Restraint That Blinds: Attention Narrowing and Consumers' Response to Numerosity in Self-Control Decisions

KEITH WILCOX
SONJA PROKOPEC

A significant amount of research on numerosity demonstrates that product perceptions are often influenced by the scale on which numerical attribute information is presented. However, fewer studies have examined how self-control is influenced by the numerosity of cost information (e.g., price, nutritional content) in situations that may violate a personal goal. The present research demonstrates that, in such situations, the numerosity of cost information has a stronger influence on self-control when consumers are highly focused on restraint. Because restrained consumers regulate their behavior by anticipating the negative emotions from violating their goals, they experience a narrowing of attention during self-control decisions that makes them more reliant on numerosity as a cue for judgment. The results of eight experiments demonstrate that consumers who are primed or predisposed to be high in restraint display less self-control when cost information is presented on a contracted scale with small numbers compared to an expanded scale with large numbers. When consumers are less focused on restraint, numerosity has less of an effect on self-control because unrestrained consumers do not experience an analogous narrowing of attention.

Keywords: numerosity, self-control, attention narrowing, anticipated emotions

Consumers use numerical product information to make a variety of decisions that involve self-control. They consider prices when deciding whether to make a purchase or to limit their spending. They depend on nutritional content when determining which items to eat and which ones to avoid. Moreover, research on the numerosity heuristic finds that the scale on which numerical product information is presented can have a considerable effect on judgment. For example, consumers prefer a rental service when the number of rentals is presented on an expanded scale with large numbers (e.g., 364 rentals per year) compared to an identical plan presented on a contracted scale with small numbers (seven rentals per week; Burson, Larrick, and Lynch 2009). This occurs because consumers often fail to engage in the deliberation necessary to understand the meaning of numerical information and instead rely on the magnitude of the numbers as a cue for judgment.

A significant amount of research has examined how product perceptions are influenced by the numerosity of information related to the benefits of consumption (Bagchi and Li 2011; Monga and Bagchi 2012; Pandelaere, Briers, and Lembregts 2011). Fewer studies, however, have examined how behavioral intentions are influenced by the numerosity of cost information (e.g., price, nutritional content) when consumption violates a personal goal. Furthermore, research examining consumers' response to the numerosity of cost information suggests that its

Keith Wilcox (ktw2113@gsb.columbia.edu) is the Barbara and Meyer Feldberg Associate Professor of Marketing at the Columbia Business School, 3022 Broadway, New York, NY 10027. Sonja Prokopec (prokopec@essec.edu) is the LVMH Chaired Professor of Marketing at the ESSEC Business School, 5 Nepal Park, Singapore 139408. Please address correspondence to Keith Wilcox. The authors would like to thank Lauren Block, Juliano Laran, Michel Pham, and members of the RED lab for their helpful comments. Supplementary materials are included in the web appendix accompanying the online version of this article

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influence on self-control may depend on several factors, such as the size of consumers' budget (Wertenbroch, Soman, and Chattopadhyay 2007).

The present research further examines how the numerosity of cost information influences self-control. We extend previous research by introducing a theory that not only accounts for how consumers react to the numerosity of product information but also considers how they respond to situations that threaten a personal goal. We propose that the numerosity of cost information primarily influences self-control when consumers are highly focused on restraint. When consumers make self-control decisions, they tend to deliberate during judgment (Baumeister and Heatherton 1996; Hofmann, Friese, and Strack 2009). Thus, as long as it is relatively easy to understand the meaning of cost information, numerosity should not have a significant impact on self-control. However, because restrained consumers regulate their behavior by anticipating the negative emotions from failing at self-control, they experience a narrowing of their attentional scope during self-control decisions, which makes them less likely to deliberate during judgment and, therefore, more likely to be influenced by the numerosity of cost information.

This theory is tested in eight experiments demonstrating that consumers who are predisposed or primed to be high in restraint display lower self-control when cost information is presented on a contracted scale with small numbers compared to an expanded scale with large numbers. The numerosity of cost information does not influence unrestrained consumers' self-control because these consumers do not experience a similar narrowing of attention in response to self-control decisions. Moreover, we show that broadening restrained consumers' attention reduces the effect of numerosity on their self-control.

The present research makes several contributions. Although previous research has demonstrated that numerosity can influence behavioral intentions in self-control contexts (Pandelaere et al. 2011; Raghubir and Srivastava 2002; Ulkumen and Thomas 2013), most of these studies did not consider how the processes involved in self-regulation may influence consumers' response to numerosity. One exception is research on duration framing (Ulkumen and Thomas 2013), which finds that the decision to adopt a goal (e.g., go on a diet) is more likely to be biased by numerosity when consumers mentally simulate the process of pursuing the goal. Adding to this area of research, we show that consumers are also more susceptible to numerosity when they anticipate the negative emotions from violating their goals. Importantly, we show that this occurs because the threat of experiencing these emotions narrows consumers' attention.

Our findings also extend research on self-control, which has shown that restrained eaters are more susceptible to external cues (Irmak, Vallen, and Robinson 2011), by demonstrating that this tendency is not limited to a specific personality trait or domain. More specifically, a pattern that emerged in all of our studies shows that participants primed to restrain their eating, as well as those focused on restraint in other self-control domains (e.g., spending), are more likely to rely on numerosity as a cue for judgment. Thus, our results suggest that attention narrowing may explain why restrained consumers are more susceptible to external cues. Hence, this research has important managerial implications, as our results suggest that interventions designed to broaden restrained consumers' attention should make them less likely to rely on external cues, such as numerosity, for judgment.

NUMEROSITY

Individuals often rely on the number of distinct elements in stimuli as a cue for judgment without considering all relevant information (Monga and Bagchi 2012). As a result, they tend to evaluate a stimulus based on the number of units into which it is divided regardless of the meaning or value of the units. Because people have learned that more pieces of something typically indicates a greater magnitude (Pelham, Sumarta, and Myaskovsky 1994), individuals judge targets to be larger when the targets are presented on scales with larger numbers; for example, a week seems longer when it is described as seven days and a yard seems bigger when it is described as 36 inches. This tendency to rely on numerosity occurs because people often fail to engage in the deliberation necessary to determine the meaning of numerical information (Pelham et al. 1994). As a result, they base their judgments on the magnitude of the numbers without fully considering other relevant information, such as the scale on which the information is presented.

A considerable amount of research finds that product perceptions are influenced by the numerosity of attribute information (Bagchi and Li 2011; Burson et al. 2009; Monga and Bagchi 2012; Pandelaere et al. 2011). For instance, distances to redeem rewards in loyalty programs seem larger when the distances are presented on an expanded scale (e.g., 10 points per dollar with a reward at 1,000 points) compared to a contracted scale (one point per dollar with a reward at 100 points; Bagchi and Li 2011). Additionally, the difference in quality between two options is perceived to be larger when the quality differences are presented on an expanded scale (200 out of 1,000) compared to a contracted scale (2 out of 10; Pandelaere et al. 2011). Consequently, consumers prefer higher quality options when quality differences are presented on a more expansive scale (Burson et al. 2009).

Prior research examining how self-control is influenced by the numerosity of cost information has primarily focused on the "face value" effect, whereby consumers' willingness to spend money is biased by the nominal value of

the currency used for payment (see also Gourville 1998 for related work on temporal framing). Raghubir and Srivastava (2002) found that consumers are more willing to spend money when using a currency that has a smaller nominal value relative to their home currency (i.e., a more contracted scale) compared to when the currency has a larger nominal value (i.e., a more expansive scale). However, research on the introduction of the euro found that the face value effect did not occur in many countries (Desmet 2002; Gamble et al. 2002) and may have had a different effect in some others (European Central Bank 2003).

Wertenbroch and colleagues (2007) suggest that these inconsistencies can be explained by the reference values that are salient at the time of judgment. Consistent with the face value effect, they show that consumers are more likely to buy premium brands (vs. generic brands) when using a currency with a small nominal value versus a large nominal value. However, this effect is prevalent when consumers have a small budget and not when they have a large budget. The authors contend that budget size moderates the effect of a currency's nominal value on spending because price differences have a greater impact on decision-making when the differences are compared to a smaller rather than a larger budget. Nonetheless, because people are likely to be more (less) concerned about limiting their spending when they have a small (large) budget, it is conceivable that differences in consumers' focus on restraint also may have played a role in the findings. We expand upon this idea in the next section.

SELF-CONTROL AND NUMEROSITY

Self-control is fundamental to people's ability to function in many domains. Self-control allows people to achieve important life outcomes (e.g., retirement), maintain good health, and improve their well-being (Tangney, Baumeister, and Boone 2004). Successful self-control involves acting consistently with personal standards and preventing actions that violate one's goals (Muraven and Baumeister 2000). However, while consumers may want to act consistently with their long-term goals, such as by eating healthy foods or limiting their spending, they often find themselves considering temptations that undermine these objectives.

When consumers face temptation, they often exercise self-control through an effortful, deliberative, and conscious process (Baumeister and Heatherton 1996; Hofmann, Friese, and Strack 2009). Thus, when consumers are exposed to threats to their goals, they tend to deliberate during judgment, which can make them more effective at interpreting cost information. For example, consumers have been shown to be more accurate at estimating the portion sizes of unhealthy (vs. healthy) foods (Cornil et al. 2014). They have also been shown to be better at estimating the caloric content of a meal when situational factors (e.g., the positioning of the restaurant) suggest the meal is unhealthy (Chandon and Wansink 2007).

These findings suggest that as long as information about the cost information scale is present and relatively easy to interpret, consumers should engage in the deliberation necessary to understand the meaning of cost information during self-control decisions. Consequently, we would not expect self-control to be biased by the numerosity of cost information under these conditions. For example, if someone knows the exchange rate between a foreign currency and his home currency, and the calculation is easy to compute, the nominal value of the currency should have a minimal impact on his spending. However, we propose that restrained consumers will be less likely to deliberate during self-control decisions, which will make them more susceptible to the numerosity of cost information.

Restraint and the Anticipation of Negative Emotions

When people behave in a manner that conflicts with their goals, they experience negative emotions from failing to act consistently with their standards (Kivetz and Simonson 2002; Okada 2005). Often, these feelings are quite benign, such as a minor twinge of guilt. However, when individuals are highly focused on restraint, even small transgressions can be perceived as failures (Cochran and Tesser 1996), which can, in turn, lead them to experience strong negative feelings. For example, people who are highly focused on restraining their spending (i.e., "tightwads") experience intense pain from spending money (Rick, Cryder, and Loewenstein 2008). Similarly, restrained eaters experience strong feelings of guilt after eating unhealthy foods (Macht and Dettmer 2006; Macht, Gerer, and Ellgring 2003).

The threat of experiencing negative emotions serves an important self-regulatory function in restrained consumers (Rick et al. 2008). They have experienced these emotions so frequently in response to goal violations that they have learned to regulate their behavior by anticipating the negative emotions from failing at self-control (Baumeister et al. 2007; Rick et al. 2008). As a result, restrained consumers tend to make self-control decisions by anticipating the negative emotions from violating their goals. When they anticipate that consumption will lead to negative feelings, they exercise self-control to avoid these emotions.

Because restrained consumers are inherently more concerned about controlling their consumption, one might expect them to be more motivated to make "good" decisions and be less susceptible to bias. We contend, however, that restrained consumers will be more likely to be biased by numerosity because they regulate their behavior by anticipating the negative emotions from violating their goals.

Specifically, we suggest that their greater focus on anticipated negative emotions during self-control decisions narrows their attention, which increases their focus on cost information and makes them less likely to deliberate on this information to determine its meaning.

Attention Narrowing in Response to Threat

Anyone who has ever been in a threatening situation (e.g., being robbed) most likely recalls how their attention was intensely focused on the source of the threat (e.g., a weapon). A significant amount of research demonstrates that when individuals are exposed to events that may cause them harm or jeopardize important goals, they experience a narrowing of their attention in response to the situation (Derryberry and Tucker 1994; Lavie 2005, Wichary, Mata, and Riekamp 2016). Attention narrowing is characterized by a reduction in perceptual and conceptual scope that allows individuals to focus on information that is most relevant in a given context by inhibiting the processing of less relevant information (Gorn, Pham, and Sin 2001; Harmon-Jones, Price, and Gable 2012). Thus, attention narrowing engenders a focus on central (vs. peripheral) information and local (vs. global) details during judgment (Derryberry and Tucker 1994).

An important determinant of attention narrowing is an individual's motivational state. Because attention narrowing is a conditioned response to threats (Derryberry and Tucker 1994), individuals experience it when they are in a heightened state of avoidance. Several studies have demonstrated that the experience of avoidance-related negative emotions, such as anxiety and anger, reduces attentional scope (Gable, Poole, and Harmon-Jones 2015). Nevertheless, people do not need to actually experience emotions for their attention to narrow; rather, simply anticipating a threat can narrow individuals' attention (Derryberry and Tucker 1994). Consequently, even though restrained consumers anticipate, rather than experience, negative emotions during self-control decisions, the threat of experiencing these emotions should result in a narrowing of their attention.

Attention Narrowing and Information Processing

The ability to focus attentional resources in response to threats has a number of benefits (e.g., avoiding distractions). Nevertheless, evidence suggests that attention narrowing can make people less likely to deliberate, which can reduce the amount of information that is considered during judgment (Keinan 1987; Lewinsohn and Mano 1993; Wichary et al. 2016). Thus, when individuals are exposed to situations that narrow attention, they tend to rely on a limited amount of relevant cues without considering other relevant information. For example, Wichary and colleagues examined the decision-making of individuals after they were exposed to threatening images, an attention narrowing manipulation (Van Steenbergen, Band, and Hommel 2011). They found that those exposed to threatening (vs. neutral) images tended to make decisions by considering only the most relevant information without considering other important information. In a similar vein, greater levels of arousal, which narrow attention (Easterbrook 1959), have been shown to reduce the amount of time people spend engaged in deliberation (Lewinsohn and Mano 1993) and lead them to process only the most diagnostic cues during judgment (Pham 1996). Likewise, the anticipation of pain can lead individuals to solve problems without considering all possible options, even when they are highly motivated to perform well on the task (Keinan 1987).

The implication of these findings for the current research is that a narrowing of attention should lead consumers to focus on cost information (e.g., prices, nutritional information) during self-control decisions because this information is highly relevant for assessing the threat posed by the situation. Furthermore, a narrower scope of attention should make them less likely to consider other information that is relevant for determining the meaning of cost information. As a result, consumers experiencing a narrowing of attention should be more biased by the numerosity of cost information. To illustrate, consider the decision to purchase a television in a foreign currency. A person experiencing a narrowing of attention (e.g., a restrained consumer) should focus on the price (in a foreign currency) because this information is highly relevant for determining the threat posed by the situation. However, her narrower attentional scope should make her less likely to consider other relevant information (e.g., the exchange rate), which will make her more likely to be biased by the nominal value of the foreign currency. In contrast, someone who is not experiencing a narrowing of attention (e.g., an unrestrained consumer) should consider other relevant information so his judgment will be less likely to be biased by the nominal value of the currency.

Integrating these lines of research, we predict that restrained consumers will be highly susceptible to the numerosity of cost information during self-control decisions. Because restrained consumers regulate their behavior by anticipating negative emotions, they will experience a narrowing of attention during self-control decisions. Their narrower attentional scope will lead them to base their judgment primarily on the numerosity of cost information, without fully considering other relevant information. As a result, restrained consumers will display less self-control when cost information is presented on a contracted scale compared to an expanded scale. Because unrestrained consumers should not experience a narrowing of attention and therefore should be more likely to deliberate during judgment, we do not expect the numerosity of cost information to have a significant effect on their self-control.

STUDY 1

The objective of study 1 was to demonstrate that consumers high in restraint are highly susceptible to the numerosity of cost information during self-control decisions. Specifically, we examined whether consumers who are predisposed to be highly focused on restraining their spending (i.e., tightwads) would be more biased by the nominal value of the currency during a spending decision compared to those who are less focused on restraining their spending.

Method

Participants and Design. Two hundred twenty-nine respondents from Amazon Mechanical Turk (MTurk) participated in the study in exchange for a small payment. The study was a 2 (currency: small nominal value vs. large nominal value) × 2 (restraint: high vs. low) between-subjects design with currency manipulated and a continuous measure of restraint.

Procedure. Respondents were randomly assigned to one of the two currency conditions and told that the purpose of the study was to test a new auction website. Participants were told that they would be making bids on different products using a new currency called TRICOIN. They were further instructed that they would be making actual bids on the products. If their bid was above the reserve price and they were the highest bidder in the auction, they would get the chance to purchase the product at the value of their winning bid (with payments made in US dollars). Participating in the auction was voluntary, and if respondents declined to participate, they were instructed that they would receive their full payment and were given another task to perform. Those who agreed to participate were reminded that they would be making their bids in TRICOINS and given the exchange rates of the currencies relative to the US dollar according to the assigned condition. More specifically, in the small nominal value condition, one TRICOIN was equal to $10, while in the large nominal value condition, 10 TRICOINS was equal to $1. Because converting TRICOINS to dollars required individuals only to multiply or divide by 10, it was relatively easy for participants to convert TRICOINS into dollars. Nevertheless, we expected individuals high in restraint (i.e., tightwads) to be biased by the nominal value of the currency.

The first product in the auction was a GoPro video camera. Participants were shown a picture and description of the camera. In the expanded scale condition, participants submitted bids using a slider that ranged from 0 to 2,000 TRICOINS without the option to submit bids below one TRICOIN. In the contracted scale condition, participants submitted bids using a slider that ranged from 0 to 20 TRICOINS that allowed participants to submit bids in hundredths of TRICOINS. We allowed bids in hundredths of TRICOINS in this condition so that respondents could make equivalent bids in US dollars compared to the large nominal value condition. Thus, in each condition the maximum bid was the equivalent of $200 and the bidding increment was the equivalent of $.10. After submitting a bid on the camera, participants were shown a picture and description of the second product, a Fitbit Charge wireless wristband, and asked to submit bids using the same slider.

Respondents who participated in the auction and those who opted out then completed the four-item Tightwad-Spendthrift scale (Rick et al. 2008; $\alpha = .64$), which served as a measure of restraint. The scale classifies people as spendthrifts (i.e., unrestrained spenders) at the high end of the scale and as tightwads (i.e., restrained spenders) at the low end of the scale.

Results

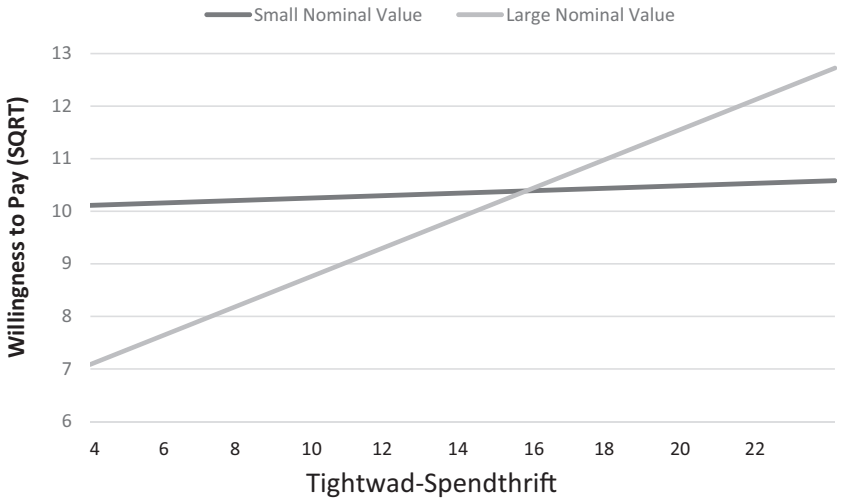
Sixty-four respondents declined to participate in the auction and two participants did not submit a bid on any item. This attrition leaves us with a final sample of 163 respondents for our analysis of spending. To ensure that there were no differences in opt-out rates for those high versus low in restraint, we ran an ANOVA with opted out (vs. not) as the factor and restraint as the dependent variable. There was no difference in restraint between those who did ($M = 13.42$) and did not opt out ($M = 13.21$; $F(1, 227) = .10$; $p = .76$).

We created a measure of spending by combining respondents' bids on both products and then converting the bids to US dollars. Because this variable was not normally distributed, we transformed the responses using a square root transformation. We analyzed spending using regression with currency, restraint, and their interaction as the independent variables. The effect of currency was insignificant ($\beta = -.63$, $t(159) = -.99$; $p = .32$) and the effect of restraint was significant, such that restrained consumers submitted lower bids than those higher in restraint ($\beta = .16$, $t(159) = 2.31$; $p = .02$). Importantly, this significant effect was qualified by the predicted currency by restraint interaction ($t(159) = 2.05$; $p = .04$; see figure 1). Restrained consumers submitted lower bids than those higher in restraint in the large nominal value condition ($\beta = .31$, $t(159) = 2.95$; $p < .01$), but not in the small nominal value condition ($\beta = .02$, $t(159) = .22$; $p = .82$).

We used the Johnson-Neyman technique, or "floodlight" analysis (Spiller et al. 2013), to decompose the interaction and identify the region on the Tightwad-Spendthrift scale where the simple effect of the nominal value of the currency was significant. We found that participants spent more when the nominal value of the currency was small rather than large for any tightwad-spendthrift score of 10.19 or below ($\beta = 1.51$, $p = .05$; 29.7% of respondents), which is a value that would classify someone as a

FIGURE 1

THE IMPACT OF NUMEROSITY AND RESTRAINT ON WILLINGNESS TO PAY



restrained spender based on prior literature (tightwads score 11 or below on this scale; Rick et al. 2008). The nominal value of the currency did not significantly affect spending for any score above this threshold.

Discussion

The findings of study 1 support our prediction that consumers high in restraint are more likely to be biased by the numerosity of cost information. Specifically, respondents who were predisposed to be highly focused on restraining their spending displayed less spending control when the nominal value of the currency was small versus large, a result that is consistent with the face value effect. The nominal value of the currency did not influence consumers who were less focused on restraint. Moreover, the findings demonstrate that restrained consumers display greater self-control compared to unrestrained consumers when the numerosity of cost information is high, but not when it is low. The next study sought to replicate our findings in a different self-control domain.

STUDY 2

The objective of the second study was to test the generalizability of our findings by examining the effect of numerosity on a consequential decision in the eating domain. Instead of measuring restraint and to provide stronger evidence for a causal relationship, we primed (vs. did not prime) participants to be highly focused on restraining their eating before having them make an unhealthy food choice decision. We expected participants highly focused on restraint to be more likely to make an unhealthy choice when nutritional information is presented on a contracted scale compared to an expanded scale. Moreover, we expected the scale on which nutritional information is presented to have less of an effect on unrestrained participants.

Method

Participants and Design. One hundred fifty-one undergraduates participated in the study for a small payment. The study was a 2 (nutritional information: contracted scale vs. expanded scale) $\times$ 2 (restraint: high vs. low) between-subjects design.

Procedure. Respondents were instructed that they were participating in two unrelated studies. The first study served as a manipulation of eating restraint. Participants in the high restraint condition were given five sentences to unscramble where the words in the sentence were associated with eating restraint (fit, thin, healthy, diet, restraint). Participants in the low restraint condition were given five sentences to unscramble where the words in the sentence were not associated with eating restraint (see the web appendix for additional details).

The second, purportedly unrelated, study examined how people respond to a new food scoring system called FSCORE. The system was described as a scoring system that takes into account the various aspects of a food item (e.g., calories, fat) to create an FSCORE, with larger scores indicating that the item is unhealthier. To provide them with information about the FSCORE scale, participants were then instructed that the average person typically

consumes 420 (42,000) FSCORE points per day in the contracted (expanded) scale condition. On the next screen, respondents were shown the FSCORE and a picture of a Snickers bar and asked to consider the food item. The FSCORE was 45 (4,500) points in the contracted (expanded) scale condition. Although our main dependent variable was a choice between a Snickers bar and a package of dried fruit, we had respondents initially evaluate the Snickers bar in isolation and did not provide them with the nutritional information about the other snack. We did this because previous research has found that when people are presented with numerical product information for multiple items, they initially compute the difference between the information before determining the meaning of the information (Pandelaere et al. 2011). Not only is this a different cognitive process than assessing a single product in isolation, it is also one that is likely to be more cognitively demanding. After choosing their snack, participants completed several filler questions about the FSCORE system. They then indicated their agreement with the statement "I am focused on restraining my eating" (1 = "strongly disagree" and 7 = "strongly agree"), which served as a manipulation check for the restraint manipulation.

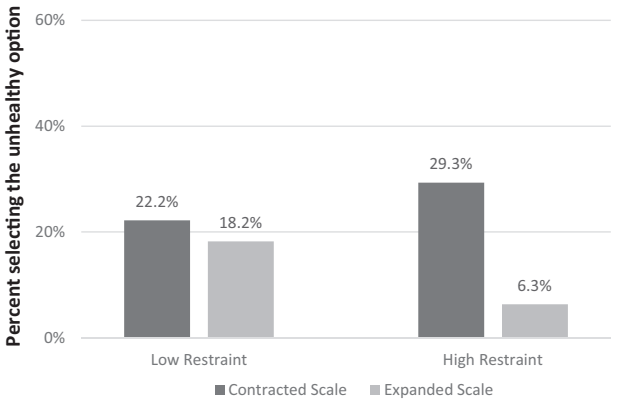
Results

Manipulation Check. Two participants did not complete the restraint manipulation check. Confirming the restraint manipulation, participants in the high restraint condition were more focused on restraining their eating ($M = 4.86$) compared to those in the low restraint condition ($M = 4.19$; $F(1, 145) = 4.42$; $p < .05$).

Unhealthy Choice. We examined the likelihood of making an unhealthy choice using logistic regression. The dependent variable was unhealthy choice, coded as 1 if participants selected the Snickers and 0 if they selected the dried fruit. The independent variables were restraint, nutritional information, and their interaction. The main effects of restraint (Wald's $\chi^2 = 1.20$, $p = .27$) and nutritional information (Wald's $\chi^2 = .19$, $p = .66$) were insignificant. However, the predicted restraint by nutritional information interaction was significant ($\beta(1) = -2.08$, $\text{Exp}(\beta) = .125$, Wald's $\chi^2 = 4.39$, $p = .04$; see figure 2). As predicted, in the high restraint condition, participants were more likely to select the Snickers when the nutritional content (i.e., FSCORE) was presented on a contracted scale (29.3%) compared to an expanded scale (6.3%; $\beta(1) = -1.83$, $\text{Exp}(\beta) = .161$, Wald's $\chi^2 = 5.12$, $p = .02$). Additionally, in the low restraint condition, there was no difference in participants' preference for the Snickers when the nutritional content was presented on a contracted scale (22.2%) compared to an expanded scale (18.2%; Wald's $\chi^2 = .19$, $p = .66$). We also examined the effect of restraint between

FIGURE 2

THE IMPACT OF NUMEROSITY AND RESTRAINT ON CHOICE OF UNHEALTHY OPTION



nutritional information conditions. Consistent with the results of study 1, participants high in restraint exercised greater self-control when the nutritional information was presented in an expanded scale ($\beta(1) = -1.46$, $\text{Exp}(\beta) = .233$, Wald's $\chi^2 = 3.20$, $p = .07$), but not when it was presented on a contracted scale (Wald's $\chi^2 = 1.20$, $p = .27$).

Discussion

The findings of study 2 provide additional support for our theory that restrained consumers are more likely to be biased by the numerosity of cost information during self-control decisions. Priming individuals to be focused on restraining their eating led them to display less self-control when the nutritional information was presented on a contracted scale with small numbers compared to an expanded scale with large numbers. As in study 1, the numerosity of cost information did not influence consumers who were less focused on restraint.

STUDY 3

We propose that restrained consumers are more biased by the numerosity of cost information during self-control decisions because of the threat posed by the situation (i.e., anticipated negative emotions). Although the results of the previous studies are consistent with our theory, an alternative explanation would suggest that cost information is simply more important to restrained consumers and that self-control does not play a role. The objective of study 3 was to rule out this alternative explanation by demonstrating that restrained consumers are more reliant on numerosity than unrestrained consumers during self-control decisions, but not when making judgments that do not

involve self-control. To accomplish this, we manipulated the extent to which consumers were focused on restraining their spending prior to making a product judgment that either involved self-control (e.g., purchase intent) or did not involve self-control (e.g., perceived value). Because assessments of perceived value do not involve self-control, we did not expect restraint to moderate participants' response to the numerosity of cost information for this type of judgment.

Method

Participants and Design. Three hundred fifty-six participants from MTurk participated in the study in exchange for a small payment. The study was a 2 (currency: small nominal value vs. large nominal value) × 2 (restraint: high vs. low) × 2 (judgment type: purchase intent vs. perceived value) between-subjects design.

Procedure. Respondents were instructed that the purpose of the study was to understand consumers' spending decisions. In the low restraint condition, they were told that they had recently moved to a new country where the local currency was the KEN and they were considering purchasing a new television. Participants in the small nominal value condition were instructed that one KEN was equal to $10 and those in the large nominal value condition were told that 10 KEN was equal to $1. Thus, similar to study 1, it was relatively easy to convert prices to US dollars. On the next screen, respondents were then told that they were considering purchasing a 55-inch Samsung television. The price of the television was 58 KEN in the small nominal value condition and 5,800 KEN in the large nominal value condition. Thus, the price was equivalent to $580 dollars in both conditions. The instructions for the high restraint condition were identical to those of the low restraint condition except participants were told that any purchases made would come from money set aside in their savings account. We expected this to increase respondents' spending restraint because consumers often mentally label money set aside for savings as "off limits" in order to avoid spending the money (Thaler 1999).

In the purchase intent condition, participants then indicated how likely they would be to purchase the television on a seven-item scale (1 = "not at all likely" and 7 = "very likely"), a measure of the dependent variable in this condition. In the perceived value condition, participants indicated how good of a deal they perceived the television to be on a seven-point scale (1 = "not at all a good deal" and 7 = "a very good deal"), a measure of the dependent variable in this condition.

After responding to the dependent measure, participants completed a three-item manipulation check for the restraint manipulation: "how focused were you on controlling your spending?", "how focused were you on restricting your spending?" and "how focused were you on restraining your spending?" (1 = "not at all" and 7 = "very much"; $\alpha = .94$).

Results

Manipulation Check. Confirming the restraint manipulation, an ANOVA with currency, restraint, and judgment type as the factors found a main effect of restraint such that participants in the high restraint condition were more focused on restraining their spending ($M = 5.62$) compared to those in the low restraint condition ($M = 5.22$; $F(1, 348) = 6.17$; $p = .01$).

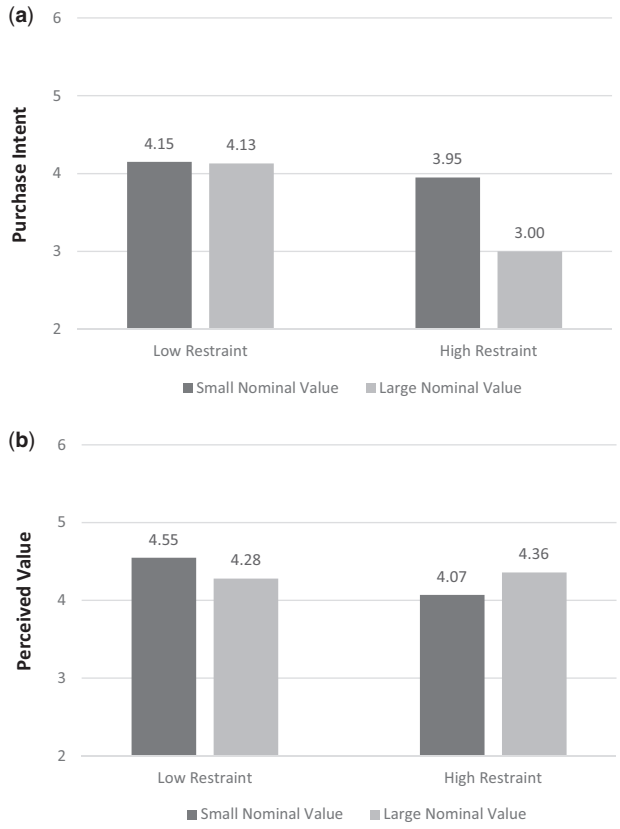
Product Judgment. An ANOVA found significant main effects of restraint ($F(1, 348) = 5.79$; $p = .02$, $\eta_p^2 = .016$) and judgment type ($F(1, 348) = 8.03$; $p < .01$, $\eta_p^2 = .023$). The effect of currency was insignificant ($F(1, 348) = 1.78$; $p = .18$). The predicted currency × restraint × judgment type (three-way) interaction on product judgment was significant ($F(1, 348) = 4.35$; $p = .04$, $\eta_p^2 = .012$). Consistent with previous studies, in the purchase intent condition (see figure 3a), participants high in restraint were more likely to make a purchase when the nominal value was small ($M = 3.95$) versus large ($M = 3.00$; $F(1, 348) = 6.48$; $p = .01$, $\eta_p^2 = .018$). For those low in restraint, there was no significant difference in purchase intent between the small ($M = 4.15$) and large nominal value conditions ($M = 4.13$; $F(1, 348) = .01$; $p = .95$). In the perceived value condition (see figure 3b), there was no significant difference between the small ($M = 4.07$) and large ($M = 4.36$; $F(1, 348) = .69$; $p = .41$) nominal value conditions for those high in restraint. Similarly, the difference in perceived value between the small ($M = 4.55$) and large nominal value conditions ($M = 4.28$; $F(1, 348) = .01$; $p = .95$) was also insignificant for those low in restraint. The fact that the nominal value of the currency did not influence perceived value was likely due to the ease of converting prices into US dollars since the exchange rate was provided just before the decision. Despite this, however, participants high in restraint were still susceptible to the nominal value of the currency when the judgment involved self-control.

Discussion

The findings of study 3 provide additional support for our theory by demonstrating that consumers situationally primed to be highly focused on restraining their spending are more likely to be biased by the numerosity of cost information during judgments that involve self-control (i.e., purchase intent). In contrast, the results show that restrained consumers are not more reliant on numerosity than unrestrained consumers during judgments of perceived value. These findings rule out the possibility that restrained consumers are more biased by numerosity simply because they find cost information more important.

FIGURE 3

THE IMPACT OF NUMEROSITY AND RESTRAINT BY JUDGMENT TYPE



STUDY 4

We propose that restrained consumers' reliance on numerosity influences their self-control because they regulate their behavior by anticipating negative emotions. If this is the case, then consumers should display less (more) self-control when cost information is presented on a contracted (expanded) scale because they anticipate that they will experience less (more) intense negative emotions from consumption. The primary objective of study 4 was to demonstrate this mechanism on restrained eaters who typically make food decisions by anticipating the guilt from eating unhealthy foods. Specifically, we sought to demonstrate that restrained eaters will anticipate experiencing less guilt and, therefore, will be more likely to eat unhealthy food items when nutritional information is presented on a contracted scale (vs. expanded scale).

Method

Participants and Design. One hundred seventy respondents from MTurk participated in the study in exchange for a small payment. The study was a 2 (nutritional information: contracted scale vs. expanded scale) × 2 (restraint: high vs. low) between-subjects design with nutritional information manipulated and a continuous measure of restraint.

Procedure. Respondents were instructed that the purpose of the study was to examine how people respond to a new food scoring system called FSCORE. The system description and scale information (i.e., average daily limit) was the same as in study 2. Immediately after receiving the scale information, respondents were told to imagine that they were considering eating a slice of pizza for lunch and to take a moment to consider their decision. As they were considering their decision, they were shown a picture of a slice of pizza and given the FSCORE. In the contracted scale condition, respondents were instructed that the slice of pizza has an FSCORE of 80, and in the expanded condition, they were told that the slice of pizza has an FSCORE of 8,000. Participants then indicated how likely they would be to eat pizza for lunch (1 = "not at all" and 7 = "very likely").

Afterward, we measured anticipated guilt by having participants indicate how intensely they expected to experience a range of positive and negative emotions from eating the pizza (1 = "not intense at all" and 7 = "very intense"), including guilt and shame ($r = .80$), which served as a measure of guilt. Finally, participants completed the 10-item Restraint scale (Polivy, Herman, and Warsh 1978; $\alpha = .78$), which served as a measure of restraint. Higher numbers on this scale indicate a greater focus on restraint.

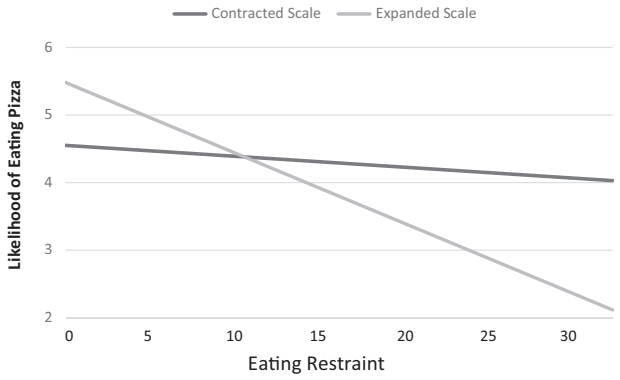
Results

Unhealthy Eating. We examined unhealthy eating using regression with nutritional information, restraint, and their interaction as the independent variables. The effect of nutritional information was insignificant ($\beta = -.40$, $t(166) = -1.41$; $p = .16$) and the effect of restraint was significant ($\beta = -.06$, $t(166) = -2.69$; $p < .01$). Importantly, this effect was qualified by a significant nutritional information by restraint interaction ($t(166) = -1.98$; $p = .05$; see figure 4). Consistent with the results of previous studies, restrained eaters were less likely to eat the pizza than those less focused on restraint when the nutritional information was presented on an expanded scale ($\beta = -.11$, $t(166) = -3.03$; $p < .01$), but not when the information was presented on a contracted scale ($\beta = -.02$, $t(166) = -.57$; $p < .57$).

We decomposed this interaction using floodlight analysis to identify the regions on the restraint scale where the simple effect of the nutritional information was significant. We found that for restraint scores of 16.17 or above (30% of respondents), participants were more likely to eat the pizza when the nutritional information was presented on a

FIGURE 4

THE IMPACT OF NUMEROSITY AND RESTRAINT ON THE LIKELIHOOD OF EATING UNHEALTHY FOOD



contracted scale compared to an expanded scale ($\beta = .60$, $p = .05$). Notably, research typically classifies someone as a restrained eater when she scores 15 or above on this scale (McFarlane, Urbszat, and Olmsted 2011). The scale on which nutritional information was presented did not significantly affect the likelihood of eating the pizza for any score below this threshold.

Mediation. A regression with nutritional information, restraint, and their interaction as the independent variables and anticipated guilt as the dependent variable found a significant effect of restraint ($\beta = .14$, $t(166) = 6.89$; $p < .001$) and an insignificant effect of nutritional information ($\beta = .18$, $t(166) = .73$; $p = .47$). The expected nutritional information by restraint interaction on anticipated guilt was significant ($t(166) = 2.23$; $p = .03$). A floodlight analysis found that participants expected to feel less guilty about eating the pizza when nutritional information was presented on a contracted scale compared to an expanded scale for restraint scores of 19.06 or above ($\beta = -.64$, $p = .05$; 24% of respondents). However, the nutritional information scale did not significantly affect guilt for scores below this threshold.

We tested whether anticipated guilt mediated the effect of nutritional information on unhealthy eating for respondents high versus low in restraint using conditional process modeling (Hayes 2013; model 8 with 5,000 bootstrap resamples). For participants high in restraint, the indirect effect of nutritional information through anticipated guilt was significant with a confidence interval that did not include zero (indirect effect = –.30, 95% CI [–.6680, –.0079]), which supports mediation. For participants low in restraint, the indirect effect of nutritional information through anticipated guilt was not significant with a confidence interval that included zero (indirect effect = .16, 95% CI [–.0655, .4503]), which does not support mediation. The index of moderated mediation for the proposed model was significant (Index = –.04, 95% CI [–.0790, –.0095]).

Discussion

The results of study 4 demonstrate that restrained consumers regulate their behavior by anticipating negative emotions. As a result, they display less self-control when cost information is presented on a contracted (vs. an expanded) scale because they anticipate that they will experience less intense negative emotions from consumption. As in previous studies, the numerosity of cost information did not influence those who were less focused on restraint. The purpose of the next study was to provide evidence that restrained consumers are more reliant on numerosity because they experience a narrowing of attention during self-control decisions.

STUDY 5

If attention narrowing explains why restrained consumers' self-control is more biased by numerosity, then the effect of numerosity on their self-control should be reduced when they experience a broadening of their attentional scope. To test this prediction, we primed (vs. did not prime) restrained consumers to experience a broadening of attention prior to making a self-control decision. When restrained consumers did not experience a broadening of attention, we expected to replicate the findings in study 4. However, when restrained consumers experienced a broadening of attention, we expected this effect to be reduced. A second objective was to demonstrate that these findings would emerge when individuals were exposed to actual cost information (i.e., nutritional information). Specifically, we manipulated the numerosity of nutritional information by providing individuals with the energy content of an unhealthy food item where the units were expressed in either kilocalories (contracted scale) or kilojoules (expanded scale).

Method

Participants and Design. Two hundred ninety-seven respondents from MTurk participated in the study in exchange for a small payment. The study was a 2 (nutritional information: contracted scale vs. expanded scale) × 2 (attentional scope: broad vs. control) between-subjects design.

Procedure. Respondents were instructed that they would be participating in several unrelated studies. At the beginning of the session, participants were told that they would be asked to make some decisions related to food consumption later on in the session. They were then asked to read a passage that described how the energy content in

food can be expressed as either kilocalories or kilojoules and that the average person typically consumes approximately 2,200 kilocalories or 9,200 kilojoules each day. The passage also gave them the conversion rate from kilocalories to kilojoules (1 kilocalorie is equal to 4.18 kilojoules). We had them read this passage to make it easy for participants to interpret the cost information that would be subsequently provided. This was important because kilocalories (i.e., calories) are more familiar to respondents in the United States, where this study was conducted. To ensure that respondents paid attention to the passage, participants were administered a comprehension check that asked them to select a number (2, 5, 8, or 12) that approximated how many kilojoules (8) was equal to 2 kilocalories. Sixty-eight people who failed this check were excluded from subsequent analysis, leaving us with a final sample of 229 participants. We did not find any significant differences in the likelihood of being excluded across conditions.

All participants were then induced to be highly focused on restraining their eating using the high restraint manipulation in study 2. Afterward, they were administered a broadening of attention manipulation that was adopted from previous research (Gable and Harmon-Jones 2012), which was purportedly a study examining how people process images. Participants were told that they would see a series of large letters that were made up of small letters (i.e., Navon letters). In the broad attentional scope condition, they were instructed that their task was to identify the large letter that is made up of the small letters. In the control condition, participants were instructed that their task was to identify either the small or large letter. Participants then completed 15 trials of the letter identification task where they were shown different images of Navon letters in sequential order. We expected that participants instructed to identify only the large letters would subsequently have a broader attentional scope compared to the control condition.

After completing the attentional scope manipulation, participants were instructed to imagine that they were considering having a snack and were thinking about having a candy bar. They were given the energy content of the candy bar in either kilocalories (240) or kilojoules (1,005). Participants then indicated how likely they would be to eat the candy bar (1 = "not at all" and 7 = "very much"). We then measured anticipated guilt using the same scales as in study 4 ($r = .77$).

Results

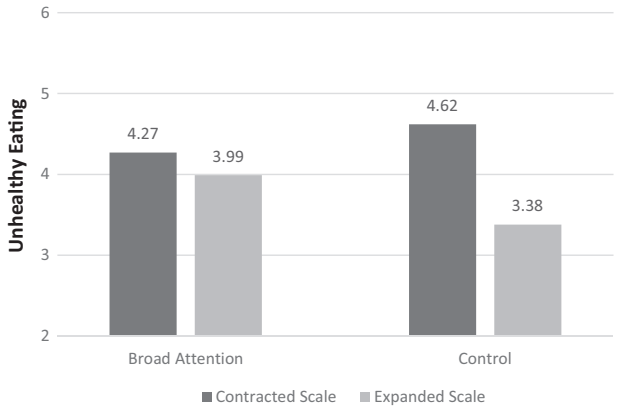
Pretest. We conducted a pretest on 177 respondents from the same panel as the main study to ensure that having individuals classify the large image during the attentional scope manipulation leads them to display a broader attentional scope. Participants in the broad and control conditions received the same manipulations from the main study. Participants in a third, baseline condition did not receive an attentional scope manipulation. Respondents then completed the eight-item global-local visual processing task (Fredrickson and Branigan 2005), which measures the breadth of attention. The task requires individuals to make eight decisions. During each decision they are presented with three figures: one figure on top (the target) and two figures on the bottom. Each decision involves choosing one of the figures on the bottom that is perceived to be most similar to the target. One of the bottom figures is more like the target on local details, so the selection of this figure is associated with a narrower attention (Fredrickson and Branigan 2005; see the web appendix for additional details). The other figure is more like the target on global details, so the selection of this figure is associated with a broader attention. We recorded the number of times participants selected a figure that was associated with a broad attentional scope as a measure of the breadth of attention. An ANOVA found that participants in the broad condition experienced a broader attention scope ($M = 6.90$) compared to those in the control ($M = 5.78$; $F(1, 174) = 3.97$; $p < .05$) and the baseline conditions ($M = 5.37$; $F(1, 174) = 9.35$; $p < .01$). There was no significant difference in attentional scope between the control and baseline conditions ($F(1, 174) = .59$; $p = .44$).

Unhealthy Eating. The main effect of nutritional information was significant ($F(1, 225) = 10.67$; $p < .01$, $\eta_p^2 = .045$) whereas the main effect of attentional scope was not significant ($F(1, 225) = .30$; $p = .59$). More importantly, the predicted nutritional information by attentional scope interaction on the unhealthy eating was significant ($F(1, 225) = 4.19$; $p = .04$, $\eta_p^2 = .018$; see figure 5). Consistent with previous studies, in the control condition, participants who were primed to be high in restraint were more likely to eat the candy bar when nutritional content was presented on a contracted scale ($M = 4.62$) compared to an expanded scale ($M = 3.38$; $F(1, 225) = 13.68$; $p < .001$, $\eta_p^2 = .057$). As expected, in the broad attentional scope condition, the effect of numerosity on unhealthy eating was reduced such that there was no significant difference in participants' likelihood of eating the candy bar when nutritional content was presented on a contracted scale ($M = 4.27$) compared to an expanded scale ($M = 3.99$; $F(1, 225) = .77$; $p = .38$).

Mediation. While the main effects of nutritional information ($F(1, 225) = .64$; $p = .42$) and attentional scope ($F(1, 225) = 1.17$; $p = .28$) were insignificant, the predicted nutritional information by attentional scope interaction on consumers' anticipated guilt was significant ($F(1, 225) = 4.30$; $p = .04$, $\eta_p^2 = .019$). In the neutral condition, restrained consumers anticipated feeling less guilty when nutritional content was presented on a contracted scale ($M = 2.80$) compared to an expanded scale ($M = 3.49$; $F(1, 225) = 4.00$; $p < .05$, $\eta_p^2 = .017$). In the broad attentional

FIGURE 5

THE IMPACT OF NUMEROSITY AND ATTENTION BROADENING ON UNHEALTHY EATING



scope condition, there was no significant difference in restrained consumers' anticipated guilt when nutritional content was presented on a contracted scale ($M = 3.04$) compared to an expanded scale ($M = 2.73$; $F(1, 225) = .84$; $p = .36$).

A mediation analysis (Hayes 2013; model 8 with 5,000 bootstrap resamples) found that in the control condition, the indirect effect of nutritional information on unhealthy eating through anticipated guilt was significant with a confidence interval that did not include zero (indirect effect = –.11, 95% CI [–.2524, –.0025]), which supports mediation. In the broad condition, the indirect effect of nutritional information on unhealthy eating through anticipated guilt was not significant with a confidence interval that included zero (indirect effect = .05, 95% CI [–.0502, .1673]), which does not support mediation. The index of moderated mediation for the proposed model was significant (Index = .16, 95% CI [.0200, .3547]).

Discussion

The results of study 5 support our theory that restrained consumers are more reliant on the numerosity of cost information during self-control decisions because they experience a narrowing of attention. Consistent with the findings of study 4, restrained consumers in the control condition displayed lower self-control when the numerosity of nutritional information was presented on a contracted (vs. expanded) scale because they anticipated experiencing less intense negative emotions from consumption. However, broadening consumers' attention at the time of judgment reduced the influence of numerosity on self-control. The objective of the next studies (6A–C) was to provide additional support for our theoretical process by employing an experimental-causal-chain design approach (Spencer, Zanna, and Fong 2005).

STUDY 6A

We propose that restrained consumers are more biased by numerosity because they regulate their behavior by anticipating negative emotions during self-control decisions, which narrows their attention. The purpose of study 6A was to establish the first stage in this theoretical process by demonstrating that restrained consumers are more focused on anticipated negative emotions during a self-control decision.

Method

Participants and Design. One hundred twenty-two respondents from MTurk participated in the study in exchange for a small payment. The study employed a two-group (restraint: high vs. low) between-subjects design.

Procedure. Respondents were told that they had recently moved to a new country and had to make purchases for their apartment. As in study 3, participants in the high restraint conditions were told that they would be using money from their savings account, while those in the low restraint condition were not given this information. Respondents were then told to imagine that they were considering purchasing a 55-inch Samsung television for $580 and to spend a moment thinking about the decision to buy the television. The submit button was disabled for three seconds.

On the next screen, participants were asked to indicate the extent to which they were focused on how painful it would be to spend money when they were considering the television purchase (1 = "not at all" and 7 = "very much"), which served as our measure of focus on anticipated negative emotions. Afterward, participants completed the same restraint manipulation check as study 3 ($\alpha = .87$). We eliminated one person from our analysis for taking a long break (more than 13 minutes) between the manipulation and the dependent measure, leaving us with a final sample of 121 respondents.

Results

Manipulation Check. We assessed the efficacy of our manipulation using ANOVA. Consistent with previous studies, there was a significant effect of restraint such that participants in the high restraint condition were more focused on restraining their spending ($M = 5.47$) compared to those in the low restraint condition ($M = 4.93$; $F(1, 119) = 3.90$; $p = .05$).

Focus on Anticipated Negative Emotions. The effect of restraint on focus on negative emotions was significant

($F(1, 119) = 7.04$; $p < .01$, $\eta_p^2 = .056$). As expected, individuals high in restraint were more focused on negative emotions ($M = 5.22$) while they were considering the decision to purchase the television compared to those low in restraint ($M = 4.39$). Thus, the results support the first stage of our theoretical process by demonstrating that restrained (vs. unrestrained) consumers are more focused on anticipated negative emotions during self-control decisions.

STUDY 6B

The objective of study 6B was to provide evidence for the second stage in our causal chain by demonstrating that when consumers regulate their behavior by anticipating negative emotions, they experience a narrowing of their attention during self-control decisions.

Method

Participants and Design. One hundred twenty respondents from MTurk participated in the study in exchange for a small payment. The study was a two-group (focus on anticipated negative emotions: high vs. low) between-subjects design.

Procedure. Respondents were told that they had recently moved to a new country and had to make purchases for their apartment. They were then told to imagine that they were considering purchasing a 55-inch Samsung television for $580. In the low focus on anticipated negative emotions condition, individuals were told to spend a moment thinking about the decision to buy the television. In the high focus on anticipated negative emotions condition, participants were instructed to think about how painful it would be to spend money on the television. The submit button was disabled for three seconds in both conditions.

After considering the television purchase decision, respondents completed the same eight-item global-local visual processing task from the pretest in study 5, which served as a measure of breadth of attention. Participants then indicated the extent to which they were focused on how painful it would be to spend money when they were considering the television. This measure served as a manipulation check for the focus manipulation (1 = "not at all" and 7 = "very much").

Results

Manipulation Check. Confirming the efficacy of our focus manipulation, participants in the high focus on anticipated negative emotions condition were more focused on how painful it would be to spend money on the television ($M = 5.27$) compared to those in the low focus on anticipated negative emotions condition ($M = 4.26$; $F(1, 118) = 9.71$; $p < .01$).

Breadth of Attention. We analyzed breadth of attention using ANOVA. As predicted, participants in the high focus on anticipated negative emotions condition displayed a narrower scope of attention ($M = 4.21$) compared to those in the low focus on anticipated negative emotions condition ($M = 5.47$; $F(1, 118) = 4.55$; $p = .03$, $\eta_p^2 = .037$). These results support the second stage of our causal chain that focusing on anticipated negative emotions during self-control decisions results in a narrowing of attention.

STUDY 6C

In study 6C, we wanted to support the last stage of our causal chain by demonstrating that a narrower scope of attention makes consumers more reliant on numerosity for judgment. To accomplish this, we manipulated the breadth of attention prior to having participants make a spending decision. We expected participants' spending to be more biased by the nominal value of the currency when their attention was narrower (vs. broader).

Method

Participants and Design. Two hundred-fifty respondents from MTurk participated in the study in exchange for a small payment. The study was a 2 (attentional scope: narrower vs. control) × 2 (nominal value: small vs. large) between-subjects design.

Procedure. Respondents were told that they would be participating in several studies examining how they process images and spend money. The session began with instructions for a "spending study" that informed them that they had recently moved to a new country and had to make purchases for their apartment. They were further informed that the local currency was called the KEN. In the small nominal value condition, one KEN was equal to 10 US dollars; in the large nominal value condition, 10 KEN was equal to 1 US dollar. Thus, consistent with previous studies, it was relatively easy to covert prices into US dollars. Participants were then informed that prior to making their purchases they would be administered a pretest for a future study on memory. They were told that they would be shown a series of images and asked to recall the images later on in the study. After receiving these instructions, participants were shown five images of animals in sequential order. Each image was presented on the screen for three seconds. In the control condition, the images of the animals were benign (e.g., a cute bear), whereas in the narrower condition, the images of the animals were threatening (e.g., a growling bear). Based on previous research demonstrating that simply exposing people to threatening images narrows attention (Van Steenbergen et al. 2011; see the web appendix for additional details), we expected participants exposed to the threatening animal images to experience a narrowing of

attention. After viewing the images, respondents were administered the same television purchase decision from study 3, which served as our dependent measure. As in study 3, the price of the television was 58 KEN in the small nominal value and 5,800 in the large nominal value condition.

Results

Pretest. One hundred twenty respondents from the same pool as the main study participated in a study to assess the efficacy of the attentional scope manipulation. Respondents were administered the same image recall study as the main study, which presented individuals with either benign or threatening images of animals. Afterward, we measured the breadth of attention using the same measure as in study 6B. An ANOVA found that participants in the narrower condition experienced a narrower scope of attention ($M = 4.78$) compared to those in the control condition ($M = 6.11$; $F(1, 118) = 6.23$; $p = .01$).

Purchase Intent. We analyzed purchase intent using ANOVA with nominal value and attentional scope as factors. The main effect of nominal value was significant ($F(1, 246) = 5.56$; $p = .02$, $\eta_p^2 = .022$) and the main effect of attentional scope was not significant ($F(1, 246) = 2.09$; $p = .15$). The predicted nominal value by attentional scope interaction on spending was significant ($F(1, 246) = 4.50$; $p = .03$, $\eta_p^2 = .018$; see figure 6). As expected, participants in the narrower condition were more likely to purchase the television in the small nominal value condition ($M = 4.48$) compared to those in the control condition ($M = 3.56$; $F(1, 246) = 10.03$; $p < .01$, $\eta_p^2 = .039$). However, in the control condition there was no difference in spending between the small ($M = 4.34$) and large ($M = 4.30$) nominal value conditions ($F(1, 246) = .05$; $p = .82$).

Discussion

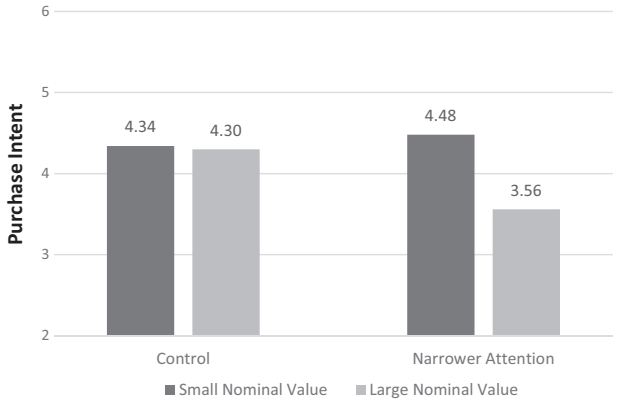
Using a causal chain approach (Spencer, Zanna, and Fong 2005), the results of studies 6A–C provide support for our theoretical process. The results show that restrained (vs. unrestrained) consumers are more focused on anticipated negative emotions during self-control decisions (study 6A). When individuals are focused on anticipated negative emotions during self-control decisions, they experience a narrowing of attention (study 6B). Finally, a narrower scope of attention was shown to make consumers more likely to rely on numerosity as a cue for judgment (study 6C).

GENERAL DISCUSSION

This research examines how differences in restraint affect consumers' propensity to be biased by the numerosity of cost information during self-control decisions. We show

FIGURE 6

ATTENTION NARROWING MAKES CONSUMERS MORE RELIANT ON NUMEROSITY



that consumers high (vs. low) in restraint are more susceptible to the numerosity of cost information (studies 1–5). As a result, restrained consumers display less self-control because they anticipate feeling less intense negative emotions from consumption when cost information is presented on a contracted scale compared to an expanded scale (studies 4 and 5). This occurs because their greater focus on anticipated negative emotions during self-control decisions (study 6A) narrows their attention (study 6B), which makes them more likely to rely on numerosity as a cue for judgment (study 6C). Importantly, we find that broadening restrained consumers' attention makes them less susceptible to numerosity (study 5).

Our research contributes to extant research investigating the relationship between numerosity and self-control. Although previous research (Pandelaere et al. 2011; Raghubir and Srivastava 2002) has demonstrated that the scale on which cost information is presented can bias self-control decisions, these studies did not consider how the motivational processes involved in such decisions affect their propensity to be biased by numerosity. The current research extends earlier research by demonstrating that the influence of numerosity on consumption decisions is contingent on whether consumers are concerned about restraining their consumption. When consumers are concerned about restraint, their narrow scope of attention leads them to focus on cost information without considering other information that is relevant for judgment, such as the meaning of cost information (e.g., price in one's home currency). However, when consumers are less concerned about restraint, and therefore do not experience a narrowing of attention, they consider more information that is relevant for judgment. As a result, they are less likely to base their judgment solely on the numerosity of cost information. In demonstrating this, we show that individual

differences that make people more focused on restraining their behavior also make them more susceptible to numerosity. To the best of our knowledge, this research is the first to demonstrate that individual differences affect consumers' propensity to be biased by numerosity.

It should be noted that we did not find that the numerosity of cost information had a significant effect on self-control when participants were not highly focused on restraint. However, this finding is not necessarily inconsistent with previous research, which has found that the numerosity of cost information can bias unrestrained consumers (Pandelaere et al. 2011; Raghubir and Srivastava 2002; Shen and Urminsky 2013; Wertenbroch, Soman, and Chattopadhyay 2007). In our studies, participants evaluated products in isolation immediately after receiving information about the cost information scale. Previous research either did not provide respondents with information about the cost information scale prior to judgment (Shen and Urminsky 2013, study 1) or had respondents evaluate multiple (as many as 20) products at the same time (Pandelaere et al. 2011; Raghubir and Srivastava 2002; Wertenbroch et al. 2007); either one of these factors would be expected to make it harder for respondents to rely on the meaning of cost information during judgment and make them more susceptible to numerosity. Thus, our findings in the unrestrained conditions are consistent with previous research showing that the numerosity effect does not emerge when it is easy to interpret cost information (Bagchi and Davis 2012). However, it is possible that other differences in our study designs, such as the lack of a salient budget, may have also played a role in our findings. Thus, future research is necessary to fully understand the factors that make people more or less biased by the numerosity of cost information.

Our findings also build on the research of Ulkumen and Thomas (2013) examining how duration framing influences consumers' willingness to adopt self-improvement plans. They find that consumers are less likely to adopt a self-improvement plan when the plan is framed as a one-year (vs. a 12-month) plan because consumers infer that a plan with a longer time period (e.g., one year) is harder to accomplish. Moreover, their effects primarily emerge when adopting the plan is personally relevant. Our findings are consistent with theirs because higher levels of restraint may be associated with greater personal relevance during self-control decisions. However, our research is different from theirs in several ways. First, they examine the decision to adopt a goal (e.g., a diet), whereas we study situations that present a threat to a goal (e.g., spending from one's savings account). Second, they show that numerosity influences self-control decisions by affecting people's confidence in achieving a goal, while we show that numerosity influences self-control through the anticipated negative emotions from failing at goal pursuit. Finally, they demonstrate that process-focused simulation determines why personal relevance makes people more susceptible to numerosity, whereas we demonstrate that attention narrowing in response to threat explains restrained consumers' response to numerosity.

The current findings also contribute to research examining how consumers who are high (vs. low) in restraint respond to situations involving self-control. In particular, several studies find that dieters tend to be more susceptible to external cues compared to nondieters (Carels, Konrad, and Harper 2007), including packaging and serving sizes (Coelho do Vale, Pieters, and Zeelenberg 2008; Scott et al. 2008), as well as the name of food (Irmak et al. 2011). Consistent with these studies, we find that restrained consumers are more susceptible to external cues (i.e., the numerosity of cost information). However, we extend this research by demonstrating that this propensity is not limited to dieters. Specifically, we showed that participants situationally primed to be highly focused on restraint, as well as those predisposed to exercise restraint in other domains (e.g., tightwads), also rely more heavily on cues for judgment. This suggests that attention narrowing may explain why restrained consumers are more susceptible to external cues and that broadening restrained consumers' attention may make them less reliant on external cues. Additionally, our findings show that restrained consumers are more likely to exercise self-control when the numerosity of cost information is presented on an expanded scale, but not when this information is presented on a contracted scale.

Our findings have other implications for consumer welfare, as they suggest that policies and initiatives designed to make nutritional information more available to consumers can encourage healthier (or unhealthier) eating depending on the scale on which this information is presented. Whereas the results suggest that requiring caloric content on restaurant menus may be effective because caloric information is represented on an expansive scale, the findings also suggest caution when using a contracted scale (e.g., grams of fat). If the number of calories is the default scale on which consumers evaluate the extent to which they should exert self-control, presenting the fat content of a food item in isolation could actually lead consumers to make unhealthier decisions compared to when no nutritional information is provided. We note, however, that the current set of studies does not directly test this possibility and provides only suggestive evidence consistent with our hypothesis; therefore, future research is necessary to examine how presenting nutritional information on contracted scales influences eating behavior relative to when no nutritional information is provided.

This research also has implications for financial decision-making, as the findings extend into the spending domain. These implications are especially relevant given the introduction of different forms of digital and virtual currencies such as Bitcoin. Consumers predisposed to

anticipating negative emotions (i.e., tightwads) might be more likely to make unsound spending or investing decisions when using Bitcoin, as it operates on a contracted scale.

The present research focuses on situations where information indicates the extent to which consumption undermines personal goals. However, there are likely to be circumstances where individuals' goals may lead them to perceive the same information as a benefit. For instance, there may be situations where consumers feel licensed to indulge or spend money, such as when they receive an unexpected financial windfall. In such situations, cost information may signal that the product satisfies their goal of splurging or indulging, which may lead numerosity to have the opposite effect on behavior (i.e., larger numbers may encourage consumption). Future research could explore the possibility that the effect of numerosity on consumption may depend on consumers' active goals and whether the information is consistent or inconsistent with these goals.

DATA COLLECTION INFORMATION

Both authors jointly managed the collection of data for studies 1, 3, 4, 5 and 6A–C using the Amazon Mechanical Turk panel in 2014–2018. The first author supervised the collection of data for study 2 by research assistants at the Columbia University Decision Research Lab in 2017. Both authors jointly analyzed these data.

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