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RESEARCH ARTICLE

Motivation to compete: Understanding and overcoming the demotivating effect of competing with more people

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Abstract

Competitions are widely used by businesses and nonprofit organizations to enhance customer engagement and foster interactions among consumers. But how can consumers be effectively motivated to participate in competitions that are large (vs. small) in size? Five studies involving a variety of competitive contexts show that, holding the objective likelihood of winning and competition prize constant, consumers tend to perceive a lower likelihood of winning and a smaller prize magnitude when the competition is larger in size. These differences in perceived likelihood of winning and perceived magnitude of competition prize can jointly impact consumers' participation in competitive situations (Studies 1a, 1b, and 2). Moreover, presenting information that enhances perceptions of winning likelihoods (Study 3) or prize magnitudes (Study 4) can remedy the negative impact of a larger competition size on participation levels. The studies also show that the underlying roles of perceived likelihood of winning and perceived prize magnitude are distinct from the role of social comparison. Overall, these findings add to consumer psychology theories and offer actionable managerial insights.

KEYWORDS

competition, contest, likelihood perception, magnitude perception, motivation to compete, participation motivation

INTRODUCTION

The advent of digital technologies provides businesses and nonprofit organizations unprecedented opportunities to leverage competitive contexts to engage with consumers (e.g., competitions for new product designs organized by DesignByHumans; fitness and athletic contests hosted on the Competition Corner platform). In these competitions, prizes are provided for winners by the sponsor organizations and individual consumers' effort influences whether they win. Despite the growing prevalence and importance, consumer behavior in competitive contexts is not yet well understood. Our research seeks to contribute to this understanding by investigating why a feature common to all competitions—the number of competitors—alters consumers' participation levels. More importantly, this research seeks to identify the means through which competition organizers can better manage participation levels, despite increasing numbers of competitors.

The number of competitors (referred to as competition size, hereafter) is often prominently featured by competition organizers (e.g., DietBet, DesignByHumans, FitBit Challenge, Frito-Lay's Do Us a Flavor, HealthyWage, StepBet). Competition size is also a legally mandated consumer disclosure in many markets. In the United States, for instance, section 17539.1 of California's Business and Professions Code explicitly requires

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competition organizers to disclose "the total number of contestants anticipated" (Legislative Counsel Bureau, 2020). Attorney Generals of Arizona, Florida, Indiana, Kanas, Missouri, Nebraska, Ohio, Rhode Island, and Washington have taken legal actions against competition organizers, mandating specific disclosure of information on competition size (Nolette, 2015). At the federal level, postal service regulations require contests mailed via the U.S. Postal Service to disclose information relating to competition size (USPS, 2004). Thus, competition size is an essential feature of competitive situations, a feature that consumers are often aware of, and a feature that competition organizers are often required by law to communicate to consumers.

Understanding how to present competition size appropriately is crucial to a competition's success, as pioneering studies suggest that competition size can affect consumer behavior in competitive contexts (e.g., Garcia & Tor, 2009; Ku et al., 2005; Pillutla & Ronson, 2005). In particular, Garcia and Tor (2009) show that having a large (vs. small) number of competitors dampens competitive motivation and can lead to degraded performance. This "N effect" is theorized to occur because, as competition size increases, comparing one's performance to that of other individuals becomes less viable and hence demotivating (Garcia & Tor, 2009, p. 872). Our research seeks to extend these prior findings, add to the consumer psychology literature on competitive contexts, and provide guidance to managers designing and implementing competitions.

Specifically, we find that large (vs. small) competition sizes can reduce competitive participation, even in contexts where social comparison tendencies may not differ across competition size. We identify previously underexplored factors that explain this pattern, contributing to a fuller understanding of the psychological mechanism of the effect of competition size. We show that despite knowing the objective likelihood of winning a competition and the objective value of the prize, consumers tend to *perceive* a lower likelihood of winning and a lower magnitude of the competition prize, when the competition is larger in size. These differences can jointly mediate the impact of competition size on participation levels. We further demonstrate that in competitive situations where social comparison does differ across competition size, perceived likelihood of winning and perceived magnitude of competition prize can still play significant mediating roles. That is, the underlying roles of these two constructs are distinct from the role of social comparison.

Furthermore, our research identifies approaches to influence perceived likelihood of winning and perceived magnitude of competition prize, the two mediators, to moderate the effect of competition size. This not only provides causal evidence for the proposed mediating mechanism but also informs how to boost consumer motivation in competitive contexts. From a practitioner's perspective, our findings regarding the psychological mechanism can help competition organizers devise better approaches to mitigate or even eliminate the demotivating effect of large competition sizes. Our results suggest that managers can strategically present information pertaining to the likelihood of winning and competition prize, to help consumers overcome the demotivating effect and bolster participation level. Such guidance is substantively important: In a follow-up investigation (reported in the General Discussion section in more detail) involving marketing managers from major organizations (who had a minimum of three years of work experience after attaining their graduate business degree), only 9% were utilizing one of these two approaches and none leveraged both. Thus, our research results provide actionable insights for managerial practice.

In the sections below, we first review the relevant literature and develop our hypotheses. We then present five empirical studies that test the hypotheses. We conclude with a discussion of the implications of our findings and potential directions for future research.

CONCEPTUAL BACKGROUND

Competition refers to "a situation in which someone is trying to win something or be more successful than someone else" (Cambridge Dictionary, 2022). In this research, we focus on common competitions where prizes are provided for winners by the sponsor organizations and individual consumers' effort influences whether they win. Given the prevalence of competitions, many scholars have investigated the behavioral implications of competitive contexts (e.g., online auctions: Chan et al., 2007; Norton et al., 2013; entertainment programs: Pillutla & Ronson, 2005; sports activities: Mowen, 2004). In this research, we explore the psychology of consumer competitions (e.g., competitions for new product ideas, fitness competitions) as a function of competition size (i.e., the number of participants in the competition).

Competition size and participation motivation

Among the seminal studies examining the impact of competition size is the work of Garcia and Tor (2009; see also Garcia et al., 2013). These scholars demonstrated the "N effect"—having a large (vs. small) number of competitors dampens competitive motivation because of differences in social comparison. That is, as competition size increases, comparing one's performance to that of other individuals becomes less viable and hence demotivating. To illustrate, in one scenario study, Garcia and Tor (2009, Study 5) asked participants to imagine that they were competing to add as many friends to their Facebook account as possible and that the top 20% performers of the 10 (vs. 10,000) competitors would each get a $100 cash prize. Those in

the larger size competition condition indicated that they were less motivated to compete, and this lower motivation was driven by a lowered inclination to compare their own progress with that of their competitors.

Other research also suggests that larger competition sizes may reduce participation levels. For example, Pillutla and Ronson (2005) investigate a TV game show in which participants could vote to remove other players and, thus, increase their own chance of winning the final prize of the game. The researchers find that, as the number of players remaining in the game decreased, participants became more competitive—they were more likely to vote out high (rather than low) performers (Pillutla & Ronson, 2005). Ku et al. (2005) show that when there were fewer bidders in auctions, participants became more competitive—they were more likely to overbid, exceeding the bid limits they set for themselves.

While the above research has shed light on the impact of competition size on motivation, the current understanding of the phenomenon is incomplete. For example, it is unclear what might occur in competitive contexts where social comparison does not significantly differ across competition size (e.g., when consumers are asked to create and submit a new product idea to a competition without being able to observe others' ideas; when consumers are deciding whether to sign up for a fitness competition without knowing others' performance). If competitive participation level still differs across competition size in such contexts, it is unclear what mechanism might be driving the effect. Importantly, it is also unclear what competition organizers should do to help consumers overcome the demotivating effect of large competition sizes. The current research seeks answers to these theoretically important and managerially substantive questions. Below, we discuss how competition size impacts consumers' perceptions of two fundamental aspects of a competitive situation (i.e., the likelihood of winning and the magnitude of competition prize), how changes in these can jointly influence consumers' participation levels, and how this mechanism, which is independent of social comparison, can be leveraged to bolster consumers' participation motivation.

Competition size, perceived likelihood of winning, and magnitude of competition prize

Ample research suggests that consumers tend not to process numerical information deeply and tend to make decisions based on subjectively perceived values rather than objective ones (e.g., Bagchi & Davis, 2012; Krishna et al., 2002; Wertenbroch et al., 2007). Research also shows that subjective numerical perceptions often deviate from the objective values. For example, consumers' perception of the likelihood of winning can differ as a function of contextual factors even when the objective likelihood of winning is held constant (Reczek et al., 2014). Building on these research streams, we argue that consumers' subjective perception of the likelihood of winning a competition can be influenced by competition size. Specifically, consumers are often cognitive misers (e.g., Shugan, 1980) who tend to be unwilling to deeply process objective ratio information (e.g., Krishna et al., 2002; Sevilla et al., 2018) and hence may not accurately take account of the objective ratio of individuals who can win. As such, participating in a large (vs. small) size competition may appear to require defeating a large (vs. small) number of other individuals, leading to a lower perceived likelihood of winning in a large (vs. small) size competition. That is, holding the objective likelihood constant (e.g., 10%), the subjectively perceived likelihood of winning tends to be lower when there are more (e.g., 2000) versus fewer (e.g., 20) participants in the competition. Drawing on research that suggests that consumers' perception of task difficulty (e.g., perceived likelihood of successful completion of a goal) is a potent driver of their motivation (Stamatogiannakis et al., 2018), we propose that differences in perceived likelihood of winning due to differences in competition size can impact consumers' participation levels: A lower perceived likelihood of winning tends to reduce participation in a competitive situation.

We further argue that competition size can also affect consumers' perceptions of the prize of the competition (e.g., the financial reward for winning). Research shows that judgments tend to be reference-dependent, even when the reference is objectively unrelated to the focal target (e.g., Tversky & Kahneman, 1974; Wertenbroch et al., 2007; Yang et al., 2019). Thus, in our research context, when consumers assess how substantial a competition prize is, they are likely to utilize other numerical aspects of the competition, including the size of the competition, as a reference for assessment. In light of a numerically large (vs. small) reference, consumers' perceived magnitude of competition prize is likely to be smaller. In other words, consumers tend to perceive the same prize (e.g., $100) as less substantial when participating in a large (e.g., 1000 competitors) versus small (e.g., 10 competitors) size competition. Because reward magnitude perception is another driver of motivation (Locke & Latham, 1990), we propose that differences in perceived magnitude of competition prize can in turn impact consumers' participation levels: A smaller perceived prize magnitude tends to reduce participation in a competitive situation.

More formally, we hypothesize that, holding the objective likelihood of winning and competition prize constant:

Hypothesis 1 *Consumers tend to perceive a lower likelihood of winning when competition size is large (vs. small).*

Hypothesis 2 *Consumers tend to perceive the prize as smaller in magnitude when competition size is large (vs. small).*

Hypothesis 3 *A lower* **(A)** *perceived likelihood of winning and* **(B)** *perceived magnitude of competition prize can jointly reduce consumers' participation in large (vs. small) size competitions.*

Note that these propositions are distinct from the social comparison-based account examined in prior research. They offer clear predictions regarding consumers' participation behavior in competitive situations where social comparison does not differ across competition size. Furthermore, the proposed mechanism should also operate in situations where social comparison does play an underlying role.

Overcoming the demotivating effect of competing with more people

If our conceptualization above is correct, it poses a challenge for competition organizers aiming to motivate consumers to participate in and remain engaged in large-size competitions. This problem is prevalent as the overwhelming majority of consumer competitions organized by firms and nonprofit organizations involve more than a few participants. Thus, a key managerial question is: How can the demotivating effect of large competition sizes be reduced or even eliminated? Prior research suggests that the presentation of information can be purposefully designed to foster more optimal decision-making (Thaler & Sunstein, 2008). Building on this insight, we explore two potential approaches to address the demotivating effect of large competition sizes.

First, if differences in perceived likelihood of winning can indeed play an underlying role in the effect of competition size on participation motivation, factors that influence how consumers perceive the likelihood of winning should moderate the effect. One such factor, which is largely under the control of the competition organizer, is how information regarding the likelihood of winning is presented. Specifically, our proposition is that because consumers often are unwilling to deeply process objective ratio information, they are inclined to perceive a lower likelihood of winning when the competition size is large (vs. small). As such, presenting information that can help consumers more easily form an accurate understanding of the likelihood of winning should moderate the effect of competition size on participation level. To illustrate, both "10% of the 2,000 participants are winners" and "10% of the 20 participants are winners" can be more easily understood as "1 in 10 participants are winners." Presenting (vs. not presenting) the latter information to consumers should thus help attenuate the differences in perceived likelihood of winning across the two competition size conditions. This in turn should moderate the effect of competition size on participation motivation. Formally:

Hypothesis 4 *Presenting information that facilitates a more accurate understanding of the likelihood of winning can moderate the effect of competition size on consumers' participation in a competitive situation.*

Second, if differences in perceived reward magnitude can indeed play an underlying role in the effect of competition size on participation motivation, factors that influence how consumers perceive prize magnitude should moderate the effect. Specifically, our proposition is that because consumers can use the numerical magnitude of competition size as a reference for assessing the magnitude of the competition prize, the same prize (e.g., $50 for each winner) tends to be perceived as smaller when the competition size is large (e.g., 2000 competitors) versus small (e.g., 20 competitors). This proposed process should thus be moderated by presenting information on competition prize in a way that enhances numerical magnitude perceptions. One approach is to present information on the total pot of prizes the competition offers: For competitions with the same objective likelihood of winning (e.g., 10%) and competition prize (e.g., $50 for each winner), a larger (e.g., 2000) versus smaller competition size (e.g., 20) would yield a larger total pot of prizes (e.g., $10,000 vs. $100), making the prize of the competition appear more substantial in magnitude. Presenting (vs. not presenting) the total prize pot can thus bolster the otherwise reduced perception of prize magnitude in larger size competitions, attenuating or even eliminating the negative effect of competition size on participation motivation. Formally:

Hypothesis 5 *Presenting information that bolsters perceived magnitude of competition prize can moderate the effect of competition size on consumers' participation in a competitive situation.*

In the next section, we present five empirical studies that test these hypotheses utilizing different sets of competition sizes, competitive tasks, objective winning likelihoods, and prizes. Studies 1a, 1b, and 2 show that in competitive situations where social comparison tendencies do not differ across competition size, participation level can still be reduced in a large (vs. small) size competition. These studies also test whether consumers' perceived likelihood of winning and perceived prize magnitude are joint mediators of the effect of competition size on participation level. Studies 3 and 4 each test a theoretically relevant moderator, identifying means through which competition organizers can mitigate the demotivating effect of large competition sizes. Importantly, by manipulating moderators that directly impact our proposed mediators, Studies 3 and 4 also provide causal evidence for the mediating roles of perceived likelihood of winning and perceived prize magnitude, in how competition size affects consumers' participation

motivation. Further, Study 4 also shows that even in situations where social comparison does play an underlying role, perceived likelihood of winning and perceived prize magnitude are distinct mediating routes through which competition size alters participation motivation.

STUDY 1A

Study 1a sought to show that competition size can impact consumer behavior via mechanisms other than social comparison. The study tested whether in prevalent competitive contexts where social comparison may not differ across competition size, consumers still exhibit a lower participation level when the competition is large (vs. small) in size. Further, Study 1a also aimed to demonstrate that a larger competition size can degrade consumers' perceived likelihood of winning (H1) and perceived magnitude of competition prize (H2), and that these changes can jointly drive consumers' participation level (H3).

Design and procedure

We recruited six hundred individuals (51% women, average age of 41) from a U.S. consumer panel (Amazon Mechanical Turk) to participate in the study for monetary compensation. As in all subsequent studies, potential participants first completed a bot check procedure (reCAPTCHA v3 by Google) and only those who passed the procedure were invited to participate in the study. They were randomly assigned to one of two conditions: small vs. large competition size. Following an established approach (Garcia & Tor, 2009), competition size was manipulated by informing participants that the pool of competitors consisted of 40 [4000] similar individuals. The objective likelihood of winning the competition (5%) and the competition prize for each winner ($75) were identical in the two conditions. We focused on participants' decision to sign up for a competition and selected a common competitive context where participants need to complete a design task independently and submit their work individually. Given these contextual characteristics, social comparison inclination might not differ across competition size. Specifically, participants were informed that, due to the coronavirus outbreak, liquid soap for hand washing had become an essential household item. A health organization was launching a competition for liquid soap dispenser bottle designs. 40 [4000] people with similar backgrounds were invited to participate in this competition. Participants would individually submit their design via email. The designs would be evaluated by a panel of experts. Participants with designs that ranked in the top 5% would each win a $75 cash prize. The winners would be individually notified via email.

Participants in both conditions responded to the same set of measures. As a measure of competitive motivation, participants indicated whether they would sign up for the competition (1 = yes, 0 = no). For perceived likelihood of winning, participants indicated how likely/probable it was that they would win the competition (1 = not likely/probable at all, 7 = very likely/probable). For perceived magnitude of competition prize, they rated the magnitude/size of the competition prize for each winner (1 = very small, 7 = very large). For social comparison, participants indicated, when deciding whether to participate in the competition, the extent to which they thought about how their design/performance might compare with their competitors' (1 = not at all, 7 = quite a lot; adapted from Garcia & Tor, 2009).

Finally, participants responded to an attention check procedure that verified whether they adequately followed the study instructions (Berinsky et al., 2014; see Methodological Detail Appendix for details) and completed basic demographic measures. The responses of 573 participants who passed the attention check were included in subsequent analyses. (Including all responses in the analyses yielded qualitatively identical patterns of results.) A confirmatory factor analysis indicated that the three sets of measures for the mediators reflected three distinct factors (χ^2 = 5.97, CFI> 0.99, RMSEA < 0.01, and SRMR = 0.01). Participants' responses to the two-scale items for perceived likelihood of winning, perceived prize magnitude, and social comparison were averaged (rs> 0.87) to create the respective operational measure for subsequent analyses.

Results

Competition signup

A logistic regression with competition size (1 = large, 0 = small) as the independent variable and participants' signup decision as the dependent variable revealed that significantly fewer participants in the large (vs. small) competition size condition decided to enter the competition (M_{large} = 46.6% vs. M_{small} = 60.2%; β = −0.55, SE = 0.17, Wald = 10.59, p = 0.001, Exp(B) = 0.58). That is, when a larger number of individuals were invited to the competition, participants became less motivated, as indicated by their lowered willingness to enter the competition.

Perceived likelihood of winning

Supporting H1, participants in the large (vs. small) competition size condition perceived that they were significantly less likely to win the competition (M_{large} = 2.73, SD_{large} = 1.84 vs. M_{small} = 3.28, SD_{small} = 1.91; F[1, 571] = 12.12, p = 0.001, d = −0.29), even though the objective likelihood of winning was identical across the two conditions.

Perceived magnitude of competition prize

Supporting H2, participants in the large (vs. small) competition size condition perceived the competition prize for each winner as significantly smaller in magnitude (M_{large} = 4.02, SD_{large} = 1.55 vs. M_{small} = 4.51, SD_{small} = 1.52; F[1, 571] = 14.51, p<0.001, d = −0.31), even though the prize was identical across the conditions.

Social comparison

Participants in both large and small competition size conditions reported having thoughts about comparing with competitors when deciding whether to sign up for the competition, but the level of such comparison did not significantly differ across the conditions (M_{large} = 4.61, SD_{large} = 1.94 vs. M_{small} = 4.84, SD_{small} = 1.78; p > 0.14). This pattern suggests that the differences in motivation to compete observed in this study cannot be simply attributed to social comparison differences.

Mediation

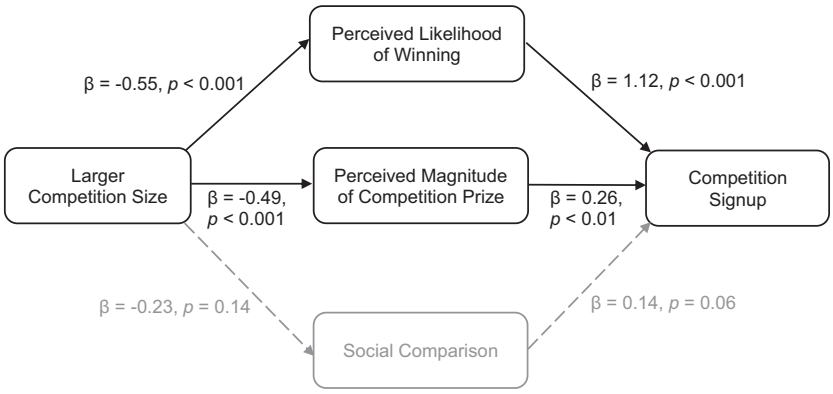
We ran a mediation analysis (Model 4; 5000 resamples; Hayes, 2017) with whether participants decided to sign up for the competition (1 = yes, 0 = no) as the dependent variable, competition size (1 = large, 0 = small) as the independent variable, and perceived likelihood of winning, perceived magnitude of competition prize, and social comparison as three simultaneous mediators (see Figure 1).

The analysis confirmed our proposed mechanism: The indirect effects of competition size through perceived likelihood of winning (β = −0.61, SE = 0.19, 95%CI [−1.02, −0.27]) and through perceived magnitude of competition prize (β = −0.13, SE = 0.06, 95%CI [−0.26, −0.03]) were both significant. The indirect effect through social comparison, however, was not significant (β = −0.03, SE = 0.03, 95%CI [−0.10, 0.01]). Further, when the indirect effects were accounted for, the otherwise significant direct effect of competition size on participation motivation became nonsignificant (β = −0.10, SE = 0.24, 95%CI [−0.57, 0.38]). In other words, supporting our propositions, perceived likelihood of winning (H3A) and perceived magnitude of competition prize (H3B) were significant mediators of the impact of competition size on participation levels. In this competitive context, social comparison did not play a mediating role (see Web Appendix for a replication using a different competitive context, as well as ancillary analyses showing that alternative mediational paths could not account for the observed behavioral patterns).

Robustness with respect to gender

As gender may potentially influence competitive motivation (e.g., Hanek et al., 2016; Vandegrift & Holaday, 2012), we ran further analyses to assess the robustness of the findings with respect to gender. First, we ran a logistic regression with competition signup decision as the dependent variable, and competition size, gender (1 = female, 0 = male), and their interaction term as the predictors. The coefficient estimate for competition size remained significant (β = −0.54, SE = 0.24, Wald = 4.98, p = 0.026, Exp(B) = 0.58). The coefficient estimates for gender and for the interaction term were not significant (ps> 0.9). This pattern indicates that the impact of competition size on participation motivation did not significantly vary across gender in the competitive context of Study 1a.

Next, to assess the potential influence of gender difference in the underlying process, we ran a moderated mediation analysis (Model 8; 5000 resamples; Hayes, 2017) with competition signup decision as the dependent variable, competition size as the independent variable, and gender as the moderator. The indexes of moderated



Note: Solid lines indicate significant paths. Dash lines indicate non-significant paths.

FIGURE 1 Study 1 results: Perceived likelihood of winning and perceived magnitude of competition prize were distinct mediators of the effect of competition size on competition signup decision

mediation for perceived winning likelihood (index = 0.27, SE = 0.37, 95%CI [−0.45, 1.01]), perceived prize magnitude (index = 0.01, SE = 0.07, 95%CI [−0.13, 0.16]), and social comparison (index = 0.01, SE = 0.05, 95%CI [−0.10, 0.11]) were all nonsignificant. These indicate that gender difference did not significantly alter the underlying process in the competitive context of Study 1a.

Discussion

The behavioral patterns observed suggest that in some competitive contexts (e.g., the competition signup decision context in Study 1a), social comparison differences might not be the most potent driver of differences in participation motivation across competition size. Such competitive contexts differ from those in the pioneering research (e.g., Garcia & Tor, 2009). For example, in the context of competition signup decision, because the decision occurs prior to engaging in the competitive task, competitors' specific performance might not be as overt (as when one is able to observe competitors' progress on the actual task). Hence, although people can still engage in social comparison when making the signup decision, the level of social comparison might not sufficiently differ across the competition size conditions (as observed in Study 1a). Importantly, the results of Study 1a suggest that differences in perceived likelihood of winning and in perceived magnitude of competition prize can account for the impact of competition size on participation levels in these competitive contexts.

STUDY 1B

Study 1b extended the findings of Study 1a in multiple ways. First, prior research (e.g., Hanek et al., 2016; Vandegrift & Holaday, 2012) suggests that gender identity can play a role in how consumers react to different competition sizes. Although including participants' gender as a moderator did not change the pattern of results in Study 1a, we sought to more robustly explore this account in Study 1b. We measured the extent to which participants identified as feminine (vs. masculine) and examined whether this continuous gender identity measure might influence the results. Moreover, Study 1b also investigated another potential alternative account—whether the detrimental effects of competition size might be due to participants' misunderstanding of the term "win" (e.g., misconstruing the term as "being the first in the competition"). Specifically, we removed the term "win" from the study and used alternative phrasing in the stimuli (e.g., "succeed" instead of "win"). If the behavioral patterns remain consistent with those of Study 1a, such misinterpretation per se would not be able to account for the results. Finally, to demonstrate robustness, we examined a different competitive context in Study 1b.

Design and procedure

We recruited six hundred individuals (47% women, average age of 39) from the same consumer panel as in Study 1a to participate in this study for monetary compensation. They were randomly assigned to one of two conditions: small vs. large competition size. The experimental procedure was similar to that of Study 1a. Specifically, participants were informed that, due to the coronavirus pandemic, many people's physical activities had been reduced. They were invited to join a competition for staying physically active for the next 4 weeks. 50 [5000] individuals with similar bodyweight, height, lifestyle, and habits would be in this competition. Each participant's physical exercise activities would be recorded during the competition. Those finishing in the top 10% would each receive a $75 cash prize. Those participants would be individually notified via email.

Participants in both conditions responded to the same set of measures. For competitive motivation, participants indicated whether they would sign up for the competition (1 = yes, 0 = no). For perceived likelihood of winning, participants indicated how likely/probable it was that they would succeed in getting a competition prize (1 = not likely/probable at all, 7 = very likely/probable). For perceived magnitude of competition prize, they rated the magnitude/size of the competition prize for each top performer (1 = very small, 7 = very large). For social comparison, participants indicated, when deciding whether to participate in the competition, the extent to which they thought about how their performance/progress might compare to their competitors' (1 = not at all, 7 = quite a lot). For gender identity, participants indicated the extent to which they saw themselves as feminine (1 = not feminine at all, 7 = extremely feminine) and as masculine (1 = not masculine at all, 7 = extremely masculine; Yan, 2016).

Finally, participants completed the same attention check procedure and basic demographic measures as in Study 1a. The responses of 578 participants who passed the attention check were included in subsequent analyses. (Including all responses in the analyses yielded qualitatively identical patterns of results.) Participants' responses to the two scale items for each of the mediators were averaged ($rs > 0.8$) to create the respective operational measure for subsequent analyses.

Results

Competition signup

A logistic regression with competition size (1 = large, 0 = small) as the independent variable and participants' signup decision as the dependent variable revealed that significantly fewer participants in the large (vs. small) competition size condition decided to enter the

competition (M_{large} = 59.1% vs. M_{small} = 68.8%; β = −0.43, SE = 0.17, Wald = 5.93, p = 0.015, Exp(B) = 0.65). As the term "win" was not used in the study, this result suggests that alternative mechanisms based on participants' misinterpretation of the term cannot account for the demotivating effect of competition size in this study.

Perceived likelihood of winning

Further supporting H1, participants in the large (vs. small) competition size condition perceived that they were significantly less likely to succeed at getting a prize in the competition (M_{large} = 4.21, SD_{large} = 2.11 vs. M_{small} = 4.62, SD_{small} = 1.97; F[1, 576] = 5.83, p = 0.016, d = −0.201).

Perceived magnitude of competition prize

Further supporting H2, participants in the large (vs. small) competition size condition perceived the competition prize for each top performer as significantly smaller in magnitude (M_{large} = 4.07, SD_{large} = 1.84 vs. M_{small} = 4.42, SD_{small} = 1.70; F[1, 576] = 5.58, p = 0.019, d = −0.197).

Social comparison

Although participants in both large and small competition size conditions reported having thoughts about comparing with their competitors when deciding whether to sign up for the competition, the levels of social comparison did not significantly differ across the conditions (M_{large} = 5.19, SD_{large} = 1.53 vs. M_{small} = 5.38, SD_{small} = 1.44; $p > 0.11$). This pattern suggests that the differences in participation motivation in this study cannot be simply attributed to the differences in social comparison.

Mediation

We ran a mediation analysis (Model 4; 5000 resamples; Hayes, 2017) with whether participants decided to sign up for the competition (1 = yes, 0 = no) as the dependent variable, competition size (1 = large, 0 = small) as the independent variable, and perceived likelihood of winning, perceived magnitude of competition prize, and social comparison as three simultaneous mediators. The analysis results further supported our proposed mechanism (H3A and H3B): The indirect effects of competition size through perceived likelihood of winning (β = −0.09, SE = 0.04, 95%CI [−0.19, −0.01]) and through perceived magnitude of competition prize (β = −0.28, SE = 0.12, 95%CI [−0.54, −0.06]) were both significant. The indirect effect through social comparison, however, was not significant (β =0.001, SE = 0.02, 95%CI [−0.04, 0.04]). Further, as expected, when the indirect effects were accounted for, the otherwise significant direct effect of competition size on participation motivation became nonsignificant (β = −0.23, SE = 0.22, 95%CI [−0.67, 0.21]).

Robustness with respect to gender

To assess the robustness with respect to the potential influence of gender difference, we first ran a logistic regression with competition signup decision as the dependent measure and competition size, gender (female = 1, male = 0), and their interaction term as predictors. The coefficient estimate for competition size remained significant (β = −0.67, SE = 0.25, Wald = 7.37, p = 0.007, Exp(B) = 0.51) and that for gender was also significant (β = −0.65, SE = 0.26, Wald = 6.54, p = 0.011, Exp(B) = 0.52). The coefficient for the interaction term was not significant (β = 0.53, SE = 0.35, Wald = 2.28, p = 0.13). This pattern indicates that while gender indeed influenced participation motivation in the competitive context of Study 1b, the impact of competition size on motivation did not significantly vary across gender.

Next, to assess the potential influence of gender difference in the underlying process, we ran a moderated mediation analysis (Model 8; 5000 resamples; Hayes, 2017) with competition signup decision as the dependent variable, competition size as the independent variable, and gender as the moderator. The indexes of moderated mediation for perceived winning likelihood (index = 0.002, SE = 0.08, 95%CI [−0.15, 0.16]), perceived prize magnitude (index = −0.02, SE = 0.25, 95%CI [−0.53, 0.47]), and social comparison (index = −0.001, SE = 0.02, 95%CI [−0.05, 0.05]) were all nonsignificant. These indicate that gender difference did not significantly alter the underlying process in the competitive context of Study 1b.

Robustness with respect to gender identity

We also probed the potential role of gender identity using the continuous gender identity measure. The masculine scale item was reverse-coded and then averaged with the feminine scale item to create a single, continuous measure of gender identity (with a higher [lower] value reflecting a more feminine [masculine] identity). We ran a logistic regression with competition signup decision as the dependent variable, and competition size, gender identity, and their interaction term as predictors. The coefficient estimate for competition size remained significant (β = −1.01, SE = 0.40, Wald = 6.16, p = 0.013, Exp(B) = 0.37) and that for the gender identity measure was also significant (β = −0.16, SE = 0.06, Wald = 6.42, p = 0.011, Exp(B) = 0.85). The

coefficient estimate for the interaction term was not significant (β = 0.14, SE = 0.09, Wald = 2.59, p = 0.11). This pattern again offers evidence that while gender identity can indeed influence participation motivation, the impact of competition size on motivation did not significantly vary across the continuum of gender identity in the competitive context of Study 1b.

To assess the potential influence of gender identity on the underlying process, we ran a moderated mediation analysis (Model 8; 5000 resamples; Hayes, 2017) with competition signup decision as the dependent variable, competition size as the independent variable, and gender identity as the moderator. The indexes of moderated mediation for perceived winning likelihood (index = 0.01, SE = 0.02, 95%CI [−0.02, 0.05]), perceived prize magnitude (index = 0.04, SE = 0.06, 95%CI [−0.08, 0.17]), and social comparison (index = −0.001, SE = 0.01, 95%CI [−0.02, 0.02]) were nonsignificant. These results indicate that differences in gender identity did not significantly alter the underlying process in the competitive context of Study 1b.

Discussion

Using a different competitive context, Study 1b provided further evidence for the underlying roles of perceived winning likelihood and perceived prize size in the demotivating effect of a larger competition size. Importantly, Study 1b showed that the results could not be explained by alternative accounts based on participants' misinterpretation of the term "win" (e.g., misconstruing the term as "being the first in the competition"), as this term was not used. Finally, the pattern of results in Study 1b could not be attributed to alternative accounts based on gender or gender identity difference. This pattern is consistent with the growing research stream showing that the influence of gender may depend on the context. For instance, in Vandegrift and Holaday (2012), gender difference in reaction to competition size emerged only when participants were made to believe that they would be leading (vs. mid-tier) performers in the competition (p. 190). Hanek et al. (2016) shows that women's less favorable reaction to a larger competition size manifests in contexts that may violate their prescriptive gender norms. In our research, the competitive contexts did not involve prescriptive gender norm violations nor evoke one's proximity to leading performers. As such, gender difference might not have significantly influenced the underlying mechanism of the competition size effect in the particular contexts we investigated.

STUDY 2

Studies 1a and 1b investigated consumers' decision to participate in a competition. To assess generalizability, Study 2 examined whether our proposed mechanism can explain the impact of competition size on the amount of effort consumers exert on an incentive-compatible competitive task. In this study, consumers were invited to provide new product suggestions, a competitive context widely leveraged by firms for customer engagement. In this study, consumers independently completed and submitted their work to the competition, a common type of competitive setup in which participants must focus on performing a cognitively demanding task on their own, leaving less mental resources for engaging in social comparison. In other words, social comparison might not differ across competition size in this competitive context. Furthermore, to demonstrate robustness, Study 2 utilized a different consumption category and a different set of competition sizes and competition prize.

Design and procedure

We recruited six hundred individuals (52% women, average age of 38) from the same consumer panel as in Study 1a to participate in this study for monetary compensation. They were randomly assigned to one of two conditions (large vs. small competition size) and shown the respective scenario on a competition for proposing new product ideas. As in Study 1a, we manipulated competition size by informing participants that they were competing in a pool of 20 [2000] similar individuals. The objective likelihood of winning (10%) and the competition prize for each winner ($5) were identical in the two experimental conditions. Specifically, participants were informed that they were one of 20 [2000] similar individuals invited to participate in a competition for coming up with as many unique instant noodle flavor ideas as possible; individuals who ranked in the top 10% would each win a $5 cash prize. Thus, participants' performance on the competitive task was consequential.

Next, participants wrote down their instant noodle flavor ideas. On a separate page, they responded to measures pertaining to the potential mediators. For perceived likelihood of winning, participants indicated how likely/probable it was that they would win the competition (1 = not likely/probable at all, 7 = very likely/probable). For perceived magnitude of competition prize, they rated the magnitude/size of the prize for each winner (1 = very small, 7 = very large). For social comparison, participants were asked to indicate, when they were working on their product ideas, the extent to which they thought about how their ideas/performance might compare with their competitors' (1 = not at all, 7 = quite a lot). Finally, as in Study 1a, participants responded to an attention check procedure and completed basic demographic measures.

Two coders who were unaware of the hypotheses of the research counted the number of unique product ideas each participant generated. Five hundred

and seventy-four participants who passed the attention check procedure and properly responded to the idea generation task (i.e., provided readable responses) were included in subsequent analyses. Discrepancies (1%) between the coders were resolved through discussion. For example, "lobster bisque flavor," "orange chicken," "spicy buffalo," and "sour cream and onion" were each counted as one idea. Responses such as "no ideas" were coded as 0. Participants whose performance ranked in the top 10% were each given a $5 prize through the consumer panel platform. The number of ideas each participant generated—a measure of motivation to exert effort in the competition—served as the dependent variable. Participants' responses to each set of the scale items were averaged to create the respective operational measure for subsequent analyses ($rs > 0.78$).

Results

Effort exerted during competition

Participants in the large (vs. small) size condition submitted significantly fewer new product ideas ($M_{large} = 3.27$, $SD_{large} = 2.36$ vs. $M_{small} = 3.76$, $SD_{small} = 3.04$; $F[1, 572] = 4.69$, $p = 0.03$, $d = -0.18$), indicating that the large (vs. small) competition size significantly lowered participants' motivation to compete, as measured by their actual performance in a task that was consequential.

Perceived likelihood of winning

Supporting H1, participants in the large (vs. small) competition size condition perceived that they were significantly less likely to win the competition ($M_{large} = 2.88$, $SD_{large} = 1.87$ vs. $M_{small} = 3.27$, $SD_{small} = 1.77$; $F[1, 572] = 6.44$, $p = 0.01$, $d = -0.21$), even though the objective likelihood of winning was identical across the conditions.

Perceived magnitude of competition prize

Supporting H2, participants in the large (vs. small) competition size condition perceived the prize for winning as significantly smaller in magnitude ($M_{large} = 3.74$, $SD_{large} = 1.56$ vs. $M_{small} = 4.32$, $SD_{small} = 1.52$; $F[1, 572] = 19.89$, $p < 0.001$, $d = -0.38$), even though the prize was identical across the conditions.

Social comparison

Participants in both large and small competition size conditions reported having thoughts about comparing with their competitors while they worked on the competitive task, but the level of such comparison did not significantly differ across the conditions ($M_{large} = 4.30$, $SD_{large} = 1.81$ vs. $M_{small} = 4.32$, $SD_{small} = 1.76$; $p > 0.8$). This pattern suggests that the significant difference in competitive motivation observed in this study cannot be simply attributed to differences in social comparison.

Mediation

We ran a mediation analysis (Model 4; 5000 resamples; Hayes, 2017) with the effort exerted during the competition (i.e., the number of unique product ideas generated) as the dependent variable, competition size (1 = large, 0 = small) as the independent variable, and perceived likelihood of winning, perceived prize magnitude, and social comparison as simultaneous mediators. This analysis further confirmed our proposed mediational relationships: The indirect effects of competition size through perceived likelihood of winning ($\beta = -0.07$, SE = 0.04, 95%CI [−0.17, −0.01]) and through perceived prize magnitude ($\beta = -0.09$, SE = 0.04, 95%CI [−0.18, −0.02]) were both significant. However, the indirect effect through social comparison was not significant ($\beta = -0.001$, SE = 0.02, 95%CI [−0.04, 0.03]). Finally, when these indirect effects were accounted for, the otherwise significant direct effect of competition size on motivation became nonsignificant ($\beta = -0.33$, SE = 0.23, 95%CI [−0.78, 0.12]). These results thus support H3A and H3B, highlighting the underlying roles of perceived likelihood of winning and perceived magnitude of competition prize.

STUDY 3

Studies 1a, 1b, and 2 found that, in certain competitive contexts, although participants engaged in substantial social comparison, the level of such comparison did not significantly differ across competition size. Yet, competitive participation levels still differed across competition size. These studies also showed that, despite knowing the objective likelihood of winning a competition and the objective value of the competition prize, participants in the large (vs. small) competition size condition perceived a lower likelihood of winning and a lower magnitude of the competition prize; these differences jointly mediated the detrimental effect of a larger competition size on participation motivation.

Study 3 sought to extend these findings in multiple ways. First, Study 3 explored a moderator of the effect—whether presenting information that facilitates a more accurate understanding of the winning likelihood can moderate the effect of competition size on motivation (H4). Second, because Study 3 manipulated a factor directly influencing the mediator—perceived winning likelihood—it also aimed to offer additional evidence for the causal role of this mediator. Importantly, this approach

helped shed further light on why the differences in perceived likelihood across competition size arise in the first place. As conceptualized earlier, consumers tend to be cognitive misers (e.g., Shugan, 1980) who are not always willing to invest the necessary mental resources to accurately process numerical information; hence, their perception of winning likelihood can be biased by competition size. If this is indeed the case (as the results of Studies 1a, 1b, and 2 suggest), then having (vs. not) more easily understandable information on the objective winning likelihood should attenuate the difference in perceived winning likelihood. Finally, to further demonstrate generalizability and robustness, Study 3 utilized yet another type of competitive context (i.e., designing an ad for a gym company).

Design and procedure

We recruited one thousand and two hundred individuals (50.5% women, average age of 39.7) from a U.S. consumer panel (Amazon Mechanical Turk) to participate in the study for monetary compensation. They were randomly assigned to a 2 (competition size: large vs. small) × 2 (likelihood of winning presentation type: control vs. enhanced) between-participant design. Participants were first informed that because of the pandemic, many people had stopped going to gyms. They were asked to imagine that they were invited to join a competition for designing web banner ads for a fitness company to help promote its gyms; participants with superior ad designs would each win a $75 prize; [20] 2000 people with similar backgrounds would participate in this competition; each person would submit one ad design, which would be ranked. Whereas those in the control condition were informed that the top 10% of participants would each win the cash prize, those in the enhanced likelihood of winning presentation condition were informed that for every 10 participants in the competition, one would win the cash prize (see MDA for more detail).

Next, all participants indicated whether they would sign up for the competition (0 = no, 1 = yes). They then responded to measures on perceived likelihood/probability of winning (1 = not likely/probable at all, 7 = very likely/probable) and perceived magnitude/size of competition prize for each winner (1 = very small, 7 = very large). For social comparison, participants indicated, when deciding whether to sign up for the competition, to what extent they thought about how their work might compare with their competitors' (1 = not at all, 7 = very much) and to what extent they considered how their ad design might compare with their competitors' (1 = not at all, 7 = very much). As in the first three studies, all participants completed an attention check and responded to basic demographic measures. The responses of 1167 participants who passed the attention check were included in subsequent analyses. (Including all responses in the analyses yielded qualitatively identical patterns of results.) The scale items for each mediator were averaged to create the respective operational measure for subsequent analyses (rs > 0.83).

Results

Competition signup

We ran a logistic regression with competition signup decision as the dependent variable and competition size (1 = large, 0 = small), winning likelihood presentation type (1 = enhanced, 0 = control), and their interaction term as predictors. This analysis revealed a significant main effect of competition size (M_{large} = 67.1% vs. M_{small} = 72.1%; β = −0.59, SE = 0.18, Wald = 10.88, p < 0.001, Exp(B) = 0.55), but the main effect of winning likelihood presentation type was not significant (p > 0.16). Importantly, there was a significant interaction effect (β = 0.74, SE = 0.26, Wald = 8.22, p = 0.004, Exp(B) = 2.08): In the control condition, the large (vs. small) competition size significantly lowered the competition signup ratio (M_{large} = 61.9% vs. M_{small} = 74.7%; p < 0.001). In the enhanced presentation of winning likelihood condition, however, signup ratios did not differ between the two competition size conditions (M_{large} = 72.3% vs. M_{small} = 69.4%; p > 0.4; see Figure 2). This pattern supports H4, illustrating that the enhanced presentation of winning likelihood can help overcome the detrimental effect of competition size on participation motivation.

Perceived likelihood of winning

We ran an ANOVA with perceived likelihood of winning as the dependent variable, and competition size and winning likelihood presentation type as between-participant factors. This analysis revealed a significant interaction effect (F[1, 1163] = 7.38, p = 0.007). The main effect of competition size (p > 0.10) and that of winning likelihood presentation type (p > 0.28) were not significant.

Planned contrasts showed that in the control condition, the large (vs. small) competition size led to a significantly lower perceived likelihood of winning (M_{large} = 3.96, SD_{large} = 2.04 vs. M_{small} = 4.46, SD_{small} = 1.92; F[1, 1163] = 9.51, p = 0.002, d = −0.25). However, in the enhanced presentation of winning likelihood condition, perceived likelihood of winning did not differ between the two competition size conditions (M_{large} = 4.39, SD_{large} = 1.86 vs. M_{small} = 4.27, SD_{small} = 1.96; p > 0.4). These results provide further support for our proposed mechanism.

Perceived magnitude of competition prize

As expected, an ANOVA with perceived magnitude of competition prize for each winner as the dependent

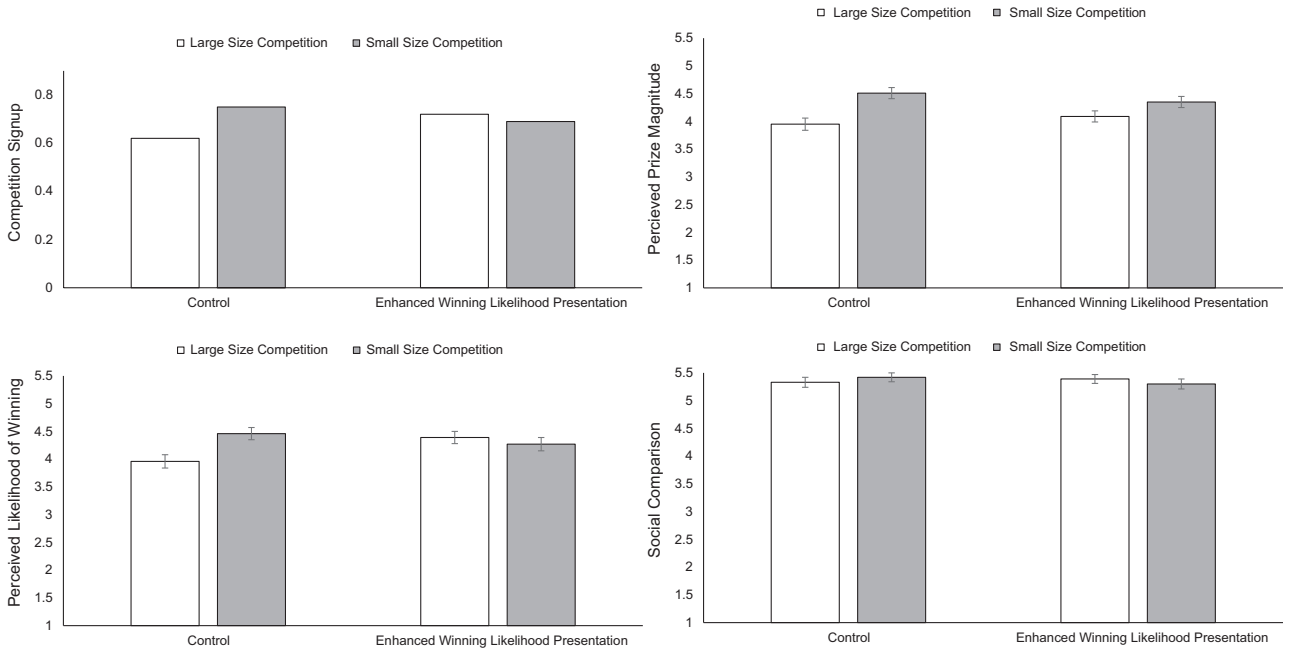


FIGURE 2 Study 3 results

variable revealed a significant main effect of competition size (M_{large} = 4.02, SD_{large} = 1.73 vs. M_{small} = 4.43, SD_{small} = 1.63; F[1, 1163] = 17.34, p<0.001, d = −0.24). The main effect of winning likelihood presentation type (p>0.9) and the interaction between the two factors (p>0.12) were not significant.

Social comparison

An ANOVA with social comparison as the dependent variable did not yield a significant main effect of competition size (M_{large} = 5.35, SD_{large} = 1.48 vs. M_{small} = 5.36, SD_{small} = 1.45; p>0.9). The main effect of winning likelihood presentation type (p>0.73) and the interaction between the two factors (p>0.27) were also not significant. This pattern offers further evidence that perceived likelihood of winning can play a role distinct from social comparison.

Moderated mediation

We ran a moderated mediation analysis (Model 8; 5000 resamples; Hayes, 2017) with competition size as the independent variable, competition signup as the dependent variable, and perceived likelihood of winning, perceived magnitude of competition prize, and social comparison as three simultaneous mediators. Winning likelihood presentation type was included in the model as the moderator.

This analysis yielded moderated mediation patterns supporting our propositions. First, the moderated mediation indexes for perceived prize magnitude (index = −0.02, SE = 0.03, 95% CI[−0.10, 0.03]) and social comparison (index = 0.01, SE = 0.02, 95% CI[−0.02, 0.05]) were not significant, indicating that the indirect effects through perceived prize magnitude and through social comparison did not significantly differ across the enhanced presentation of winning likelihood versus control conditions. In contrast, the moderated mediation index for perceived likelihood of winning (index = 0.61, SE = 0.23, 95% CI [0.16, 1.08]) was significant, indicating that the enhanced presentation of winning likelihood moderated the underlying role of this construct. Specifically, the indirect effect through perceived likelihood of winning in the control condition (β = −0.49, SE = 0.17, 95%CI [−0.82, −0.18]) was negative and significant. In the enhanced presentation of winning likelihood condition, however, the indirect effect (β = 0.12, SE = 0.16, 95%CI [−0.18, 0.44]) was not significant. Overall, these results provide further evidence that perceived likelihood of winning (H3A) can play a distinct underlying role in how competition size impacts participation motivation.

STUDY 4

Study 3 showed that enhanced presentation of winning likelihood can moderate the impact of competition size on participation motivation. Study 4 sought to examine another theoretically relevant moderator and further illustrate the distinct underlying role of perceived prize magnitude. That is, Study 4 tested whether presenting information that bolsters perceived magnitude of competition prize can moderate the effect of competition size on consumers' participation motivation (H5). By

influencing perceived prize magnitude directly, Study 4 also sought further evidence for the causal role of this construct in mediating the effect of competition size on motivation. Furthermore, the studies thus far involved contexts where participants' social comparison did not significantly differ across the large (vs. small) competition size condition. Study 4 sought to examine a competitive context in which social comparison does play an underlying role, testing whether our proposed mechanism is robust. That is, Study 4 examined whether, even in situations where levels of social comparison differ as a function of competition size, the mechanism we propose can operate independently of that through social comparison.

Design and procedure

We recruited eight hundred individuals (52% women, average age of 40) from the same consumer panel as in Study 3 to participate in this study for monetary compensation. They were randomly assigned according to a 2 (competition size: large vs. small) × 2 (prize presentation type: control vs. enhanced) between-participant design. Specifically, participants were informed that because of the coronavirus outbreak, staying physically active had become more challenging than before. They were asked to imagine that they were joining a fitness competition for walking more steps in 4 weeks; winners of the competition would each receive a $50 prize; they would be competing in a pool of 20 [2000] individuals with similar bodyweight, height, lifestyle, and habits; each person's progress during the competition would be tracked and shown to others in real time through a mobile phone app; those who ranked in the top 10% by the end of the 4 weeks would each get the prize money. Participants in the control condition were not provided any further information. Participants in the enhanced prize presentation condition were shown the total prize pot of the respective competition—those who ranked in the top 10% by the end of the 4 weeks would each get an equal share of $100 [$10,000] of the prize money (see MDA for more detail).

Next, all participants indicated the extent to which they would be motivated/driven to compete in the fitness competition (1 = not motivated/driven at all, 7 = very motivated/driven). They then responded to measures on perceived likelihood/probability of winning (1 = not likely/probable at all, 7 = very likely/probable) and perceived magnitude/size of competition prize for each winner (1 = very small, 7 = very large). For social comparison, participants indicated, during the competition, how much they would compare their progress with their competitors' (1 = not at all, 7 = very much) and how inclined they would be to compare their performance with their competitors' (1 = not at all, 7 = very much). Further, as in the first four studies, participants completed an attention check procedure and responded to basic demographic measures. The responses of 786 participants who passed the attention check were included in subsequent analyses. (Including all responses in the analyses yielded qualitatively identical patterns of results.) Each set of the scale items was averaged, respectively, into a single measure for subsequent analyses ($rs > 0.82$).

Results

Participation motivation

We ran an ANOVA with competition size (1 = large, 0 = small) and prize presentation type (1 = enhanced, 0 = control) as between-participant factors, and participation motivation as the dependent variable. Supporting our proposition, this analysis revealed a significant interaction effect ($F[1, 782] = 11.49$, $p < 0.001$). The main effect of prize presentation type ($M_{enhanced} = 5.42$, $SD_{enhanced} = 1.59$ vs. $M_{control} = 5.19$, $SD_{control} = 1.72$; $F[1, 782] = 3.90$, $p < 0.05$, $d = 0.14$) was significant but that of competition size was not ($p > 0.20$).

Planned contrasts revealed that in the control condition (in which information on the total prize pot was not presented), the large (vs. small) competition size led to significantly lower levels of participation motivation ($M_{large} = 4.92$, $SD_{large} = 1.87$ vs. $M_{small} = 5.46$, $SD_{small} = 1.52$; $F[1, 782] = 10.56$, $p = 0.001$, $d = -0.32$). In the enhanced prize presentation condition, however, participants' participation motivation did not significantly differ between the two competition sizes ($M_{large} = 5.55$, $SD_{large} = 1.57$ vs. $M_{small} = 5.29$, $SD_{small} = 1.59$; $p > 0.12$; see Figure 3). In fact, participation motivation was directionally higher when the competition size was large (vs. small). Importantly, for participants in the large competition size condition, the enhanced presentation of the competition prize significantly boosted motivation to compete ($F[1, 782] = 14.39$, $p < 0.001$, $d = 0.36$). In the small competition size condition, however, presentation type did not exhibit a significant effect ($p > 0.3$). These results hence support H5, providing further evidence for our proposed mechanism.

Perceived likelihood of winning

An ANOVA with perceived likelihood of winning as the dependent variable revealed a significant main effect of competition size ($M_{large} = 3.88$, $SD_{large} = 1.80$ vs. $M_{small} = 4.34$, $SD_{small} = 1.67$; $F[1, 782] = 13.62$, $p < 0.001$, $d = -0.26$). No other main effect or interaction effect was significant ($ps > 0.34$).

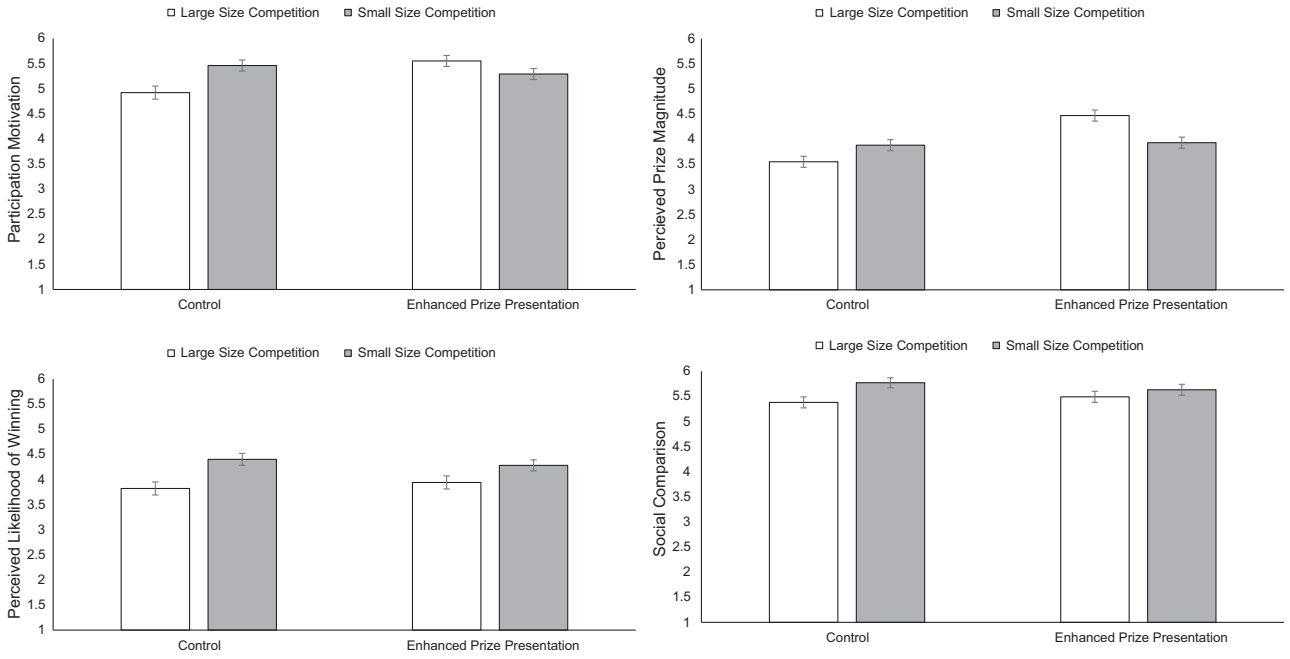


FIGURE 3 Study 4 results

Perceived magnitude of competition prize

An ANOVA with perceived prize magnitude as the dependent variable revealed a significant interaction effect between competition size and prize presentation type (F[1, 782] = 15.42, p<0.001). The main effect of enhanced prize presentation type was significant ($M_{enhanced}$ = 4.20, $SD_{enhanced}$ = 1.58 vs. $M_{control}$ = 3.71, $SD_{control}$ = 1.54; F[1, 782] = 19.15, p<0.001, d = 0.31) but that of competition size was not (p>0.36).

Planned contrasts revealed that in the control condition, the large (vs. small) competition size led participants to perceive the competition prize for each winner as significantly smaller in magnitude (M_{large} = 3.55, SD_{large} = 1.58 vs. M_{small} = 3.88, SD_{small} = 1.49; F[1, 782] = 4.54, p = 0.03, d = −0.21). However, in the enhanced prize presentation condition, those in the large (vs. small) competition size condition perceived the prize for each winner as significantly larger in magnitude (M_{large} = 4.47, SD_{large} = 1.62 vs. M_{small} = 3.93, SD_{small} = 1.50; F[1, 782] = 11.72, p = 0.001, d = 0.35). These results hence provide further support for our proposed underlying mechanism.

Social comparison

An ANOVA with social comparison as the dependent variable only revealed a significant main effect of competition size (M_{large} = 5.49, SD_{large} = 1.54 vs. M_{small} = 5.70, SD_{small} = 1.43; F[1, 782] = 4.12, p = 0.04, d = −0.14). In other words, participants exhibited a higher social comparison inclination when competition size was smaller, and this inclination was not affected by prize presentation type. No other effects were significant (ps> 0.11).

Moderated mediation

We ran a moderated mediation analysis (Model 8; 5000 resamples; Hayes, 2017) with competition size (1 = large, 0 = small) as the independent variable, participation motivation as the dependent variable, and perceived likelihood of winning, perceived magnitude of competition prize, and social comparison as three simultaneous mediators. Prize presentation type (1 = enhanced, 0 = control) was included in the model as the moderator.

This analysis yielded moderated mediation patterns supporting our propositions. First, the moderated mediation index for social comparison (index = 0.13, SE = 0.08, 95%CI [−0.03, 0.28]) and that for perceived likelihood of winning (index = 0.09, SE = 0.10, 95%CI [−0.09, 0.30]) were not significant, indicating that the indirect effect through social comparison and that through perceived winning likelihood did not significantly differ across the enhanced prize presentation versus control conditions. In contrast, the moderated mediation index for perceived prize magnitude was significant (index = 0.21, SE = 0.06, 95%CI [0.10, 0.35]), indicating that the enhanced prize presentation moderated the underlying role of perceived prize magnitude. Specifically, the indirect effect through perceived prize magnitude in the control condition (β = −0.08, SE = 0.04, 95%CI [−0.17, −0.01]) was negative and significant. In the enhanced prize presentation condition, however, the indirect effect (β = 0.13, SE = 0.04, 95%CI [0.05, 0.22]) was positive and significant. These findings thus further highlight the distinct underlying role of perceived prize magnitude in how competition size impacts participation motivation.

GENERAL DISCUSSION

Although competitions are widely used by firms and nonprofit organizations to enhance customer engagement and foster interactions among consumers, the current understanding of how to effectively leverage such contexts to increase consumers' participation levels is incomplete. Our research adds to this understanding by investigating a feature common to all competitive situations—the number of competitors involved. This feature is often saliently promoted by competition organizers and is a legally required consumer disclosure in many markets. Seminal research (e.g., Garcia & Tor, 2009) suggests that social comparison differences due to competition size can drive participation level. However, it is unknown what might occur in competitive contexts where social comparison does not differ across competition size. If competitive participation level still differs, it is unknown what mechanism might be underlying the effect. Perhaps more importantly, it is unclear what can be done to help consumers overcome the demotivating effect of a larger competition size. The current research seeks answers to these theoretically important and managerially substantive questions.

Specifically, we propose that, holding the objective likelihood of winning and competition prize constant, consumers tend to perceive a lower likelihood of winning and a smaller prize magnitude when the competition is larger in size. Such differences in perceived likelihood of winning and perceived prize magnitude can jointly impact consumers' participation levels. As these mechanisms operate independently of social comparison, they can explicate consumers' participation behavior in competitive contexts where social comparison does not differ across competition size (and in contexts where it does differ).

We tested these propositions in a series of studies involving different competitive contexts, competition sizes, prizes, and likelihoods of winning. Studies 1a, 1b, and 2 demonstrated that in competitive situations where social comparison did not differ across competition size, participation level was still reduced in the large (vs. small) size competitions. Studies 1a and 1b examined consumers' decision to sign up for competitions. Supporting our propositions, a large (vs. small) competition size negatively impacted participants' perceived likelihood of winning and perceived magnitude of competition prize. However, social comparison did not differ across competition size. Further, differences in perceived likelihood of winning and perceived prize magnitude (but not social comparison) jointly mediated the lowered signup ratio. These studies also showed that potential alternative accounts based on gender difference or misinterpretation of the notion of "win" would not be able to account for the behavioral patterns.

Study 2 investigated how much effort participants exerted in an incentive-compatible competition with a large (vs. small) number of competitors. Replicating the results of the first two studies, a large (vs. small) competition size lowered participants' perceived likelihood of winning and perceived magnitude of competition prize, which in turn jointly mediated the lowered competitive effort. Social comparison did not differ across competition size and did not play a mediating role in the competitive context examined in Study 2.

Studies 3 and 4 tested moderating factors that directly influenced our proposed mediators, thereby providing causal evidence for the mechanism. Study 3 showed that presenting information that facilitated more accurate perceptions of the likelihood of winning attenuated the detrimental impact of competition size on participation motivation. Study 4 investigated a competitive context where social comparison indeed played a significant role. It showed that presenting information that bolstered perceived magnitude of competition prize also attenuated the negative impact of a larger competition size on participation motivation. Even after accounting for the underlying role of social comparison, perceived likelihood of winning and perceived magnitude of competition prize played significant causal roles.

Theoretical and managerial implications

Our research complements the extant theories of consumer behavior in competitive contexts. We find that larger competition sizes can reduce competitive participation, even in contexts where social comparison tendencies may not differ across competition size. We identify previously underexplored factors that can explicate this pattern—despite knowing the objective likelihood of winning a competition and the objective value of the prize, consumers tend to perceive a lower likelihood of winning and a lower magnitude of the competition prize when the competition is larger in size. These differences jointly mediate the impact of competition size on the participation level. Furthermore, we show that even in competitive situations where social comparison does differ across competition size, perceived likelihood of winning and perceived magnitude of competition prize remain significant joint mediators. That is, the underlying roles of these two constructs are distinct from the role of social comparison. These findings thus help provide a fuller understanding of the psychological mechanism underlying the effect of competition size on participation motivation.

In addition, our research identifies approaches to influence perceived likelihood of winning and perceived magnitude of competition prize, the two mediators, and hence provide causal evidence for their role in the effect of competition size on participation motivation. These approaches also inform how managers can bolster consumers' participation in competitive contexts. Specifically, the results of Study 3 suggest

that competition organizers can strategically present information pertaining to the likelihood of winning, to help boost consumers' subjective perception of winning likelihood. This can attenuate or even eliminate the dampening effect of competition size on participation motivation. The results of Study 4 suggest that competition organizers can also overcome the demotivating effect by presenting information about the total pot of prizes given to all the winners. Such information can boost subjective perception of competition prize and hence bolster participation levels.

To assess the extent to which managers are aware of these two approaches uncovered in our research, we conducted a brief follow-up study. Thirty-one executives at major firms in different industries (e.g., advertising, FMCG, online retail, social media) anonymously participated in the study. All the managers had a minimum of 3 years of work experience in marketing areas, after completing their graduate business degree. They were informed that an app company was trying to motivate as many people as possible to participate in a fitness competition and use the firm's fitness app, and that the firm was about to send out the following text message to potential customers: "Hi! You are invited to participate in a competition for walking more steps in the next four weeks. This competition is expected to have 2000 participants who are similar to you. The number of steps each participant walks in the four weeks will be tracked and displayed in real-time via a smartphone app. Those who rank in the top 10% will each win a $100 cash prize. Tab #here# to sign up!" The managers were asked to edit this text message to make it as effective as possible. 52% of the managers made substantive changes such as adding a motivational opening (e.g., "Congratulations! We have an exciting opportunity for you!", "Clearly you love walking!"), including a hashtag (e.g., "#WalkMonthChallenge"), or further highlighting the benefits (e.g., "WIN $100 while getting fitter!", "Walk away with $100 dollars within 28 days! Right where you are!"). However, only 6% opted to present information pertaining to the likelihood of winning (e.g., "The top 200 entrants will each win a $100 cash prize." "200 people will be awarded $100 dollars each as prize money.") and only 3% opted to present information on the total pot of prize money (e.g., "$20,000 in cash prizes to be won!"). None of the managers leveraged both perceived likelihood of winning and total pot size. These findings suggest that the majority of frontline managers (those who are typically responsible for making decisions about using competitions in business endeavors) may not be aware of the approaches identified in this research for increasing participation and engagement in large competitions. Our research results thus offer important guidance to marketers, enabling them to more effectively design and leverage consumer competitions.

Limitations and future research directions

Our findings suggest several potential directions for future research. Our studies show that perceived likelihood of winning, perceived magnitude of competition prize, and social comparison can each play an underlying role in the effect of competition size on participation levels. Future research can identify situations in which some of these factors might play a more potent role than others. For instance, in face-to-face competitive contexts such as taking an examination along with larger versus smaller groups of people (Garcia & Tor, 2009, Study 1), social comparison cues could be more overt than in corresponding online contexts such as those examined in our studies. Social comparison may hence play a stronger role in the former type of situations. Furthermore, the "stage" of the competitive context might also matter. For example, when consumers are deciding whether to sign up for a competition, they might be influenced relatively more by perceptions of winning likelihood and of competition prize, as competitors' performance is not known or less salient. However, when their rivals' competitive progress is made overtly salient during a competition, social comparison-based processes might become highly activated and exert greater influence as a function of competition size. Future research can explore these possibilities to identify the most potent driver(s) of behavior in each type of competitive setup/stage and develop approaches that can effectively bolster participation motivation in the respective context. Relatedly, because competitive versus noncompetitive situations may stimulate different motivations (Amir & Lobel, 2012, 2014), future research can also investigate whether some aspects (e.g., perceived success likelihood vs. perceived prize magnitude) of the psychological mechanism uncovered in this research might be more potent when the context is competitive (e.g., competing against 10 [1000] people) versus noncompetitive (e.g., being observed by 10 [1000] people).

The results of Studies 1a and 1b suggest that, in the competitive contexts we examined, gender or gender identity might not be able to account for differences in perceptions of winning likelihood and prize magnitude, and hence participation motivation. However, as highlighted in prior research (e.g., Hanek et al., 2016; Vandegrift & Holaday, 2012), it would be important to delineate the conditions under which gender or gender identity can alter consumers' participation motivation. Future research can investigate these boundary conditions to yield systematic insights on how to ensure gender equity in competitive contexts. Moreover, Study 1b explored whether linguistic variations (e.g., "win" vs. "succeed") may influence how consumers construe a competitive setup. Although Study 1b showed that our results are robust with respect to such linguistic variations, future research could more fully investigate the impact of different linguistic features on consumer

behavior in competitive contexts. Such investigation can inform how competition organizers can better communicate their competitions to bolster participation levels.

The results of Study 2 suggest that competition size can influence consumers' ideation effort in competitive contexts. This complements the ideation literature (e.g., Moreau & Dahl, 2005) and is relevant to businesses and nonprofit organizations seeking to leverage competitive contexts for creative purposes, such as generating new product/service ideas through consumer competitions. Although our findings suggest that a larger quantity of ideas can be solicited when competitions are more optimally presented, future research is needed to investigate how different presentations of competitions may influence the quality of ideas (e.g., creative and implementable ideas).

To assess generalizability, we utilized different operationalizations of competitive motivation across studies (e.g., competition signup, effort exerted on the competitive task). We acknowledge that although competitive motivation levels can be reflected by these different behavioral measures, the behaviors are distinct and can be influenced by factors other than competition size such as the specific goals consumers hold (see, e.g., Huang, 2018 for a discussion). Thus, it would be important for future research to explore the variations across these different behavioral manifestations of competitive motivation and shed light on how to more effectively motivate consumers as a function of the specific competitive behavior. It would also be important to further examine downstream effects of competitive motivation, identifying factors that can influence the extent to which higher competitive motivation translates into better competitive performance.

Our research focused on how people react to competitive situations with different characteristics (i.e., a large vs. small competition size). There has been related judgment and decision-making research, examining phenomena such as base-rate neglect (e.g., Bar-Hillel, 1980; Hamill et al., 1980; Kahneman & Tversky, 1973) and denominator neglect (e.g., Burson et al., 2009; Pacini & Epstein, 1999; Reyna & Brainerd, 2008). Base-rate neglect research shows that people may insufficiently consider general frequency information when evaluating a specific instance and that this occurs because they tend to rely on the representativeness heuristic—how closely the specific instance resembles something (Kahneman & Tversky, 1973) or because they see little relevance of the general frequency information in the focal situation (e.g., Bar-Hillel, 1980). These insights suggest interesting directions for future research on consumer behavior in large (vs. small) competitions. For instance, future research can explore whether and how making one's general performance level (e.g., success rate in past situations involving similar tasks) salient can influence the individual's participation motivation in a focal competitive context with a large (vs. small) number of competitors. Furthermore, research on denominator neglect shows that people "focus on the number of times a target event has happened (e.g., the number of treated and nontreated patients who die) without considering the overall number of opportunities for it to happen (e.g., the overall number of treated and nontreated patients)" (Garcia-Retamero et al., 2010, p. 672). However, our findings and those of prior research (e.g., Garcia & Tor, 2009) suggest that in some situations people may rely quite a bit on the denominator (e.g., the total number of competitors in a contest) in their decision-making. Thus, it would be important for future research to investigate when and why people may focus more versus less on denominator information.

Our research focused on investigating competition size, which is one of the common features of competitive contexts. Future research could explore how other important characteristics of competitions might impact consumer behavior. For example, participation motivation might differ depending on the type of competitors one faces (e.g., competing with long-term rivals vs. not). Moreover, people may chronically differ in their reactions to competitive contexts (e.g., Brown et al., 1998; Yang et al., 2015). For instance, professional athletes or race car drivers might not be demotivated by competition size because they chronically crave competition. As another example, individuals who grew up in more densely populated societies might be more accustomed to larger competition sizes. Future research could thus explore whether competition-related individual differences might lead to different behavioral patterns than those shown in the current research. Relatedly, future research could examine whether consumers are able to adapt to the influence of competition size over repeated competitions and probe the factors that might inhibit or facilitate this process.

Finally, we identified two potential approaches to overcome the demotivating effect of competing with more people. It would be helpful for future research to examine whether deploying both approaches simultaneously versus just one of the approaches might be more (or less) effective at increasing participation motivation. It would also be important to develop other interventions that leverage different mechanisms (e.g., social comparison). Overall, exploring research directions such as the above can help advance theories of consumer behavior in competitive contexts and offer important managerial insights.

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REFERENCES

Amir, O., & Lobel, O. (2012). Driving performance: A growth theory of noncompete law. *Stanford Technology Law Review*, *16*, 535–578.

Amir, O., & Lobel, O. (2014). How non-competes stifle performance. *Harvard Business Review*. Jan-Feb, 26.

Bagchi, R., & Davis, D. F. (2012). $29 for 70 items or 70 items for $29? How presentation order affects package perceptions. *Journal of Consumer Research*, *39*(1), 62–73.

Bar-Hillel, M. (1980). The base-rate fallacy in probability judgments. *Acta Psychologica*, *44*(3), 211–233.
Berinsky, A. J., Margolis, M. F., & Sances, M. W. (2014). Separating the shirkers from the workers? Making sure respondents pay attention on self-administered surveys. *American Journal of Political Science*, *58*(3), 739–753.
Brown, S. P., Cron, W. L., & Slocum, J. W., Jr. (1998). Effects of trait competitiveness and perceived intraorganizational competition on salesperson goal setting and performance. *Journal of Marketing*, *62*(4), 88–98.
Burson, K. A., Larrick, R. P., & Lynch, J. G., Jr. (2009). Six of one, half dozen of the other: Expanding and contracting numerical dimensions produces preference reversals. *Psychological Science*, *20*(9), 1074–1078.
Chan, T. Y., Kadiyali, V., & Park, Y. H. (2007). Willingness to pay and competition in online auctions. *Journal of Marketing Research*, *44*(2), 324–333.
Cambridge Dictionary. (2022). Competition. Retrieved June 24, 2022 from http://dictionary.cambridge.org/dictionary/english/competition
Garcia, S. M., & Tor, A. (2009). The N-effect: More competitors, less competition. *Psychological Science*, *20*(7), 871–877.
Garcia, S. M., Tor, A., & Schiff, T. M. (2013). The psychology of competition: A social comparison perspective. *Perspectives on Psychological Science*, *8*(6), 634–650.
Garcia-Retamero, R., Galesic, M., & Gigerenzer, G. (2010). Do icon arrays help reduce denominator neglect? *Medical Decision Making*, *30*(6), 672–684.
Hamill, R., Wilson, T. D., & Nisbett, R. E. (1980). Insensitivity to sample bias: Generalizing from atypical cases. *Journal of Personality and Social Psychology*, *39*(4), 578–589.
Hanek, K. J., Garcia, S. M., & Tor, A. (2016). Gender and competitive preferences: The role of competition size. *Journal of Applied Psychology*, *101*(8), 1122.
Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (second ed.). Guilford Press.
Huang, S. C. (2018). Social information avoidance: When, why, and how it is costly in goal pursuit. *Journal of Marketing Research*, *55*(3), 382–395.
Kahneman, D., & Tversky, A. (1973). On the psychology of prediction. *Psychology Review*, *80*(4), 237–251.
Krishna, A., Briesch, R., Lehmann, D. R., & Yuan, H. (2002). A meta-analysis of the impact of price presentation on perceived savings. *Journal of Retailing*, *78*(2), 101–118.
Ku, G., Malhotra, D., & Murnighan, J. K. (2005). Towards a competitive arousal model of decision-making: A study of auction fever in live and internet auctions. *Organizational Behavior and Human Decision Processes*, *96*(2), 89–103.
Legislative Counsel Bureau. (2020). California business and professions code, general business regulations, section 17539.1.
Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting and task performance*. Prentice Hall.
Moreau, C. P., & Dahl, D. W. (2005). Designing the solution: The impact of constraints on consumers' creativity. *Journal of Consumer Research*, *32*(1), 13–22.
Mowen, J. C. (2004). Exploring the trait of competitiveness and its consumer behavior consequences. *Journal of Consumer Psychology*, *14*(1–2), 52–63.
Nolette, P. (2015). *Federalism on trial: State attorneys general and national policymaking in contemporary America*. University Press of Kansas.
Norton, D. A., Lamberton, C. P., & Naylor, R. W. (2013). The devil you (don't) know: Interpersonal ambiguity and inference making in competitive contexts. *Journal of Consumer Research*, *40*(2), 239–254.
Pacini, R., & Epstein, S. (1999). The relation of rational and experiential information processing styles to personality, basic beliefs, and the ratio-bias phenomenon. *Journal of Personality and Social Psychology*, *76*(6), 972–987.
Pillutla, M., & Ronson, S. (2005). Do we prefer coworkers who are better or worse than us? Evidence from the "weakest link" game. *Academy of Management Proceedings*, *1*, 1–6.
Reczek, R. W., Haws, K. L., & Summers, C. A. (2014). Lucky loyalty: The effect of consumer effort on predictions of randomly determined marketing outcomes. *Journal of Consumer Research*, *41*(4), 1065–1077.
Reyna, V. F., & Brainerd, C. J. (2008). Numeracy, ratio bias, and denominator neglect in judgments of risk and probability. *Learning and Individual Differences*, *18*(1), 89–107.
Sevilla, J., Isaac, M. S., & Bagchi, R. (2018). Format neglect: How the use of numerical versus percentage rank claims influences consumer judgments. *Journal of Marketing*, *82*(6), 150–164.
Shugan, S. M. (1980). The cost of thinking. *Journal of Consumer Research*, *7*(2), 99–111.
Stamatogiannakis, A., Chattopadhyay, A., & Chakravarti, D. (2018). Attainment versus maintenance goals: Perceived difficulty and impact on goal choice. *Organizational Behavior and Human Decision Processes*, *149*, 17–34.
Thaler, R., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. Yale University Press.
Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, *185*(4157), 1124–1131.
USPS. (2004). *Domestic mail manual*. USPS.
Vandegrift, D., & Holaday, B. (2012). Competitive behavior: Tests of the N-effect and proximity to a standard. *Journal of Neuroscience, Psychology, and Economics*, *5*(3), 182.
Wertenbroch, K., Soman, D., & Chattopadhyay, A. (2007). On the perceived value of money: The reference dependence of currency numerosity effects. *Journal of Consumer Research*, *34*(1), 1–10.
Yan, D. (2016). Numbers are gendered: The role of numerical precision. *Journal of Consumer Research*, *43*(2), 303–316.
Yang, H., Carmon, Z., Ariely, D., & Norton, M. I. (2019). The feeling of not knowing it all. *Journal of Consumer Psychology*, *29*(3), 455–462.
Yang, H., Stamatogiannakis, A., & Chattopadhyay, A. (2015). Pursuing attainment versus maintenance goals: The interplay of self-construal and goal type on consumer motivation. *Journal of Consumer Research*, *42*, 93–108.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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