,233) = 25.905$, $p < .001$, $\eta_p^2 = .182$).A post-hoc power analysis conducted in G*Power showed that, even after accounting for a small proportion of excluded participants, statistical power reached 1.00. This provides strong confidence in correctly rejecting the null hypothesis, confirming that the observed between-group differences reflect genuine effects and that the results are highly reliable. Following this, a serial mediation model was constructed using PROCESS (model 6) macros with 5000 bootstrap samples. After controlling for PSC and reward value, conditions requiring high assistance (vs. no assistance) had a significant negative direct effect on willingness to participate ($\beta_{D2} = -8.88$, $p < .01$). Additionally, conditions that required assistance (vs. no assistance) were more likely to trigger perceptions of freedom threat ($\beta_{D1} = 6.31$, $p < .05$; $\beta_{D2} = 8.45$, $p < .01$) and hostile feelings ($\beta_{D1} = 0.34$, $p < .05$; $\beta_{D2} = 0.41$, $p < .05$). Hostile feelings, in turn, negatively affected willingness to participate ($\beta = -8.40$, $p < .001$), while freedom threat had no significant effect ($p > .5$).

Mediation Effect Results showed that the perception of threat to freedom alone did not mediate the relationship between conditions and willingness to participate ($BootCI_{D1}$: [-0.77, 1.44]; $BootCI_{D2}$: [−1.12, 1.78]). Hostile feelings, however, played a significant mediating role between conditions and willingness to participate (indirect $effect_{D1} = -2.86$, $BootCI_{D1}$: [−5.57, −0.53]; indirect $effect_{D2} = -3.43$, $BootCI_{D2}$: [−6.62, −0.46]). Additionally, serial mediation was significant (relative indirect $effect_{D1} = -1.02$, $BootCI_{D1}$: [−2.14, −0.14]; relative indirect $effect_{D2} = -1.37$, $BootCI_{D2}$: [−2.70, −0.33]). When the order of the mediating variables was reversed, the effect was not significant ($BootCI_{D1}$: [-0.33, 0.64]; $BootCI_{D2}$: [-0.44, 0.78]). Thus, H2 was supported. Additionally, the direct impact of low-assistance (no-assistance) on participation was not significant ($p > .5$, CI: [−3.95, 7.21]). The indirect effect of consumer psychological reactance was, however, significant, indicating a fully mediated relationship between condition and willingness when low assistance was required for RRPs (vs. no assistance).

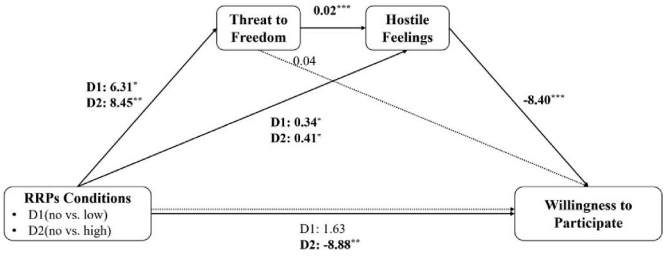

Fig. 2. Study 1.

5. Discussion

Study 1 confirms H1 and H2, showing that RRP conditions requiring assistance from others significantly reduce consumer participation. Low-threshold assistance fully mediated the relationship between RRP conditions and participation through psychological reactance, while high-threshold assistance showed partial mediation. Despite earlier research suggesting minimal social pressure in online networks (Wang et al., 2018), this study found PSC strongly deter RRP participation ($\beta = -4.50$, $p < .001$). PRV positively influenced referral intention, and rewards mitigated threats to freedom ($\beta = -1.91$, $p < .05$) and hostile emotions ($\beta = -0.30$, $p < .001$). These findings align with existing studies that emphasise the role of rewards in enhancing consumer engagement in RRPs.

The findings validate the consumer psychological reactance process, showing threats to freedom trigger negative emotions, reducing willingness to participate in both high- and low-threshold RRP groups. This aligns with earlier research indicating that consumers often resist marketing efforts due to negative emotional responses (Sciandra, 2019). Further investigation is required, prior studies on RRPs have emphasized the need to explore how RRPs perform under various experimental contexts to ensure the robustness of these findings (Zhang et al., 2019), especially it is crucial to examine the causal sequence of consumer psychological reactance (cognition → emotion) in a different context.

5.1. Study 2

Although Study 1 provided initial support for our hypotheses, the robustness of the effect across different contexts remains unclear. In practice, referral rewards often depend on referee registration—a requirement that is particularly critical for firms, especially when launching new products, to accelerate user growth. To address this, we conducted Study 2.

5.1.1. Method: experimental scenario

To investigate how RRP qualifying conditions influence consumer engagement in a new setting, Study 2 focused on the rapidly growing Meal Kit delivery market in China. This industry — which provides customers with pre-portioned ingredients and recipes for home cooking — heavily depends on consumer endorsements, WOM, and RRPs to build momentum. The study explored how different types of RRP qualifying conditions — those that require assistance from others versus those that do not — affect customer engagement. For example, referrers might receive rewards for sharing referral links with their social networks (Haenlein and Libai, 2017) or for inviting friends to register for a service (Gershon et al., 2020). In this context, requiring the referred person to register was categorized as an "assistance-required" condition, helping to strengthen the study's validity.

The scenario was adapted from Ang et al. (2021). Participants received background information about Meal Kit services and were introduced to the fictional brand Tasty Box. Its WeChat Moments RRP was presented as graphic posters. The control group received a RMB 20

Table 3
Study 1: Serial mediation model results.

	Consequences											
	Threat to Freedom (TF)				Hostile Feelings (HF)				Willingness to Participate (WTP)			
Antecedents	Coef	SE	*p*	CI	Coef	SE	*p*	CI	Coef	SE	*p*	CI
D1:no vs. low	6.31	2.96	<0.05	[0.49,12.13]	0.34	0.16	<0.05	[0.03,0.65]	1.63	2.83	>0.5	[-3.95,7.21]
D2:no vs. high	8.45	2.99	<0.01	[2.55,14.34]	0.41	0.16	<0.05	[0.09,0.72]	−8.88	2.90	<0.01	[-14.59,-3.18]
Threat to Freedom(TF)	–	–	–	–	0.02	0.004	<0.001	[0.01,0.03]	0.04	0.07	>0.5	[-0.09,0.17]
Hostile feelings(HF)	–	–	–	–	–	–	–	–	−8.40	1.18	<0.001	[-10.73,-6.08]
Perceived Social Costs(PSC)	10.17	1.06	<0.001	[8.30,12.03]	0.37	0.06	<0.001	[0.25, 0.49]	−4.50	1.17	<0.001	[-6.80,-2.19]
Perceived Value of Rewards(PVR)	−1.91	0.90	<0.05	[-3.62,-0.20]	−0.30	0.05	<0.001	[-0.39,-0.21]	4.33	0.90	<0.001	[2.56,6.10]
	$R^2 = 0.532$				$R^2 = 0.697$				$R^2 = 0.714$			
	F(4,231) = 65.629,p < .001				F(5,230) = 105.655,p < .001				F(6,229) = 95.442,p < .001			

Relative indirect effect

Conditions→TF→WTP	Effect	BootSE	BootCI	Conditions→TF→HF→WTP	Effect	BootSE	BootCI
D1:no vs. low	0.24	0.54	[-0.77,1.44]	D1:no vs. low	−1.02	0.51	[-2.14, −0.14]
D2:no vs. high	0.33	0.69	[-1.12,1.78]	D2:no vs. high	−1.37	0.61	[-2.70,-0.33]

Conditions→HF→WTP	**Effect**	**BootSE**	**BootCI**	**Conditions→HF→TF→ WTP**	**Effect**	**BootSE**	**BootCI**
D1:no vs. low	−2.86	1.29	[-5.57,-0.53]	D1:no vs. low	0.11	0.24	[-0.33,0.64]
D2:no vs. high	−3.43	1.56	[-6.62,-0.46]	D2:no vs. high	0.14	0.30	[-0.44, 0.78]

voucher for forwarding the poster to their WeChat Moments. In the intervention groups, participants earned the same voucher only after 5 or 10 friends registered with Tasty Box. Similarly, in Experiment 2, we included an attention check question:

'In the previous scenario, what was the value of the voucher offered by Tasty Box? Did it require friend registrations? If yes, how many registrations were needed? Please provide your answer in the following format: __ yuan; (not) required; __ friend registrations [fill in the blanks].'"

5.1.1.1. Participants and design. 270 participants were recruited from Credamo, excluding those from Study 1. Procedures mirrored Study 1. After removing participants with incorrect answers on key questions, 244 valid responses remained(128 females, Mage = 30.21, SDage = 8.31). After excluding a portion of unqualified samples, ANOVA results for demographic characteristics across groups showed no significant differences among the three groups in terms of gender ($F(2,241) = 2.461$, $p > .05$), age ($F(2,241) = 0.882$, $p > .1$), education level ($F(2,241) = 0.807$, $p > .1$), or income ($F(2,241) = 0.131$, $p > .1$). Variable measurements, the measurement-model and the results of HTMT and Cross loading test were reliable,(see Appendix A for detailed results). Findings are shown in Fig. 3, with detailed analyses presented in Table 4.

6. Results

ANOVA results reveal significant differences among the three groups in perceived assistance required (M no = 2.62, M low = 4.43, M high = 5.32, $F(2, 241) = 63.20$, $p < .001$). Perceived scenario authenticity, however, showed no significant differences (M no = 6.11, M low = 6.29, M high = 6.04, $F(2, 241) = 2.09$, $p > .05$). These results support the effectiveness of the RRP condition manipulation and confirm the overall validity of the scenarios.

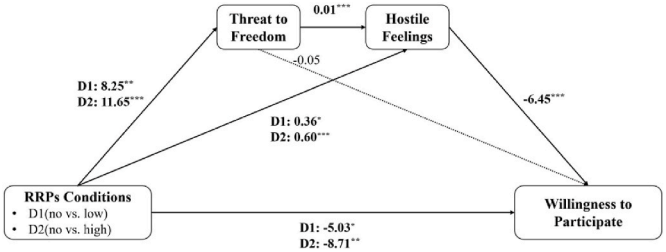

Fig. 3. Study2.

Main Effect: ANOVA results revealed a significant main effect across groups ($WTP_{no} = 80.38$, $WTP_{low} = 55.27$, $WTP_{high} = 37.19$, $F(2, 241) = 66.20$, $p < .001$,$\eta_p^2 = .355$), supporting H1. Furthermore, the independent variable also exerted a significant influence on the mediator variables ($F_{X\to TF}(2,241) = 49.612$, $p < .001$, $\eta_p^2 = .292$; $F_{X\to HF}(2,241) = 61.538$, $p < .001$, $\eta_p^2 = .338$). A serial mediation model was then constructed using PROCESS macros (model 6) with 5000 bootstrap samples. After controlling for PSC and reward value, conditions requiring assistance had a significant negative effect on participants' willingness to engage ($\beta_{D1} = -5.03$, $p < .05$, $\beta_{D2} = -8.71$, $p < .01$). These conditions positively affected perceived threats to freedom ($\beta_{D1} = 8.25$, $p < .01$, $\beta_{D2} = 11.65$, $p < .001$) and hostile feelings ($\beta_{D1} = 0.36$, $p < .05$, $\beta_{D2} = 0.60$, $p < .001$). Hostile feelings significantly reduced willingness to refer ($\beta = -6.45$, $p < .001$), while threats to freedom had a insignificant negative effect ($\beta = -0.05$, $p > .1$).

Mediation Effect: While threats to freedom alone did not mediate the relationship ($BootCI_{D1}$: [−1.82, 0.46], $BootCI_{D2}$: [−2.56, 0.59]), hostile feelings emerged as a significant mediator (indirect $_{D1} = -2.32$, $BootCI_{D1}$: [−4.20, −0.58]; indirect $_{D2} = -3.85$, $BootCI_{D2}$: [−6.42, −1.59]). The serial mediation pathway (threats to freedom → hostile feelings) was also significant (relative indirect $effect_{D1} = -0.77$, $BootCI_{D1}$: [-1.70, −0.17]; relative indirect $effect_{D2} = -1.08$, $BootCI_{D2}$: [−2.17, −0.33]). However, reversing the order of mediators nullified the effect ($BootCI_{D1}$: [-0.50, 0.15], $BootCI_{D2}$: [-0.74, 0.24]), providing further support for Hypothesis 2.

7. Discussion

Study 2 further underscores the pivotal role of RRP qualifying conditions in shaping consumer behavior. Even after controlling for PSC and reward value, conditions requiring assistance significantly reduced consumers' willingness to participate in RRPs — even when the participation threshold was low. Specifically, the registration condition, which involved sharing personal data, raised greater privacy concerns than the simpler act of obtaining likes (Martin and Murphy, 2017). The effect was significantly mediated by psychological reactance, following the causal pathway from perceived threats to freedom to hostile feelings. Notably, hostile feelings alone also mediated willingness to participate, consistent with findings from Study 1. These results highlight the importance of carefully managing RRP conditions to promote positive

Table 4
Study2 Serial mediation model results.

	Consequences											
	Threat to Freedom(TF)				Hostile Feelings(HF)				Willingness to Participate(WTP)			
Antecedents	Coef	SE	*p*	CI	Coef	SE	*p*	CI	Coef	SE	*p*	CI
D1:no vs. low	8.25	2.66	<0.01	[3.02,13.49]	0.36	0.14	<0.05	[0.08,0.64]	−5.03	2.44	<0.05	[-9.83,-0.23]
D2:no vs. high	11.65	3.02	<0.001	[5.71, 17.59]	0.60	0.17	<0.001	[0.27,0.92]	−8.71	2.83	<0.01	[-14.30,-3.13]
Threat to Freedom(TF)	–	–	–	–	0.01	0.003	<0.001	[0.01,0.02]	−0.05	0.06	>0.1	[-0.17,0.06]
Hostile feelings(HF)	–	–	–	–	–	–	–	–	−6.45	1.08	<0.001	[-8.59,-4.32]
Perceived Social Costs(PSC)	10.73	0.81	<0.001	[9.13,12.33]	0.43	0.06	<0.001	[0.32, 0.54]	−2.58	1.06	<0.05	[-4.66,-0.50]
Perceived Value of Rewards(PVR)	−2.87	0.79	<0.001	[-4.43,-1.31]	−0.28	0.04	<0.001	[-0.37,-0.20]	5.54	0.78	<0.001	[3.99,7.08]
	$R^2 = 0.684$				$R^2 = 0.770$				$R^2 = 0.780$			
	$F(4,239) = 129.047, p < .001$				$F(5,238) = 159.757, p < .001$				$F(6,237) = 139.65, p < .001$			

Relative indirect effect

Conditions→TF→WTP	Effect	BootSE	BootCI	Conditions→TF→HF→WTP	Effect	BootSE	BootCI
D1:no vs. low	−0.45	0.57	[-1.82, 0.46]	D1:no vs. low	−0.77	0.39	[-1.70, −0.17]
D2:no vs. high	−0.64	0.81	[-2.56, 0.59]	D2:no vs. high	−1.08	0.48	[-2.17, −0.33]

Conditions→HF→WTP	**Effect**	**BootSE**	**BootCI**	**Conditions→HF→TF→ WTP**	**Effect**	**BootSE**	**BootLLCI**
D1:no vs. low	−2.32	0.92	[-4.20, −0.58]	D1:no vs. low	−0.12	0.16	[-0.50, 0.15]
D2:no vs. high	−3.85	1.25	[-6.42, −1.59]	D2:no vs. high	−0.20	0.24	[-0.74, 0.24]

emotional responses and enhance engagement (Septianto and Mathmann, 2023).

Taken together, Studies 1 and 2 demonstrate how the structure of reward conditions can influence participation, with psychological reactance acting as a key mediating mechanism. While Study 1 examined these effects in a post-consumption context, Study 2 extended the findings to a pre-consumption setting.

7.1. Study 3

Study 3 examines the moderating effect of RRP timing using a 3 × 2 experimental design, which includes three levels of assistance (none, low, high) and two consumption phases (pre- and post-consumption), resulting in six experimental conditions. To enhance the robustness and generalizability of the findings, a widely consumed product — coffee — was selected as the study context. This choice aligns with prior RRP research conducted in China (Xu et al., 2023), and supports the use of diverse, relatable scenarios.

7.1.1. Method: experimental scenario

The scenario, adapted from Xu et al. (2023), involves the virtual brand 'Youjian' running an RRP on WeChat. In the control group, participants earn a RMB5 coffee voucher by forwarding brand information to their WeChat Moments. In the intervention groups, participants must also obtain 33 (low assistance) or 66 (high assistance) 'likes' to receive the voucher. The pre-consumption condition frames participants as unfamiliar with the coffee's quality, while the post-consumption condition indicates prior satisfaction with its flavour. Consistent with the previous experiments, in Experiment 3 we also included an attention check: "In the scenario described earlier, have you previously tried coffee from this store? [Single choice] Yes/No" to verify their attentiveness to the experimental context.

7.1.1.1. Participants and design. As Experiment 3 employed a two-factor between-subjects design, we set the statistical test in G*Power to "ANOVA: Fixed effects, special, main effects and interactions." Using the default effect size setting (Effect size f = 0.175), α error probability = 0.05, and Power (1-β) = 0.80, the estimated total required sample size was approximately 450 participants. The recruitment and procedures followed Studies 1 and 2. The analysis included 599 valid samples (394 females, 78.6 % aged 21–40). After excluding a number of unqualified samples, ANOVA results on demographic characteristics across the six groups indicated no significant differences in terms of gender ($F(5,593) = 0.634$, $p > .05$), age ($F(5,593) = 0.162$, $p > .1$), education level ($F(5,593) = 0.851$, $p > .1$), or income ($F(5,593) = 1.238$, $p > .1$). Variable measurements, the measurement-model and the results of HTMT and Cross loading test were reliable, (see Appendix A for detailed results). Unlike Studies 1 and 2, which used a single-factor, three-level design (control/intervention1/intervention2; three groups), Study 3 employed a two-factor 3 × 2 design [(control/intervention1/intervention2) × (pre vs. post); six groups]. Results are shown in Fig. 4, with detailed analyses presented in Table 5.

8. Results

ANOVA results confirm effective manipulation of the RRP condition ($M_{no} = 2.90$, $M_{low} = 5.08$, $M_{high} = 5.91$, $F(2, 596) = 230.91$, $p < .001$). No significant differences were found in perceived authenticity across the six groups ($F(5, 593) = 1.38$, $p > .05$), indicating a valid scenario design. Preliminary two-way ANOVA results provided initial evidence of moderating effects ($F_{X*W→WTP} = 6.68$, $p = .001$, $\eta_p^2 = .022$; ($F_{X*W→TF} = 12.913$, $p < .001$, $\eta_p^2 = .042$; ($F_{X*W→HF} = 8.531$, $p < .001$, $\eta_p^2 = .028$). A moderated serial mediation model (Model 84 from the PROCESS macro) was used to test the hypothesis.

Main effect. After controlling for PSC and reward value, RRP conditions requiring assistance (vs. no assistance) significantly decreased

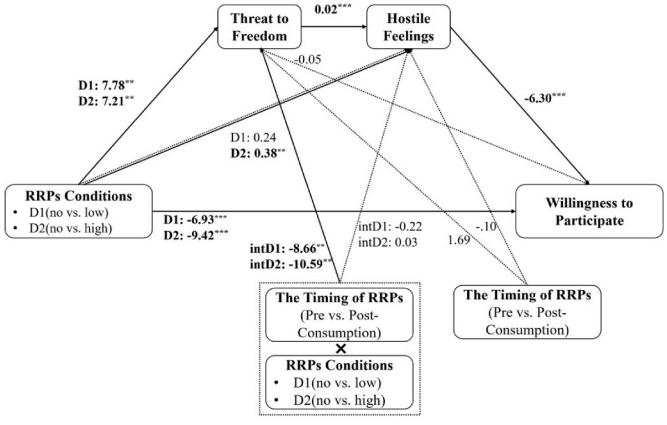

Fig. 4. Moderated serial mediations.

Table 5
Study 3 Moderated serial mediation model.

	Consequences											
	Threat to Freedom (TF)				Hostile Feelings (HF)				Willingness to Participate (WTP)			
Antecedents	Coef	SE	*p*	CI	Coef	SE	*p*	CI	Coef	SE	*p*	CI
D1:no vs. low	7.78	2.39	<0.01	[3.09,12.48]	0.24	0.13	>0.05	[-0.00,0.49]	−6.93	1.61	<0.001	[-10.09,-3.77]
D2:no vs. high	7.21	2.48	<0.01	[2.33, 12.08]	0.38	0.13	<0.01	[0.12,0.63]	−9.42	1.68	<0.001	[-12.72,-6.13]
RRP timing (pre vs.post)	1.69	2.27	>0.1	[-2.77,6.15]	−0.10	0.12	>0.1	[-0.34,0.13]				
D1 × RRP timing	−8.66	3.26	<0.01	[-15.06,-2.26]	−0.22	0.17	>0.1	[-0.56,0.12]				
D2 × RRP timing	−10.59	3.28	<0.01	[-17.03,-4.15]	0.03	0.17	>0.1	[-0.37,0.31]				
Threat to Freedom(TF)	–	–	–	–	0.02	0.002	<0.001	[0.02,0.03]	−0.05	0.04	>0.1	[-0.14,0.03]
Hostile feelings(HF)	–	–	–	–	–	–	–	–	−6.30	0.74	<0.001	[-7.77,-4.83]
Perceived Social Costs(PSC)	10.52	0.54	<0.001	[9.46,11.58]	0.35	0.04	<0.001	[0.28, 0.43]	−2.28	0.84	<0.01	[-3.68,-0.87]
Perceived Value of Rewards(PVR)	−3.95	0.49	<0.001	[-4.91,-2.98]	−0.20	0.03	<0.001	[-0.26,-0.15]	7.26	0.52	<0.001	[6.24,8.28]
	$R^2 = 0.674$ F(7,591) = 174.739,p < .001				$R^2 = 0.752$ F(8,590) = 223.707,p < .001				$R^2 = 0.760$ F(6,592) = 313.190,p < .001			

Relative conditional indirect effects

Conditions→TF→WTP	RRPs timing	Effect	BootSE	BootCI	Conditions→HF→WTP	RRPs timing	Effect	BootSE	BootCI
D1:no vs. low	pre	−0.41	0.44	[-1.40,0.35]	D1:no vs. low	pre	−1.54	0.77	[-3.13,-0.09]
	post	0.05	0.16	[-0.24,0.44]		post	−0.15	0.73	[-1.62,1.20]
Index of moderated mediation		0.45	0.50	[-0.39,1.61]	**Index of moderated mediation**		1.39	1.05	[-0.65,3.49]
D2:no vs. high	pre	−0.38	0.42	[-1.33,0.29]	D2:no vs. high	pre	−2.36	0.91	[-4.32,-0.80]
	post	0.18	0.23	[-0.23,0.71]		post	−2.15	0.93	[-4.20,-0.57]
Index of moderated mediation		0.56	0.59	[-0.45,1.88]	**Index of moderated mediation**		0.21	1.08	[-1.95,2.32]

Conditions→TF→HF→WTP	**RRPs timing**	**Effect**	**BootSE**	**BootCI**	**Conditions→HF→TF→WTP**	**RRPs timing**	**Effect**	**BootSE**	**BootCI**
D1:no vs. low	pre	−1.08	0.42	[-2.02,-0.35]	D1:no vs. low	pre	−0.15	0.16	[-0.51,0.12]
	post	0.12	0.29	[-0.49,0.69]		post	−0.001	0.06	[-0.15,0.13]
Index of moderated mediation		1.20	0.50	[0.30,2.28]	**Index of moderated mediation**		0.15	0.17	[-0.13,0.54]
D2:no vs. high	pre	−1.00	0.37	[-1.84,-0.36]	D2:no vs. high	pre	−0.19	0.20	[-0.64,0.16]
	post	0.47	0.34	[-0.19,1.19]		post	−0.10	0.11	[-0.35,0.08]
Index of moderated mediation		1.47	0.54	[0.54,2.67]	**Index of moderated mediation**		0.10	0.14	[-0.10,0.43]

consumers' willingness to participate ($\beta_{D1} = -6.93$, $p < .001$, $\beta_{D2} = -9.42$, $p < .01$). These conditions also increased perceptions of threats to freedom ($\beta_{D1} = 7.28$, $p < .01$, $\beta_{D2} = 7.21$, $p < .01$) and hostile feelings ($\beta_{D1} = 0.24$, $p = .0541$, $\beta_{D2} = 0.38$, $p < .001$), supporting H1.

Moderated serial mediation. The results indicate that, after controlling for PSC and PRV, RRP timing significantly moderates the serial mediation effect of consumer psychological reactance. Specifically, RRP timing reduced threats to freedom ($int_{D1} = -8.66$, $p < .01$; $int_{D2} = -10.59$, $p < .01$), although its effect on hostile feelings was not significant ($p_{D1} = 0.1$, $p_{D2} = 0.1$). The moderated serial mediation effect was significant (index $_{D1} = 1.20$, BootCI $_{D1\ pre\ vs.\ post}$: [0.30, 2.28]; $index_{D2} = 1.47$, BootCI $_{D2\ pre\ vs.\ post}$: [0.54,2.67]). In the pre-consumption phase, conditions requiring assistance (vs. no assistance) triggered psychological reactance processes that reduced willingness to participate (relative indirect effect $_{pre\text{-}D1} = -1.08$, $BootCI_{pre\text{-}D1}$: [−2.02,-0.35], relative indirect effect $_{pre\text{-}D2} = -1.00$, $BootCI_{pre\text{-}D2}$: [−1.84,-0.36]). No significant mediation occurred, however, in the post-consumption phase (BootCI $_{D1\ post}$: [-0.49,0.69], BootCI $_{D2\ post}$: [-0.19,1.19]), supporting H3. Reversing the mediating variable order nullified the serial mediation effect (BootCI $_{pre\text{-}D1}$: [-0.51.,12], BootCI $_{post\text{-}D1}$: [-0.15,0.13]; BootCI $_{pre\text{-}D2}$: [-0.64,0.16], BootCI $_{post\text{-}D2}$: [-0.35.,08]), confirming the causal chain of consumer psychological reactance.

9. Discussion

Study 3 provides further support for H1 and H2 and introduces a test of H3, revealing that RRP timing significantly moderates psychological reactance. These findings deepen our understanding of how RRP conditions influence the referrer–receiver relationship, suggesting that post-consumption RRPs elicit lower reactance and greater willingness to participate.

Results show that hostile feelings mediate the relationship when high-threshold assistance is required, regardless of RRP timing (relative indirect effect $_{pre\text{-}D2} = -2.36$, $BootCI_{pre\text{-}D2}$: [−4.32,-0.80], relative indirect effect $_{post\text{-}D2} = -2.15$, BootCI $_{post\text{-}D2}$: [−4.20,-0.57]). While RRP timing moderates the overall serial mediation pathway, it does not significantly affect the mediation effect of hostile feelings in high-threshold conditions. The moderated mediation index was not significant in the post-consumption condition $BootCI_{D1}$: [-0.65,3.49], $BootCI_{D2}$: [−1.95,2.32]), suggesting that when assistance requirements are high, timing plays a limited role and consumer emotions become the primary driver of engagement (Septianto and Mathmann, 2023; Xu et al., 2023).

Overall, Study 3 confirms the causal sequence proposed in psychological reactance theory: perceived threats to freedom lead to hostile feelings, which in turn reduce behavioral intent. Importantly, the moderating role of RRP timing offers new insights into the temporal dynamics of psychological reactance, particularly in relation to pre- and post-consumption contexts (Bertini and Aydinli, 2020).

9.1. General discussion

9.1.1. Theoretical contribution

The three experiments collectively address different layers of the research question. Study 1 demonstrated that even low assistance thresholds (e.g., 44 likes) can trigger psychological reactance, challenging assumptions that minimal online requirements would not elicit negative psychological responses (Wang et al., 2018). Study 2 showed

that registration requirements also induced significant psychological reactance, producing effects comparable to those observed under the 'likes' condition. This suggests that the reactance process is not highly context-specific. Finally, Study 3 revealed that post-consumption RRPs can moderate reactance, a finding made possible by comparing different consumption stages within the same scenario. Given that the measurement of the relevant latent variables in this study's experiments was conducted using questionnaire scales, corresponding CFA, HTMT, and VIF tests were performed for each sub-study. The results indicate that common method bias and collinearity issues do not pose a serious threat to the study's conclusions (detailed results are provided in Appendix A). Furthermore, since the measurement instruments for the latent variables remained consistent across the three experimental scenarios, a measurement invariance test was also conducted. The results showed almost no significant differences in the pairwise comparisons of the measurement tools across the different scenarios (detailed results are provided in Appendix B). Therefore, the conclusions drawn in this study demonstrate a certain degree of robustness.

This research advances the understanding of RRPs by focusing on reward qualifying conditions — an underexplored area in the literature (Belo and Li, 2022) — and responding to calls for deeper insight into RRP mechanisms (Gershon et al., 2020). Our findings demonstrate how online RRPs influence consumer participation and highlight potential negative effects, particularly under certain qualifying conditions (Wirtz et al., 2013). Through three contextual experiments, we address key knowledge gaps and show that reward conditions exert a significant and consistent influence on participation behavior. Our work contributes theoretically by examining the adverse effects of RRPs on consumer engagement, using a moderated serial mediation model to uncover how specific reward structures shape behavioral outcomes (Wirtz et al., 2019a, b).

We extend the understanding of online RRPs acceptance by applying psychological reactance theory, offering novel insights into the cognitive and emotional triggers of reactance. While prior research has predominantly examined reactance during referral adoption (Sciandra, 2019), our study applies the theory to the context of RRP participation, demonstrating that reactance can arise when consumers interact with firms offering RRPs—particularly under high-assistance conditions. Beyond merely extending psychological reactance theory to RRP participation, this research advances the theory by addressing key limitations in its current marketing applications. First, although existing reactance frameworks have largely conceptualized resistance as a response to explicit persuasive attempts (e.g., unsolicited advertisements or mandatory recommendations), our findings identify "reward qualifying conditions" as a novel, implicit trigger of reactance in digital referral contexts. Unlike direct infringements on autonomy, these conditions generate a subtle yet impactful threat to freedom by tying reward attainment to external dependencies (e.g., others' likes or registrations). This expands the scope of reactance theory to include structural barriers embedded in incentive-based marketing systems.

Additionally, we refine the causal mechanism of reactance by empirically validating the sequential cognitive-affective pathway (perceived threat to freedom → hostile feelings) across three distinct consumption contexts. Our experiments provide consistent evidence for this process in diverse product settings (Bertini and Aydinli, 2020), demonstrating that the cognitive-to-emotional progression holds robustly across varied scenarios (Zhang et al., 2019). These findings show that reactance in participation decisions follows a structured psychological process, addressing prior work that often blurred the distinction between cognitive and affective components. Moreover, by drawing on a broader and more diverse online consumer sample, we enhance the external validity of the results and move beyond the student-based samples commonly used in earlier research (Amarnath and Jaidev, 2021).

Finally, our finding that post-consumption timing mitigates reactance further modifies the boundary conditions of the theory. This result shows that contextual factors—such as having completed a consumption experience—can attenuate perceived threats to freedom, suggesting that reactance is not an invariant response but a contextually contingent one. Collectively, these refinements enhance the explanatory power of psychological reactance theory in the dynamic digital era (Amarnath and Jaidev, 2021), where consumer autonomy is intertwined with social and commercial interactions.

9.1.2. *Managerial implications*

This research explores how RRPs, as a component of virtual marketing strategy, can provide firms with broader commercial benefits, such as attracting new customers through referrals and fostering deeper relationships with existing ones. The study offers key insights for marketing managers designing more effective RRPs. Based on empirical evidence from three scenario-based experiments (Study 1: gym services; Study 2: meal-kit subscriptions; Study 3: coffee-shop retail), we develop a Managerial Decision Reference Matrix for RRPs (Table 6). This matrix translates the study's theoretical insights into actionable guidance for practitioners operating in similar contexts. For instance, in service-oriented settings, we recommend implementing (a) minimal or no-assistance qualifying conditions (e.g., low thresholds for social-media likes) and (b) post-consumption RRP launch timing. This combination not only reduces psychological reactance but also increases consumers' willingness to participate and lowers resistance to referral behaviors, thereby improving the overall effectiveness of RRPs.

In addition, we note that online interactions pose unique challenges to consumers' willingness to participate in RRPs (Sciandra, 2019), particularly regarding the eligibility conditions for earning rewards. When these conditions introduce barriers — such as requiring assistance from others — they can significantly reduce engagement. Our findings suggest that simplifying these requirements can encourage greater participation. Consumers tend to prefer reward structures that do not depend on others for success. If individuals perceive a risk that their ability to earn a reward depends on others' actions — such as a referral failing to register or complete a purchase — their willingness to participate declines. Firms should consider lowering assistance thresholds (e.g., reducing the number of required 'likes' or purchases) to minimize perceived risk and create a better balance between encouraging engagement and meeting commercial objectives.

Cultural considerations also play a crucial role in shaping consumer behavior. For example, among Chinese consumers, assistance-based reward conditions may conflict with cultural values such as benevolence and moral obligation (Wang, 2007), potentially leading to negative emotional responses and perceptions (Wirtz et al., 2013). This tension can reduce the overall return on investment for RRPs. To address

Table 6
Managerial decision reference matrix for RRPs.

Consumption Contexts	Recommendations for Reward Qualifying Conditions	RRPs Timing	Expected Outcomes
Service-oriented (e.g., gyms)	No/low assistance	Post-consumption	Increased willingness to participate and low psychological resistance.
Subscription-based (e.g., meal kits)	Low assistance	Post-consumption as primary	Reduced privacy concerns and improved referral quality.
High-frequency daily consumption (e.g., coffee)	No assistance/ extremely low assistance	Post-consumption as primary	Dual conversion of repeat purchases and referrals, with minimal reactance.

this issue, firms operating in China—or seeking to enter the Chinese market—should highlight mutual benefits for both referrers and referees, while also providing opt-out options to help reduce social pressure. Enhancing the perceived value of rewards can also offset negative effects. Allowing consumers to choose from a range of meaningful rewards or increasing reward value may help sustain engagement even under more demanding conditions (Orsingher and Wirtz, 2018).

To maximize the effectiveness of RRPs, firms should focus on three goals: acquiring new customers, increasing the monetary value of referrals, and improving the quality of referred customers (Van den Bulte et al., 2018). However, psychological reactance — negative emotional responses triggered by perceived threats to autonomy — can arise when RRPs provoke hostile feelings. While PRV can reduce such feelings, hostility remains a distinct mediating factor. Marketers should be cautious in structuring RRPs to avoid triggering consumer resistance. Incorporating gamification — the use of game mechanics to enhance consumer interaction — offers a promising solution. Gamification has been shown to improve user experience and emotional engagement while minimizing negative emotions (Sigala, 2015). Given the growing trend of gamified marketing on social platforms (Harwood and Garry, 2015; Robson et al., 2016), integrating gamification into RRPs can encourage participation, reduce resistance, and make the referral process more enjoyable. For example, "Share to Get Coupons," which aligns with the cultural norm of mutual benefit, has become a common promotional practice on Taobao, China's largest e-commerce platform. During the annual Double Eleven Shopping Festival and other major online sales events, Taobao also employs various gamified referral mechanisms that allow consumers to earn rewards through team-based collaborative games—an approach that many Chinese consumers find highly engaging and enjoyable. Furthermore, Xu et al. (2023) showed that disclosing referrer rewards in invitation messages can promote referral behavior by making such actions appear more socially normative and reducing psychological barriers. We argue that this insight can be integrated with the reward conditions examined in this study. Specifically, improving reward disclosure in RRPs with high-threshold conditions may help mitigate the psychological reactance triggered by such requirements.

Finally, our findings suggest that online RRPs are most effective when introduced after consumers have experienced the product or service, as this can reduce psychological reactance and enhance participation. Managers should therefore carefully consider both the timing and design of RRPs. Programs are best initiated after a positive consumption experience, with reward conditions set at reasonable thresholds; otherwise, significant negative reactions may still occur. For example, merchants on Meituan can strategically introduce RRPs after users have expressed satisfaction with their food and service, while clearly communicating the associated reward information. Such timing and transparency can help expand their base of loyal customers and attract new potential customers.

Consumer responses to online stimuli have become increasingly complex. Behaviors such as link hovering, click-throughs, shopping cart abandonment, and repeat visits can all be tracked (McCoy et al., 2008; Kukar-Kinney & Close, 2010). Marketers can leverage this data to evaluate the effectiveness of RRPs and adjust reward conditions, thresholds, or timing accordingly. This approach can also help identify high-lifetime-value customers (Haenlein and Libai, 2017), enabling firms to target them with post-consumption RRPs to maximize returns.

In summary, this study highlights several key conditions for designing effective RRPs:

1. A balanced effort-to-reward ratio;
2. Alignment with cultural norms;
3. Low perceived risk of referral non-performance;
4. Implementation after consumption rather than before.

Importantly, negative past experiences with RRPs can lead to dissatisfaction and reluctance to participate in future programs, even when incentives are offered (Cho, 2004). Thus, no RRP can compensate for poor service or subpar products (Wirtz et al., 2019b) — quality must remain the foundation.

10. Limitations and directions for future research

This study focuses exclusively on WeChat—a social media platform distinguished by its unique features and strong relational networks (Wirtz et al., 2019a). Chinese WeChat users primarily build their social networks based on offline relationships, such as friends, family, and colleagues, which increases the PSC of participating in online RRPs. However, social media platforms (e.g., X, Bluesky) differ considerably in interaction norms and tie strength, factors that can influence user receptiveness to RRPs. Future research should examine RRP designs across multiple platforms to determine whether and how the effects of RRP conditions on participation intentions vary by platform type and positioning, thereby providing a more comprehensive understanding. Although our experiments were conducted in WeChat-based scenarios, we deliberately incorporated diverse contexts (e.g., fitness, food, beverages) and reward structures (e.g., likes, registrations, time-limited incentives) to mitigate monocultural bias. Further validation on non-Chinese platforms is recommended to enhance cross-context robustness. Beyond platform characteristics, individual differences also play a critical role in shaping consumer responses to rewards and engagement in RRPs (Zhang et al., 2019). Future studies should account for these variations to develop a more nuanced understanding of consumer motivation and behavior in RRP participation. We also acknowledge that our sample is drawn from an online panel of Chinese digital consumers. This limits the generalizability of our findings to populations with different cultural backgrounds or lower levels of digital engagement. Future research should validate the proposed theoretical framework in cross-cultural contexts to assess its broader applicability.

Consistent with common practices in experimental marketing research, fictional brands were employed to control for participants' prior knowledge and biases, allowing clearer insights into underlying psychological mechanisms. However, we acknowledge that in our scenario-based experiments, using a fictitious brand and asking participants to imagine a prior consumption experience may reduce the internal realism of the design, representing an inherent methodological compromise. Consumers may respond more favorably to brands associated with search products or those with strong positive brand equity. The use of fictional brands therefore limits the generalizability of our findings to real-world products and services. Given the scenario-based experimental design, participants may also infer the study's hypotheses from contextual cues and adjust their responses accordingly, which could compromise the authenticity of both behavioral and psychological measures. To address potential demand characteristics, future research could employ field experiments conducted in collaboration with real brands. By implementing RRPs with varying reward conditions in actual consumption environments (e.g., physical stores or official apps), participants can engage naturally without being aware of the experimental intent, thereby minimizing demand effects. Such designs would also strengthen external and ecological validity by capturing real-world referral behaviors and outcomes. In addition, we recommend the use of longitudinal designs to track consumers' RRP participation over a longer period, spanning multiple stages of the consumption cycle (e.g., initial experience, repeat purchase). Long-term data collection can help avoid transient response biases common in cross-sectional experiments and allow researchers to observe the stable relationships among reward conditions, psychological reactance, and willingness to participate, as well as the dynamic evolution of key variables such as consumption experience and PSC. We acknowledge that although we included PSC and PRV as control variables in the analysis, the mediation effects observed in this study may not be solely attributable to "threat to freedom". The experimental manipulation may have simultaneously

introduced a "higher barrier to execution" and "delayed reward fulfillment"—both of which could independently reduce participation intention. Therefore, future research, particularly studies relying on scenario-based experiments could build on our work by designing more refined experiments to disentangle the effect of "freedom restriction" from those of "effort cost" and "reward immediacy", thereby more precisely isolating the unique role of psychological reactance in RRPs. This approach would help ensure that the research more directly reflects the core mechanisms of psychological reactance. Of course, we acknowledge that the reward qualifying conditions of RRPs may influence consumers' willingness to engage in recommendation behaviors through mediating mechanisms other than the psychological reactance process examined in this study. We look forward to future research identifying more causal psychological process mechanisms to enrich our theoretical framework. Our study also offers implications for marketing science. For example, future research could aim to identify optimal reward conditions and threshold configurations for implementing RRPs across specific social environments or platforms, thereby balancing economic rationality with consumer engagement.

Although RRPs are still relatively new compared to traditional advertising and loyalty programs, this study provides important insights into current technologies, social media trends, and consumer behavior. As social media platforms and digital interactions continue to evolve, consumer responses are likely to change as well. Continued research will be essential to ensure that RRPs remain relevant and effective marketing tools.

CRediT authorship contribution statement

Jian Zhang: Writing – original draft, Methodology, Investigation, Data curation. **Qing Lu:** Writing – review & editing, Validation, Project administration, Conceptualization. **Li Zhang:** Validation, Supervision, Funding acquisition, Data curation, Conceptualization. **David Harness:** Writing – review & editing, Validation, Conceptualization.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGPT and DeepSeek to improve the readability and language of the manuscript. After using these tools, the author(s) reviewed and edited the content as needed and take full responsibility for the content of the published article.

Declaration of competing interest

We hereby declare that there are no conflicts of interest—financial, professional, or personal—that could have influenced the research, analysis, authorship, or publication of this manuscript.

All authors have reviewed and approved this statement. We affirm that we have disclosed all relevant affiliations and funding sources within the manuscript as required.

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Appendix A. Experimental scenarios and Diagnostic Test

Study1

Experimental scenarios

Please read and envision the scenario depicted in the following material:

Several weeks ago, you enrolled in a fitness center named "Active Gym", with a monthly membership fee of 300 yuan. Active Gym offers members comprehensive training regimens and is equipped with premium-grade equipment, including weight machines, free weights, various cardiovascular exercise equipment (e.g., stationary bicycles), as well as balance and stretching apparatus. Furthermore, you can select from over 20 weekly courses (such as Pilates, strength training, and boxing) to maintain physical well-being. You have had multiple experiences at Active Gym and are satisfied with the services and facilities provided to members by the fitness center.

During your most recent visit to Active Gym, the staff informed you of an incentivized reposting campaign launched by the gym on WeChat Moments. If you agree to repost Active Gym's promotional poster on your WeChat Moments (with the requirement of being publicly visible without any group restrictions[***in low assistance required group: ……and garner 44 likes from your friends, in high assistance required group: ……and garner 88 likes from your friend***s]), you will receive a 30-yuan membership fee voucher.

Diagnostic Test

Table A1
Study1 CFA Results

Constructs	Standardized Loading	Cronbach's α	AVE	C.R
Perceived threat to freedom (TF)				
I feel that my ability to make my own choices has been diminished.	0.920	0.935	0.838	0.940
It seems that my freedom to choose has been taken away.	0.952			
I feel constrained in my actions.	0.873			
Hostile feelings (HF)				
The conditions for obtaining the voucher make me feel frustrated.	0.869	0.830	0.714	0.833
The requirements to get the voucher cause me to feel angry.	0.820			
Perceived social costs (PSC)				
If you repost this on your Moments, others may perceive it as you benefiting yourself at their expense.	0.827	0.909	0.716	0.910
Reposting this on your Moments may lead to increased social distance with your WeChat contacts.	0.878			
Others might feel uncomfortable if you share this campaign information on your Moments.	0.837			

(*continued on next page*)

Table A1 (*continued*)

Constructs	Standardized Loading	Cronbach's α	AVE	C.R
If I participate in reposting, others may view themselves as being exploited.	0.843			
Reposting on your Moments may lead friends to believe you are aiming to help them(*R*).	–			
Perceived reward value (PRV)				
The rewards offered by gym are very appealing.	0.994	0.919	0.860	0.925
The gym's reward program is quite substantial.	0.856			

$\chi 2/df = 2.402$, CFI = 0.977,GFI = 0.928, NFI = 0.961, TLI = 0.967, RMSEA = 0.077.

Table A2
Study1 HTMT-Ratio and HTMT Inference

	Original data(O)	Data average(M)	2.50 %	97.50 %	Bias	2.50 %	97.50 %
PSC <-> HF	0.844	0.844	0.754	0.923	0	0.749	0.919
PVR <-> HF	0.753	0.753	0.656	0.837	0	0.649	0.833
PVR <-> PSC	0.613	0.613	0.501	0.715	0	0.496	0.711
TF<–> HF	0.807	0.806	0.732	0.871	−0.001	0.731	0.871
TF<–> PSC	0.764	0.764	0.669	0.844	0	0.659	0.839
TF<–> PVR	0.54	0.538	0.428	0.641	−0.002	0.429	0.642

Note: The results revealed that all HTMT values ranged from 0.54 to 0.844, remaining below the conservative threshold of 0.90 for conceptually similar constructs, and the upper confidence interval limit is nicely below the 1 value and thereby the HTMT inference criterion is found to indicate that all HTMT values are significantly different from 1 (Henseler et al., 2015). These findings indicate that each construct is empirically distinct, and that discriminant validity is well established. Further support for discriminant validity was provided through conceptual differentiation among constructs.

Table A3
Study1 Cross loadinng Test

	HF	PSC	PVR	TF
hf1	**0.93**	0.693	−0.659	0.661
hf2	**0.921**	0.67	−0.567	0.662
psc1	0.603	**0.876**	−0.486	0.611
psc2	0.666	**0.906**	−0.503	0.648
psc4	0.695	**0.881**	−0.552	0.621
psc5	0.644	**0.887**	−0.461	0.624
pvr1	−0.682	−0.585	**0.968**	−0.52
pvr2	−0.589	−0.496	**0.956**	−0.446
tf1	0.638	0.665	−0.464	**0.943**
tf2	0.648	0.672	−0.448	**0.958**
tf3	0.73	0.657	−0.514	**0.926**

Note: one expects that an indicator has the highest loading value (in bold)with the construct to which it has been assigned to.

Table A4
Study1 VIF Test

	VIF
PVR - > HF	1.562
PVR - > TF	1.530
PVR - > Y	1.844
PVR - > HF	2.245
PVR - > TF	1.493
PVR - > Y	2.602
HF - > Y	3.282
TF - > HF	2.130
TF - > Y	2.426
X - > HF	1.210
X - > TF	1.171
X - > Y	1.244
MeanVIF	**1.895**

Note: The VIF for each construct was found to be below 5.0, thus indicating a lack of multicollinearity (Hair et al., 2011).

Study2

Experimental scenarios

Brief Introduction:

Prepared dishes, also referred to as pre-prepared and conditioned food products, generally use various agricultural, livestock, poultry, and aquatic products as raw materials, supplemented by seasonings and other auxiliary ingredients. They are semi-finished products processed through techniques such as pre-selection and seasoning. With the increasing enrichment of people's home-based lifestyles, prepared dishes that meet the demand for "light cooking" have begun to rapidly occupy people's dining tables, driving sustained growth in the scale of China's prepared dish market. Currently, popular prepared dishes on the market are mainly categorized into four types:

- Ready-to-eat: Edible immediately after opening, such as canned braised products and vacuum-packaged cooked food.
- Ready-to-heat: Edible after heating, such as instant noodles, self-heating hot pots, and self-heating rice.
- Ready-to-cook: Semi-finished dishes requiring cooking before consumption, such as semi-finished pork tripe and chicken, fish-flavored shredded pork, and similar products.
- Ready-to-assemble: Cleaned and sliced fresh vegetables or side dishes, such as hot pot/barbecue vegetable packs and meat packs.

Scenarios:

"Tasty Box" is a ready-to-assemble fresh food delivery service provider, committed to offering consumers specialized subscription services for fresh ingredient packages. By delivering pre-portioned fresh food raw materials and customized recipes, it enables consumers to easily enjoy the pleasure of home cooking.

Previously focusing on the European and American markets, Tasty Box has garnered widespread acclaim. Currently, the company has expanded its operations into the Chinese market and is conducting large-scale research on China's prepared dish market. The aim is to obtain effective information feedback, thereby better catering to the needs of Chinese consumers.

One day, you intend to try cooking with prepared dishes and discover that "Tasty Box" is launching a new user promotion campaign—entitled "Delicious Recommendation Rewards"—in order to help more Chinese consumers learn about and try out the company's services. The specific details are as follows:

None assistance required group Low assistance required group High assistance required group

Diagnostic TestTable A5 Study2 CFA Results

Constructs	Standardized Loading	Cronbach's α	AVE	C.R
Perceived threat to freedom (TF)				
I feel that my ability to make my own choices has been diminished.	0.861	0.940	0.894	0.962
It seems that my freedom to choose has been taken away.	0.945			

(*continued on next page*)

(*continued*)

Constructs	Standardized Loading	Cronbach's α	AVE	C.R
I feel constrained in my actions.	0.948			
Hostile feelings (HF)				
The conditions for obtaining the voucher make me feel frustrated.	0.908	0.873	0.887	0.940
The requirements to get the voucher cause me to feel angry.	0.853			
Perceived social costs (PSC)				
If you repost this on your Moments, others may perceive it as you benefiting yourself at their expense.	0.886	0.930	0.827	0.950
Reposting this on your Moments may lead to increased social distance with your WeChat contacts.	0.868			
Others might feel uncomfortable if you share this campaign information on your Moments.	0.865			
If I participate in reposting, others may view themselves as being exploited.	0.890			
Perceived reward value (PRV)				
The rewards offered by *Tasty Box* are very appealing.	0.950	0.924	0.930	0.964
The *Tasty Box*'s reward program is quite substantial.	0.904			

$\chi 2/df = 1.632$, CFI = 0.991,GFI = 0.954, NFI = 0.978, TLI = −0.987, RMSEA = 0.051.

Table A6
Study2 HTMT-Ratio and HTMT Inference

	Original data(O)	Data average(M)	2.50 %	97.50 %	Bias	2.50 %	97.50 %
PSC <->HF	0.888	0.888	0.829	0.941	0	0.827	0.939
PVR<−> HF	0.798	0.797	0.712	0.875	−0.001	0.712	0.875
PVR <-> mpsc	0.638	0.637	0.541	0.728	−0.001	0.54	0.726
TF <-> HF	0.865	0.864	0.791	0.931	−0.001	0.789	0.929
TF <-> PSC	0.846	0.846	0.778	0.907	0	0.774	0.904
TF <-> PVR	0.663	0.662	0.562	0.75	−0.001	0.561	0.749

Note: The results revealed that all HTMT values ranged from 0.638 to 0.888, remaining below the conservative threshold of 0.90 for conceptually similar constructs, and the upper confidence interval limit is nicely below the 1 value and thereby the HTMT inference criterion is found to indicate that all HTMT values are significantly different from 1 (Henseler et al., 2015). These findings indicate that each construct is empirically distinct, and that discriminant validity is well established. Further support for discriminant validity was provided through conceptual differentiation among constructs.

Table A7
Study2 Cross Loading Test

	HF	PSC	PVR	TF
hf1	**0.945**	0.763	−0.713	0.761
hf2	**0.938**	0.745	−0.637	0.715
psc1	0.74	**0.916**	−0.585	0.714
psc2	0.688	**0.904**	−0.49	0.724
psc4	0.755	**0.9**	−0.558	0.701
psc5	0.726	**0.917**	−0.518	0.738
pvr1	−0.71	−0.577	**0.966**	−0.608
pvr2	−0.674	−0.565	**0.963**	−0.586
tf1	0.708	0.725	−0.538	**0.921**
tf2	0.744	0.757	−0.586	**0.959**
tf3	0.771	0.761	−0.63	**0.955**

Note: one expects that an indicator has the highest loading value (in bold)with the construct to which it has been assigned to.

Table A8
Study2 VIF Test

	VIF
PSC - > HF	2.801
PSC - > TF	1.621
PSC - > Y	3.464
PVR- > HF	1.807
PVR- > TF	1.712
PVR- > Y	2.132
HF - > Y	4.351
TF - > HF	3.143
TF - > Y	3.38
X - > HF	1.501
X - > TF	1.414
X - > Y	1.583
MeanVIF	**2.409**

Note: The VIF for each construct was found to be below 5.0, thus indicating a lack of multicollinearity (Hair et al., 2011).

Study3

Experimental scenarios

Please read and envision the scenario depicted in the following material:

"You Jian" is a newly opened coffee shop near your workplace. You have never placed an order at this shop before and have no prior knowledge of the quality and taste of the coffee it serves.[***in post consumption group: You have previously tasted the coffee at this shop and are satisfied with its flavor.***] One day, when you plan to order a cup of coffee, you accidently come across a reward-based reposting advertisement launched by this coffee shop. The specific content is as follows:

"You Jian Coffee Shop is committed to providing you with delicious coffee. From now on, if you agree to repost the shop's new product information to your WeChat Moments (required to be publicly visible without group restrictions[***in low assistance required group: ……and receive 33 likes from your friends; in high assistance required group: ……and receive 66 likes from your friends***]), you will receive a 5-yuan coffee voucher!"

Diagnostic TestTable A9 Study3 CFA Results

Constructs	Standardized Loading	Cronbach's α	AVE	C.R
Perceived threat to freedom (TF)				
I feel that my ability to make my own choices has been diminished.	0.938	0.955	0.918	0.971
It seems that my freedom to choose has been taken away.	0.946			
I feel constrained in my actions.	0.925			
Hostile feelings (HF)				
The conditions for obtaining the voucher make me feel frustrated.	0.888	0.868	0.883	0.938
The requirements to get the voucher cause me to feel angry.	0.863			
Perceived social costs (PSC)				
If you repost this on your Moments, others may perceive it as you benefiting yourself at their expense.	0.844	0.928	0.822	0.949
Reposting this on your Moments may lead to increased social distance with your WeChat contacts.	0.891			
Others might feel uncomfortable if you share this campaign information on your Moments.	0.872			
If I participate in reposting, others may view themselves as being exploited.	0.887			
Perceived reward value (PRV)				
The rewards offered by *Youjian* are very appealing.	0.951	0.920	0.925	0.961
The *Youjian*'s reward program is quite substantial.	0.895			

$\chi 2/df = 3.582$, CFI = 0.986,GFI = 0.955, NFI = 0.981, TLI = 0.980, RMSEA = 0.066.

Table A10
Study3 HTMT-Ratio and HTMT Inference

	Original data(O)	Data average(M)	2.50 %	97.50 %	Bias	2.50 %	97.50 %
PSC<-> HF	0.882	0.882	0.836	0.923	−0.001	0.834	0.921
PVR<-> HF	0.781	0.781	0.727	0.83	0	0.727	0.829
PVR<-> psc	0.681	0.681	0.62	0.736	−0.001	0.62	0.736
TF<-> HF	0.885	0.885	0.843	0.924	0	0.842	0.923
TF<-> PSC	0.836	0.836	0.793	0.874	0	0.792	0.873
TF<-> PVR	0.696	0.696	0.638	0.749	0	0.638	0.748

Note: The results revealed that all HTMT values ranged from 0.681 to 0.885, remaining below the conservative threshold of 0.90 for conceptually similar constructs, and the upper confidence interval limit is nicely below the 1 value and thereby the HTMT inference criterion is found to indicate that all HTMT values are significantly different from 1 (Henseler et al., 2015). These findings indicate that each construct is empirically distinct, and that discriminant validity is well established. Further support for discriminant validity was provided through conceptual differentiation among constructs.

Table A11
Study3 Cross Loading Test

	HF	PSC	PVR	TF
hf1	**0.942**	0.739	−0.686	0.772
hf2	**0.938**	0.749	−0.627	0.742
psc1	0.69	**0.889**	−0.512	0.68
psc2	0.722	**0.92**	−0.575	0.717
psc4	0.727	**0.903**	−0.621	0.722
psc5	0.73	**0.914**	−0.577	0.733
pvr1	−0.692	−0.622	**0.964**	−0.648
pvr2	−0.651	−0.591	**0.96**	−0.607
tf1	0.786	0.765	−0.61	**0.958**
tf2	0.763	0.764	−0.611	**0.961**
tf3	0.768	0.734	−0.656	**0.955**

Note: one expects that an indicator has the highest loading value (in bold)with the construct to which it has been assigned to.

Table A12
Study3 VIF Test

	VIF
PSC- > HF	2.818
PSC- > TF	1.72
PSC- > Y	3.273
PVR- > HF	1.915
PVR- > TF	1.723
PVR- > Y	2.094
HF - > Y	4.017
TF - > HF	3.047
TF - > Y	3.59
W - > HF	1.042
W - > TF	1.022
W - > Y	1.054
X - > HF	2.378
X - > TF	2.344
X - > Y	2.411
W x X - > HF	2.154
W x X - > TF	2.116
W x X - > Y	2.154
MeanVIF	**2.271**

Note: The VIF for each construct was found to be below 5.0, thus indicating a lack of multicollinearity (Hair et al., 2011).

AppendixB. Measurement Invariance Test

Table B1
Results1 of Invariance measurement testing using Permutation(Study1-2)

Study1-2 *AVE, CR, Cronbach'α invariance*					
AVE					
Constructs	Original (Study1)	Original (Study2)	Original difference	Permutation Mean difference	95 %Confidence Interval
TF	0.888	0.894	−0.006	0	[-0.046, 0.045]
HF	0.857	0.887	−0.03	0	[-0.039, 0.038]
PSC	0.787	0.827	−0.039	0	[-0.043, 0.046]
PVR	0.925	0.93	−0.005	−0.001	[-0.025, 0.023]
CR					
TF	0.96	0.962	−0.002	0	[-0.018, 0.018]
HF	0.923	0.94	−0.017	0	[-0.022, 0.021]
PSC	0.937	0.95	−0.013	0	[-0.015, 0.016]
PVR	0.961	0.964	−0.002	−0.001	[-0.013, 0.012]
Cronbach'α					
TF	0.937	0.94	−0.003	0	[-0.029, 0.029]
HF	0.833	0.873	−0.04	0	[-0.051, 0.049]
PSC	0.91	0.93	−0.02	0	[-0.022, 0.024]
PVR	0.92	0.924	−0.005	−0.001	[-0.029, 0.027]

Table B2
Results2 of Invariance measurement testing using Permutation(Study1-2)

	Compositional Invariance		Partial Measurement Invariance		Equal Mean Assessment			Equal Variance Assessment		Full Measurement Invariance	
Constructs	Original correlation	Correlation permutation mean	5 %		Original difference	Permutation mean difference	Confidence Interval	Original difference	Permutation mean difference	Confidence Interval	
TF	1	1	1	Yes	−0.046	−0.004	[-0.175, 0.176]	−0.201	−0.001	[-0.153, 0.162]	Yes/ No
HF	1	1	1	Yes	0.027	−0.001	[-0.174, 0.181]	−0.132	0	[-0.157, 0.151]	Yes/ Yes
PSC	1	1	1	Yes	−0.052	−0.003	[-0.178, 0.185]	−0.159	0.002	[-0.161, 0.173]	Yes/ Yes
PVR	1	1	1	Yes	−0.258	0.003	[-0.18, 0.173]	−0.071	−0.003	[-0.16, 0.163]	No/ Yes

Table B3
Results3 of Invariance measurement testing using Permutation(Study1-3)

Study1-3 *AVE, CR, Cronbach'α invariance*					
AVE					
Constructs	Original(Study1)	Original(Study3)	Original difference	Permutation mean difference	95 %Confidence Interval
TF	0.888	0.918	−0.03	0	[-0.027, 0.025]
HF	0.857	0.883	−0.026	0	[-0.031, 0.029]
PSC	0.787	0.822	−0.035	−0.001	[-0.041, 0.037]
PVR	0.925	0.925	0	0	[-0.021, 0.018]
CR					
TF	0.96	0.971	−0.011	0	[-0.01, 0.009]
HF	0.923	0.938	−0.015	0	[-0.018, 0.017]
PSC	0.937	0.949	−0.012	0	[-0.014, 0.012]
PVR	0.961	0.961	0	0	[-0.011, 0.01]
Cronbach'α					
TF	0.937	0.955	−0.018	0	[-0.017, 0.015]
HF	0.833	0.868	−0.035	0	[-0.041, 0.038]
PSC	0.91	0.928	−0.018	−0.001	[-0.021, 0.018]
PVR	0.92	0.92	0	0	[-0.025, 0.021]

Table B4
Results4 of Invariance measurement testing using Permutation(Study1-3)

	Compositional Invariance			Partial Measurement Invariance	Equal Mean Assessment			Equal Variance Assessment			Full Measurement Invariance
Constructs	Original correlation	Correlation permutation mean	5 %		Original difference	Permutation mean difference	Confidence Interval	Original difference	Permutation mean difference	Confidence Interval	
TF	1	1	1	Yes	−0.141	0	[-0.161, 0.15]	−0.196	−0.004	[-0.134, 0.113]	Yes/No
HF	1	1	1	Yes	0.05	−0.001	[-0.163, 0.153]	−0.057	−0.004	[-0.139, 0.125]	Yes/Yes
PSC	1	1	1	Yes	0.047	0	[-0.152, 0.149]	−0.152	−0.003	[-0.145, 0.132]	Yes/No
PVR	1	1	1	Yes	0.027	0	[-0.16, 0.152]	−0.158	−0.002	[-0.123, 0.127]	Yes/No

Table B5
Results5 of Invariance measurement testing using Permutation(Study2-3)

Study2-3 *AVE, CR, Cronbach'α invariance*					
AVE					
Constructs	Original(Study2)	Original(Study3)	Original difference	Permutation mean difference	95 %Confidence Interval
TF	0.894	0.918	−0.024	0	[-0.031, 0.029]
HF	0.887	0.883	0.004	0	[-0.028, 0.027]
PSC	0.827	0.822	0.005	0.001	[-0.037, 0.032]
PVR	0.93	0.925	0.004	0	[-0.023, 0.02]
CR					
TF	0.962	0.971	−0.009	0	[-0.012, 0.011]
HF	0.94	0.938	0.002	0	[-0.016, 0.015]
PSC	0.95	0.949	0.002	0	[-0.012, 0.011]
PVR	0.964	0.961	0.002	0	[-0.012, 0.011]
Cronbach'α					
TF	0.94	0.955	−0.015	0	[-0.019, 0.017]
HF	0.873	0.868	0.005	0	[-0.036, 0.034]
PSC	0.93	0.928	0.002	0.001	[-0.019, 0.016]
PVR	0.924	0.92	0.005	0	[-0.027, 0.024]

Table B6
Results6 of Invariance measurement testing using Permutation(Study2-3)

	Compositional Invariance	Partial Measurement Invariance	Equal Mean Assessment	Equal Variance Assessment	Full Measurement Invariance

(*continued on next page*)

Table B6 (*continued*)

	Compositional Invariance			Partial Measurement Invariance	Equal Mean Assessment			Equal Variance Assessment			Full Measurement Invariance
Constructs	Original correlation	Correlation permutation mean	5 %		Original difference	Permutation mean difference	Confidence Interval	Original difference	Permutation mean difference	Confidence Interval	
Constructs	Original correlation	Correlation permutation mean	5 %		Original difference	Permutation mean difference	Confidence Interval	Original difference	Permutation mean difference	Confidence Interval	
TF	1	1	1	Yes	−0.094	−0.002	[-0.152, 0.153]	0.004	0	[-0.109, 0.113]	Yes/Yes
HF	1	1	1	Yes	0.02	−0.002	[-0.158, 0.156]	0.075	−0.002	[-0.132, 0.118]	Yes/Yes
PSC	1	1	1	Yes	0.097	−0.002	[-0.142, 0.157]	0.007	0	[-0.135, 0.128]	Yes/Yes
PVR	1	1	1	Yes	0.273	0.001	[-0.149, 0.148]	−0.086	−0.005	[-0.133, 0.106]	No/Yes

Data availability

Zhang, Jian (2025), "Data of 3 RRP Studies", Mendeley Data, V1, doi: 10.17632/67g2czmytn.1.

Data of 3 RRP Studies (Original data) (Mendeley Data).

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