Why (and When) Are Uncertain Price Promotions More Effective Than Equivalent Sure Discounts?

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Past research suggests that offering customers a probabilistic promotion, such as an X% chance to get a product for free, is often more effective than providing a sure discount of equal expected value. In five studies (N = 8,969), we find that probabilistic price promotions are more effective than equivalent sure discounts only when those sure discounts are or seem trivial. Specifically, we find that probabilistic promotions are relatively more effective (1) when the sure discounts are actually smaller, (2) when the sure discounts are made to feel smaller by presenting them alongside a larger discount, and (3) when the sure discounts are made to feel smaller by framing them as a percentage discount rather than a dollar amount. These findings are inconsistent with two leading explanations of consumers' preferences for probabilistic promotions—diminishing sensitivity and the overweighting of small probabilities—and suggest that people's preferences for uncertainty are more strongly tethered to their perceptions of the size of the sure outcome than they are to their perceptions of the probability of getting the uncertain reward.

Keywords: uncertainty, risk aversion, probability weighting, peanuts effect, price discounts

It is hard to go a day without being exposed to a price promotion, and that is because price promotions are among the most important tools in the marketer's arsenal. The vast majority of price promotions come in the form of sure discounts, meaning that consumers know for sure what price discount they will receive with their purchase. However, retailers sometimes introduce *probabilistic* price promotions, those that offer some chance to receive a discount. For example, several companies, including Dell, Banana Republic, Forever21, GAP, and hotels.com, have launched mystery coupon campaigns that offer consumers a chance at a large discount on their purchase. Some of those coupons offer 100% off of the sale price, thus giving them the product for free. Similarly, some companies, such as Media Markt, have offered a 100% discount to every 10th or 100th customer (Mazar, Shampanier, and Ariely 2017). Given that these types of price promotions coexist in the marketplace, it is natural to ask which is more effective: offering consumers a sure discount on a purchase or offering them a chance to get the product at an even greater discount? The answer is not obvious.

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Research that speaks directly to whether people prefer sure discounts or probabilistic price promotions provides mixed results (Attari, Chatterjee, and Singh 2022; Lee et al. 2019; Mazar et al. 2017). Some results suggest that such probabilistic price promotions are more effective than equivalent sure discounts (Lee et al. 2019; Mazar et al. 2017). For example, Mazar et al. (2017) found that consumers are more likely to purchase a product when it comes with a 10% chance to get it for free than when it comes with a 10% sure discount. Lee et al. (2019) followed up on this finding by assessing the effects of probabilistic price promotions on customers' shopping basket size in a supermarket. They found that shoppers preferred to receive a 1% chance to get the purchases in their shopping basket for free than to receive a 1% sure discount. Both of these articles suggest that probabilistic price promotions may be more effective than sure discounts. From a practical perspective, these findings suggest that marketers should implement probabilistic price promotions in order to increase sales.

However, other research shows that a probabilistic price promotion may not always be more effective than an equivalent sure discount. For example, Attari et al. (2022) asked participants to choose between a probabilistic price promotion and a sure discount for products such as a $60 coffeemaker or a $20 pen. Across their studies, they frequently found that fewer than 50% of participants opted for the probabilistic price promotion over the sure discount and that the relative distaste for probabilistic price promotions was greater when there was a high probability of receiving a smaller discount (vs. a smaller probability of receiving a larger discount) and when the potential savings were framed as "discounts" rather than as "reduced prices." Mixed findings in past research suggest we still lack a clear understanding of what determines whether probabilistic price promotions are more attractive versus less attractive than sure discounts that are equivalent in expected value.

In the current article, we draw on and add to research on risk preferences in nonpromotional contexts and on price perceptions in the marketing literature to suggest that probabilistic price promotions are more attractive than equivalent sure discounts only when those sure discounts seem trivial. Importantly, our account suggests that probabilistic price promotions will not only be more effective when equivalent sure discounts are *objectively* small but that they will also be more effective when objectively sizable sure discounts are considered within a context that makes them feel small or framed in way that makes them feel small. For example, we will show that how a sure discount is framed—as a percent reduction versus dollars off—can change how large the sure discount feels, and thus whether consumers prefer a probabilistic price promotion or the sure discount. In demonstrating this, our research offers important practical directions for marketers who try to decide whether, when, and how to implement probabilistic price promotions to drive purchases.

The Role of Stakes

To make progress on the question of when consumers would prefer a probabilistic price promotion, it is useful to think of it as a specific instantiation of a broader question: are people more likely to be risk averse (preferring certainty) or risk seeking (preferring uncertainty)? Here, too, the evidence is mixed. On the one hand, there is much evidence suggesting that most people are risk averse. For example, a core tenet of prospect theory, backed by decades of research, is that most people prefer sure gains to lotteries offering equal (or even somewhat better) expected value (Kahneman and Tversky 1979). The literature also offers evidence of "direct risk aversion," finding that people are often willing to pay more for a sure $20 than for an equal chance to receive either $20 or $40 (Gneezy, List, and Wu 2006; Simonsohn 2009). On the other hand, this evidence for direct risk aversion does not materialize when people make choices or provide ratings (Moon and Nelson 2020). In addition, the popularity of lotteries, casinos, and sports betting also suggests that risk-seeking preferences are quite common.

Researchers have not succeeded in pinning down everything that predicts risk-averse versus risk-seeking behavior. However, they have identified one important moderator: the size of the stakes on offer. Research on the so-called peanuts effect has found that people become relatively more risk seeking with decreasing monetary amounts (Chen and Jia 2005; Holt and Laury 2005; Prelec and Loewenstein 1991; Weber and Chapman 2005). For example, when given a choice between a 25% chance to get $4 or getting $1 for sure, more people would opt for the gamble than when given a choice between a 25% chance to get $400 and getting $100 for sure. That is, the peanuts effect describes a shift in people's risk preferences in the context of monetary gambles, with people becoming more risk seeking for miniscule monetary amounts.

Previous Work on Probabilistic Promotions. With the peanuts effect in mind, let us return to the mixed evidence pertaining to the relative attractiveness of probabilistic price promotions versus sure discounts in previous work. Table 1 gives an overview of the products, product prices, and discount probabilities used in past studies. As evident from this table, prior work that has established a preference for probabilistic price promotions over sure discounts has primarily used low-priced products and therefore small sure discounts (Kovacheva and Nikolova 2024; Lee et al. 2019; Mazar et al. 2017). For example, Mazar et al. (2017) found a preference for probabilistic price promotions over sure discounts using products such as a $0.75 candy bar, a $4.50 DVD, or a $10 pen. (They found similar results for a $200 hotel stay, a finding that we were unable to replicate;

TABLE 1

EVIDENCE FOR A PREFERENCE FOR PROBABILISTIC PRICE PROMOTIONS IN PREVIOUSLY PUBLISHED PAPERS AND HOW THESE FINDINGS FIT WITH OUR PROPOSED ACCOUNT

Study	Product	Product price	Dependent measure	Sure discount and probabilistic promotions included in the study	Finding	How does this finding fit with our proposed account?
Mazar et al. (2017)						
1	Candy bars	$0.75	Choice of candy bar with either promotion	1/3 off versus 1/3 chance for free	Preference for purchase with probabilistic promotion	Low product price
2	DVD to rent	$4.50	Choice of promotion	10%–90% off versus 10%–90% chance for free (five levels)	Preference for probabilistic promotion at 10%–67% but no significant effect for 90%	Low product price; no effect for large probability of 90%
3	DVD to rent	$4.50	Choice of promotion	$0.50 off versus 11% chance for free/12% chance to pay $0.38/13% chance to pay $0.69	Preference for probabilistic promotion in all conditions	Low product price
4	Pen	$10	Choice of promotion	5%–95% off versus 5%–95% chance for free (13 levels; participants made a choice for each level)	Preference for probabilistic promotion at all probability levels up to 67% but no significant effect at probabilities of 70%–95%	Low product price; no effect for larger probabilities ≥70%
5a	Hotel stays	$200	Choice of hotel	10% off versus 10% chance for free/20% chance for half price	Preference for booking the hotel with probabilistic promotion	We did not replicate this finding using the stimuli provided by the authors (see our supplemental study S5)
Lee et al. (2019)						
1	Customer's shopping basket	Depends on the customer's purchases	Choice of promotion	1% off versus 1% chance for free	Between 50.0% and 89.3% of participants chose the probabilistic promotion depending on the payment method and elicitation timing	Small percentage discount and most people prefer the probabilistic promotion
Attari et al. (2022)						
1a	Coffeemaker	$60	Choice of promotion	$4 off versus 20% chance of a $20 discount	44.1% of participants chose the probabilistic promotion	Moderate prices and discounts, and most people prefer the sure discount
1b	Pens	$70	Choice of pen with either promotion	$10 off versus 1/3 chance of a $30 discount (counterbalanced across pens)	31.7% of participants chose the pen that came with a probabilistic promotion	
2	Pen	$20	Choice of promotion	$0.50–$9.50 off versus 5%–95% chance of a $10 discount	Between 59.5% and 2.7% of participants chose the probabilistic promotion	Preference for probabilistic promotion only for small probabilities

NOTES.—This overview focuses on studies from prior work in which product or promotion choices serve as the primary measure. Mazar et al. (2017) also conducted a study examining basket size, specifically the number of days booked at a hotel (study 5b). Additionally, study 4 by Mazar et al. (2017) included a monetary gamble condition, which is not included in this overview. Lee et al. (2019) explored both basket size (study 2) and the perception of pain associated with paying (study 4). Furthermore, in study 3 by Lee et al. (2019), they replicate the findings from their study 1. However, the specific choice shares for the comparison between a 1% sure discount and a 1% chance of getting the purchase for free are not reported, so this comparison is excluded from our overview. Finally, for Attari et al. (2022), we present only the results from their "amount of discount" condition, as this framing aligns with the focus of our article.

supplemental study S5.) Moreover, when research has used larger purchases (e.g., a customer's entire shopping basket), the discount probabilities investigated were restricted to 1%, and the corresponding sure discount may therefore have been perceived as small (Lee et al. 2019). Indeed, a 1% off discount on a $300 purchase is only $3. In addition, past research (Attari et al. 2022; Mazar et al. 2017) has also found that the effectiveness of probabilistic price promotions is greater when discount probabilities (and thus the size of their sure-discount counterparts) are smaller. Hence, a review of the published findings points to probabilistic price promotions being relatively more effective when the equivalent sure discounts are smaller.

Pilot Studies. Further support for the notion that the effectiveness of probabilistic price promotions might depend on the objective size of the stakes comes from a series of pilot studies with which we started our investigation. In these pilot studies, we found evidence that manipulating the objective size of the sure discount by either manipulating the percentage associated with it (supplemental studies S1a–c) or by manipulating the price of the product (supplemental study S2) can change the effectiveness of probabilistic price promotions. We describe these pilot studies briefly below and present them in full in web appendix C.

In supplemental studies S1a–c, participants chose between three hotels, one of which came with a price promotion. In each of supplemental studies S1a–c, we manipulated both the type of price promotion (sure vs. probabilistic) and the percentage associated with the promotion (e.g., 1% vs. 10% in supplemental study S1a). We expected that participants would be more likely to forego the sure discount when it was relatively small than when it was relatively large, meaning that we would expect, for example, the probabilistic promotion to be relatively more effective when the promotion percentage was 1% than when it was 10%. The results supported this prediction across all three studies. For example, in supplemental study S1a, we found that people chose a promoted hotel more often when it came with a 1% chance to get the booking for free than when it came with a 1% sure discount ($p < .001$), possibly because that 1% discount did not seem very large. However, the probabilistic price promotion was no more effective than the sure discount when the promoted hotel came with a 10% discount or a 10% chance of getting it for free ($p = .515$). Overall, the results from supplemental studies S1a–S1c suggest that probabilistic price promotions tend to be more effective when the corresponding sure discount is smaller. Although the interaction between promotion type and discount probability was not significant across all studies, the pattern of results was directionally consistent with the notion that the effectiveness of the promotions depends on the size of the sure discount (Table S5; web appendix C).

In addition, in supplemental study S2, we also asked participants to choose between three hotels, one of which came with a price promotion. However, in this study, we manipulated both the type of promotion (sure vs. probabilistic) and the hotel prices ($48 vs. $480 for the target hotel) in a between-subjects design. We expected that the probabilistic promotion would be relatively more effective in the low-price condition than the high-price condition. Indeed, we found a significant interaction between promotion type and price ($p = .041$), such that when the price of the product was high, participants were equally likely to purchase the product regardless of the promotion type ($p = .609$). However, when the price of the product was low, they were more likely to purchase the hotel stay when it came with a probabilistic promotion than when it came with a sure discount ($p = .001$). This suggests that probabilistic price promotions are relatively more attractive when the price of the product is lower and thus when the size of the discount is lower.

Taken together, the findings in previously published work on probabilistic price promotions (Attari et al. 2022; Lee et al. 2019; Mazar et al. 2017), and our pilot studies suggest that probabilistic price promotions might be more effective when the equivalent sure discount is smaller, either because the discount probability is smaller or the price of the product is smaller. We turn to a more systematic investigation of this in the current article. Importantly, we further show that what matters is not only the objective size of the sure discount but that even changing the *subjective* size of the sure discount can change people's preferences for a probabilistic price promotion over the sure discount. For example, we show that simply changing the context in which a sure discount is presented or the way it is framed (as a percentage or a dollar amount) can change people's perceptions of its perceived size and hence their preference for probabilistic promotions over the sure discounts.

Conceptual Framework

We draw on research on the peanuts effect in risky choice and on price perceptions in the marketing literature to suggest that consumers will find probabilistic price promotions more attractive than equivalent sure discounts only when those sure discounts seem trivial. For example, whereas consumers may prefer a 1% chance of receiving a $100 discount to a $1 sure discount, they may prefer a $50 sure discount to a 50% chance of receiving a $100 discount. Importantly, we posit that what matters is not only the objective size of the sure discount but also its perceived subjective size. Our theorizing hinges on two core propositions.

First, we propose that sure discounts can sometimes be perceived as trivial and that this can make a probabilistic promotion appear more attractive in comparison. The

perceived size of a sure discount plays a critical role in shaping consumers' purchasing decisions (Grewal, Marmorstein, and Sharma 1996; Guha et al. 2018; Urbany, Bearden, and Weilbaker 1988). This perception is influenced by consumers' internal reference price or evoked price range (Janiszewski and Lichtenstein 1999; Kalyanaram and Winer 1995; Monroe 1973) and by whether the price reduction is seen as impactful (Han, Gupta, and Lehmann 2001; Kalyanaram and Little 1994; Zhang, Sussman, and Hsee 2021). For a sure discount to feel impactful, it must exceed a certain threshold (Han et al. 2001). Discounts that fail to cross this threshold are often perceived as trivial, placing consumers in a zone of price insensitivity (Kalyanaram and Little 1994) in which the offer may be judged as inadequate (Darke and Freedman 1993).

However, perceptions of triviality may not apply to probabilistic promotions that offer a chance of getting a product for free (or at a significantly reduced price). In these cases, the consumer either pays the full price or receives a substantial discount—potentially 100% if the product is free. Because the outcome of a probabilistic promotion can result in such a substantial discount, these promotions are less likely to be perceived as trivial. As a result, when sure discounts feel small, probabilistic promotions may seem relatively more attractive.

Formally, we propose the following:

Proposition 1: People will be more likely to prefer a probabilistic promotion over an equivalent sure discount when the sure discount feels smaller.

In positing this, we help reconcile the mixed evidence on the relative effectiveness of probabilistic price promotions in prior literature and revise some of its existing conclusions. For example, whereas some prior research suggests that probabilistic price promotions are always more attractive than sure discounts (Mazar et al. 2017), our research suggests that they are only more attractive under particular (and predictable) circumstances, namely when the sure discount seems trivial. More broadly, our proposition differs from utility-based explanations, which assume that individuals assess expected value by integrating both outcome magnitude and probability. In contrast, we propose that people focus primarily on the magnitude of the sure discount, and when this discount is perceived as trivial, the appeal of the probabilistic promotion increases.

Second, we propose that this arises not only when stakes are objectively small but also when they merely feel small. In proposing this, our research more generally contributes to the literature on consumer decision-making under uncertainty by showing that the peanuts effect extends to the important marketing context of price promotions and that the subjective stake size matters. That is, similar to how consumers evaluate prices subjectively, we suggest that the perceptions of peanuts-like price changes may also be subjective (Janiszewski and Lichtenstein 1999; Monroe 1973).

This second proposition has some interesting implications. For example, it suggests that in the right context, even objectively large sure discounts can feel like "peanuts." In addition, the same sure discount may be seen as large or small depending on how it is framed, and that framing can in turn influence risk preferences. Indeed, in studies 4 and 5, we leverage the fact that sure discounts are perceived to be smaller when framed as percentages rather than dollar amounts (at least for the kinds of products that we use in our studies; Chen, Monroe, and Lou 1998; Della Bitta, Monroe, and McGinnis 1981; DelVecchio, Shanker, and Smith 2007; González et al. 2016) and show that participants' preferences for probabilistic price promotions increase when the equivalent sure discounts are framed as percentages rather than dollar amounts. That is, without altering the objective size of the sure discount, we can alter the relative attractiveness and effectiveness of a probabilistic price promotion. Formally, we propose the following:

Proposition 2: Holding constant the actual size of a potential sure discount, people will be more likely to prefer probabilistic price promotions when contextual factors make the sure discount feel smaller.

All told, our work suggests that risky decisions in the context of price promotions are not driven entirely by stable risk preferences but rather by an assessment of whether a sure discount feels trivial enough to risk or large enough to acquire.

Related Theories of Risky Choice

Our propositions broadly align with the proposition brought forward in a recent review paper by Kovacheva and Nikolova (2024) that declares that, "all else being equal, an uncertainty marketing tactic that involves lower stakes will be more appealing than one that involves higher stakes" (10). Importantly, however, whereas Kovacheva and Nikolova (2024) do not propose a specific psychological process, our conceptual framework posits that promotions tied to uncertainty are more appealing at lower stakes precisely because the equivalent sure discount will be perceived as trivial by the customer.

By focusing on the perceived size of the sure discount, our conceptual framework is different from existing accounts that have been proposed to explain consumers' preferences for probabilistic price promotions or risk preferences more generally. In what follows, we organize the discussion of these accounts into three key areas: (1) accounts that predict risk seeking, (2) accounts that predict increased risk seeking for small probabilities, and (3) accounts that predict increased risk seeking for objectively small amounts. We discuss each account in the context of probabilistic price promotions and outline why none can parsimoniously account for the results presented in the current article. Table 2 summarizes the accounts discussed in the text.

TABLE 2

RELATED THEORIES OF RISKY CHOICE TESTED IN AND OUTSIDE OF THE DOMAIN OF PRICE PROMOTIONS

Theoretical account	Domain tested	Description
Accounts that predict risk seeking		
Diminishing sensitivity to prices (Mazar et al. 2017)	Probabilistic price promotions	For both sure discounts and probabilistic price promotions, consumers display diminishing sensitivity to price increases.
Innate optimism (Goldsmith and Amir 2010)	Uncertain gift promotions	Consumers' automatic reaction to uncertain gift promotions is to interpret them positively, leading them to expect they will obtain the best possible outcome.
Subjective probabilities (Ailawadi et al. 2014)	Conditional rebates[a]	Consumers' subjective probabilities of the event occurring (and hence of obtaining the reward) are higher than objective probabilities.
Accounts that predict increased risk seeking for small probabilities		
Probability weighting (Kahneman and Tversky 1979)	Monetary gambles	People subjectively evaluate probabilities; they overweigh small probabilities and underweigh large probabilities, leading them to become more risk seeking at small winning probabilities.
Probability weighting (Attari et al. 2022)	Probabilistic price promotions	
Accounts that predict increased risk seeking for objectively small amounts		
Concavity/convexity of the utility function (Markowitz 1952)	Monetary gambles	The utility function is convex for small gains and concave for large gains; the inflection point reflects the switch from risk seeking to risk aversion. (In the loss domain, this is reversed; i.e., the utility function is concave for small losses and convex for large losses.)
Stake-dependent probability weighing (Fehr-Duda et al. 2010)		This account extends probability weighting (Kahneman and Tversky 1979) to different stake sizes: people assign lower probability weights to high-stakes gambles than to low-stakes gambles, leading them to become more risk seeking at lower stakes.
Anticipated disappointment (Weber and Chapman 2005)		People anticipate less disappointment at lower stakes from not winning a gamble than they do at higher stakes, leading them to become more risk seeking at lower stakes.
Other related accounts		
Hedonic editing for trivial losses (Harinck et al. 2007)	Monetary losses (vs. gains)	Small losses are perceived as trivial and not painful, and this can lead loss aversion to reverse at small stakes.

[a]Conditional rebates are a type of promotion for which the discount on a purchase is tied to an external event, such as a sports team winning a game.

Accounts That Predict Risk Seeking. First, a number of existing accounts predict an absolute preference for uncertainty in the context of price promotions or related contexts. Most relevant to our work, Mazar et al. (2017) propose that consumers' preferences for probabilistic promotions hinge on diminishing sensitivity to prices, the fact that consumers are less sensitive to changes in prices as prices increase. This account predicts that consumers "should always prefer a probabilistic free price promotion to a sure price promotion of equal expected value" (Mazar et al. 2017, 253).[1] However, Attari et al. (2022) sometimes find the reverse, namely an absolute preference for the sure discount (as do we in our pilot studies; web appendix C). Hence, diminishing sensitivity to prices cannot explain consumers' preferences for probabilistic price promotions.

1 To understand why diminishing sensitivity to prices would result in a preference for probabilistic price promotions over equivalent sure discounts as described in the study by Mazar et al. (2017), let us consider a product originally priced at \$10. Imagine that this product is offered either with a sure discount of 20% off or with a 20% chance to get it for free (i.e., a probabilistic promotion). Importantly, these two promotions offer the same expected price for the product, namely \$8. According to diminishing sensitivity, the value of a price, $v(x)$, is equal to x^{α}, where $\alpha < 1$. Prior research suggests that $\alpha = 0.88$ in some contexts (Prelec 1998), so we will use that value for this example, though the precise value does not matter. In this example, the value of the sure discount is equal to the value of the original price ($\$10^{88} = \$7.59$) minus the value of the discounted price ($\$8^{88} = \$6.23$), which is \$1.36. The value of the probabilistic promotion is equal to the value of the original price ($\$10^{88} = \$7.59$) minus the value of the original price times the probability of paying the original price ($\$7.59(0.80) = \$6.07$), which is \$1.52. Thus, the probabilistic promotion (\$1.52) is valued more highly than the sure discount (\$1.36). Indeed, it is generally true that when a sure discount and a probabilistic promotion result in the same expected value for a product and the probabilistic promotion offers a p chance to get the product for free, then diminishing sensitivity means that the value of the probabilistic promotion will always be higher than the value of the sure discount (Mazar et al. 2017). This is because under diminishing sensitivity, the discounted price will always feel larger than a $(1 - p)$ chance of getting the regular price. A diminishing sensitivity explanation of consumers' price promotion preferences therefore predicts that consumers will always prefer a probabilistic promotion to a sure discount of equal expected value.

Other accounts propose that consumers might sometimes prefer uncertainty because of a favorable view of the likelihood of obtaining the uncertain outcome. For example, Goldsmith and Amir (2010) posit that consumers' automatic reactions to uncertain gift promotions is to interpret them positively, leading them to expect they will obtain the best possible outcome (i.e., the higher valued gift). Similarly, Ailawadi et al. (2014) suggest that for conditional rebates (a type of promotion in which the uncertainty stems from a discount being tied to an external event), consumers believe that the likelihood of the event occurring is higher than it is. However, similar to diminishing sensitivity to prices, these accounts are insufficient to explain why probabilistic price promotions are not always preferred (Attari et al. 2022; see our pilot studies).

Accounts That Predict Increased Risk Seeking for Small Probabilities. Second, prospect theory suggests that people overweigh small probabilities and that people therefore are more likely to accept gambles that offer smaller probabilities (Kahneman and Tversky 1979; Tversky and Kahneman 1992).[2] In line with this, Mazar et al. (2017)[3] and Attari et al. (2022) demonstrate that probabilistic price promotions are more attractive for smaller probabilities. In addition, Mazar et al. (2017) find no preference for probabilistic promotions when probabilities are large, and Attari et al. (2022) sometimes find a preference for sure discounts. Overweighting of small probabilities may explain the results of our pilot studies (and of study 1), which indicate that probabilistic price promotions are more attractive when the probability (and thus the percentage discount) is smaller. However, overweighting of small probabilities cannot explain why consumers' preferences for probabilistic promotions are increased by manipulations that make the sure discount seem smaller without altering the probability itself (e.g., by displaying the sure discount as a percentage rather than a dollar amount, as we demonstrate in studies 4 and 5).

Accounts That Predict Increased Risk Seeking for Objectively Small Amounts. Third, some existing theories suggest that risk preferences may vary with the size of the objective stakes. Markowitz (1952) proposed that people might prefer a 10% chance of winning \$1 over receiving \$0.10 for sure, reflecting risk-seeking behavior at small stakes. Prelec and Loewenstein (1991) later coined this phenomenon the "peanuts effect." Notably, their definition does not necessarily imply risk-seeking at small stakes, as a reduction in risk aversion is sufficient to account for the effect. Empirical evidence for the peanuts effect has been documented in several studies (Chen and Jia 2005; Fehr-Duda et al. 2010; Holt and Laury 2005; Weber and Chapman 2005), and various explanations have been proposed to account for it.

Markowitz (1952) originally attributed the peanuts effect to the curvature of the utility function, proposing that it shifts from convex for small gains to concave for large gains. However, prospect theory posits that the utility function for gains is consistently concave (Kahneman and Tversky 1979; Tversky and Kahneman 1992). As a result, alternative explanations for the peanuts effect have been proposed that do not rely on changes in the shape of the utility function.

Fehr-Duda et al. (2010) explain the peanuts effect through the probability weighting function, showing that stake size influences how people weight probabilities. Specifically, they find that individuals assign lower probability weights to high-stakes gambles than to low-stakes gambles, leading to greater risk-seeking behavior at lower stakes. Although this explanation highlights how the objective size of stakes affects probability weights for uncertain outcomes, it does not address how subjective perceptions of the same stake size influence consumers' preferences for probabilistic price promotions.

Weber and Chapman (2005) offer a different account that is rooted in the psychology of negative emotions. They propose that when stakes are objectively small, people anticipate less disappointment from not winning a gamble than they do at higher stakes, making them inclined to be more risk seeking at lower stakes. In their empirical studies, Weber and Chapman (2005) did not measure disappointment directly but support their explanation by manipulating probability magnitudes (e.g., 25% vs. 5%) and probability ratios (e.g., 4 vs. 2)[4] for monetary gambles

2 We will rule out this explanation in our studies, but it is worth mentioning that there really is not good evidence that people generally overweight small probabilities. First of all, Kahneman and Tversky (1979) themselves suggested that although sometimes people will overweight small probabilities, they will sometimes edit them down to zero (and thus underweight them). Second, as mentioned in Footnote 3, the results from Mazar et al. (2017) were at least somewhat inconsistent with people overweighting small probabilities. Third, Green, Lee, and Rothschild (2024) have recently shown that what was considered one of the best real-world examples of people's tendency to overweight small probabilities—the favorite-longshot bias in horse betting—is actually caused by bettors' reliance on biased information that the race tracks give them.

3 Mazar et al. (2017) considered a version of their diminishing sensitivity account that incorporates the probability weighting function of prospect theory. This account makes two unique predictions: (1) consumers will be more likely to prefer probabilistic promotions over sure discounts when the probability of obtaining the probabilistic promotion is smaller, and (2) consumers will prefer the probabilistic promotion unless the probability of obtaining the probabilistic promotion is quite large (e.g., $p > .6$). Although their findings do not definitively rule out the operation of probability weighting, they do seem to be more consistent with an account of diminishing sensitivity that does *not* incorporate probability weighting. Indeed, Mazar et al. (2017) conclude that, "our findings may be better explained by diminishing sensitivity to prices without weighted probabilities" (257).

4 Probability ratio in the context of the investigation by Weber and Chapman (2005) refers to the ratio between the probabilities of the two possible outcomes. To illustrate, a choice between having a 25% chance of getting a larger outcome and getting a smaller outcome for sure (100% chance) would reflect a probability ratio of 4, and a choice

across different outcome magnitudes (e.g., $1 vs. $10 vs. $100 vs. $1,000). They show that outcome magnitude interacts with both probability magnitude and probability ratio, thus indicating that the peanuts effect is larger for larger probability magnitudes and ratios.[5] That is, although it would be reasonable to assume that perceived disappointment is likely a function of both the uncertain outcome and the sure outcome, the empirical evidence by Weber and Chapman (2005) focuses on altering features associated primarily with uncertain outcomes (i.e., winning probabilities).

Our account offers a different perspective on the peanuts effect, one that considers an aspect of the choice setting that previous work seems to have neglected: rather than focusing on features of the uncertain outcome such as subjective probability weights (Fehr-Duda et al. 2010) or probability magnitudes and ratios (Weber and Chapman 2005), we focus on how perceptions of the *sure outcome*, particularly its perceived size, may shift preferences toward the uncertain outcome.

Understanding how people perceive the sure outcome in the choice set is particularly important because we are investigating the peanuts effect in the context of price promotions rather than monetary gambles, and decades of research have established that consumers pay great attention to the size of sure discounts (i.e., the discount depth; Darke and Freedman, 1993; Grewal et al. 1996; Guha et al. 2018; Janiszewski and Lichtenstein 1999; Monroe 1973; Urbany et al. 1988). In line with this, in our studies, we show that manipulations that make the sure discount feel smaller without changing its objective size increase people's tendency to opt for the probabilistic promotion over the sure discount and thus increase risk taking. We also provide process evidence suggesting that people's perceptions of the size of the sure discount mediate their choices.

To our knowledge, we are the first to extend the peanuts effect to the important context of price promotions. In fact, prior work on probabilistic price promotions had claimed to rule out the peanuts effect as a possible explanation, with Mazar et al. (2017) concluding that their findings on probabilistic price promotions "are less likely an artifact of the 'peanuts' effect (Prelec and Loewenstein 1991, 256)" because they still find their effect for discounts larger than $1. This conclusion is not surprising considering that work on the peanuts effect has largely focused on objectively miniscule amounts. In considering the perceived—rather than objective—size of the offer at stake, we advance our understanding of the role that perceptions of peanuts can play in this context.

Other Related Accounts. Related to our proposition, the role of subjective perceptions of stakes has also been discussed in the context of a different phenomenon: loss aversion, the notion that losses are psychologically more impactful than gains (Tversky and Kahneman 1992). However, research has shown that this tendency can reverse when stakes are small (Gal and Rucker 2018; Harinck et al. 2007). Harinck et al. (2007) attribute this reversal to people's subjective perceptions of small losses. They find that the happiness people feel when imagining winning $1 is greater than the unhappiness they feel when imagining losing the same amount. This suggests that small losses are perceived as trivial and not particularly painful, allowing people to easily discount them. As a result, loss aversion diminishes and may even reverse for small stakes. Although loss aversion focuses on the evaluation of losses relative to gains, which is not at issue here, we see parallels between this work and our investigation. In both cases, people's subjective perceptions of the size of outcomes play a crucial role (Harinck et al. 2007).

Overall, our review and discussion of existing theories of risky choice suggest that some accounts predict increased risk-seeking behavior for small probabilities or objectively small amounts (as demonstrated in studies 1 and 2). However, none of these accounts predict our key finding: manipulations altering the perceived size of a sure discount—without changing its objective size or any features of the probabilistic promotion—can influence risk preferences.

Overview of Studies

Our research investigates whether consumers' preferences for a probabilistic price promotion over an equivalent sure discount depends on the extent to which the sure discount feels trivial. In most of our studies, we focused on investigating probabilistic promotions that offered a chance to get a product for free because such promotions have been a primary focus of prior research (Lee et al. 2019; Mazar et al. 2017) and because consumers (and survey takers) are likely to easily understand them. For example, it is probably easier for consumers to compute the expected value of a 10% chance of getting a $400 product for free than to compute the expected value of a 50% chance of getting a $400 product at an 80% discount. Nevertheless, we also present experimental evidence that our theory applies to circumstances in which consumers are faced with probabilistic promotions that do not offer a chance to get a product for free.

between having a 50% chance of getting a larger outcome and getting a smaller outcome for sure (100% chance) would reflect a probability ratio of 2.

5 In study 2, we manipulate whether participants choose between a 10% chance of getting the product for free and a sure discount (probability ratio of 10) or a 20% chance to get the product for half price and a sure discount (probability ratio of 5). In this study, we find a main effect on risk taking when the probability ratio is higher ($p = .036$). However, contrary to Weber and Chapman (2005), we do not observe a significant interaction between probability ratio and price of the product (i.e., objective size of the discount), at least not for the prices that we used.

Across five studies (and five supplemental studies), we used different strategies to manipulate how small a sure discount would feel, including (1) varying the percentage discount/probability (e.g., 1% vs. 10%) while holding the price of the product constant, (2) varying the price of the product (e.g., $48 vs. $480) while holding the percentage discount/probability constant, (3) varying whether the same sure discount is presented in the context of a larger or smaller price/discount, and (4) varying the framing of the sure discount by presenting it either as a dollar amount or a percentage. In our studies, we measured consumers' preferences by asking them directly to choose between a probabilistic promotion and a sure discount for a given product. In a final study, we also present (correlational) evidence that participants' perceived size of the sure discount mediates people's preferences for probabilistic promotions over equivalent sure discounts.

We report all of our measures, manipulations, exclusions, and how we determined our sample sizes, and we preregistered all of our studies. All of our data, materials, and preregistrations are available on ResearchBox: https://researchbox.org/3299.

STUDY 1

In study 1, we asked participants to choose between receiving a sure discount or a probabilistic promotion on a hotel stay. We started our investigation with promotions on hotel bookings because companies such as hotels.com have previously implemented probabilistic price promotions online and because prior research investigating probabilistic price promotions has used similar stimuli (Mazar et al. 2017).

We manipulated the size of the sure discount by manipulating both the price of the product and the percentage associated with the promotions. We expected that participants would be more likely to forego the sure discount when it was relatively small than when it was relatively large and thus that the probabilistic promotion would be relatively more effective when either the price of the product was low or the percentage associated with the promotions was small.

Method

Participants. We conducted study 1 using US participants from Amazon's Mechanical Turk (MTurk). Participants received $0.50 for participation. We decided in advance to recruit 900 participants for this study, and we wound up with a final sample of 852 participants (average age = 35 years; 51.5% female). The final sample included all participants who indicated their choice, but, as we preregistered, we kept only the first response from Internet Protocol (IP) addresses that appeared more than once in the dataset (resulting in 11 exclusions), and we excluded any participants whose IP addresses were identical to those of participants in supplemental studies S1a, S1b, and S2 (36 participants).

Procedure. In this study, we presented participants with one hotel and asked them to imagine that they had selected this hotel for an upcoming trip to the Jersey Shore. Participants also learned that the hotel came with one of two types of price promotions and that they could choose which type of price promotion they would like to receive. Participants could choose between a promotion that came in the form of a sure discount (described as "receiving X% off of the price of the hotel room") and a probabilistic promotion (described as "an X% chance to get the hotel room for free"). Figure 1 shows the stimuli that we used in study 1.

We manipulated both the percentage associated with the promotions and the price of the promoted hotel. We randomly assigned participants to one of four conditions of a two (promotion percentage: 1% vs. 10%) by two (price of promoted hotel: low vs. high) between-subjects design. We manipulated the percentage associated with the promotions to be either 1% or 10%. We also manipulated the price of the promoted hotel to be either the one-night price ($48) or the 10-night price ($480). As a consequence, the size of the sure discount varied across conditions, from $0.48 in the "1%/low price" condition to $48 in the "10%/high price" condition.

We measured whether or not participants selected the probabilistic promotion (1 = they chose the probabilistic promotion, 0 = they chose the sure discount). At the end of the study, we assessed participants' age and gender.

Results and Discussion

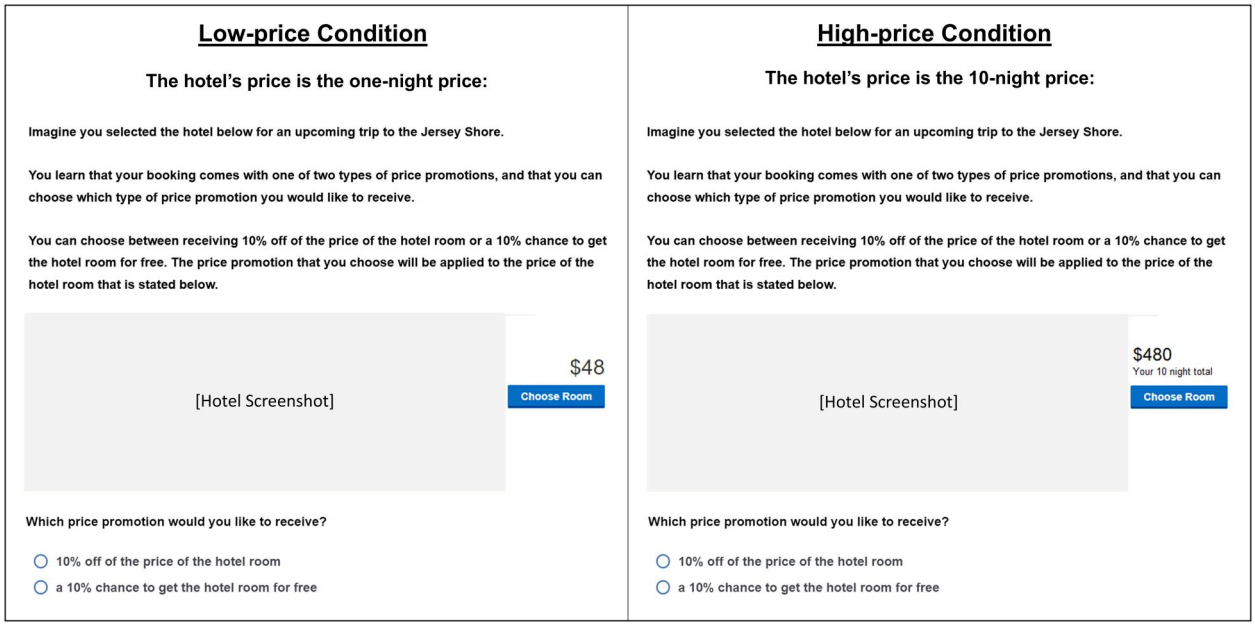
Figure 2 displays the results of study 1. We used ordinary least squares (OLS) to regress whether participants chose the probabilistic promotion (1 = they chose the probabilistic promotion, 0 = they chose the sure discount) on (1) the promotion percentage condition (contrast coded), (2) the price condition (contrast coded), and (3) the interaction between the two conditions.[6]

Participants were more likely to choose the probabilistic promotion over the sure discount when the percentage was 1% than when it was 10%, $b = 0.351$, standard error (SE) = 0.032, $t(848) = 11.02$, and $p < .001$ and when the price was low ($48) than when it was high ($480), $b = 0.072$, SE = 0.032, $t(848) = 2.27$, and $p = .024$. The interaction was not significant ($p = .462$). The results displayed in Figure 2 further show that the percentage of participants choosing the probabilistic promotion was largest when the

6 In studies 1 and 2, we used choice as a dependent variable. For these studies, we preregistered to analyze the data using OLS regressions rather than logistic regressions because the two analyses produce nearly identical results and because OLS coefficients are easier to interpret (i.e., as the percentage-point difference between conditions). Analyzing the data using logistic regression does not change the significance of a result (web appendix A).

FIGURE 1

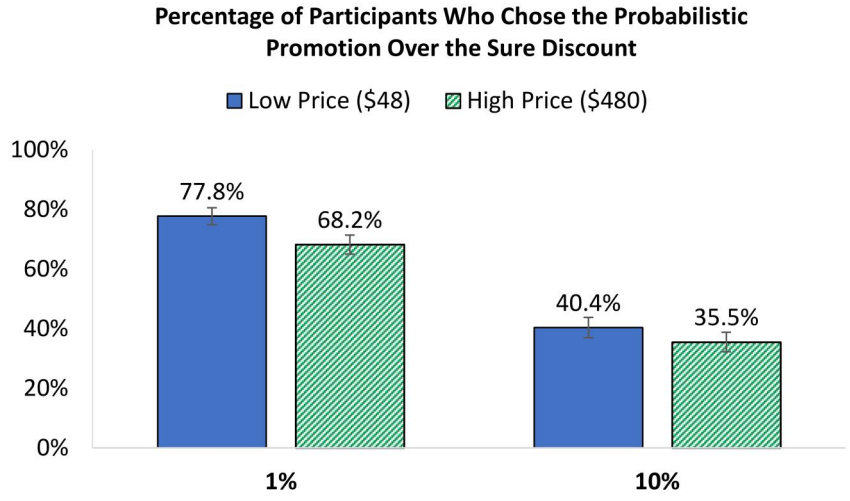
STIMULI PRESENTED IN STUDY 1 (10% CONDITION)



NOTE.—Stimuli presented in study 1. Participants in study 1 were randomly assigned to one of four conditions of a two (promotion percentage: 1% vs. 10%) by two (price of promoted hotel: low vs. high) between-subjects design. This figure shows the two 10% conditions, with the hotel screenshot omitted. Full stimuli are available on ResearchBox: https://researchbox.org/3299.

FIGURE 2

RESULTS OF STUDY 1



size of the sure discount was smallest ($0.48) and smallest when the size of the sure discount was largest ($48). In addition, participants were more likely to prefer a 1% probabilistic promotion to 1% off when the price was $480 than they were to prefer a 10% probabilistic promotion to 10% off when the price was $48. This suggests that people's evaluation of the size of discounts might partly be based on the absolute size of the discount (which was identical in these conditions: $4.80) and partly based on the proportional size of the discount (which is greater when getting 10% off than when getting 1% off of the original price).

Taken together, these results suggest that people are more likely to choose a probabilistic promotion over a sure discount when the sure discount is smaller, either because the percentage associated with the promotions is small or because the price is small.

STUDY 2

In study 1, the probabilistic promotion offered a chance to get the product for free, meaning the consumer would pay nothing. Past research suggests that a price of zero holds special appeal and elicits positive affect (Palmeira 2011; Shampanier, Mazar, and Ariely 2007), which may cause consumers to overreact to free offers. It is therefore important to test whether our findings generalize to promotions that do not include a chance to get the product for free.

If consumers' attraction to probabilistic promotions stems from the chance to get the product for free, we would expect this effect to diminish or disappear when the promotion instead offers a chance at a larger but nonfree discount, such as receiving the product for half price. However, if the perceived size of the sure discount drives the effect, the results should remain consistent regardless of whether the probabilistic promotion includes a chance to get the product for free or a significant nonfree discount. In either scenario, we expect probabilistic promotions to become more attractive when the product price is low rather than high.

Method

Participants. We conducted study 2 using US participants from MTurk. Participants received $0.50 for participation. We decided in advance to recruit 2,400 participants for this study, and we wound up with a final sample of 2,338 participants (average age = 38 years; 49.3% female). The final sample included all participants who indicated their choice, but, as preregistered, we kept only the first response from IP addresses that appeared more than once in the dataset (resulting in 74 exclusions).

Procedure. The procedure of this study was very similar to the procedure of study 1. We presented participants with one hotel and asked them to imagine that they had selected this hotel for an upcoming trip to the Jersey Shore. Participants also learned that the hotel came with one of two types of price promotions, either a sure discount or a probabilistic promotion, and that they could choose which type of price promotion they would like to receive (Figure 3).

Participants were randomly assigned to one of four conditions from a two (price: low vs. high) by two (probabilistic promotion type: chance for free vs. chance for half price) between-subjects design. As in study 1, we manipulated the price of the promoted hotel to be either the one-night price ($48) or the 10-night price ($480). In addition, we also manipulated the type of probabilistic promotion that we presented to participants alongside the sure discount. The sure discount always came in the form of receiving 10% off the price of the hotel room. In the probabilistic free condition, the probabilistic promotion provided "a 10% chance to get the hotel room for free," but in the probabilistic non-free condition, the probabilistic promotion entailed "a 20% chance to get the hotel room for half price." In each of the probabilistic promotion conditions, the expected value of the promotion corresponded to the expected value of the sure discount.

We measured whether or not participants selected the probabilistic promotion (1 = they chose the probabilistic promotion, 0 = they chose the sure discount). At the end of the study, we assessed participants' age and gender.

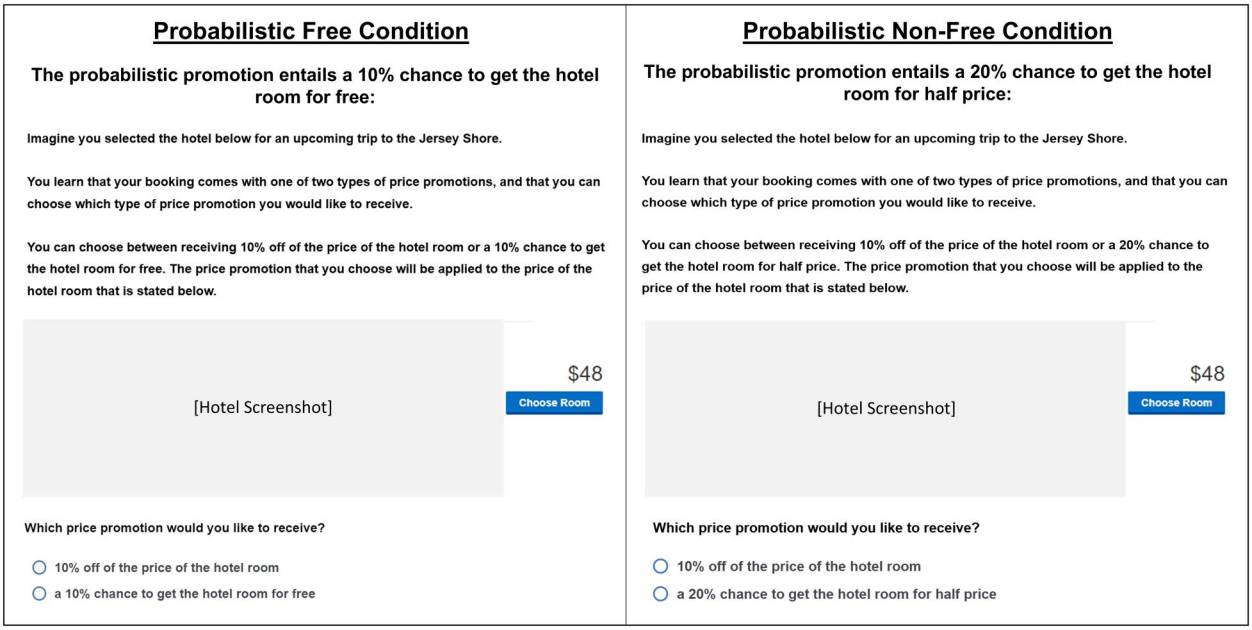
Results and Discussion

Figure 4 displays the results of study 2. We used OLS to regress whether participants chose the probabilistic promotion (1 = they chose the probabilistic promotion, 0 = they chose the sure discount) on (1) the price condition (contrast coded), (2) the probabilistic promotion type condition (contrast coded), and (3) the interaction between the two conditions.

Replicating the results from study 1, participants were more likely to choose a probabilistic promotion over a sure discount when the price was low ($48) than when it was high ($480), $b = 0.056$, SE = 0.020, $t(2,334) = 2.79$, and $p = .005$. Participants were also overall more likely to choose the probabilistic free promotion over the sure discount than they were to choose the probabilistic non-free promotion over the sure discount, $b = 0.042$, SE = 0.020, $t(2,334) = 2.10$, and $p = .036$. Importantly, however, the interaction between the probabilistic promotion type and the price of the product was not significant ($p = .961$). That is, although participants were overall more likely to choose the probabilistic promotion when it entailed a chance to get the hotel room for free than when no free outcome was involved, this effect did not interact with our manipulation of the size of the sure discount (via the price of the product). The size of the sure discount influenced

FIGURE 3

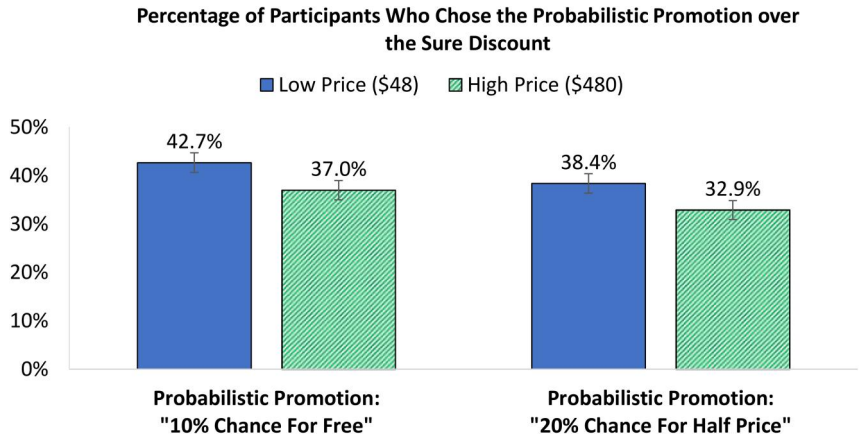
STIMULI PRESENTED IN STUDY 2 ($48 CONDITION)



NOTE.—Stimuli presented in study 2. Participants in study 2 were randomly assigned to one of four conditions of a two (price: low vs. high) by two (probabilistic promotion type: chance for free vs. chance for half price) between-subjects design. This figure shows the two low-price conditions, with the hotel screenshot omitted. Full stimuli are available on ResearchBox: https://researchbox.org/3299.

FIGURE 4

RESULTS OF STUDY 2



participants' preferences for both the free and the non-free probabilistic price promotion such that participants were more likely to opt for the probabilistic price promotion when the price of the product was low (and thus the sure discount was small) than when it was high (and thus the sure discount was large). This shows that our effect generalizes to probabilistic price promotions that do not provide a chance to get the product for free.

STUDY 3

In studies 1 and 2, we manipulated the objective size of the sure discounts by directly manipulating features of the promotion itself (its percentage) or of the product for which the promotion was offered (the product's price). In study 3, we sought to test whether we would observe the same effects by holding the objective size of the sure discount constant while changing only how large or small those discounts feel. Specifically, we set out to make the same sure discount feel smaller by presenting it in the context of another larger-priced product that came with a larger discount.

Method

Participants. We conducted study 3 using US participants from Prolific. Participants received \$0.50 for participation. We decided in advance to recruit 2,400 participants, and we wound up with a final sample of 2,221 participants (average age = 39 years; gender: 48.8% female, 49.5% male, and 1.7% nonbinary). The final sample included all participants who indicated which promotion they would like to choose. As preregistered, we deleted responses from IP addresses or Prolific IDs that appeared more than once in the dataset (resulting in 329 exclusions).[7]

Procedure. We presented participants in this study with a scenario about purchasing a gym membership (Figure 5). Participants imagined that they had just decided to buy a one-year membership to a gym and a week's worth of personal training sessions. The focal product in this scenario was the personal training sessions for which the price was held constant at \$50. For this focal product, we gave participants a choice between a sure discount and a probabilistic price promotion as described below. We presented this focal product in the context of another product, the one-year gym membership. We manipulated the price and the corresponding discount of the gym membership by framing it either as the yearly gym membership price or the monthly gym membership price.

Participants were randomly assigned to one of two conditions. Participants in the high-comparison-price condition saw the gym membership price framed as a yearly price: They learned that the price of the gym membership was \$480/year and that they would get a \$48 discount (i.e., 10% off of the yearly gym membership price). Participants in the low-comparison-price condition saw the gym membership price framed as a monthly price: They learned that the price of the gym membership was \$40/month and that they would get a \$4 discount (i.e., 10% off of the yearly gym membership price). The price for the personal training sessions was presented as \$50 in either condition. Participants learned that they could choose which price promotion they would like to receive on the personal training sessions, a sure discount of \$5 or a 10% chance to get the personal training sessions for free. We predicted that the probabilistic price promotion would become relatively more attractive than the \$5 sure discount when the \$5 discount was presented in the context of the larger comparison price and discount (i.e., \$48 off of the yearly gym membership) than when it was presented in the context of the smaller comparison price and discount (i.e., \$4 off of the monthly gym membership).

Because both the gym membership and the personal training sessions came with a promotion, we presented participants in the scenario with an overview of the price promotion packages that they could choose between. This overview always included the sure discount on the gym membership and varied with respect to whether participants received a sure discount ("\$5 off of the personal training sessions") or a probabilistic promotion ("a 10% chance to get the personal training sessions for free") on the personal training sessions. Figure 5 shows the exact wording of the scenario and the choice options that we presented to participants in either condition. We randomized whether the sure discount or the probabilistic promotion was presented first.

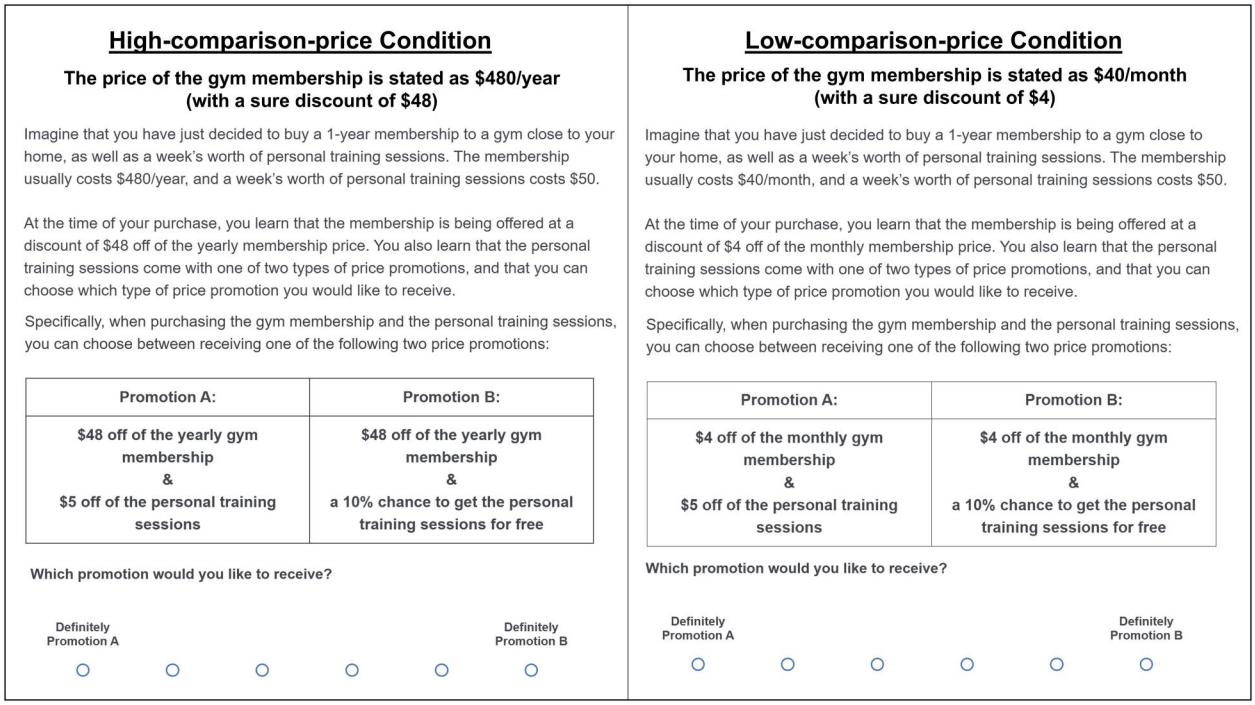
Participants indicated which promotion they would like to receive on a six-point scale that ranged from 1, "definitely Promotion A," to 6, "definitely Promotion B." Because we randomized the order in which the sure discount and the probabilistic promotion were presented, we scored participants' answers so that 1 = "definitely sure discount" and 6 = "definitely probabilistic promotion."

In this study, we also asked participants an additional question to understand whether the prices presented in the scenario would change how wealthy participants perceive themselves to be. We asked, "In this scenario, how wealthy would you feel?" (1 = not at all wealthy; 7 = extremely wealthy). Participants always answered this question on a separate page on which the complete scenario was presented again. We randomized the order of this question and our main dependent measure, the promotion choice. That is, participants either first indicated their promotion choice or they first answered this question. At the end of the study, we assessed participants' age and gender.

7 Note that we programmed the Qualtrics survey for this study so that it excluded anyone who used a mobile device. However, on Prolific, we accidently advertised the study as being open to mobile devices. This may have resulted in people first attempting the study on a mobile device and then switching to a nonmobile device, possibly increasing the number of duplicate IP addresses. The results of this study remain qualitatively unchanged if we do not exclude duplicate IP addresses or Prolific IDs.

FIGURE 5

STIMULI PRESENTED IN STUDY 3



Results and Discussion

First, we regressed participants' ratings of the promotions on the comparison-price condition (1 = high comparison price, 0 = low comparison price). As predicted, participants were more likely to prefer a 10% chance of getting the $50 personal training sessions for free over a sure discount of $5 when they considered the promotions in the context of a $48 discount on the yearly membership price ($M = 2.92$, SE = 0.06) than when they considered them in the context of a $4 discount on the monthly membership price ($M = 2.60$, SE = 0.05), $b = 0.322$, SE = 0.079, $t(2,219) = 4.09$, and $p < .001$.

Second, we regressed participants' perceptions of their own wealth on the comparison-price condition. We found that participants perceived themselves as more wealthy when they considered the promotions in the context of a $48 discount on the yearly membership price ($M = 3.41$, SE = 0.04) than when they considered them in the context of a $4 discount on the monthly membership price ($M = 3.27$, SE = 0.04), $b = 0.142$, SE = 0.060, $t(2,219) = 2.36$, and $p = .018$.

In an exploratory analysis, we controlled for participants' wealth perceptions in the regression. The effect of comparison price/discount on the promotion choice was barely reduced and remained highly significant, $b = 0.305$, SE = 0.078, $t(2,217) = 3.89$, and $p < .001$. This suggests that participants' changes in their own perceived wealth is probably not the primary driver of the effect of the comparison price/discount on participants' promotion choice.

Study 3 demonstrates that asking consumers to consider the same discount in the context of a larger price and discount can increase people's relative preference for a probabilistic promotion. We replicated these results in supplemental study S3 using the same scenario as in this study and in supplemental study S4 using a different scenario in which participants imagined buying a product after having previously made another purchase (web appendix D). Taken together, our findings suggest that sure discounts may become relatively less attractive (and hence probabilistic promotions more attractive) when a comparison price/discount makes them appear smaller. These findings align with previous research indicating that comparison prices and discounts influence how price offers are perceived (Nunes and Boatwright 2004; Rajendran and Tellis 1994; Santana, Thomas, and Morwitz 2020).

In the next study, we tested an additional way to manipulate how large a sure discount feels, namely by manipulating the framing of the sure discount.

STUDY 4

In study 4, we set out to examine whether framing the sure discount as a percentage (e.g., 10% off of $50) or a dollar amount (e.g., $5 off of $50) alters people's likelihood of choosing a probabilistic promotion over an equivalent sure discount. In studies 1–3, we established that the perceived size of a sure discount drives people's preferences for probabilistic promotions. Thus, if the perceived size of a sure discount is affected by whether the sure discount is presented as a percentage or a dollar amount, then this should also affect people's preferences for probabilistic promotions.

Prior work suggests that how a discount is framed may change how large it is perceived to be (Chenet al. 1998; Della Bitta et al. 1981; DelVecchio et al. 2007; González et al. 2016). However, this research provides inconsistent results with respect to the direction of the effect. For example, research by Della Bitta et al. (1981) suggests that framing a sure discount as a dollar amount leads to higher savings perceptions than framing it as a percentage. In contrast, Chen et al. (1998) found that dollar framing increased saving perceptions for high-priced products, but percentage framing increased savings perceptions for low-priced products. However, they did not find any effect on a measure of purchase intentions. Similarly, González et al. (2016) found that dollar framing resulted in both higher saving perceptions and higher purchase intentions for high-priced products, whereas percentage framing directionally, but not significantly, increased saving perceptions and purchase intentions for low-priced products. Given that these existing findings are inconsistent and somewhat complicated, we conducted a pretest to examine whether a percentage (vs. dollar) framing would make a sure discount feel larger or smaller. The results from this pretest informed our predictions for the main study.

Pretest

We conducted a pretest to examine whether participants perceive the size of a sure discount to be different depending on whether the discount is framed as a percentage or as a dollar amount.

Participants. We conducted the pretest on MTurk. Participants received $0.30 for participation. We decided in advance to recruit 900 participants for this pretest, and we wound up with a final sample of 867 participants (average age = 36 years; gender: 47.5% female). The final sample included all participants who provided their rating, but, as we preregistered, we kept only the first response from IP addresses that appeared more than once in the dataset (resulting in 20 exclusions), and we excluded any participants whose IP addresses were identical to those of participants in supplemental studies S1a, S1b, and S2 (18 participants).

Procedure. Participants were asked to imagine that they were about to buy a product and that the product came with a sure discount equal to 10% off. We randomly assigned participants to one of four conditions of a two (price of promoted product: low vs. high) by two (framing of sure discount: percentage vs. dollar amount) between-subjects design. The original price of the product was $11 in the low-price condition and $311 in the high price condition. Furthermore, the discount was either framed as a percentage off of the original price (e.g., "You will get 10% off of the price of the product.") or as a dollar amount (e.g., "You will get $1.10 off of the price of the product."). We asked participants to indicate how small or large the discount felt to them (1 = very small; 7 = very large).

Results. Panel A of Figure 7 displays the results of this pretest. Not surprisingly, participants rated the sure discount as smaller in the low-price condition than in the high-price condition, $b = -0.276$, SE = 0.091, $t(863) = -3.03$, and $p = .003$. More importantly, they rated the discount as smaller when it was framed as a percentage off of the original price than when it was framed as a dollar amount, $b = -0.621$, SE = 0.091, $t(863) = -6.80$, and $p < .001$. The interaction was not significant ($p = .801$).

Thus, the framing of the sure discount influenced its perceived size, even though the sure discount always corresponded to getting 10% off of the original price of the product. This pretest suggests that because a sure discount feels smaller when it is framed as a percentage than when it is framed as a dollar amount, people should be more likely to choose a probabilistic promotion over a sure discount when the latter is framed as a percentage than when it is framed as a dollar amount. We tested this prediction in study 4.

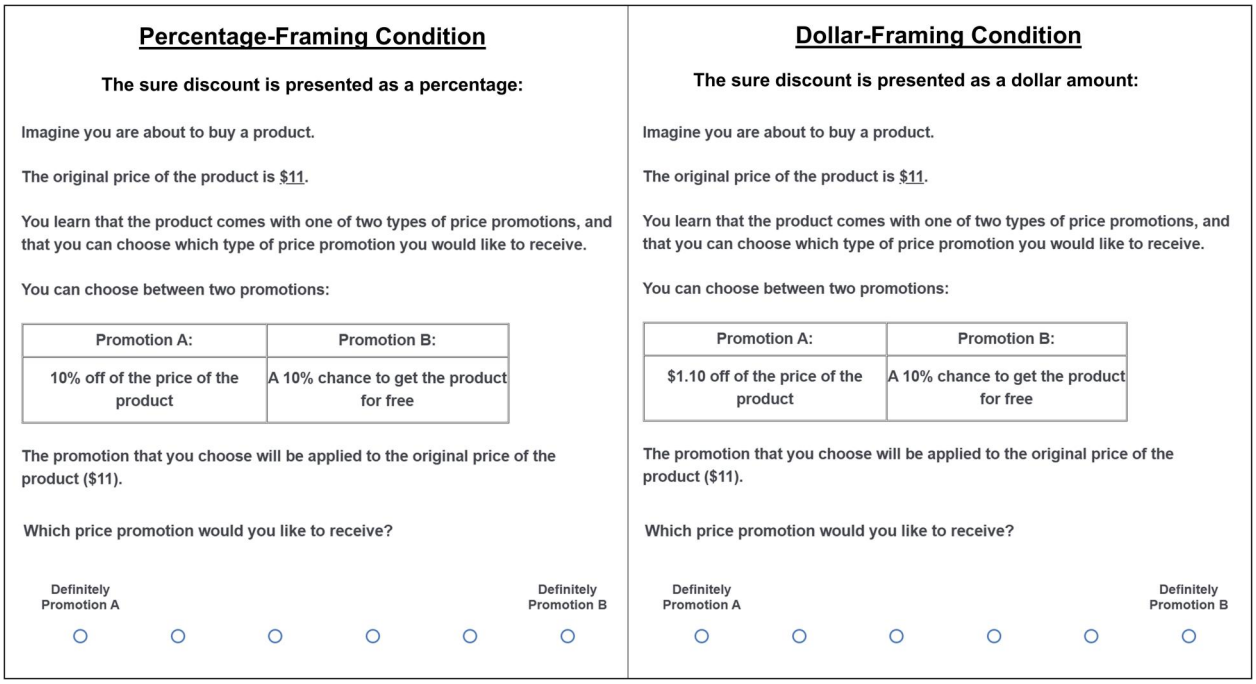
Method

Participants. We conducted study 4 using US participants from MTurk. Participants received $0.30 for participation. We decided in advance to recruit 2,400 participants for this study, and we wound up with a final sample of 2,371 participants (average age = 36 years; 51.2% female). The final sample included all participants who indicated their promotion choice, but, as we preregistered, we kept only the first response from IP addresses that appeared more than once in the dataset (resulting in 28 exclusions).

Procedure. In this study, we asked participants to imagine that they were about to buy a product that came with one of two types of promotions and that they could choose which promotion they would like to receive. We randomly assigned participants to one of four conditions from a two (price of promoted product: low vs. high) by two (framing of sure discount: percentage vs. dollar amount) between-subjects design. We used the same price conditions in this study as in our pretest. That is, in the

FIGURE 6

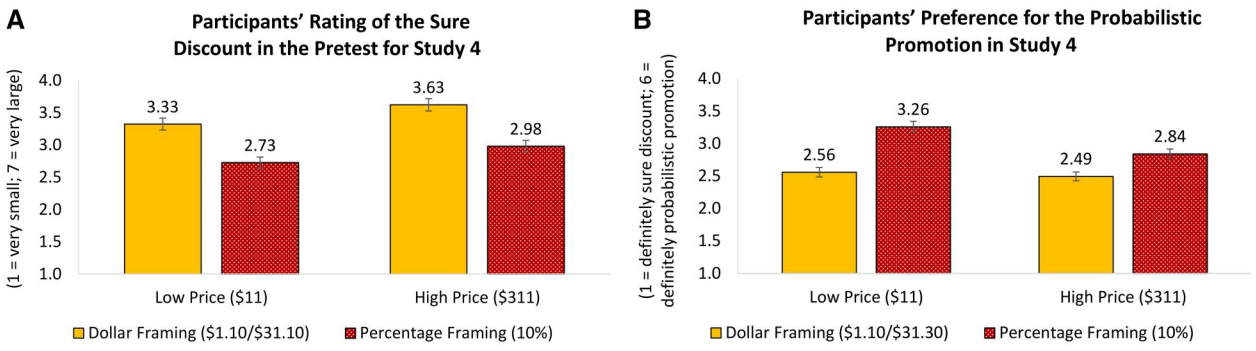
STIMULI PRESENTED IN STUDY 4 (LOW-PRICE CONDITIONS).



NOTE.—Sample stimulus for study 4. Participants were randomly assigned to one of four conditions of a two (price of promoted product: low vs. high) by two (framing of sure discount: percentage vs. dollar amount) between-subjects design. This figure shows the two low-price conditions.

FIGURE 7

PANEL A SHOWS THE RESULTS OF THE PRETEST FOR STUDY 4 AND PANEL B SHOWS THE RESULTS OF STUDY 4



low-price condition, the original price of the product was $11, and in the high price condition, it was $311.

Participants received information about the two types of price promotions. One of the price promotions was a probabilistic promotion ("a 10% chance to get the product for free"), and the other was a sure discount that corresponded to getting 10% off of the price of the product. We manipulated whether the sure discount was presented as a percentage (i.e., 10% off) or as the equivalent dollar amount (i.e., $1.10 off in the low-price condition and $31.10 off in the high-price condition). Figure 6 shows the exact wording of the scenario and the choice option that participants faced.

We randomized whether the sure discount or the probabilistic promotion was displayed first.

We asked participants to indicate which price promotion they would like to receive on a six-point scale that ranged from 1 = "definitely promotion A" to 6 = "definitely promotion B." Because we randomized the order in which the sure discount and the probabilistic promotion were presented, we scored participants' answers so that 1 = "definitely sure discount" to 6 = "definitely probabilistic promotion." At the end of the study, we assessed participants' age and gender.

Results and Discussion

Panel B of Figure 7 displays the results of study 4. As we preregistered, we used OLS to regress participants' rating of the price promotions on (1) the price condition (contrast coded), (2) the framing condition (contrast coded), and (3) the interaction between the two conditions.

In line with the results from our previous studies, participants were more likely to choose the probabilistic promotion over the sure discount when the price was low (and the sure discount was smaller) than when it was high (and the sure discount was larger), $b = 0.241$, SE = 0.075, $t(2,367) = 3.20$, and $p = .001$. More importantly, and in line with the predictions derived from our pretest, participants were also more likely to choose the probabilistic promotion over the sure discount when the sure discount was framed as a percentage than when it was framed as a dollar amount, $b = 0.523$, SE = 0.075, $t(2,367) = 6.94$, and $p < .001$. The interaction was significant as well, $b = 0.352$, SE = 0.151, $t(2,367) = 2.34$, and $p = .019$, such that the framing of the sure discount had a larger effect in the low-price condition, $b = .699$, SE = 0.111, $t(1,182) = 6.29$, and $p < .001$, than in the high-price condition, $b = 0.347$, SE = 0.102, $t(1,185) = 3.41$, and $p = .001$.

Further supporting our hypothesis, a comparison of panels A and B in Figure 7 shows that people were *most* likely to prefer the probabilistic promotion in the condition in which the sure discount was rated the smallest in the pretest (i.e., when the price was \$11 and the sure discount was framed as a percentage) and *least* likely to prefer the probabilistic promotion in the condition in which the sure discount was rated the largest in the pretest (i.e., when the price was \$311 and the sure discount was framed as a dollar amount). Thus, the results from this study suggest that we can alter people's preferences for probabilistic promotions simply by changing whether the sure discount is framed as a percentage or as a dollar amount.

STUDY 5

Studies 1–4 established that people are more likely to choose a probabilistic promotion over a sure discount when the sure discount *is* or *seems* trivial. In study 5, we measure both participants' perceptions of the size of the sure discount and their preferences for a probabilistic price promotion in the same study and demonstrate that the perceived size of the sure discount mediates participants' preferences for probabilistic price promotions.

Method

Participants. We conducted this study using US participants from Prolific. Participants received \$0.60 for participation. We decided in advance to recruit 1,200 participants for this study, and we wound up with a final sample of 1,187 participants (average age = 35 years; gender: 48.1% female, 49.3% male, and 2.6% nonbinary). The final sample included all participants who indicated their choice, but, as we preregistered, we excluded those participants whose IP address or Prolific ID appeared more than once in the dataset (resulting in 20 exclusions).

Procedure. The procedure of this study was very similar to the procedure of study 4. However, we only included the low-price condition but not the high-price condition in this study for simplicity. We asked participants to imagine that they are about to buy an \$11 product and that this product comes with one of two types of price promotions, either a sure discount or a probabilistic promotion. Participants learned that they could choose which price promotion they would like to receive.

Just like in study 4, we manipulated whether the sure discount was framed as 10% off of the original price or as the equivalent dollar amount (\$1.10). The probabilistic promotion was a 10% chance to get the product for free. In the survey that participants saw, we labelled the two promotions "promotion A" and "promotion B," and we randomized the order in which the promotions were displayed between subjects. Participants indicated their choice using a six-point Likert scale that ranged from "1 = definitely promotion A" to "6 = definitely promotion B." As we preregistered, for our analysis, we converted participants' responses to indicate how likely they would be to choose the probabilistic promotion (1 = definitely the sure discount; 6 = definitely the probabilistic promotion). After participants indicated their choice and on the next page, we presented the scenario to participants again and asked, "Consider the sure discount of 10% [\$1.10] off of the price of the product. How small or large does this discount feel to you?" (1 = very small, 7 = very large). At the end of the study, we assessed participants' age and gender.

Results

Main Analysis. As we preregistered, we used OLS to regress participants' rating of the price promotions on how the sure discount was framed (1 = percentage framing, 0 = dollar amount framing). Participants were significantly more inclined to choose the probabilistic promotion over

the sure discount when the sure discount was framed as a percentage ($M = 3.26$, $SE = 0.08$) rather than a dollar amount ($M = 2.64$, $SE = 0.08$), $b = 0.612$, $SE = 0.114$, $t(1,185) = 5.39$, and $p < .001$.

Analyses of Mediator. Despite the sure discount being objectively the same amount in both framing conditions, participants indicated that the discount felt smaller to them when it was framed as a percentage (i.e., 10%; $M = 2.44$, $SE = 0.05$) rather than a dollar amount (i.e., \$1.10; $M = 3.23$, $SE = 0.06$), $b = -0.784$, $SE = 0.075$, $t(1,185) = -10.45$, and $p < .001$.

Mediation Analysis. We tested whether participants' perceived size of the sure discount mediated the effect of the framing condition on participants' promotion choice. As noted above, participants indicated that the discount felt smaller to them when it was framed as a percentage (i.e., 10%; $M = 2.44$, $SE = 0.05$) rather than a dollar amount (i.e., \$1.10; $M = 3.23$, $SE = 0.06$), $b = -0.784$, $SE = 0.075$, $t(1,185) = -10.45$, and $p < .001$ (path a in the mediation analysis). Participants who indicated the sure discount felt smaller were more likely to prefer the probabilistic promotion over the sure discount, $b = 0.482$, $SE = 0.040$, $t(1,185) = 12.00$, and $p < .001$ (path b in the mediation analysis). After controlling for participants' perceived size of the sure discount, the effect of framing condition on participants' rating of the probabilistic promotion decreased (path c: $b = 0.612$, $SE = 0.114$, $t(1,185) = 5.39$, $p < .001$; path c': $b = 0.255$, $SE = 0.113$, $t(1,184) = 2.26$, $p = .024$). A bootstrapped mediation analysis revealed a significant indirect effect of the framing condition on participants' choice via the mediator of perceived size of the sure discount: indirect effect = 0.36, 95% confidence interval = [0.26–0.45]. Thus, we find that participants' perceived size of the sure discount mediates participants' preference for choosing a probabilistic promotion over a sure discount.

GENERAL DISCUSSION

Is it more effective to offer customers a probabilistic price promotion, such as an X% chance to get the product for free, or to provide them with a sure discount of equal expected value? The literature directly examining this question is mixed: some articles suggest that probabilistic price promotions may always be more effective (Mazar et al. 2017), whereas others provide a more mixed picture (Attari et al. 2022).

The fact that past evidence does not provide a clear answer is not actually that surprising because the question of whether consumers are more attracted to probabilistic promotions or sure discounts can be thought of as a specific instantiation of the more general question of whether consumers are more risk averse or risk seeking, a question that itself lacks a clean answer. Nevertheless, we can borrow lessons from that broader literature. One lesson from that broader literature is that consumers tend to be risk averse for gains but that their level of risk aversion declines with the stake size, such that consumers may even exhibit risk-seeking behavior when the objective stakes are extremely small. In the current article, we first tested whether this lesson holds in the context of price promotions and then further extended it to the perceived—rather than objective—size of sure outcomes.

Theoretical Contributions

In this article, we make two theoretical advances. First, we show that that general lesson from the broader literature does indeed apply to price promotions: consumers' relative preference for probabilistic price promotions over sure discounts of equal expected value does increase as the size of the stakes decreases. This finding is important, as it contradicts theories that suggest that probabilistic price promotions will always be more effective. Second, we contribute to the broader literature on risky choice by showing that risk-seeking behavior increases not only when the stakes are objectively reduced but also when the same stakes are subjectively reduced. This is important because it suggests that consumers may exhibit a much more widespread tendency to be risk seeking in the domain of gains; all you need to do is make the stakes *feel* small.

Across five studies and five supplemental studies, we found that probabilistic price promotions are more effective than sure discounts of equal expected value when those sure discounts are or seem small. Specifically, we found that probabilistic promotions are relatively more effective when the percentage associated with the promotions is smaller (studies 1 and 2), when the original price of the product is smaller (studies 1 and 2), when the sure discounts are made to feel smaller by presenting them alongside a larger discount (study 3), and when the sure discounts are made to feel smaller by framing them as a percentage discount rather than a dollar amount (studies 4 and 5). In addition, in study 5, we found that participants' perceived size of the sure discount mediates participants' likelihood of choosing the probabilistic promotion.

As noted, our findings are inconsistent with theories that posit that people will always prefer probabilistic price discounts to sure discounts of equal expected value (e.g., diminishing sensitivity to price as presented in the study by Mazar et al. 2017). However, it is also worth noting that our findings cannot be explained by consumers' overweighting of small probabilities (Attari et al. 2022; Kahneman and Tversky 1979), as we found that consumers' preferences for probabilistic promotions are increased by manipulations that hold the probability of the probabilistic promotion constant while making the sure discount seem smaller (e.g., by displaying it as a percentage rather than a dollar amount). Indeed, our findings suggest that people's preferences for uncertainty are more strongly

tethered to their perceptions of the size of the sure outcome than they are to their perceptions of the probability of getting the uncertain reward. If true, this suggests that phenomena that have been long explained in terms of probability weighting, such as people's willingness to purchase lottery tickets and/or insurance (Kahneman and Tversky 1979), may be better explained in terms of people's perceptions of the size of the sure amount that they are asked to pay. For example, a $1 payment for a lottery ticket may seem trivially small to a consumer who is considering the many millions they could stand to win. Similarly, a $750 life insurance premium may seem small to a consumer who is considering how much the million-dollar policy will pay out.

It is also important to point out that our theory predicts a relative, not absolute shift in preferences for probabilistic price promotions when the equivalent sure discounts feel small. In fact, in many of our studies, we seem to find the reverse, namely an absolute preference for sure discounts over probabilistic price promotions. That is, when the sure discount feels trivial, people become more inclined to opt for the probabilistic price promotion, but in absolute terms, they still prefer the sure discount. We see this, for example, when comparing participants' ratings of either promotion in our Likert-scale based studies (studies 3–5) to the midpoint of the scale. In those studies, the midpoint of the scale is 3.5, with 1 corresponding to participants definitely preferring the sure discount and 6 to participants definitely preferring the probabilistic promotion. Exploratory analyses show that in all conditions across studies 3–5, participants' average rating was significantly lower than the midpoint of the scale, suggesting an absolute preference for the sure discount (web appendix B).

Because our theorizing hinges on people's perceptions of the size of sure discounts, it is important to consider what it is that guides these perceptions. Although we are very far from having an exhaustive answer to this question, we can say that these perceptions are likely to be driven by both absolute sizes and relative sizes (Darke and Freedman 1993). Thus, people will judge the same percentage discount to be larger when the product is more highly priced so that 10% off of a car feels larger than 10% off of a candy bar. At the same time, people will judge the same absolute discount to be smaller when the product is more highly priced so that a $1 discount on a car feels smaller than a $1 discount on a candy bar. For any given evaluation, both effects may be in place, and which of these effects is larger or smaller is likely to depend on the context and on the individual.

Practical Implications

Our research has important practical implications. Companies deciding whether to offer a probabilistic price promotion or a sure discount to increase sales might find our findings useful. Contrary to prior research that suggests that probabilistic price promotions are generally more attractive than sure discounts (Mazar et al. 2017), our research suggests that they are only more attractive under particular circumstances, namely when the sure discount seems trivial.

First, our empirical results reveal that probabilistic price promotions become relatively more attractive when the size of the stakes decreases. Practically speaking, this suggests that marketers might find it beneficial to offer probabilistic price promotions on very-small-priced items, such as candy bars (Mazar et al. 2017) but that such promotions are less likely to be advantageous on higher-priced items. Similarly, offering probabilistic price promotions may be worth considering for very low discount probabilities, such as 1% (Lee et al. 2019), rather than for higher discount probabilities.

Second, our findings suggest that probabilistic price promotions become relatively more attractive not only when equivalent sure discounts are objectively small, but also when objectively sizable sure discounts are perceived to be smaller. For example, the results of study 3 suggest that presenting a sure discount alongside a higher-priced product with its own discount can make the sure discount feel smaller, thereby enhancing the relative appeal of an equivalent probabilistic price promotion. Companies could benefit from considering how the presence of other prices and discounts may influence the perceived attractiveness of their price promotions.

Third, studies 4 and 5 demonstrate that framing a sure discount as a percentage reduction versus a dollar amount can influence how large the discount feels, thereby affecting the relative appeal of an equivalent probabilistic promotion. In our studies, sure discounts framed as dollar amounts were consistently perceived as larger than those framed as percentages. However, companies should test these framing strategies with their specific price points and discount percentages to determine the most effective approach for their product displays.

In some real-world cases, companies that use probabilistic promotions—such as mystery coupons offering a chance at a larger discount (e.g., Dell, Banana Republic)—might be leveraging this insight. These promotions could be used in situations in which the sure discount is perceived as trivial. For instance, offering a mystery coupon or a chance at a larger discount may be a more effective strategy than offering a small sure discount. In these cases, the probabilistic promotion could be more appealing than a small sure discount, especially when context or framing cues make the sure discount feel trivial to consumers.

All told, our findings demonstrate that considering whether to offer a probabilistic price promotion should be subject to various considerations—particularly with respect to how consumers perceive an equivalent sure discount.

We caution marketers to think strategically about whether and when to make use of probabilistic price promotions.

Future Directions

In the current set of studies, we manipulated the perceived discount size by manipulating the context in which the discounts are presented or whether they are framed as a percentage or a dollar amount. We suspect that other changes to the context or framing will also affect consumers' perceptions of the size of the sure discount. For example, whether a discount is presented as an amount off ("$5 off") or a reduced price ("$55 sales price"; Attari et al. 2022) might influence how small or large the discount is perceived to be.

In addition, there is likely heterogeneity in consumers' perceptions of discounts or their risk-seeking behavior in general. That is, the same sure discount may feel smaller or larger to a specific person, and some consumers may be generally more attracted to probabilistic promotions than others. Companies might want to consider finding out which sure discounts on their products their customer segments perceive as trivially small and adopt their marketing tactics accordingly.

Moreover, we choose to conduct our experimental studies in online settings that enable us the greatest possible control over our experimental conditions and allowed us to collect large sample sizes to test our research question. Future studies could test the presented insights in the field and in collaboration with a diverse set of companies.

Future research could also investigate the effects of offering probabilistic promotions on repeat purchases and brand equity. Prior research suggests that probabilistic promotions can alleviate at least some of the negative effects that sure discounts often have, including those on perceived product quality and perceived adequacy of selling prices after the promotion (Alavi, Bornemann, and Wieseke 2015; Kovacheva and Nikolova 2024). However, does *not* winning a probabilistic promotion affect consumers' perceptions of fairness or trust in the company? It is likely that a consumer's experience with probabilistic price promotions from one company may also influence how the consumer reacts to probabilistic price promotions implemented by another company. We look forward to future research investigating the effects of probabilistic price promotions on such and similar outcomes that are of interest to companies.

Conclusion

In sum, our research suggests that people's preferences for probabilistic promotions over sure discounts heavily depend on the perceived size of the sure discount. This simple fact has widespread implications, both theoretically and practically.

DATA COLLECTION INFORMATION

The data for studies 1, 2, 4 and supplemental studies S1a and b and S2–S5 were collected online via Amazon's MTurk between January and October 2018. The data for studies 3 and 5 and supplemental study S1c were collected online via Prolific between February and April 2023. The lead author collected and analyzed the data in collaboration with the second author. The data, analysis code, materials, and preregistrations for all studies are available on ResearchBox: https://researchbox.org/3299.

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