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In general, consumers enjoy products less with repeated consumption. Unfortunately, there are few known ways to slow such satiation. The authors show that consumers satiate more slowly on a product when it is available for consumption only at limited times. Specifically, they find that perceived limited availability made a product more enjoyable, and yet this effect largely emerged only after repeated consumption. The authors attribute this finding to an urge to take advantage of a rare consumption opportunity, which leads people to pay less attention to the quantity consumed and subsequently to experience less satiation. A series of studies establish the effect of perceived limited availability on the rate of satiation, show that it influences how much people eat, provide mediation evidence of the proposed theoretical account, and eliminate the effect by making salient the total amount consumed. The authors conclude with implications of these findings.

Keywords: satiation, well-being, limited availability, scarcity, hedonic consumption

Limited Availability Reduces the Rate of Satiation

Enjoyment decreases with repeated consumption for nearly every experience. That is, people satiate on their favorite stimuli as they consume them (Coombs and Avrunin 1977). Satiation presents a challenge for maintaining happiness because consumers must search for new experiences to maintain the same level of enjoyment (Brickman and Campbell 1971). A remedy could prove instrumental to consumer well-being, and yet previous research has shown few ways to reduce satiation (e.g., Raghunathan and Irwin 2001; Redden 2008). Our research finds a solution by leveraging perceptions of limited availability to establish a new preventive against this phenomenon.

The typical consumer response to satiation is to increase variety by consuming something different (Herrnstein and Prelec 1991; Ratner, Kahn, and Kahneman 1999). Although such switching might reduce satiety, this strategy requires an abundance of different products that are readily available and well liked. In many cases, a favored product may instead have limited opportunities to consume it. We focus

on this notion of limited availability as it might apply to seasonality, shelf life, physical proximity, or lack of money. For example, imagine a family that must eat a giant fruit basket over the holidays before it spoils. Satiation poses a particularly significant cost here if it prevents full enjoyment of the tasty, healthy fruits while they are briefly available.

We propose that consumers have a natural ability to take advantage of rare consumption opportunities—inducing slower satiation when availability is limited. Although limited availability may increase the desire to consume (Fromkin 1970; Verhallen 1982), we argue that its benefits extend further because they increase with repeated consumption. In other words, limited availability slows satiation. Our theoretical account is that limited availability perceptions trigger a focus on consuming as much as possible, leaving less need to monitor the quantity consumed or worry about overconsumption (as many dieters do). We propose that this lack of attention to the quantity consumed subsequently reduces the rate of satiation. The result is that consumers are naturally encouraged to take fuller advantage when consuming a product they perceive to be available only on limited occasions.

In addition to consumer well-being, the effect of limited availability on satiation has several implications for the firm. First, given that many marketers focus on creating value for consumers, our findings have direct insights into

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how firms can better deliver value. Specifically, creating a sense of limited availability can slow consumer satiation and prolong enjoyment of the firm's offering. Second, firms have few proven ways to lift the consumer demand curve and increase consumption beyond changing the product itself. Our research establishes perceptions of limited availability as a way to increase ongoing demand—importantly, without incurring the expensive and risky investment of new product development. Third, because the rate of satiation directly strikes at the core of consumer enjoyment, our findings have implications across the marketing mix. We highlight that firms should consider leveraging limited availability in such broad areas as advertising, packaging, product life cycle, pricing, promotions, and product timing, among others. The net result may be that the firm can create more value for consumers with little additional investment.

Our research also contributes to several literature streams that include satiation and limited availability. We establish that limited availability increases enjoyment during consumption, a generally assumed but largely untested claim (Cialdini 2009). In our studies, limited availability did not affect initial liking; rather, the benefit appeared only over time through less satiation. This finding suggests that theories of limited availability (as well as the more general notion of scarcity) need to incorporate repeated consumption to fully capture any effects on liking. We also establish limited availability as one of the few ways to combat satiation, a research call that has largely gone unanswered (Brickman and Campbell 1971). This could explain why products that are available for a limited time only (e.g., pumpkin ice cream at Halloween), reserved for special occasions (e.g., an expensive sushi restaurant), or seasonal in nature (e.g., certain fruits or seafood) endure as favorites over time. More generally, we highlight attention to the quantity consumed as an important driver of satiation. Perceptions of limited availability offer one way to influence this attention specifically, but this is likely not unique. We expect that our work will spur further research to uncover factors that also reduce such attention, resulting in more ways to lower satiation and improve consumer happiness.

THEORETICAL DEVELOPMENT

Limited Availability and Liking

In general, prior work on scarcity has studied any lack of product availability (Brock 1968; Cialdini 2009). The nature of scarcity can be either situational, with little quantity available at hand, or temporal, with few opportunities to consume. Previous research has typically focused on situational scarcity and how consumers use it to infer desirability (Cialdini 2009). For example, people valued recipe books more when the books were unavailable due to popularity or limited supply (Verhallen 1982). Fromkin (1970) finds that people wanted to spend more time in a "chamber" when told it was unavailable at the moment. People similarly desired an art print more when they were told it was available from only one museum versus from most stores (Lynn 1989). Inman, Peter, and Raghubir (1997) likewise show that an offer seemed like a better deal if it had restrictions such as a purchase limit, purchase precondition, or time limit. In summary, scarcity increases wanting.

Beyond its effects on wanting, there is little evidence that limited availability makes consuming a product more enjoyable. Worchel, Lee, and Adewole (1975) show that people

had a greater desire to eat a cookie when fewer cookies were present; however, they found no difference in taste ratings of the cookie. Kurtz (2008) indicates that reminding students that they had only a short amount of time left in college improved their ratings of happiness, possibly because they now found the college experience more enjoyable. Beyond these two studies, however, there is little research on the effects of limited availability on experienced enjoyment.

Motivated by the relationship between scarcity and wanting, we address the question of how limited availability affects enjoyment over time during repeated consumption. We have people rate their enjoyment during consumption (i.e., while eating a food), and all of our studies test for effects beyond wanting or just an initial exposure. We propose that the effects of limited availability on enjoyment manifest predominantly in the satiation rate over the course of repeated consumption (which previous research has not measured). We next discuss how enjoyment changes over time and how limited availability could affect this process of satiation.

Satiation with Repeated Consumption

Satiation refers to the process whereby consumers enjoy a stimulus less as they consume more of it (Coombs and Avrunin 1977; Redden 2008). Consumers often attribute satiation to physiological changes such as feeling full (Mook and Votaw 1992), but mounting evidence shows that satiation is partially psychological (Galak, Redden, and Kruger 2009; McSweeney and Swindell 1999; Redden 2008; Rolls et al. 1981). For example, the decrease in liking while eating is not strongly tied to the calories consumed (Johnson and Vickers 1992); however, it is connected, for example, to the similarity of a chip flavor with past chips eaten (Maier, Vickers, and Inman 2007). Given this evidence, researchers have linked satiation to processes that include adaptation (Helson 1964), habituation (Thompson and Spencer 1966), and optimal stimulation (Berlyne 1971). This psychological component explains why satiation occurs for noningested stimuli, appears nearly instantaneously, depends on memory, and dissipates with variety. More importantly, it also allows interventions to slow satiation, although they do not alter physiological processes such as digestion.

Although multiple psychological processes contribute to satiation, prior work has shown that a common driver of this phenomenon is the level of attention during consumption. For example, children habituated less quickly while eating pizza (as measured by their salivation rate) when they simultaneously completed a hard versus an easy memory task (Epstein et al. 2005). Brunstorm and Mitchell (2006) similarly show that participants reported smaller changes in hunger, fullness, and the desire to eat when distracted by a computer game while eating cake. Higgs and Woodward (2009) likewise find that watching television during lunch increased the amount of snacks people were likely to eat later in the afternoon. Finally, multiple interruptions made a massage more enjoyable by disrupting the process of adaptation (Nelson and Meyvis 2008). These findings each indicate that attention plays a role in satiation.

Beyond general distractions, previous studies hint that attention to the quantity consumed may particularly influence satiation. Participants ate more than 75% more soup when the bowl was continually filled without their knowl-

edge (Wansink, Painter, and North 2005), and diners ate more at an unlimited buffet when empty plates were removed (Wansink and Payne 2007). Although these works did not measure ongoing enjoyment, they suggest that satiation decreases because people pay less attention to how much they have consumed. We propose that perceptions of limited availability influence how much attention people pay to consumption quantity and this affects the subsequent satiation rate.

Limited Availability, Attention, and Satiation Rate

We propose that people take advantage of a limited consumption opportunity by trying to consume a great amount. Given this desire and less need for restraint, people may pay less ongoing attention to the quantity during consumption. We base this prediction on previous work establishing that people monitor their behavior less when eating a less-threatening food. People regulated themselves less when eating food from a small package because consuming all of it had fewer consequences (Coelho do Vale, Pieters, and Zeelenberg 2008). Likewise, people with high trait self-control did not closely monitor the quantity they consumed when eating healthy foods (Redden and Haws 2013). We propose that perceptions of limited availability similarly signal that it is less critical for consumers to pay attention to the quantity consumed. If a food has limited availability, there is much less risk of over-consuming that food in the long run because there will be many times when it cannot be eaten at all. As a result, we propose that the mere perception of limited availability lessens the attention paid to the quantity consumed, and this reduced attention slows satiation to promote greater consumption.

Although limited availability may reduce attention to the quantity consumed, our theory does not require that people must necessarily attend more to other aspects of the experience (e.g., brand, flavor, texture). That is, we do not assume that attention is a single resource that stays constant across all experiences. Our theory is thus not rooted in the notion of a general distraction from the current experience. We propose instead that limited availability triggers a focus on consuming more, which leads to a reduction in a very specific type of attention—attention to the quantity consumed—to slow satiation. To the extent that other features gain salience and draw attention away from the quantity consumed, we expect even greater effects on satiation.

We predict that perceptions of limited availability encourage more consumption by slowing satiation through reduced attention to the quantity consumed. However, note that another route to the same outcome could result from closely monitoring the quantity consumed and actively regulating behavior on the basis of the progress being made. We posit that, compared with increasing attention, reducing attention may be a more effective strategy because it requires less cognitive effort by automatically operating through ongoing enjoyment rather than recruiting more effortful self-control resources that require nearly constant attention. In other words, satiation provides an efficient yet influential means to regulate how much people keep consuming.

We test our theory in a series of studies in which participants rated their enjoyment as they ate a food. Study 1 validates the core prediction because participants became satiated more slowly when eating grapes after learning that they were available only at certain times of the year (vs. regularly available). Study 2 shows the general nature of our

effect by replicating it with chocolate candy. More importantly, it establishes reduced attention to the quantity consumed as a mediator. Study 3 provides further evidence of our process by directly manipulating attention to the quantity consumed. When we encouraged participants to track how many chocolates they ate, limited availability no longer affected satiation. Study 4 extends the behavioral relevance of our effect by showing that limited availability reduced satiation, which led participants to eat more and made them more likely to purchase and pay more for the food. Attention to the quantity consumed again explained this result because inaccuracies in the estimated quantity consumed mediated the effects. Study 5 further details our theoretical framework by showing that limited availability reduced attention to the quantity consumed because participants focused on consuming more. The studies consistently establish that the perception of limited availability slows satiation because people pay less attention to the quantity consumed.

STUDY 1

Study 1 tests our core prediction that perceptions of limited availability slow satiation. We gauged satiation by how much ongoing enjoyment ratings dropped over time, in line with recent research (Nelson and Meyvis 2008; Ratner, Kahn, and Kahneman 1999; Redden 2008). We chose to use grapes because they are familiar and most people like them. They also have a growing season and naturally have times of the year when they are more or less available.

Method

One hundred thirty undergraduate students participated for partial course credit. After arriving at the lab, the students were told that they would participate in a taste test in which they would each eat a total of 16 grapes. Participants first ate a single grape and rated “How much are you enjoying these grapes so far?” (1 = “not at all,” and 100 = “very much”). They then read the following description in which we manipulated the perceived availability of the grapes (changes for the continuous availability condition noted in brackets):

The grape you just tasted belongs to a particular [common] species that grows in very few places of [all over] the world each year. Because of this, this grape has limited availability [is widely available] and is quite scarce [common].

This design ensured that participants were familiar with the task before the key manipulation. More importantly, it also provided an initial rating of enjoyment unbiased by the availability manipulation. This enabled us to compare enjoyment before any information, immediately after the availability manipulation, and over time after the availability manipulation.

After reading the description, participants received five servings of grapes, each with three units. They rated enjoyment on the previous 100-point scale after each serving. Thus, each participant gave six enjoyment ratings, with one before the availability manipulation and five afterward. After eating the final grape, participants assessed the availability of the grapes by rating their agreement (1 = “not at all,” and 9 = “very much”) with the statements “This species of grape is widely available” and “This species of grape is really common.” These final measures served as manipulation checks.

Results

Manipulation checks. Participants perceived the grapes to be less available when they were in the limited versus the continuous availability condition ($M_{\text{limited}} = 4.50$ vs. $M_{\text{continuous}} = 8.79$; $t(128) = 7.64$, $p < .0001$). Likewise, participants in the limited availability condition also perceived the grapes to be less common than did participants in the continuous availability condition ($M_{\text{limited}} = 3.98$ vs. $M_{\text{continuous}} = 6.00$; $t(128) = 5.51$, $p < .0001$). Therefore, we conclude that the manipulation of limited availability worked as intended.

Effect of limited availability on satiation. Our core prediction was that participants in the limited availability condition would satiate more slowly. We tested the effect on satiation of limited availability using a regression on the five enjoyment ratings taken after the manipulation. The model included availability as an effect-coded factor (set to 1 for limited and -1 for continuous) and the cumulative number of servings previously eaten as a continuous measure. The model also included the enjoyment rating taken before the manipulation as a covariate and a repeated measure with an unstructured error structure. The analysis indicated a main effect of the number of servings ($F(1, 127) = 75.78$, $p < .0001$), in that enjoyment declined as participants ate more grapes. More importantly, as the key test of our theory, there was an interaction between availability and the number of servings ($F(1, 127) = 15.75$, $p < .0001$). As Figure 1 shows, participants in the limited availability condition became satiated more slowly than those in the continuous availability condition. The model did not show a main effect for availability ($F < 1$, n.s.), indicating that limited availability affected enjoyment only over the course of repeated consumption.

We performed a series of planned contrasts to verify that the pattern of the interaction matched our theory. The initial enjoyment rating taken before the availability manipulation did not differ between the two conditions ($M_{\text{limited}} = 76.00$ vs. $M_{\text{continuous}} = 76.91$; $t < 1$, n.s.). This finding merely indicates that our random assignment was successful in that the two groups liked the grapes to the same extent in general. A contrast of the enjoyment rating taken immediately after the availability manipulation also indicated no difference

($M_{\text{limited}} = 74.22$ vs. $M_{\text{continuous}} = 76.70$; $t < 1$, n.s.). This lack of effect shows that limited availability did not have an immediate effect on enjoyment. However, as we predicted, the contrast on the final enjoyment rating indicated a significant difference ($M_{\text{limited}} = 67.66$ vs. $M_{\text{continuous}} = 56.58$; $t(128) = 2.02$, $p < .05$). This pattern of results provides evidence that limited availability resulted in a slower rate of satiation (i.e., a less steep slope) and yet had no immediate effect on enjoyment (i.e., no intercept difference).

Discussion

Study 1 confirmed our hypothesis that perceptions of limited availability reduce the rate of satiation. When participants ate grapes they believed were available only at particular times of the year, they satiated less than those who believed that the grapes were always available. Indeed, this perception of limited availability had a substantial effect in this study. Satiation in terms of the decrease in reported enjoyment was reduced by more than half ($M_{\text{limited}} = 8.34$ vs. $M_{\text{continuous}} = 20.33$) when the grapes were framed as having limited (vs. continuous) availability. This study produced sizable effects on satiation even though participants physically consumed the grapes. The physical ingestion of the grapes provided participants access to physiological signals of their ongoing satiation. Despite these findings, we propose that the perception of limited availability still reduced satiation because satiation also relies on how much attention people pay to the amount consumed.

Although these results are consistent with our theory, they argue against a demand effect whereby participants infer that they should rate the limited availability grapes as more enjoyable. Here, a demand effect would predict strong effects immediately after the manipulation, and yet we observe no such effects on initial enjoyment. We instead find that the effect occurs only with repeated consumption, counter to a demand effect or inference-based explanation that might even dissipate over time.

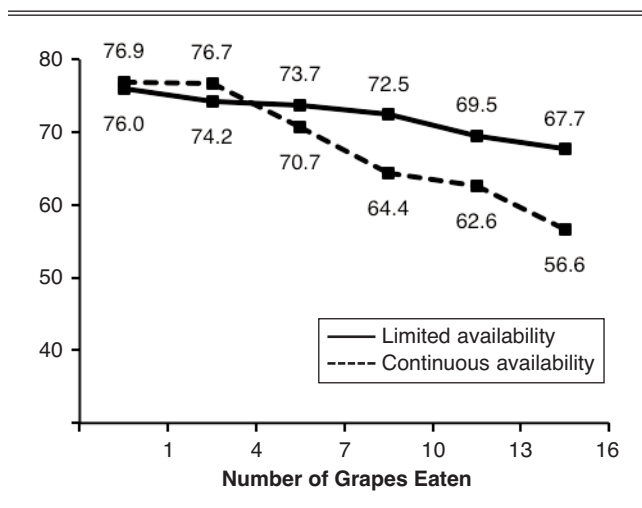
In Study 1, we found the predicted effects when participants ate grapes, but we expect our theory to hold across nearly every type of food, unlike some alternative explanations. For example, the notion that limited availability might provide a “license” to sin with fewer negative emotions such as regret (Fitzsimons, Nunes, and Williams 2007; Khan and Dhar 2006) seems less applicable to a virtuous food such as grapes. Our proposed process seems to account better for the data here. The next study gathers additional measures to provide more direct evidence for our theory, which helps further rule out several alternative explanations.

STUDY 2

Study 2 has two goals. First, it tests whether the effects in Study 1 generalize to other foods. The previous findings could have related to something peculiar about grapes, such as that they are seasonal, perceived as virtuous, or not craved in general. To test whether our prediction holds for other foods, we used chocolate in Study 2. Chocolate provides a stark contrast to grapes because it is not seasonal, relatively unhealthy, and highly desired. We predicted that, regardless of food type, perceptions of limited availability would still slow satiation by reducing attention to the quantity consumed. Second, this study more directly measured attention to the quantity consumed to test whether it mediated the effect of limited availability on satiation. Mediation

Figure 1

MEAN ENJOYMENT RATING BY CONDITION IN STUDY 1



evidence would provide strong support for our theory and help rule out alternative accounts not steeped in attention to the quantity consumed.

Method

One hundred seventy-seven undergraduate students participated for course credit. Each participant received six small pieces (21 grams) of chocolate in this experiment. Participants first ate one piece and rated it on a 100-point scale (“How much are you enjoying this candy so far?” 1 = “not at all,” and 100 = “very much”). Each participant then read the following passage adjusted for whether they had been randomly assigned to the limited or continuous availability condition:

The product you just tasted contains cocoa grains that belong to a particular [very common] species that grows only in a few areas of Brazil for a short period of time [all over the world] every year. Because of this the product has limited availability [is widely available] and is quite scarce [common].

Following the manipulation, participants consumed and rated the remaining five chocolates. After rating the sixth piece, participants answered the question “How much attention did you pay to the quantity of chocolate consumed?” (1 = “not at all,” and 9 = “very much”). We included this measure so we could test whether our proposed process mediated any effects. We also asked, “How much attention did you pay to the flavor of the chocolate?” (1 = “not at all,” and 9 = “very much”) to rule out the possibility that attention to any detailed aspect of the experience could explain the effect. Finally, we included two checks to ensure that our manipulations influenced perceptions of limited availability. Participants rated their agreement (1 = “not at all,” and 9 = “very much”) with the statements “This chocolate is widely available” and “This chocolate is really common.”

Results

Manipulation checks. Participants in the limited availability group rated the chocolates as less available than those in the continuous availability condition ($M_{\text{limited}} = 3.63$ vs. $M_{\text{continuous}} = 8.60$; $t(175) = 11.58$, $p < .0001$). They similarly perceived the chocolates as less common when they were framed as being available at only certain times ($M_{\text{limited}} = 3.80$ vs. $M_{\text{continuous}} = 6.09$; $t(175) = 8.50$, $p < .0001$). Both of these items indicate that the availability manipulation was successful.

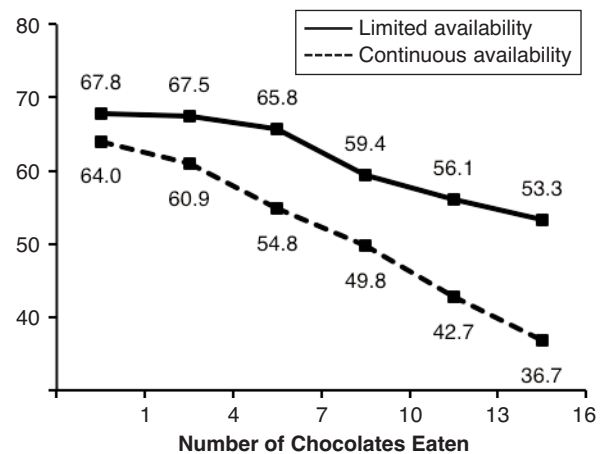
Effect of limited availability on satiation. We predicted that manipulating availability to seem limited would lower the satiation rate. To test this prediction, we performed a regression on the five enjoyment ratings taken after the availability manipulation. The model included the availability condition as an effect-coded factor (set to 1 for limited and -1 for continuous) and the cumulative number of pieces previously eaten as a continuous factor. The model also included a covariate for the enjoyment rating taken before the manipulation and a repeated measure with an unstructured error structure. The analysis indicated a main effect of the number eaten ($F(1, 174) = 99.60$, $p < .0001$): enjoyment declined with greater consumption. There was also a marginal main effect of availability ($F(1, 174) = 3.43$, $p < .07$). However, the main effects were qualified by the predicted interaction between availability and number eaten ($F(1, 174) = 8.38$, $p < .01$).

Figure 2 shows the nature of the interaction: enjoyment declined more slowly for those in the limited versus the continuous availability condition. This reduced satiation led participants in the limited condition to enjoy the last piece of chocolate more than participants in the continuous condition ($M_{\text{limited}} = 53.30$ vs. $M_{\text{continuous}} = 36.73$; $t(175) = 3.43$, $p < .001$). However, there was no difference in the enjoyment ratings taken either immediately before the availability manipulation ($M_{\text{limited}} = 67.82$ vs. $M_{\text{continuous}} = 64.01$; $t < 1$, n.s.) or immediately after it ($M_{\text{limited}} = 67.52$ vs. $M_{\text{continuous}} = 60.94$; $t(175) = 1.44$, $p > .15$). The pattern of results for these contrasts indicates that the interaction was driven by a difference in the rate of satiation (i.e., a slope) rather than a temporary increase in initial liking (i.e., an intercept). This is exactly the pattern our theory predicted.

Attention to quantity as a mediator. Consistent with our theory, participants in the limited condition paid less attention to the quantity consumed ($M = 5.63$) than did those in the continuous condition ($M = 6.78$; $t(175) = 2.51$, $p < .02$). We tested for mediation using Preacher and Hayes’s (2008) procedure. Our measure of satiation was the rating of the second piece eaten (taken right after the manipulation) minus the rating of the final piece eaten.¹ We then confirmed that this drop in enjoyment was predicted by both the availability condition ($\beta = -4.99$, $t(175) = 2.63$, $p < .01$) and the attention to quantity mediator ($\beta = 1.51$, $t(175) = 2.46$, $p < .02$). Finally, a bootstrapping analysis indicated that the factor for the availability condition had a significant indirect effect on the drop in enjoyment via the attention to quantity pathway ($\beta = -1.44$, 95% confidence interval [CI]: [-1.13, -4.23]), which signifies that attention to the quantity consumed mediated the effect of availability on satiation. A similar analysis indicated no evidence that attention to the flavor mediated the effect, because this factor was not influenced by the availability manipulation ($M_{\text{limited}} = 6.14$ vs. $M_{\text{continuous}} = 6.60$; $t(175) = 1.10$, $p > .27$) or related to the

¹We found similar results when we calculated the drop in enjoyment using the first rating before the manipulation as the starting point. However, the rating taken after the manipulation seems to be a more appropriate control because it accounts for any main effect of the availability manipulation on enjoyment.

Figure 2
MEAN ENJOYMENT RATING BY CONDITION IN STUDY 2



drop in enjoyment ($\beta = -.06$, $t < 1$, n.s.). Thus, it is not attention to any aspect of the experience, but rather reduced attention to the quantity consumed, that explains why limited availability reduced satiation.

Discussion

Study 2 replicates the previous study in confirming our core prediction: perceptions of limited availability reduce satiation. This finding provides further support for our theory and generalizes the effects to another food. Compared with the grapes in Study 1, the chocolate used in Study 2 is available at all times of the year, is considered a vice for most diets, and is a pleasurable indulgence. Even so, we still found that limited availability reduced satiation while participants ate the chocolate. This finding is highly relevant because many of the unavailable products in the marketplace are often of a hedonic nature. The results across the first two studies using different foods suggest that our effect generalizes to many foods.

We posit that limited availability had this effect because satiation depends on how much attention people pay to the amount eaten. Specifically, we posit that a person's belief that he or she is consuming a product with limited availability reduces attention on the quantity consumed, which in turn slows satiation. Process measures provide direct evidence for the role of attention to the consumption quantity but show no support for attention to the flavor, which indicates that our effects do not reflect a general distraction that reduces attention to every aspect of an experience; rather, the effect is specific and focused on attention to the quantity consumed. Such limited availability seems to have a special ability to impede the attention processes that contribute to satiation. In Study 2, we created this benefit for consumers merely by claiming that the chocolates were not always available for consumption. As a result, the limited opportunities for consumption proved an effective way to combat satiation.

STUDY 3

The primary goal of Study 3 is to provide further support for our theory and proposed process. The previous study establishes attention to the quantity eaten as a mediator of the effect of limited availability on satiation. To complement this mediation evidence, we directly manipulated our core construct of attention to the quantity eaten. If attention to the quantity eaten underlies the effect of availability on satiation, as we propose, explicitly instructing participants to pay close attention to their consumption quantity should diminish the effect. Such a finding would provide strong evidence for our proposed theory.

Method

Three hundred twelve undergraduates participated for partial course credit. The stimuli and procedure matched those used in the previous study with the addition of the attention-to-quantity cue manipulation. This resulted in a 2 (availability: limited vs. continuous) \times 2 (attention-to-quantity cue: absent vs. present) between-subjects design.

Each participant ate a total of six pieces (21 grams) of chocolate. After eating each piece, they rated their enjoyment on a 100-point scale ("How much are you enjoying this candy so far?" 1 = "not at all," and 100 = "very much"). We manipulated availability as in the previous study by altering the description of the chocolate to be available

either only at certain times or continuously at all times. Participants read this description between eating the first and second pieces of chocolate so that the first enjoyment rating could serve as a covariate unbiased by the manipulation. Participants in the attention-to-quantity cue present condition were asked, "How many candies did you just eat?" immediately after eating each piece. This manipulation was designed to induce participants to pay more attention to the quantity of chocolate they had consumed. Participants in the attention-to-quantity cue absent condition did not receive this question and were left to their own devices, as in the previous studies.

Results

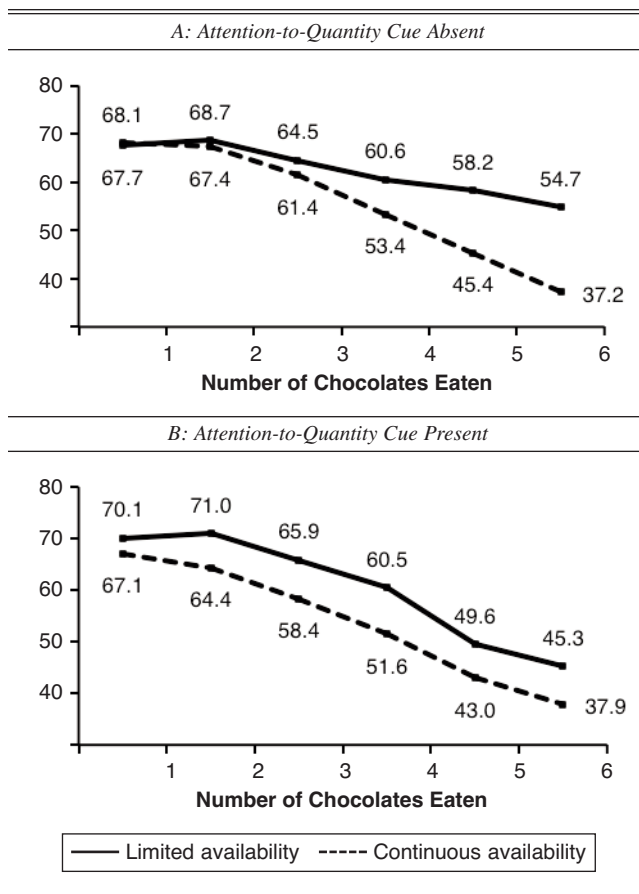
Effect of limited availability on satiation. We tested our predictions using a regression analysis on the five enjoyment ratings taken after the manipulation. The model included factors for the availability and attention-to-quantity cue conditions (effect-coded with limited availability and attention-to-quantity cue present set to +1) and the cumulative number of pieces eaten as a continuous factor. The model also included the initial enjoyment rating taken before the availability manipulation as a covariate and a repeated measure with an unstructured error structure. The analysis indicated a main effect for availability ($F(1, 307) = 4.53$, $p < .04$) and for the number previously eaten ($F(1, 307) = 221.92$, $p < .0001$). These two factors also significantly interacted with each other ($F(1, 307) = 7.14$, $p < .01$). More importantly, as our theory predicted, all these results were qualified by the overall three-way interaction with the attention cue factor ($F(1, 307) = 5.30$, $p < .03$). Figure 3 shows the nature of this interaction; we report separate regressions for each attention cue condition to test the pattern of the results subsequently.

Attention-to-quantity cue absent. For participants without the attention cue, the results replicated the previous studies. There was a main effect of the number previously eaten ($F(1, 171) = 113.71$, $p < .0001$), no main effect of availability ($F(1, 171) = 1.40$, $p > .23$), and a two-way interaction between these factors ($F(1, 171) = 16.58$, $p < .0001$). These participants found the chocolate equally enjoyable before the availability manipulation ($M_{\text{limited}} = 67.66$ vs. $M_{\text{continuous}} = 68.05$; $t < 1$, n.s.) and immediately after it ($M_{\text{limited}} = 68.71$ vs. $M_{\text{continuous}} = 67.42$; $t < 1$, n.s.). However, after the sixth piece of chocolate, participants in the limited availability condition enjoyed the chocolate more than participants in the continuous availability condition ($M_{\text{limited}} = 54.73$ vs. $M_{\text{continuous}} = 37.17$; $t(172) = 3.62$, $p < .001$). This result shows that the difference in enjoyment was not attributable to an intercept effect; rather, it was due to a slope effect, as we predicted.

Attention-to-quantity cue present. For participants receiving the attention cue, the results support our theory that attention to the quantity eaten underlies our effects. There was a main effect of the number previously eaten ($F(1, 135) = 116.40$, $p < .0001$) but no interaction between the number previously eaten and the availability condition ($F < 1$, n.s.). The lack of an interaction shows that cuing participants to the quantity eaten eliminated the effect of availability on the rate of satiation, which resulted in no differences in enjoyment between the limited and continuous availability groups regardless of whether enjoyment was measured before the availability manipulation ($M_{\text{limited}} = 70.12$ vs. $M_{\text{continuous}} = 67.13$; $t < 1$, n.s.), immediately after it ($M_{\text{limited}} =$

Figure 3

MEAN ENJOYMENT RATING BY CONDITION IN STUDY 3



70.99 vs. $M_{\text{continuous}} = 64.39$; $t(136) = 1.45, p > .14$), or after the final piece ($M_{\text{limited}} = 45.25$ vs. $M_{\text{continuous}} = 37.90$; $t(136) = 1.27, p > .20$). Forcing participants to pay more attention to the quantity they consumed by merely asking, “How many candies did you just eat?” made those in the limited availability condition satiate just as quickly as those in the continuous availability group. Indeed, consistent with our theory, only the limited availability condition without the attention cue had a satiation rate that differed from the other three groups (each pairwise comparison had $p < .01$).

Discussion

Study 3 replicated our other studies by showing that perceptions of limited availability reduced satiation. Furthermore, this study provided additional evidence that our proposed process of attention to the quantity consumed underlies the effect. We eliminated the influence of perceived availability on the rate of satiation by instructing participants to attend to the quantity they were consuming. Thus, when nudged to pay attention to their consumption quantity, participants eating a food with seemingly limited availability became satiated exactly like their counterparts who believed they were consuming a continuously available product. Unsurprisingly, the presence of this attention cue did not influence the satiation rate of those participants who believed their product was continuously available, presumably because they were already paying attention to how much they had eaten. Coupling this study with Study 2, we have convergent evidence that changes in the attention to the quantity consumed drives our effects.

STUDY 4

The previous studies establish that limited availability slows the rate of satiation. Study 4 has three objectives to expand on these findings. First, it tests the robustness of the effects of limited availability to downstream consequential outcomes. Whereas previous studies kept the quantity constant to gauge satiation properly, this study allows participants to eat the chocolate freely (i.e., no piece-by-piece instructions with ratings). If limited availability slows satiation, as we predict, it should also lead participants to eat more. In addition to this behavioral measure of satiation, Study 4 also included more typical managerial measures of retrospective enjoyment, purchase intention, and willingness to pay that should similarly reflect satiation. Second, the free consumption setting afforded an additional test of our theory. We took a more objective measure of attention to the quantity consumed by having participants estimate how much chocolate they ate. If participants in the limited availability condition indeed paid less attention to the quantity consumed, they should have less accurate estimates of the amount eaten. As a proxy for attention to the quantity consumed, we expected estimation accuracy to mediate the effect of limited availability on the amount consumed. Third, this study altered the availability manipulation to address a potential concern. Although the manipulations in the previous studies clearly influenced perceived availability, they may have also affected perceived uniqueness or rarity. This study better differentiated these constructs by eliminating any unique aspects (e.g., grains from Brazil) and making salient that the product was widely available (not rare in terms of quantity) but only during certain time periods.

Method

One hundred twenty-two undergraduate students completed this study for course credit. Participants learned that they would be eating chocolate as part of a taste test. They each received a cup with 30 pieces (90g) of chocolate. Participants next read the following passage adjusted for whether they had been randomly assigned to the limited availability or continuous availability condition:

The chocolate you are going to eat in this study belongs to a species that is available during only a very brief window of time each year [throughout the whole year]. It is available during this time, but you cannot get it during all of the rest of the time [It is always readily available and you can get it anytime].

Participants then learned that they could eat as much chocolate as they wanted. After they stopped eating, they returned any uneaten candy to the lab administrator. The lab administrator then left the room and counted the number of pieces to calculate how much each participant ate.

Participants next answered several questions about their continuing interest in the chocolate. They rated the following items: “Overall, how much did you enjoy the chocolate you ate during this study?” (0 = “not at all,” and 10 = “very much”); “How likely would you be to purchase this chocolate?” (0 = “not likely at all,” and 10 = “very much likely”); and “How much would you pay for a serving of this chocolate as big as what you received?” We gauged attention to the quantity consumed by having participants estimate the number of chocolate pieces they ate during the study. Finally, as manipulation checks, participants rated their agreement (0 = “not at all,” and 10 = “very much”) with the

statements “This chocolate is widely available” and “This chocolate is really common.”

Results

Manipulation checks. Compared with the continuous availability condition, participants in the limited availability condition considered the chocolate less available ($M_{\text{limited}} = 7.16$ vs. $M_{\text{continuous}} = 8.18$; $t(120) = 2.07$, $p < .05$) and less common ($M_{\text{limited}} = 5.13$ vs. $M_{\text{continuous}} = 6.68$; $t(120) = 3.07$, $p < .01$). These findings indicate that the availability manipulation was successful.

Effect of limited availability on quantity consumed. We predicted that participants in the limited availability condition would consume more chocolate as a result of slower satiation. In line with this prediction, participants in the limited availability condition ate 36% more chocolate than those in the continuous availability group ($M_{\text{limited}} = 6.50$ vs. $M_{\text{continuous}} = 4.78$; $t(120) = 2.83$, $p < .01$). We presume that they ate more chocolates because they satiated more slowly, especially because satiation seemed relevant as not a single participant ate every piece of the very large serving we gave them.

Estimated quantity consumed. If participants in the limited availability condition paid less attention to the quantity consumed, we expect them to provide less accurate estimates. We calculated the accuracy of each estimate as the absolute value of the estimated quantity less the actual quantity that a participant ate (i.e., the unsigned error). Consistent with our prediction, participants in the limited availability condition had more inaccurate estimates than those in the continuous availability group ($M_{\text{limited}} = 2.95$ vs. $M_{\text{continuous}} = 1.77$; $t(120) = 2.91$, $p < .01$).

Mediation analysis. Our theory further predicts that this inaccuracy mediates effects on the quantity consumed. Greater inaccuracy was indeed related to the quantity consumed ($\beta = 1.03$, $t(120) = 10.52$, $p < .0001$). When we regressed quantity consumed on both the estimate inaccuracy and the availability condition (effect-coded as 1 for limited and -1 for continuous), the estimated inaccuracy remained reliable ($\beta = 1.00$, $t(119) = 9.92$, $p < .0001$), whereas the availability coefficient declined from .85 ($t(120) = 2.83$, $p < .01$) to .44 ($t < 1$, n.s.). Bootstrapping indicated significant mediation ($\beta = .59$, 95% CI: [.23, 1.00]). We also performed a mediation analysis with estimate inaccuracy and the raw estimate both included as factors. Bootstrapping indicated that estimate inaccuracy mediated the effect of availability ($\beta = .49$, 95% CI: [.19, .99]), whereas the raw estimate did not ($\beta = .15$, 95% CI: [-.23, .41]). This pattern shows that the mediation results did not simply reflect an inaccuracy resulting from those in the limited availability condition eating more. Instead, the accuracy of the estimate drove the effects on the quantity eaten, consistent with our theory that predicts less attention to the quantity consumed.

Other dependent measures. We next analyzed the effect of the availability manipulation on the other measures that should reflect satiation. Compared with the continuous availability condition, participants in the limited availability group recalled that the experience was more enjoyable ($M_{\text{limited}} = 8.37$ vs. $M_{\text{continuous}} = 7.40$; $t(120) = 2.52$, $p < .02$), expressed a greater likelihood of buying the chocolate ($M_{\text{limited}} = 6.60$ vs. $M_{\text{continuous}} = 5.20$; $t(120) = 2.87$, $p < .01$), and noted a willingness to pay more for the candy ($M_{\text{limited}} = 3.18$ vs. $M_{\text{continuous}} = 2.08$; $t(120) = 2.55$, $p < .02$). Across all these measures, participants in the limited

availability condition had a greater lingering desire to have more of the chocolate.

Discussion

This study tested our predictions using several measures that should reflect satiation, and perceived limited availability affected them all. Limited availability led participants to eat more, to recall enjoying the experience more in retrospect, to be more likely to purchase the candy, and to be willing to pay more for it. These findings suggest that the ability of limited availability to reduce satiation likely has a wide range of consequences—specifically, the behavioral outcome of eating more. This is a particularly important consequence for consumers and policy makers, especially given the obesity epidemic (Flegal et al. 2012). Of course, other outcomes of purchase intent and willingness to pay also have great relevance to firms marketing their products.

The free consumption in this study not only tested our theory in a new setup but also provided further evidence of our proposed process. Instead of a postmeasure of attention to the quantity consumed, we employed a more objective measure of attention using an estimate of the quantity eaten. Consistent with paying less attention, participants had less accurate estimates of how much they ate when they were told the candy had limited (vs. continuous) availability. Moreover, the degree of inaccuracy served as a mediator and helped account for why limited availability increased how much people ate, which provides further evidence to support our proposed theory that limited availability slows satiation by reducing attention to the quantity consumed.

The four studies presented thus far provide consistent evidence that perceptions of limited availability slow satiation. In addition, a variety of process evidence has linked this effect to reduced attention to the quantity consumed. It is worthwhile to ask why limited availability is linked to a lower level of such attention. We have proposed that this occurs because people take advantage of the opportunity to consume a product whose availability is limited by focusing on consuming more. With this outcome in mind, they have less need to monitor intake or keep track of the quantity consumed. The next study tests whether a focus on consuming more plays this role as an antecedent.

STUDY 5

Study 5 builds on the findings in the previous studies in three important ways. First, although we have demonstrated the role of attention to the quantity consumed, the findings did not explain why such reduced attention occurs. We propose that people pay less attention to how much they consume because they focus on eating more. To establish direct evidence of this connection, this study measures these underlying constructs to test for mediation. Second, thus far we have measured enjoyment throughout the consumption experience to better capture the full pattern of changes over time. A drawback to this thorough approach is that participants may have found these repeated ratings somewhat fatiguing or irritating. We were also concerned that the baseline measure may have attenuated any initial effects of limited availability because, in general, previous research on wanting has not used such prerating (Verhallen 1982; Worchel, Lee, and Adewole 1975). Study 5 alleviates both concerns by measuring enjoyment at only two points: after the initial piece and after the final piece. Third, this study includes the behavioral measure of choice. Participants

chose how many pieces of chocolate they would take home and provided critical managerial measures of retrospective enjoyment, purchase intent, and willingness to pay.

Method

Eighty-three undergraduate students participated for course credit. Participants received 12 chocolate pieces (30g) in total. Before eating the candies, each participant read the following passage, adjusted for the randomly assigned availability condition (limited or continuous):

The chocolate you are going to eat in this study belongs to a species that is available during only a very brief window of time each year [throughout the whole year]. It is available during this time, but you cannot get it during all of the rest of the time [It is always readily available and you can get it anytime].

After the manipulation, participants consumed only the first piece of chocolate. They then rated “How much are you enjoying this product so far?” and “How much would you like to eat more of this candy?” using two separate 100-point scales (1 = “not at all,” and 100 = “very much”). We added this second measure of liking because Study 5 had fewer measurement trials than in previous studies, and both measures are common in the satiation literature. Participants were then told that they could eat the remaining 11 pieces. After they finished eating, they again rated the last piece using the same two scales so that the drop in ratings could capture satiation. Participants also rated how much they enjoyed the chocolate overall (0 = “not at all,” and 10 = “very much”). We also included two other measures to capture the lingering desire for the chocolate as participants indicated the following items: “How likely would you be to purchase this chocolate?” (1 = “not at all likely,” and 10 = “very likely”) and “How much would you pay for a full bar of this chocolate?” Finally, as a behavioral measure of satiation, each participant learned after eating the chocolates (and not earlier) that they could choose how many pieces to take home. If participants in the limited availability condition were indeed less satiated, they should take home more chocolates to eat later.

Participants then completed several measures designed to test our proposed process. Participants answered the following questions: “When eating the chocolate, did you try to consume as much as you could?” (0 = “not at all,” and 10 = “a lot”) and “How much attention did you pay to the quantity of chocolate you consumed?” (0 = “none at all,” and 10 = “very much”). To assess the role of other mechanisms, participants also rated “How much attention did you pay to the flavor of the chocolate consumed?” (0 = “no attention at all,” and 10 = “a lot of attention”); “Did this study get your full attention the whole time?” (0 = “not at all,” and 10 = “a lot”); “To what extent did you try to look for different aspects of the taste of the chocolate as you were consuming it?” (0 = “not at all,” and 10 = “very much”); “How much regret did you feel when eating this chocolate?” (0 = “not at all,” and 10 = “very much”); “Would you say that the chocolate you ate today is a premium chocolate?” (0 = “not at all,” and 10 = “very much”); and “How expensive do you think the chocolate you ate today is?” (0 = “not at all,” and 10 = “very much”). Finally, to ensure that our manipulations influenced perception of limited availability more than rarity, participants rated their agreement (1 = “not at all,” and 9 = “very much”) with the statements “This chocolate is widely available,” and “This chocolate is really common.” Partici-

pants also answered the question “How rare is the chocolate you just tasted?” (0 = “not rare at all,” and 10 = “very rare”).

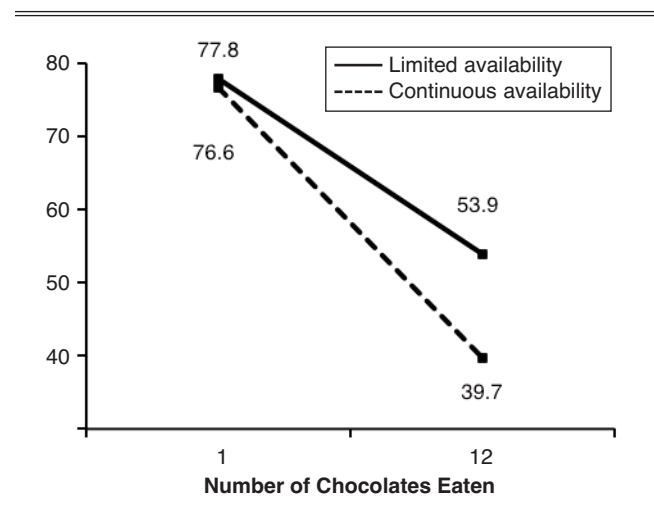
Results

Manipulation checks. Participants in the limited availability condition considered the chocolates less available than those in the continuous availability group ($M_{\text{limited}} = 5.34$ vs. $M_{\text{continuous}} = 6.57$; $t(81) = 2.21, p < .04$). They similarly perceived the chocolates to be less common ($M_{\text{limited}} = 4.24$ vs. $M_{\text{continuous}} = 5.28$; $t(81) = 2.33, p < .03$). Both these items indicate that the availability manipulation was successful. Moreover, there was no significant difference in perceptions of rarity between conditions ($M_{\text{limited}} = 4.54$ vs. $M_{\text{continuous}} = 4.18$; $t < 1, n.s.$), which indicates that our manipulation altered perceptions of limited availability more so than rarity. In addition, as we intended, participants ate most of the chocolate they received ($M = 82\%$), and many (64%) ate all of it; moreover, neither of these measures differed by condition (both $ps > .64$), indicating that the quantity consumed is unlikely to account for any differences in enjoyment.

Effect of limited availability on satiation. We predicted that perceptions of limited availability would slow the rate of satiation. To test our hypothesis, we performed a repeated-measures analysis of variance on indexes averaging the enjoyment and the desire for more ratings ($\alpha > .82$ for both initial and final index). The model included timing (initial, final) as a within-subject factor and availability (limited, continuous) as a between-subjects factor.² The analysis identified a main effect of timing as participants satiated over time ($F(1, 81) = 79.21, p < .0001$) but indicated no main effect of limited availability ($F < 1, n.s.$). More importantly, as Figure 4 shows, the timing and limited availability factors interacted ($F(1, 81) = 4.05, p < .05$). There was no significant difference in rated enjoyment immediately after consumption of the first chocolate ($M_{\text{limited}} = 77.82$ vs. $M_{\text{continuous}} = 76.62$; $t < 1, n.s.$), but participants in the limited availability condition indicated greater enjoyment after the

²We also performed all the subsequent analyses with the quantity consumed included as a covariate. None of the statistical conclusions changed as our predicted effects tended to be even larger after accounting for quantity.

Figure 4
MEAN ENJOYMENT INDEX BY CONDITION IN STUDY 5



final piece ($M_{\text{limited}} = 53.89$ vs. $M_{\text{continuous}} = 39.71$; $t(81) = 2.00$, $p < .05$). Thus, we replicated our previous findings.

Other dependent measures. We next analyzed the effect of the availability manipulation on other measures that should reflect satiation. Compared with the continuous availability condition, participants in the limited availability group chose to take home more chocolate ($M_{\text{limited}} = 4.73$ vs. $M_{\text{continuous}} = 3.07$; $t(81) = 2.19$, $p < .04$), recalled the overall experience as being more enjoyable ($M_{\text{limited}} = 7.34$ vs. $M_{\text{continuous}} = 6.33$; $t(81) = 2.20$, $p < .04$), and had a greater likelihood of purchasing the chocolate ($M_{\text{limited}} = 6.21$ vs. $M_{\text{continuous}} = 4.56$; $t(81) = 2.90$, $p < .01$). They also indicated a willingness to pay more for the candy, but this result did not attain statistical significance ($M_{\text{limited}} = 1.40$ vs. $M_{\text{continuous}} = 1.25$; $t < 1$, n.s.). Regardless, the overall pattern is clear because participants in the limited availability condition had a greater desire for more of the candy.

Mediation analysis for attention to quantity consumed. We have posited that perceptions of limited availability slow satiation because of reduced attention to the quantity consumed. We tested this claim with a mediation analysis. We calculated satiation as the index of ratings after the first piece minus that after the last piece.³ The availability independent variable (effect-coded as 1 for limited and -1 for continuous) influenced the attention-to-quantity mediator ($M_{\text{limited}} = 4.75$ vs. $M_{\text{continuous}} = 6.48$; $t(81) = 3.09$, $p < .01$). The attention-to-quantity mediator was also related to the dependent variable of satiation ($\beta = 4.70$, $t(81) = 3.76$, $p < .001$). When we simultaneously regressed the dependent variable on both the mediator and the independent variable, the mediator remained significant ($\beta = 4.34$, $t(80) = 3.28$, $p < .01$), whereas the coefficient for the independent variable declined from -6.99 ($t(81) = 2.01$, $p < .05$) to -2.95 ($t < 1$, n.s.). A bootstrapping analysis confirmed that the availability manipulation had a significant, indirect effect on satiation through the attention-to-quantity pathway ($\beta = -3.74$, 95% CI: $[-1.48, -7.28]$). This pattern of results indicates

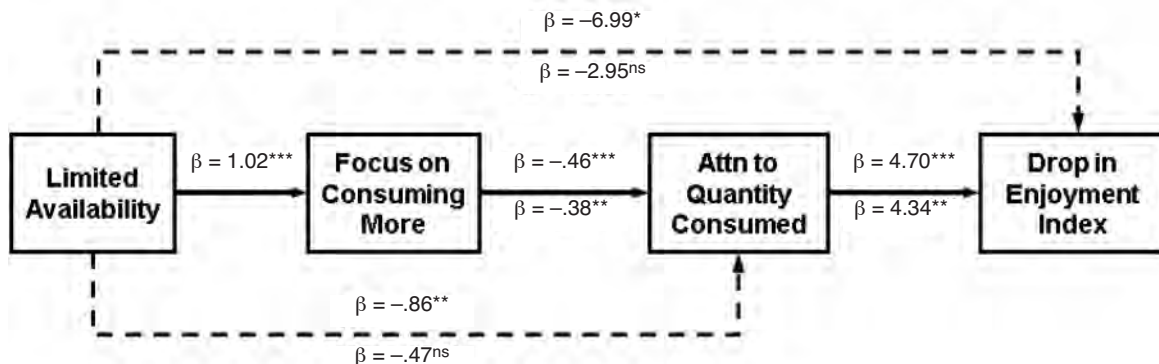
that attention to the quantity consumed mediated the effect of limited availability on the rate of satiation.

Mediation analysis for focus on consuming more. We have further proposed that attention to the quantity consumed differs because limited availability leads people to focus on consuming more. To demonstrate this other piece of our process sketched in Figure 5, we conducted an additional mediation analysis. The focus on consuming more was influenced by the manipulation of availability ($M_{\text{limited}} = 6.07$ vs. $M_{\text{continuous}} = 4.03$; $t(81) = 4.00$, $p < .0001$) and was related to attention to the quantity consumed ($\beta = -.46$, $t(81) = 4.19$, $p < .0001$). When the analysis of the effect of limited availability on attention to quantity included the focus on consuming more mediator, the mediator remained reliable ($\beta = -.38$, $t(80) = 3.18$, $p < .01$), and the availability coefficient decreased from $-.86$ ($t(81) = 3.09$, $p < .01$) to $-.47$ ($t(80) = 1.56$, $p > .12$). A bootstrapping analysis confirmed the presence of significant mediation ($\beta = -.40$, 95% CI: $[-.12, -.82]$). This result shows that a focus on consuming more mediated the effect of limited availability on attention to the quantity consumed.

Mediation analysis for other constructs. We tested whether other measures mediated the effect of limited availability on satiation. The availability manipulation did not affect attention paid to the flavor ($M_{\text{limited}} = 6.29$ vs. $M_{\text{continuous}} = 5.62$; $t(81) = 1.57$, $p > .12$), to different aspects of the food ($M_{\text{limited}} = 5.61$ vs. $M_{\text{continuous}} = 5.10$; $t(81) = 1.02$, $p > .31$), or to the study ($M_{\text{limited}} = 6.90$ vs. $M_{\text{continuous}} = 6.26$; $t(81) = 1.21$, $p > .22$). Moreover, it did not affect regret ($M_{\text{limited}} = 3.98$ vs. $M_{\text{continuous}} = 3.76$; $t < 1$, n.s.), although it did alter perceptions of the chocolate being a premium ($M_{\text{limited}} = 5.22$ vs. $M_{\text{continuous}} = 3.88$; $t(81) = 2.58$, $p < .02$) and expensive product ($M_{\text{limited}} = 5.15$ vs. $M_{\text{continuous}} = 3.93$; $t(81) = 2.63$, $p < .02$). However, the extent of satiation did not correlate with either the perception of the chocolate being premium ($r = -.10$, $p > .35$) or expensive ($r = -.20$, $p > .08$). This finding indicates that these perceptions likely did not serve as mediators. Overall, the process shown in Figure 5 best accounts for the pattern of our findings.

³We also performed the analyses using the index of the initial rating as a covariate. None of the statistical conclusions changed.

Figure 5
MEDIATION ANALYSES IN STUDY 5



* $p < .05$.

** $p < .01$.

*** $p < .001$.

ns Not significant.

Notes: Limited availability is effect-coded. Simple tests appear above each line. Tests in the regression model with the mediator appear below each line.

Discussion

This study replicates the previous findings and confirms our theoretical process. When told that a product was available only at limited times, participants paid less attention to the quantity consumed, which reduced satiation. Mediation evidence established that this happened partly because limited availability triggered a focus on consuming more, which encouraged less ongoing monitoring of the quantity being eaten. However, perceptions of limited availability did not reduce attention to just any aspect of the experience, as a general distraction account would predict. A general distraction account cannot explain why limited availability increased the focus on eating more yet simultaneously decreased attention to the quantity consumed.

The results indicate that reduced attention to the quantity consumed was the critical driver of our effects. The data did not indicate evidence of mediation for attention to other aspects (e.g., flavor, overall study) or for any of several other constructs we measured (e.g., regret, premium perceptions, rarity of the product). This helps rule out several alternative explanations because the evidence better supports our proposed process.

This study also demonstrates the general nature of this phenomenon along several dimensions. First, participants tasted and rated the chocolate only after the availability manipulation. This study design is more consistent with some previous work on limited availability and wanting (Verhallen 1982; Worchel, Lee, and Adewole 1975) and likely matches the timing found in natural settings because consumers often learn about a product before tasting it. We still replicated our key results, indicating that our effects are not peculiar to the design of our studies. Second, this study measured ongoing enjoyment on only two occasions: after eating the first and last pieces. We again found that the perception of limited availability reduced the drop in enjoyment, suggesting that fatigue likely did not drive the effect in previous studies. Third, this study demonstrated that the perception of limited availability led participants to choose more of the candy to take home with them. This finding suggests that limited availability affects not only the current consumption experience but also a range of future effects that include product preferences, consumption frequency, brand loyalty, willingness to pay, and so on.

GENERAL DISCUSSION

Satiation is a ubiquitous problem in the marketing field. That is, firms develop and consumers find offerings they really enjoy and yet discover that this pleasure is fleeting because the satiation from repeated consumption makes it less enjoyable. Such satiation poses a consequential problem both for consumers, because they futilely search for new experiences to sustain their happiness (Brickman and Campbell 1971), and for those serving consumers (e.g., policy makers, firms, parents), who face a constantly changing set of preferences. Unfortunately, although researchers have highlighted this problem, previous work has demonstrated few successful solutions (for exceptions, see Raghunathan and Irwin 2001; Redden 2008). The present research adds to this sparse literature by showing that the perception of limited availability effectively reduces satiation.

Five empirical studies establish that creating the mere perception of limited availability by stating that a product can be obtained only at certain times reduces the rate of satiation. We demonstrate this effect whether participants eat a food

that is more virtuous (grapes) or more hedonic (chocolate). We also find that the effect appears regardless of whether satiation is captured through the decline in enjoyment ratings, the amount consumed, the amount taken home, recall of the overall experience, intention to purchase, or willingness to pay. This evidence shows the general nature of this effect and suggests that it likely holds across most foods for most outcomes tied to preference. Moreover, we demonstrate that the effect of perceived limited availability on satiation occurs only after repeated consumption, which provides a fuller picture of the phenomenon and highlights the importance of time and consumer dynamics. This pattern of results also rules out alternative explanations that emerge immediately rather than only over time. For example, if a demand effect or simple quality inference were driving our effect, we would have likely observed strong effects after the manipulation rather than only after repeated consumption.

Our studies also establish why the perception of limited availability reduced satiation. Consumers who believed that a product had limited availability paid less attention to how much they consumed, and this made them satiate more slowly. Process evidence supported this explanation in the form of mediation, using measured attention to the quantity (Studies 2 and 5); moderation, by directly manipulating this attention to eliminate the effect (Study 3); and mediation, using the accuracy of the estimated quantity eaten (Study 4). Finally, we also established that perceptions of limited availability reduce attention to the quantity consumed because people feel the need to take advantage of the limited consumption opportunity they had been given (Study 5). Across the studies, we found consistent evidence that the perception of limited availability slows satiation by reducing attention to the quantity consumed.

Our findings deepen the field's understanding of satiation (and how to slow it) while providing insight into how limited availability affects liking. We found that limited availability increased enjoyment only by reducing satiation after participants consumed a considerable amount (i.e., a slope effect). This pattern of results shows that the popular belief that limited availability increases liking and enjoyment (Cialdini 2009) is perhaps an oversimplification. Limited availability indeed increases enjoyment, but in our studies, this effect largely developed only over time.

Although prior work has documented that limited availability increases wanting (Lynn 1992; Verhallen and Robben 1994; Worchel, Lee, and Adewole 1975), we consistently failed to find evidence that it affects initial enjoyment. We can speculate why our findings seemingly differ from previous work. First, our studies focused on the food domain, whereas many previous studies used nonfood stimuli (e.g., recipe books, art prints). The strong sensory feedback inherent in eating food may serve to mask any inferences from availability cues. Indeed, one of the few articles on limited availability to use food (Worchel, Lee, and Adewole 1975) found no effect for the sensory-based ratings of taste. Second, we measured ratings of enjoyment during the consumption experience, whereas previous work has focused on quality judgments, wanting, and choice. It could be that limited availability affects how much people want something more than it affects how much they enjoy consuming it, akin to the notion that wanting and liking can sometimes diverge (Berridge 1996). Third, we manipulated limited availability across occasions, whereas prior studies have often focused on the limited quantity on hand. The lat-

ter manipulation could create a greater sense of urgency and appreciation for even the very first unit consumed (because so few are left and others might take them). Regardless, given the scant experimental evidence showing that limited availability increases actual enjoyment, further research might fruitfully explore whether these (and other) conditions influence whether the effect emerges on initial consumption.

We confirmed that limited opportunities to consume slow satiation, but we should also note limitations. The effect of limited availability on satiation may attenuate with consumption on many occasions. It is easy to imagine that a stimulus once limited in availability is no longer viewed as such after being available many times. However, when thoughts of limited availability have been activated, we expect that the tendency to turn off satiation may be automatic. This could explain why consumers from industrialized countries (the sample population we used in our studies) would still show our predicted effects even though their survival no longer depends on consuming large amounts of stimuli that seem to be limited in availability.

Managerial Implications

Our findings have implications across the marketing mix for firms. Given that satiation reduces product usage, creating perceptions of limited availability provides a way to increase consumer demand without incurring the extensive investment of product development. In anticipation of less satiation and greater consumption, firms might consider larger package sizes for products with limited availability. Our findings also imply that a product with limited availability underperforms in the single exposure setup typically found in product taste tests or focus groups and yet ultimately performs well in the market because of less satiation with repeated consumption. Indeed, firms might intentionally restrict the times a successful product is available (an “in-and-out”) and explore the long-term effectiveness of this strategy in increasing product preference and demand. For example, McDonald’s has regularly cycled the McRib in and out of its menu for more than 30 years. A fruitful opportunity for firms may be to optimize the frequency and duration for periods of limited availability, which will likely differ across products.

Beyond product offerings, we expect that marketers will explore numerous ways to trigger limited availability perceptions, including tying products to daily specials (e.g., special soup du jour), day of the week (e.g., Sunday brunch), promotion periods (e.g., limited time only), harvest time (e.g., corn in late summer), or small production runs (e.g., limited edition). The key with any such approach is creating a sense of limited availability, which leads consumers to enjoy themselves for a longer time. An effective strategy may be to link limited availability to an already salient event, such as candy that is orange and brown for Halloween or pastel colors for Easter. For example, calling a product a “Holiday Edition” may be more effective than “Special Edition.” More generally, our findings caution that consumer enjoyment may not increase for any product’s claim of being special or rare. Rather, the critical lever for long-term enjoyment is the creation of a sense of a limited opportunity to consume that people must take advantage of immediately. We expect that firm messaging centered on notions of limited availability will prove effective in marketing communications. An interesting challenge, then, is balancing the desire always to have widespread distribution across many channels versus maintaining an appearance of limited

availability. We have identified limited availability as a lever, but firms should explore how to best incorporate this effect in their advertising, packaging, retail displays, and so on.

Our findings also apply to a firm’s pricing strategy. If consumers satiate less and enjoy a product more, they should be willing to pay more for it (as in Study 4). Firms should then have less pressure to discount a product with limited availability, which has particular relevance for industries with intense rivalry and price competition. Notably, it is possible that offering a discount for only a limited time could itself trigger perceptions of limited availability. Thus, a temporary price promotion may lead households to increase their usage level as a result of less satiation, which could produce volume increases that help compensate for the lower margins. Firms need to test these and other possibilities now that our work has identified limited availability as an effective way to limit the satiation that continually tempers consumption.

Future Research Directions

It is worth noting how our findings fit with previous work on availability and consumption. We add to this literature stream by demonstrating the importance of the type of limited availability. Prior research has found that limited availability in the form of quantities on hand can reduce the amount consumed (Folkes, Martin, and Gupta 1993; Wansink 1996). Although this previous work did not measure enjoyment (so it is necessarily silent on satiation), in some ways we found the opposite relationship because perceived limited availability reduced satiation and increased consumption (as in Study 4). We reconcile these two findings by differentiating limited quantity on hand (as in much previous work) versus limited availability due to few opportunities to consume (as in our work). The former notion of a limited quantity should encourage conservation to make it last, whereas the latter notion of a rare consumption opportunity should encourage free consumption and the slower satiation rate we find. Further research should explore how the situational and temporal aspects of limited availability affect enjoyment and intake in different ways.

We have speculated that people maximize the opportunity to eat foods with limited availability, and slower satiation facilitates this outcome. Future studies could explore the evolutionary foundations of this effect and investigate whether it is automatic. Future researchers could also work to understand how conscious goals to regulate one’s diet fit with our findings. Previous work has shown that a smaller package can increase consumption by reducing concerns about overeating and lessening the need for self-regulation (Coelho do Vale, Pieters, and Zeelenberg 2008). Our proposed process similarly taps into reduced attention to the quantity consumed but focuses on how this affects the satiation that makes the food less enjoyable (and less tempting). Future studies could explore how our concept of increased satiation may interact with increased self-regulation to promote healthier eating (see, e.g., Redden and Haws 2013). Regardless, we suggest that dieters avoid foods that are limited in availability (or at least appreciate their effects on satiation) and avoid making this factor more salient (e.g., chocolate cake only on Fridays). These steps might help them use satiation to better control their diet. Future studies could also examine how broadly our effects apply, an important concern for firms. It remains an open question whether limited availability will reduce satiation for all foods, all physical products, or even all experiences.

Conclusion

Our work identifies limited availability as a way to reduce attention to the quantity consumed and slow the rate of satiation. Of course, limited availability is almost certainly not unique in this ability. We expect further research to uncover other factors that could similarly slow satiation. For example, when people mindlessly follow the norm of how others behave (Cialdini 2009), they may pay less attention to the quantity they consume and thus become less satiated. By identifying attention to the quantity consumed as a key underlying mechanism, the present work provides direction to further research to identify the best ways to slow satiation. We show that the perception of limited availability is one way to dampen this type of attention, and although there are surely multiple ways to trigger such impressions, there are also surely other constructs that produce similar effects on attention to quantity. We hope this work encourages and assists such endeavors given the importance of satiation for firm performance and consumer well-being.

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