Put a limit on it: The protective effects of scarcity heuristics when self-control is low

Tracy TL Cheung[1], Floor M Kroese[1], Bob M Fennis[2] and Denise TD De Ridder[1]

Abstract

Low self-control is a state in which consumers are assumed to be vulnerable to making impulsive choices that hurt long-term goals. Rather than increasing self-control, the current research exploits the tendency for heuristic-based thinking in low self-control by employing scarcity heuristics to promote *better* consumption choices. Results indicate that consumers low in self-control especially benefited and selected more healthy choices when marketed as "scarce" (Study 1), and that a demand (vs supply) scarcity heuristic was most effective in promoting utilitarian products (Study 2) suggests low self-control involves both an enhanced reward orientation and increased tendency to conform to descriptive norms.

Introduction

Self-control is important for a wide variety of consumer behaviors and decisions. Consumers have to exercise their capacity for self-control in order to make optimal choices, whether it is choosing a healthy, lean green salad instead of a scrumptious, double-layered chocolate cake; or prioritizing practicality over luxury when shopping for a product, self-control is required in order to override impulses, overcome temptations, and forego short-term gratifications in favor of the more beneficial long-term goals (De Ridder et al., 2012). However, consumers often do not exercise self-control to warrant well-considered choices and thoroughly processed decisions (Bargh, 2002; Wansink and Sobal, 2007). In a state of low self-control, consumers make choices that offer immediate gratification that may undermine their long-term interests. For instance, they make more unplanned purchases (Vohs and Faber, 2007) and buy more unhealthy snacks impulsively (Honkanen et al., 2012). Furthermore, while consumers' decision-making process involves both cognition and affect, such that a virtuous choice like a healthy choice might not always be the product of "cold" cognition and exclusively void of affect (and vice

versa for an unhealthy choice), research appears to converge that under low self-control consumers are typically more swayed by affective features of a product than by cognitive considerations (Bruyneel et al., 2006). Accordingly, in order to circumvent such negative outcomes, an important undertaking would be to mitigate low self-control in order to facilitate better consumption choices that are in line with long-term interests. However, deviating from traditional approaches, the current research proposes to work with, rather than against, consumer's low self-control. Earlier work by Fennis et al. (2009) has suggested that consumers in states of low self-control become more susceptible to complying with marketing strategies based on influence principles (i.e. reciprocity, liking, and consistency). In light

[1]Utrecht University, The Netherlands
[2]University of Groningen, The Netherlands

Corresponding author:
Tracy TL Cheung, Utrecht University, Heidelberglaan 1, De Uithof, Postbus 80.140, Utrecht 3508 TC, The Netherlands.
Email: t.t.l.cheung@uu.nl

of this, in the current research, we investigate whether the influence principle of scarcity, a classic "weapon of influence" (Cialdini, 2008) that has yet to be tested in conditions of low self-control, can be used to guide consumers in low self-control states toward choices that foster their long-term interests. That is, we question whether scarcity endorsed by marketing appeals would invariably lead to negative choices when self-control is low (i.e. choices that favor immediate gratification over long-term goals). Instead, the current research argues the opposite and aims to showcase scarcity as a strategic tool, rather than a lethal weapon, used in low self-control conditions to promote choices (e.g. healthy food choices and utilitarian products with long-term value) that would benefit consumers' long-term interests. Through two studies, the current research first demonstrates the influence of the general scarcity principle in low self-control and subsequently compares the effectiveness of two specific types of scarcity—supply scarcity versus demand scarcity—on consumers low in self-control.

Low self-control and heuristics

A state of low self-control is proposed to occur because of previous volitional acts of self-control (or "willpower") depleting a single, common limited resource, and *ego-depletion* has been termed to describe the phenomenon of self-control failure due to previous exertion (Baumeister et al., 1998). Although this conceptualization of self-control is not undisputed (Carter and McCullough, 2013; Inzlicht and Schmeichel, 2012; Schmeichel et al., 2010), there is considerable experimental support that exercising self-control in an initial task results in impaired subsequent self-control performance in a second, seemingly unrelated task (for a review, see Hagger et al., 2010). When individuals are depleted and low in self-control, they tend to respond in a more acquiescent and passive manner (Wheeler et al., 2007), as they are also more likely to resort to easier courses of action that are low-effort, habitual, and automatic (Janssen et al., 2008). Considering that heuristics act as rules-of-thumb and mental shortcuts that facilitate decision-making by reducing time, cognitive effort, and the quantity of information to be processed (Shah and Oppenheimer, 2008), it is not difficult to imagine why heuristics are highly attractive in states of low self-control.

While previous research has shown people to increasingly rely on heuristics during decision-making under low self-control conditions (Pocheptsova et al., 2009; Pohl et al., 2013), the current research is the first to examine whether these findings generalize to the influence principle of scarcity. The influence principle of *scarcity* is frequently endorsed by marketers for product promotions (e.g. "Limited Time Offer!"; "Selling out fast! Get yours now while supplies last!"), because consumers often perceive scarce products as more valuable than products that are abundant (Cialdini, 2008; Verhallen and Robben, 1994). As

the limited availability of a product is considered as a cue to the quality of the product, scarcity accordingly operates as a heuristic (Cialdini, 2008). The current research predicts consumers low in self-control to be increasingly prone to the effects of the scarcity heuristic. Furthermore, the current research proposes that by working with consumers' susceptibility to heuristic-based thinking in low self-control conditions, a scarcity heuristic could be used to promote better (i.e. long-term oriented) consumption choices. Accordingly, in Study 1, the goal is to first demonstrate that the effect of scarcity would be especially enhanced in states of low self-control by testing the hypothesis that consumers low in self-control would select *more healthy* food choices if they were promoted by a scarcity heuristic emphasizing limited availability

Nonetheless, while scarcity in general emphasizes the limited availability of a certain product, it could be driven by different circumstances such as supply or demand (Gierl et al., 2008). It is important to draw the distinction between these two types of scarcity because while both supply and demand scarcity enhance product desirability, they operate through different inference processes. Supply scarcity is primarily due to short supply, for example, when a vendor is restricting the time period that a product is available (e.g. "Limited time offer!"). When the scarcity of a product is conveyed through supply, consumers use this as a heuristic inferring that the product is valuable due to its exclusivity. In contrast, demand scarcity occurs when there is a high amount of prior product purchases. By emphasizing that scarcity of a product is caused by demand (e.g. "Selling out fast! Get yours now while supplies last!"), consumers use this as a heuristic cueing a product is particularly popular among many others (Van Herpen et al., 2014). Study 2 specifically compares the effects of supply scarcity versus demand scarcity in the context of low self-control conditions. Intuitively, one may predict supply scarcity to be more potent than demand scarcity due to its presumed impact on perceived product exclusivity (Van Herpen et al., 2014), but the reverse might actually be the case. More specifically, while the impact of supply scarcity on product desirability seems straightforward, an early meta-analysis (Lynn, 1991) shows only a fair effect size ($r = .12$), thus suggesting that while effective, the extent to which supply scarcity might trigger and satisfy the increased reward sensitivity that has been shown to be associated with conditions of low self-control (Inzlicht and Schmeichel, 2012; Schmeichel et al., 2010) might be modest. Demand scarcity, in contrast, might prove to be particularly effective under low self-control conditions. That is, as a heuristic, demand scarcity suggests that the limited availability of a product is due to its popularity among many others. This inference may resonate well with individuals low in self-control. Evidently, many people have chosen this product previously, and while this may convey a high-quality product, it might also signal something else—a descriptive

norm (Cialdini et al., 1991). The observation that a product is unavailable due to popular demand suggests what is the typical and prevalent behavior in that specific context and critically functions as a cue to convey what is probably attractive or immediately advantageous for the individual (Jacobson et al., 2011). Corroborating the impact of descriptive norms in a different context, in a series of studies Jacobson et al. (2011) have indeed found compelling evidence that descriptive (but not injunctive) norms proved particularly effective in fostering conformity when people were low in self-control. Extrapolating from these findings to the current context, the current research therefore posits that scarcity cues that imply a descriptive norm (i.e. demand scarcity) should prove to be more effective than scarcity cues without such normative information (i.e. supply scarcity) in low self-control conditions. Hence, Study 2 tests the hypothesis that in low self-control conditions, both a supply scarcity heuristic and a demand scarcity heuristic would be effective in promoting utilitarian products with more long-term value, but that a demand scarcity heuristic would work even better.

In summary, the current research examines the effects of scarcity in low self-control conditions. The current research expects consumers low in self-control to be susceptible to the effects of scarcity in general, but that a demand scarcity heuristic would be particularly more potent compared to a supply scarcity heuristic. Furthermore, in light of the existing literature that typically portrays low self-control in a negative light, in which under such a state consumers easily succumb to "bad" temptations, the current research aims to take advantage of low self-control conditions by employing scarcity heuristics to facilitate "better" consumption choices that are typically not the default choice in low self-control conditions (i.e. healthy food choices in Study 1 and utilitarian consumer goods in Study 2). Foreshadowing our results, the two studies in the current research reveal that interventions could be designed to work with low self-control, and that the principle of scarcity would be a promising and convenient strategy to promote better choices that are in line with long-term benefits.

Study 1

Extending on the existing literature that consumers are generally sensitive to the influence of heuristics, Study 1 aims to show that low levels of self-control would accentuate the influence of scarcity even more. Accordingly, as a first step, Study 1 tests the effectiveness of using scarcity as a heuristic in promoting healthy food products in low self-control conditions. Specifically, Study 1 employs a food choice task where consumers make a choice between two products (e.g. healthy vs unhealthy food) over a series of product pairs. The main hypothesis is that when no heuristic is present to promote the healthy food choices, participants low in self-control would favor the tasty, but unhealthy food options (i.e. opting for immediate gratification). However, a scarcity heuristic might counter this typical low self-control effect. In order to be more confident in attributing the effectiveness of the scarcity heuristic exclusively to the conditions of low self-control, Study 1 included a number of potential covariates. Specifically, Study 1 included Need for Cognition (NFC), which refers to the motivation for deliberate and thoughtful thinking on a chronic level, as it has been shown to be related to consumers' susceptibility to peripheral cues such as heuristics in the formation of product preferences (Haugtvedt et al. 1992). In addition, Study 1 also took into account of consumer characteristics (i.e. frequency of purchasing food products on offer, extent to eat healthily, and frequency of purchasing healthy food products) that may influence participants' food choices.

Method

Participants. Participants were 67 individuals living in the United States recruited through Amazon's Mechanical Turk. Three participants did not indicate demographic information including age, gender, level of education, and current employment status. The mean age of the remaining participants was 38.02 years ($SD = 13.30$), and females made up 43.8 percent of the sample. Furthermore, 1.6 percent of the sample received no formal schooling, 17.2 percent were educated up to high school level, 67.2 percent completed a college or university degree, and 14 percent received post-bachelor's education. When reporting current employment status, 56.3 percent of participants were employed for wages, 10.9 percent were self-employed, 9.4 percent were out of work and currently looking for work, 1.6 percent were out of work and currently not looking for work, 6.3 percent were homemakers, 7.8 percent were students, 4.7 percent were retired, and 3.1 percent were unable to work.

Design and procedure. The design of Study 1 consisted of two independent variables, where scarcity (scarcity heuristic vs no heuristic) was a within-subjects factor manipulated in the food choice task, and self-control was a between-subjects continuous predictor. The dependent variable was the number of healthy choices made in the food choice task.

Participants were informed that they would complete three unrelated questionnaires related to consumer preferences, but there was no explicit mentioning that they would be first filling out the State Self-Control Scale (SSCS) (Ciarocco et al., 2012), followed by the food choice task, and finally the NFC Scale (Cacioppo et al., 1989) in addition to four questions that assessed consumer characteristics. Upon completion of all questionnaires, participants were thanked and received a code to confirm their participation for monetary compensation.

Food choice task. The food choice task was presented as a marketing survey that assessed consumer preferences.

Participants were informed that they had to evaluate a series of products presented in pairs by indicating their preferred choice of product from each pair. In total, participants evaluated 24 product pairs. Of interest were 12 food product pairs that presented a self-control dilemma, in which a healthy food product was paired with a tastier but relatively unhealthy food product. To illustrate, the food pairs included examples such as ice-cream versus Greek yogurt, salad versus pizza, cereal bar versus Oreo cookie, and donuts versus rice crackers. Finally, the remaining 12 product pairs acted as filler pairs that were not further analyzed.

Independent variables

Scarcity. The scarcity heuristic was conveyed with the promotion tagline "Value of the week, while supplies last!" The scarcity heuristic was presented in six of the food product pairs in the food choice task, and it was always associated with the healthy food option. In the remaining six food product pairs, there was no heuristic, and no information was provided about the food products.

State self-control. State self-control was measured using the SSCS (Ciarocco et al., 2012), which was presented as a questionnaire on mood. Participants were asked to indicate the degree to which they agreed (1 = *not true*, 7 = *very true*) with 25 statements that described their current state such as "I feel motivated" and "I feel like my willpower is gone" (reverse coded) on the SSCS. A final standardized state self-control score was calculated by averaging the scores from all the statements, where a higher scored reflected a higher level of state self-control. Cronbach's alpha (*α*) of .96 reported good internal consistency for the SSCS in this study.

Dependent variable. The dependent variable was the average number of healthy choices made from the food pairs that had a scarcity heuristic and the food pairs that had no heuristic in the food choice task, both ranging from 0 to 6.

Control variables. Study 1 controlled for the potential influence that the NFC, as well as the other consumer characteristics, may have on the dependent variable of healthy choices.

NFC Scale. The NFC Scale (Cacioppo et al., 1984) consisted of 25 statements in which participants had to indicate the degree to which each statement described them (1 = *extremely uncharacteristic of me*, 4 = *extremely characteristic of me*). Statements on the scale included examples such as "I prefer complex to simple problems" and "I would rather do something that requires little thought than something that is sure to challenge my thinking abilities" (reverse coded). A final standardized NFC score was calculated by averaging the scores from all the statements, where a higher

scored reflected a greater NFC. Cronbach's *α* of .94 reported good internal consistency for the NFC Scale in this study.

Consumer characteristics. Additional questions including (1) "How often do you purchase food products on offer or promotion?", (2) "To what extent do you try to eat healthily?", and (3) "How often do you purchase healthy food products?" were included to control for individual differences that may affect consumers' food choices. Participants responded to these four one-time questions on a 7-point scale ranging from 1 (*never*) to 7 (*always*). The scores to each of the three questions were standardized.

Results

Descriptives. Participants reported purchasing food products on offer or promotion (*M* = 5.14, *SD* = 1.40) relatively frequently. Moreover, they also reported eating healthily to a moderate extent (*M* = 5.11, *SD* = 1.53) and purchasing healthy food products on a relatively frequent basis (*M* = 4.98, *SD* = 1.43). Finally, participants selected an average of 5.6 healthy food products (*SD* = .21) out of the 12 food choice pairs.

Effects of a scarcity heuristic on healthy food choices. A repeated-measures analysis of covariance (ANCOVA) was employed to examine the effects of a general scarcity heuristic on participants' healthy food choices, in which scarcity (no heuristic vs scarcity heuristic) was a within-subjects factor and state self-control was a continuous predictor. Furthermore, in addition to controlling for the potential influence of NFC, consumer characteristics including participants' extent of healthy eating (*r* = .57, *p* < .001) and frequency of purchasing healthy food products (*r* = .45, *p* < .001) were included as covariates since they were significantly correlated with the dependent variable.

There was a significant main effect of scarcity, where more healthy choices were made in food pairs that had a scarcity heuristic (*M* = 3.14, *SD* = 1.61), compared to when there was no heuristic (*M* = 2.52, *SD* = 1.19), $F(1, 58) = 17.37$, *p* < .001, $\eta^2 = .23$. Self-control was also a significant predictor ($F(1, 58) = 4.87$, *p* = .03, $\eta^2 = .08$). Results also indicated that NFC was not a significant covariate ($F(1, 58) = .35$, *p* = .56). Moreover, the extent to which participants try to eat healthily ($F(1, 58) = 14.12$, *p* < .001, $\eta^2 = .20$) had an influence on the number of healthy choices, but not on the frequency to which participants purchase healthy food products ($F(1, 58) = .58$, *p* = .45). Finally, as expected, there was a significant interaction between scarcity and self-control, $F(1, 58) = 8.03$, *p* = .006, $\eta^2 = .12$ (Figure 1). Parameter estimates indicate that when there was a scarcity heuristic, the number of healthy food choices increased as self-control levels decreased, *b* = −.50, *t*(58) = −3.11, *p* = .03. However, self-control had no influence on the
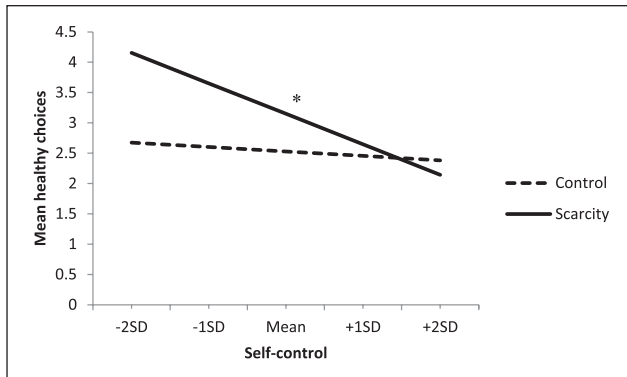
Figure 1. Healthy food choices made as a function of scarcity heuristic and self-control.
*$p < .05$.

outcome of healthy choices made when there was no heuristic present, $b = -.073$, $t(58) = -.53$, $p = .60$.

Discussion

The predicted interaction with the scarcity heuristic proved to be significant—when there was a scarcity heuristic promoting the healthy food options, low self-control levels facilitated the number of healthy choices made while controlling for the effects of consumers' reported extent to which they try to eat healthily. On the other hand, when the scarcity heuristic was not present, results did not show evidence of a negative trend between self-control and healthy food choices. Additionally, as NFC was not a significant covariate in our analysis, Study 1 could more confidently rule out that the increased use of heuristic was dependent on NFC, and that the use of the scarcity heuristic could be attributed to low self-control.

These findings serve as first evidence that consumers low in self-control would especially benefit from having the installation of a scarcity in the environment to market healthier food choices. Nonetheless, the scarcity heuristic used in Study 1 was ambiguous with regard to whether the scarcity was driven by high demand or low supply (or both). As such, while Study 1 demonstrated the influence of scarcity (in general) in promoting healthy food choices especially in low levels of self-control, it does not inform whether supply or demand scarcity was driving this effect. Another shortcoming of Study 1 is that due to its within-subjects design, each food pair was only presented once with (or without) a scarcity heuristic and not counterbalanced. Moreover, Study 1 assessed self-control using self-report measures.

Overcoming the limitations of Study 1, Study 2 pits the two variants of scarcity directly against each other: supply versus demand scarcity and compares their effectiveness in the context of low self-control. Moreover, Study 2 experimentally manipulates self-control and adopts a between-subjects design that includes a control condition

where all product pairs are presented without a heuristic adjunct to two other experimental heuristic conditions. If the reasoning for predictions was correct, then both supply and demand scarcity heuristics would be effective under low self-control conditions, but we expect the demand scarcity heuristic to exceed the effects of a supply scarcity heuristic.

Study 2

Study 2 compares the effectiveness of the supply scarcity and demand scarcity in promoting utilitarian products over hedonic products, testing the hypothesis that demand scarcity would be more effective in low self-control conditions considering that it not only enhances product desirability but also conveys a descriptive norm that individuals low in self-control are highly sensitive to; whereas the supply scarcity only infers product desirability information without conferring the behavior of other people. Additionally, Study 2 examines whether the use of scarcity heuristics could extend to promoting utilitarian products that offer long-term practical value over hedonic products that bestow short-term indulgence (Dhar and Wertenbroch, 2000). Generally, it is expected that participants in low self-control conditions would prefer the attractive hedonic products with indulgent properties unless they are accompanied by a scarcity heuristic. More importantly, Study 2 aims to demonstrate that a demand scarcity heuristic works better than a supply scarcity heuristic.

Method

Participants and design. A total of 165 participants were recruited from a large university in The Netherlands. The mean age of the participants was 21.11 years ($SD = 3.26$). The sample consisted exclusively of females to minimize the potential influence of gender on product preferences. The study used a 2 (self-control: low vs high) × 3 (heuristics: no heuristic vs supply scarcity heuristic vs demand scarcity heuristic) between-subjects design.

Procedure. The study was presented as two separate tasks, the first being the Stroop Task employed as a self-control manipulation and the second being a product choice task presented as a marketing study that assessed participants' choice between utilitarian versus hedonic products. Upon arrival in the laboratory, participants provided informed consent for their participation and were assigned to a cubicle where they completed both tasks on the computer. At the end of the experiment, participants were thanked, debriefed, and compensated with course credit of €4 for participation.

Manipulations

Supply scarcity heuristic and demand scarcity heuristic. The scarcity heuristics were always associated with the utilitarian

Table 1. Perceived practicality, indulgence, and attractiveness of consumer goods in utilitarian–hedonic product trade-off pairs.

Pair	Practicality			Indulgence			Attractiveness		
	M	*SD*	*t* test, sig.	*M*	*SD*	*t* test, sig.	*M*	*SD*	*t* test, sig.
Sandals	5.90	1.79	$t(32)=4.45$, $p<.001$	4.06	2.16	$t(32)=-5.64$, $p<.001$	3.12	2.19	$t(32)=-8.19$, $p<.001$
High heels	3.61	2.00		7.03	2.08		7.45	1.70	
Sewing kit	8.57	.83	$t(32)=3.26$, $p<.001$	2.82	1.96	$t(32)=-10.60$, $p<.001$	3.76	1.77	$t(32)=-9.90$, $p<.001$
Mascara	4.82	2.21		7.58	1.15		7.36	3.76	
First-aid kit	8.58	.83	$t(32)=9.10$, $p<.001$	2.82	1.96	$t(32)=-12.14$, $p<.001$	3.76	1.77	$t(32)=-9.45$, $p<.001$
Make-up set	4.82	2.21		7.58	1.15		7.36	1.50	

SD: standard deviation.

products in the product choice task. The supply scarcity heuristic was depicted by the slogan "Available only this week!" In the demand scarcity heuristic condition, participants were told that some products were particularly popular with participants and were therefore low in stock. It was then presented with the slogan "Popular item, while supplies last!" Finally, in the no heuristic condition, participants were solely presented with product pairs without any accompanying heuristics.

Self-control. Unlike Study 1 that measured self-control based on self-report, Study 2 experimentally manipulated participants' self-control levels. The Stroop Task was employed in this study to manipulate self-control levels following previous research (e.g. Govorun and Payne, 2006; Halali et al., 2014) that has also used this paradigm to deplete participants. Participants were presented with a series of color words (i.e. red, blue, yellow, and green) on the computer screen; each of which was displayed in a font color that either matched (congruent trial) or did not match its semantic meaning (incongruent trial). Every trial began with a fixation cross at the center of the screen (500 ms), followed by the presentation of the color word (200 ms), and participants had 800 ms to indicate the font color of the word by pressing the designated key on the keyboard.

All participants completed 12 practice trials in order to familiarize themselves with the task and were then equally distributed to either the high or low self-control condition by randomization. In the high self-control condition, participants performed a total of 30 congruent trials that lasted for approximately 5 minutes. In the low self-control condition, however, participants performed a total of 300 trials divided over three blocks, where two-thirds of the trials were incongruent trials dispersed randomly throughout the task. In order to correctly identify the font color of the word, participants would have to exercise self-control to suppress the automatic and predominant response of reading (i.e. Stroop effect). The length of the low self-control condition was approximately 15 minutes.

Product choice task. The product choice task was presented as an online marketing study that assessed consumer preferences. The product choice task consisted of eight product pairs presented in a randomized order, and five out of the eight product pairs were hedonic–utilitarian trade-off pairs. The hedonic–utilitarian product trade-off pairs represented a self-control dilemma, as participants would have to exercise self-control in order to forego the indulging properties of the hedonic product (e.g. make-up set) and select the more practical but less attractive utilitarian product (e.g. first-aid kit; Mishra and Mishra, 2011). These product trade-off pairs were pretested, and the mean values and *SD*s are presented in Tables 1 and 2. The remaining three product pairs were filler pairs that were not further analyzed.

Participants were asked to indicate which of the two products they would prefer at that moment and were also informed that it was not necessary to deliberate over the options as the survey was only interested in consumer preferences, and that there were no objective correct answers. To increase participants' engagement in the product task, participants were told the cover story that they would receive one of the product choices that they selected at the end of the experiment. The cover story was also conveyed to increase the credibility of the scarcity heuristics—that some products are only available this week (i.e. supply scarcity) or that some products are low in stock because they are especially popular with previous participants (i.e. demand scarcity). The dependent variable was the number of utilitarian choices made from the trade-off product pairs, ranging from 0 to 6.

Results

Five participants who had missing data in the Stroop Task and five other participants who performed the Stroop Task with an accuracy of 0 percent were excluded in the analyses. The resulting sample in the analysis consisted of 155 participants.

Table 2. Perceived healthiness and attractiveness of food products in utilitarian–hedonic product trade-off pairs.

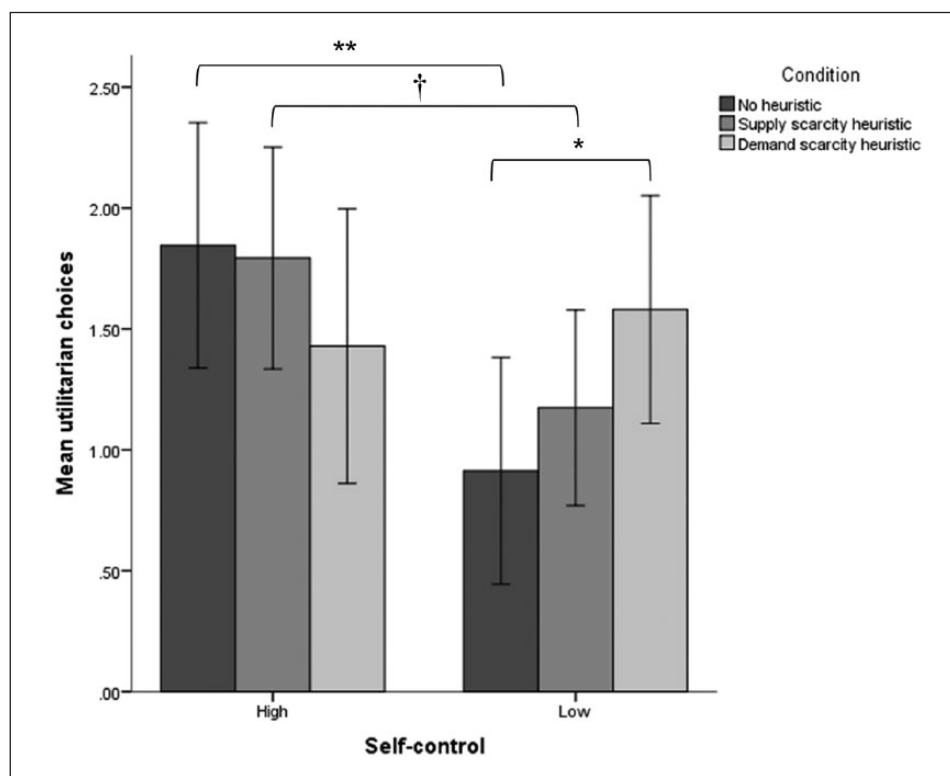| Pair	Healthiness			Attractiveness		
	M	*SD*	*t* test, sig.	*M*	*SD*	*t* test, sig.
Cereal cookie	4.79	1.04	$t(89) = 17.35$, $p < .001$	3.91	1.16	$t(89) = -6.62$, $p < .001$
Chocolate bar	2.18	1.07		4.99	1.20	
Mixed nuts and raisins	4.40	1.38	$t(89) = 7.83$, $p < .001$	2.89	1.40	$t(89) = -9.94$, $p < .001$
Potato chips	2.48	1.37		4.76	1.16	

SD: standard deviation.

Figure 2. Effect of self-control and heuristic on the number of utilitarian product choices. Error bars represent 95 percent CI. **p < .01; *p < .05; †*p* = .06.

In order to test the effect of self-control, heuristics, and their interaction on the number of utilitarian products chosen, a 2 (self-control: high vs low) × 3 (heuristic: no heuristic vs supply scarcity heuristic vs demand scarcity heuristic) between-subjects analysis of variance (ANOVA) was performed. As expected, there was a significant main effect of self-control on the number of utilitarian products chosen, where participants in the high self-control condition chose more utilitarian products ($M = 1.71$, $SD = 1.23$) than participants in the low self-control condition ($M = 1.26$, $SD = 1.15$), $F(1, 147) = 5.84$, $p = .02$, $\eta^2 = .04$. The main effect of heuristic was not significant, $F(2, 147) = .12$, $p = .85$. Finally, the two-way interaction between self-control and heuristics was marginally significant, $F(2, 147) = 2.76$, $p = .06$, $\eta^2 = .04$ (Figure 2).

In order to test the specific hypotheses regarding the effectiveness of different scarcity heuristics, simple main effects were examined. First, for participants high in self-control, there were no significant differences between the number of utilitarian products chosen across the three heuristic conditions: no heuristic ($M = 1.85$, $SD = 1.26$), supply scarcity heuristic ($M = 1.79$, $SD = 1.21$), and demand scarcity heuristic ($M = 1.43$, $SD = 1.25$), all $ps > .23$. On the other hand, results revealed that participants low in self-control chose significantly more utilitarian products when there was a demand scarcity heuristic ($M = 1.58$, $SD = 1.29$) than when there was no heuristic present ($M = .91$, $SD = 1.08$), $p = .04$. The supply scarcity heuristic ($M = 1.17$, $SD = .94$) did not differ from the other two conditions, all $ps > .21$.

Furthermore, the comparison of the number of utilitarian products chosen by participants in high versus low self-control demonstrated the typical effect of low self-control when no heuristic was present, in which participants low in self-control ($M = .91$, $SD = 1.08$) chose significantly less utilitarian products than participants high in self-control ($M = 1.85$, $SD = 1.26$), $p = .007$. However, when there was a demand scarcity, no significant difference between the number of utilitarian choices made by participants high ($M = 1.43$, $SD = 1.25$) or low in self-control ($M = 1.58$, $SD = 1.29$) was found, $p = .65$. Finally, a marginally significant difference suggested that despite the presence of a supply scarcity, participants low in self-control ($M = 1.17$, $SD = .94$) still chose less utilitarian products than participants with high self-control ($M = 1.79$, $SD = 1.21$), $p = .06$.

Discussion

In Study 2, we obtained support for the hypothesis that a demand scarcity heuristic would outperform a supply scarcity heuristic in promoting more practical utilitarian products over attractive hedonic products in low self-control conditions. Specifically, it was observed that in the low self-control condition, participants made more utilitarian product choices promoted by a demand scarcity heuristic, as opposed to when no heuristic was present. Moreover, the demand scarcity heuristic seemed to offer "protective effects" against the pitfalls of low self-control—in the presence of demand scarcity, participants in the low self-control condition selected just as many utilitarian choices as participants in the high self-control condition. However, participants low in self-control were not as receptive to the supply scarcity heuristic that promoted the utilitarian products, in which they still selected fewer utilitarian products in the low self-control condition compared to the high self-control condition.

The finding in Study 2 that the demand scarcity heuristic was more influential supports previous finding that individuals low in self-control tend to conform with descriptive norms (Jacobson et al. 2011). This serves as a reminder that perhaps while all heuristics generally function as decisional shortcuts, the way they operate is not the same, at least in the context of low self-control conditions. As such, the degree of the effectiveness of different heuristics should not be assumed to be equal without considering the context that they are performing in, and consumers low in self-control may ultimately benefit more from certain heuristics (e.g. demand scarcity heuristic) than from others.

General discussion

This study explored the potential of using scarcity heuristics to promote healthy food choices and utilitarian products with long-term benefits for consumers lacking self-control

who would generally opt out for alternatives with short-term gratification. The current research demonstrated that by measuring state levels of self-control (Study 1) and experimentally manipulating self-control (Study 2), consumers low in self-control benefited from having scarcity heuristics guide their decisions toward more optimal choices. Study 1 found that lower levels of self-control actually increased consumers' choices for healthy food choices in the presence of scarcity. Building off this finding, Study 2 distinguishes between the demand scarcity heuristic and the supply scarcity heuristic by comparing their effectiveness in promoting utilitarian choices, in which results indicated the superiority of the former in low self-control conditions. Our finding that the demand scarcity heuristic was more influential in low self-control conditions is in line with the notion that low self-control is associated with increased reward sensitivity (Inzlicht and Schmeichel, 2012; Schmeichel et al., 2010) but also corroborates previous research that has found individuals low in self-control to favor and conform to descriptive norms (Jacobson et al., 2011). Although Experiment 1 presented food choices whereas Experiment 2 presented generic consumer goods, the similar pattern of results observed in both studies thereby reveals the robustness of the effect of low self-control leading to a "virtuous" choice given that it is promoted by an appropriate scarcity heuristic. Nonetheless, given the importance of health promotion in the current obesogenic environment, we particularly welcome future studies to replicate and extend on our current research to further examine and validate the effectiveness of scarcity heuristics to promote healthy food choices. Specially, our finding that the demand scarcity heuristic was more influential also dovetails the recent study by Salmon et al. (2014) who showed that people low in self-control were much more likely to base their food choices on the suggestion of a descriptive norm (i.e. a pie chart showing the behavior of the majority of previous participants making a healthy choice) that acted as a social proof heuristic. Correspondingly, it may be that the demand scarcity heuristic similarly provides a social proof mechanism. In light of this, it would be interesting to question whether the social information conveyed by these particular heuristics (i.e. demand scarcity heuristic, social proof heuristic) might be the key ingredient to its success. As such, future research could shed insight by comparing heuristics that contain a social component (e.g. authority, reciprocity) with heuristics that only convey an exemplar without any social aspect (e.g. availability, recognition). Moreover, future effort should more stringently consider how to optimally design and maximize the effectiveness of heuristics in low self-control conditions. In the case of scarcity heuristics, it is critical to ensure that scarcity information offers believability (e.g. is the scarcity understood and perceived to be legitimate?), choice (e.g. do people still feel a sense of freedom to choice without feeling threatened or coerced?), and alternatives (e.g. do they need it? Are there substitutes?) (Mortensen and

Allen, 2013). If these criteria are not met, there is a chance that the heuristic will backfire and induce the opposite desired effects.

While there is a positive outlook regarding the usefulness of heuristics, it should nonetheless be acknowledged that the current research relied only on hypothetical choices (although Study 2 attempted to simulate a real product choice task and increase participant engagement by informing participants that they would receive one of the product choices they make). Similarly, in real-life contexts, price is an important determinant of purchase decisions and as such in considering consumers' choices, future research should take into account how socio-economic factors might interact with behavioral factors such as the ones showcased in this study. For one, it would be important to include broader samples of individuals with diverse socio-economic backgrounds. Furthermore, it has been criticized that the dichotomy of consumption choices, prevalently applied to food choices where "healthy" is considered the good choice and the "unhealthy" alternative is considered the bad choice, is misleading since there is and should be much uncertainty in what defines "good" food and "bad" food in relation to health and wellbeing (Askegaard et al., 2014). As such, to improve and extend on the current research, it is recommended that future studies expand the list of choice outcomes from one-off dichotomized choices to more comprehensive measures such as options from an entire meal (menus), food diaries recorded over time spans, and shopping lists that resemble more closely with real-life and naturalistic settings. Employing such measures rather than relying on one-off binary choice outcomes not only increases ecological validity but also allows for directing focus on moderation and the balance of choices, which are crucial for health and wellbeing.

Having to process considerable amounts of information and make countless decisions on a daily basis, consumers often rely on heuristics to help them to think in ways that are quick and easy (Kahneman et al., 1982; Todd and Gigerenzer, 2007), while heuristic-based thinking is execrated when self-control levels are low (Pocheptsova et al., 2009). It is no coincidence that marketing campaigns frequently endorse heuristic principles to entice consumers into buying products to increase profit. However, the first implication of the current research is that the same factors (e.g. low self-control) that lead consumers to making an impulsive or suboptimal choice could be reversed into an impulsive but virtuous choice. Indeed, the current research exploited low self-control conditions and employed conventional marketing tactics that endorse scarcity heuristics in promoting "virtuous" product choices that would support consumers' long-term interests. This approach deviates from traditional interventions that focus on increasing self-control and instead showcases low self-control as a state that could be favorable to consumer welfare. Consumers low in self-control would indeed make the "right" choice in line with long-term interests if the choice setting offers suitable heuristics promoting them. As Study 1 showed, simply associating healthy food products with scarcity led to more healthy choices made by consumers low in self-control. This strategy could be easily extrapolated from an experimental setting and be implemented as in-store ads or displays as part of health promotion campaigns aimed at healthy eating. Nonetheless, critical to underscore is that certain heuristics may be *more* suitable in low self-control conditions. The observation in Study 2 that the demand scarcity heuristic performed best overall puts forth an additional implication. It appears that using limited availability to emphasize product value and presenting a descriptive norm as a social proof component to attest to its value may be important ingredients for the successful promotion of virtuous consumption choices in low self-control conditions. That is, when consumers are seeking to buy a utilitarian product, for example, the demand scarcity acts as a heuristic for consumers to form an accurate judgment of product performance through social proof information (e.g. the probability that so many buyers would purchase a bad product would be unlikely; Ku et al., 2013).

Deviating from traditional approaches that target at raising self-control, our strategy of working with low self-control conditions through the use of scarcity heuristics lends itself as a promising tactic that could be publicly implemented on a large scale to promote consumer welfare. Importantly, the use of scarcity heuristics to promote healthy food products or utilitarian consumer goods (without forbidding their alternatives) aligns well with the call for optimizing choice architectures to encourage more optimal consumption choices (Johnson et al., 2012).

Conclusion

The current research began by asking whether following scarcity heuristics endorsed by advertising appeals would invariably lead consumers into choices that mainly benefit the interests of the marketeer rather than the wellbeing of the consumers. By working with low self-control conditions that facilitate heuristic-based thinking, which is typically seen as a vice that inevitably leads to suboptimal choices, the current research found that the influence principle of scarcity was able to promote better consumption choices that would benefit consumers' long-term interests. In this light, low self-control is not necessarily a state that should be avoided, and that scarcity could also be employed as a strategic tool, rather than a weapon of influence, in promoting better consumption choices for consumers low in self-control. Nonetheless, as some tools are sharper than others, our findings also indicate the demand scarcity heuristic, which highlights reward emphasis and provides descriptive norm information, to be more effective than the supply scarcity heuristic in promoting utilitarian consumer goods in the context of low self-control.

Declaration of conflicting interests

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