

# Life-History Strategy, Food Choice, and Caloric Consumption

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## Abstract

Do people's perceptions that they live in a harsh environment influence their food choices? Drawing on life-history theory, we propose that cues indicating that the current environment is harsh (e.g., news about an economic crisis, the sight of people facing adversity in life) lead people to perceive that resources in the world are scarce. As a consequence, people seek and consume more filling and high-calorie foods, which they believe will sustain them for longer periods of time. Although perceptions of harshness can promote unhealthy eating, we show how this effect can be attenuated and redirected to promote healthier food choices.

## Keywords

evolutionary psychology, life-history theory, food, self-control, health

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Researchers have made considerable progress in understanding why people make the food choices they make and how to help people make healthier choices. Several dispositional and situational factors can lead people to choose high-calorie food. Such choices can be influenced by the underestimation of the calories in a meal (Chandon & Wansink, 2007), temptations in the immediate environment (Papies & Hamstra, 2010), people's tendency to exert self-control (Tangney, Baumeister, & Boone, 2004), and people's goals (Fishbach & Shah, 2006; Laran & Janiszewski, 2009). In this article, we present an alternative influence that may lead to consumption of high-calorie foods.

We contend that people may choose to consume high-calorie food items as a consequence of exposure to cues indicating that the current environment is harsh (Ellis, Figueredo, Brumbach, & Schlomer, 2009). Drawing on life-history theory (Charnov, 1993; Roff, 2002; Stearns, 1992) and on research showing that environmental cues can influence behavior without people's awareness (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001), we suggest that harsh-environment cues lead people to perceive that resources are scarce. As a consequence, people seek and consume filling and high-calorie foods, which can sustain them for longer periods of time than low-calorie foods can. Although perceptions of environmental harshness can promote unhealthy eating, we also show how this effect can be attenuated and redirected to help promote healthier food choices.

## Life-History Theory

Life-history theory describes how resources are allocated to various survival tasks, such as growth and reproduction (Charnov, 1993; Roff, 2002; Stearns, 1992). Life-history theory was initially developed to explain animal behavior, but it has become increasingly useful for understanding human behavior (Belsky, Houts, & Fearon, 2010; Griskevicius, Delton, Robertson, & Tybur, 2011; Griskevicius, Tybur, Delton, & Robertson, 2011; Nettle, 2010). According to life-history theory, all organisms, including humans, face a fundamental trade-off when allocating energy and resources between somatic effort (effort that organisms devote to their own development) and reproductive effort (Ellis et al., 2009). Favoring somatic effort is linked to a slow life-history strategy, which is associated with a late age of reproduction and a tendency to delay gratification to increase future payoffs (Figueredo et al., 2006). In contrast, favoring reproductive effort is linked to a fast life-history strategy, which is associated with an early age of reproduction and a preference for immediate benefits at the expense of long-term consequences.

The extent to which an individual will adopt a slow or fast strategy depends on the individual's environment. Fast

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life-history strategies are adaptive in environments that are harsh, such as environments in which resources are scarce and competition is fierce (Ellis et al., 2009). Because the future is uncertain in such environments, it is evolutionarily adaptive to enact fast strategies associated with investment in immediate reproduction instead of long-term payoffs. Accordingly, research has shown that individuals who grew up in deprived neighborhoods, as opposed to affluent neighborhoods, were younger when first giving birth and breast-fed each of their children for a shorter period of time (Nettle, 2010). Thus, in harsh environments, the benefits of long-term developmental growth are minimized because people focus on how they can acquire and use resources in the present.

## The Current Research

Although past research has focused on how life-history strategies are calibrated by people's childhood environments (Belsky, Steinberg, & Draper, 1991), we propose that life-history strategies may also be influenced by people's environments in adulthood. Specifically, people should adopt a fast strategy when they perceive themselves to be in an environment that is currently harsh (Griskevicius, Delton, et al., 2011; Griskevicius, Tybur, et al., 2011). This is because environmental harshness implies danger and competition for scarce resources. Therefore, people who perceive the environment to be harsh focus on securing the maximum amount of resources in the present, a pattern of behavior that characterizes a fast strategy. Thus, exposure to cues indicating a harsh environment, such as news about economic problems, the sight of a competitive coworker, or even words such as *adversity* or *struggle*, might trigger behaviors associated with a fast life-history strategy. This phenomenon may be quite pervasive, given the large body of documented evidence that priming cues in people's environments nonconsciously influence their behavior (Bargh et al., 2001; Chartrand, Fitzsimons, & Fitzsimons, 2008; Kay, Wheeler, Bargh, & Ross, 2004; Laran, 2010).

In the research reported here, we examined whether exposure to cues associated with a harsh environment influenced people's food choices. Although past research has not considered how life-history strategies relate to food choice (Ellis et al., 2009; Kaplan, Hill, Lancaster, & Hurtado, 2000), we proposed that a fast life-history strategy should be associated with a desire to consume high-calorie foods. One of the strongest predictors of a fast life-history strategy is a lack of resources early in life (Nettle, 2010; Promislow & Harvey, 1990). Therefore, if environmental cues associated with harshness increase perceptions of resource scarcity, people exposed to such cues should enact a fast strategy and eat high-calorie foods in an attempt to address this sense of scarcity (Briers, Pandelaere, Dewitte, & Warlop, 2006). High-calorie foods provide immediate energy and can keep people fed for longer periods of time than can low-calorie foods. Thus, high-calorie foods should be more desirable than low-calorie foods in harsh environments, in which resources are scarce.

We used laboratory and field studies to investigate whether environmental cues associated with harshness lead people to choose and consume high-calorie foods. In addition to testing how a variety of cues in people's current environment can trigger behaviors associated with different life-history strategies, this research was the first to examine the relationship between life-history strategies and caloric consumption.

## Study 1

In Study 1, we investigated how the activation of the concept of environmental harshness influences food consumption. As discussed earlier, exposure to cues associated with environmental harshness should increase the value of foods that can keep people fed for long periods of time and thereby lead people to consume a larger quantity of high-calorie food items. By the same logic, exposure to cues associated with environmental harshness should decrease the value of low-calorie foods, because these foods cannot keep people fed for long periods of time. This devaluation should lead people to consume a smaller quantity of lower-calorie food items.

## Method

Participants were 121 passersby on a college campus (49.6% female, 50.4% male<sup>1</sup>) who volunteered to participate in a taste test. The design was a 2 (prime: neutral vs. environmental harshness) × 2 (framing: low calorie vs. high calorie) between-subjects design.

We set up a stand on campus to purportedly investigate students' perceptions of a new type of M&M. We told passersby that the company responsible for producing M&Ms had hired two college students to investigate other students' perceptions of the company's products. These college students were actually hired research assistants who were blind to the hypotheses of the study. Students who volunteered to participate were seated and told to grab a premeasured bag containing 1.69 oz of M&Ms and to pour its contents into a Styrofoam bowl. They were then given an initial consent form with instructions that varied by condition (assignment of participants to condition was randomly determined). In the high-calorie framing condition, the instructions mentioned that "the main distinction in this new type of M&M is with the chocolate used, which contains high-calorie, highly rated imported ingredients." In the low-calorie framing condition, the instructions said that "the main distinction in this new type of M&M is with the chocolate used, which contains low-calorie, highly rated imported ingredients." Once participants read the instructions, they were told to sample the M&Ms until they were ready to fill out a second form, which was ostensibly administered for product feedback.

Two posters, both of which had six sentences written on them, were positioned against a wall 6 ft from the tasting table, directly across from participants. In the environmental-harshness condition, each of the six sentences contained one

word associated with environmental harshness (“survival,” “withstand,” “persistence,” “shortfall,” “struggle,” and “adversity,” respectively). In the neutral condition, the six sentences contained neutral words. Once participants felt they had eaten enough, they were asked to return their bowl of M&Ms to the experimenter in exchange for the feedback form, which contained a series of seven questions about characteristics of the M&Ms (e.g., taste, color, moistness). After participants completed this form, they were extensively debriefed for suspicion and thanked for their participation.

Once each participant left, we weighed his or her bowl (in grams) using a precision scale and subtracted that number from the initial weight of the full bag and Styrofoam bowl to measure how much the participant had eaten. None of the participants were able to articulate how the content in the posters might have influenced their consumption, which supports the idea that any observed effects were unconscious. When made aware of our hypothesis, most participants in the environmental-harshness condition agreed that the sentences were associated with harshness and could have influenced their perceptions of resource scarcity, but no participant admitted that the posters had actually influenced his or her consumption. Most participants indicated that their consumption had been influenced by how many M&Ms they felt they had to eat to answer taste-test questions, how much they liked M&Ms, or how much they liked candy in general.

## Results and discussion

To test for the impact of the primes, we exposed a separate sample of participants ( $N = 49$ ) to the sentences used in the main study and had them report the extent to which they agreed with the following statements: “Resources in this world are scarce” and “We live in a harsh environment.” Responses were made using scales from 1 to 9, with higher scores indicating greater agreement. The participants also rated their current level of hunger, mood, and degree of arousal, again using scales from 1 to 9. We used the 10-item ( $\alpha = .81$ ) Perceived Stress Scale to assess participants’ current and recent levels of perceived stress in life; responses were made using scales from 1 to 4, and perceived-stress scores were calculated by summing across items, with higher scores indicating greater perceived stress (Cohen & Williamson, 1988).

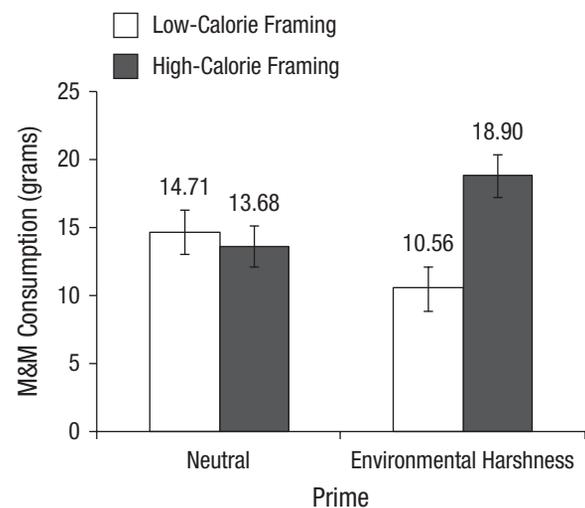
Compared with participants exposed to neutral primes, participants exposed to environmental-harshness primes perceived the environment to be harsher (neutral condition:  $M = 5.58$ ,  $SD = 1.91$ ; environmental-harshness condition:  $M = 6.80$ ,  $SD = 1.85$ ),  $t(47) = -2.27$ ,  $p = .028$ , and resources to be scarcer (neutral condition:  $M = 5.88$ ,  $SD = 1.45$ ; environmental-harshness condition:  $M = 7.00$ ,  $SD = 1.56$ ),  $t(47) = -2.61$ ,  $p = .012$ . Priming did not influence hunger (neutral condition:  $M = 5.42$ ,  $SD = 2.73$ ; environmental-harshness condition:  $M = 4.76$ ,  $SD = 2.73$ ),  $t(47) = 0.84$ ,  $p > .40$ ; mood (neutral condition:  $M = 4.96$ ,  $SD = 2.27$ ; environmental-harshness condition:  $M = 5.20$ ,  $SD = 2.10$ ),  $t(47) = -0.39$ ,  $p > .70$ ; arousal (neutral

condition:  $M = 4.33$ ,  $SD = 2.48$ ; environmental-harshness condition:  $M = 4.44$ ,  $SD = 2.14$ ),  $t(47) = -0.16$ ,  $p > .80$ ; or stress (neutral condition:  $M = 22.33$ ,  $SD = 4.39$ ; environmental-harshness condition:  $M = 20.68$ ,  $SD = 4.85$ ),  $t(47) = 1.25$ ,  $p > .20$ .

In Study 1, an analysis of variance (ANOVA) revealed a significant interaction between priming condition and framing,  $F(1, 117) = 8.82$ ,  $p = .004$  (Fig. 1). In the neutral condition, participants who believed the M&Ms to be high in calories ( $M = 13.68$  g,  $SD = 9.86$ ) consumed as much as did participants who believed the M&Ms to be low in calories ( $M = 14.71$  g,  $SD = 8.64$ ),  $F(1, 117) = 0.20$ ,  $p = .66$ . In the environmental-harshness condition, participants who believed the M&Ms to be high in calories ( $M = 18.90$  g,  $SD = 10.43$ ) consumed more than did participants who believed the M&Ms to be low in calories ( $M = 10.56$  g,  $SD = 5.83$ ),  $F(1, 117) = 15.12$ ,  $p < .001$ . Looked at differently, compared with participants in the neutral condition, participants in the environmental-harshness condition consumed more M&Ms if they believed them to be high in calories,  $F(1, 117) = 4.81$ ,  $p = .03$ , but less if they believed them to be low in calories,  $F(1, 117) = 4.02$ ,  $p = .047$ . These results are evidence that high-calorie foods, which are useful when resources are scarce, are consumed in larger quantities when an environment is perceived to be harsh, whereas low-calorie foods are consumed in smaller quantities.

## Study 2

Study 2 tested the prediction that the effects of perceived environmental harshness disappear when people are given resources. In this study, we also sought to distinguish between the mechanism driving fast-life-history-strategy activation and a willingness to indulge. The acquisition of resources should not influence the food choices of people who want to



**Fig. 1.** Consumption of M&Ms as a function of priming (neutral vs. environmental harshness) and framing (low calorie vs. high calorie) in Study 1. Error bars show standard errors.

indulge, because willingness to indulge is the result of pleasure-seeking behavior, not of resource scarcity. Moreover, we measured the perceived filling capacity of the food items to test whether activation of a fast life-history strategy led people to desire foods that would sustain them for long periods, a desire that should ultimately determine choices of high-calorie items.

## Method

Participants were 238 students enrolled in an introductory marketing class (52.5% female, 47.5% male) who participated in exchange for course credit. (The marketing class did not cover psychological concepts such as the effects of priming on behavior.) The design was a 3 (prime: pleasure vs. environmental harshness vs. neutral)  $\times$  2 (resource: provided vs. not provided) between-subjects design. Participants performed a priming task and a food-preference task. They were told that the purpose of the first task was to determine people's attentional capabilities. Participants were seated in front of a computer and were told to focus their attention on a fixation point that would be replaced by a letter string. Participants were instructed to press 0 on the keyboard if the letter string was a word and 1 if it was not. After 10 practice trials, participants completed 5 target trials with words that were associated with environmental harshness ("survival," "withstand," "persistence," "struggle," and "adversity"), words that were associated with pleasure seeking ("pleasure," "indulgence," "gratification," "comfort," and "enjoyment"), or neutral words. Each participant completed the 5 target trials in random order, along with 5 filler trials and 25 nonword trials.

Once participants completed the priming task, half of them were presented with a message on the computer screen saying that they would receive \$1 (our resource manipulation), purportedly for their participation in the task. Participants called over the experimenter, who then gave them a \$1 bill inside an envelope. For the second task, participants were told that the researchers were interested in what they currently felt like eating and were told that they could choose between a garden salad and cupcakes. A pretest ( $N = 40$ ) showed that the cupcakes were perceived to be tastier ( $M = 7.48$ ,  $SD = 1.66$ ) than the garden salad ( $M = 6.10$ ,  $SD = 1.77$ ),  $t(39) = 3.79$ ,  $p = .001$ , and higher in calories ( $M = 7.98$ ,  $SD = 1.36$ ) than the garden salad ( $M = 2.63$ ,  $SD = 1.37$ ),  $t(39) = 16.25$ ,  $p < .001$ . In the main study, participants completed a measure of filling capacity by indicating the extent to which they agreed with the statement, "The option I chose will keep me fed longer"; responses were made using a scale from 1 (*strongly disagree*) to 9 (*strongly agree*).

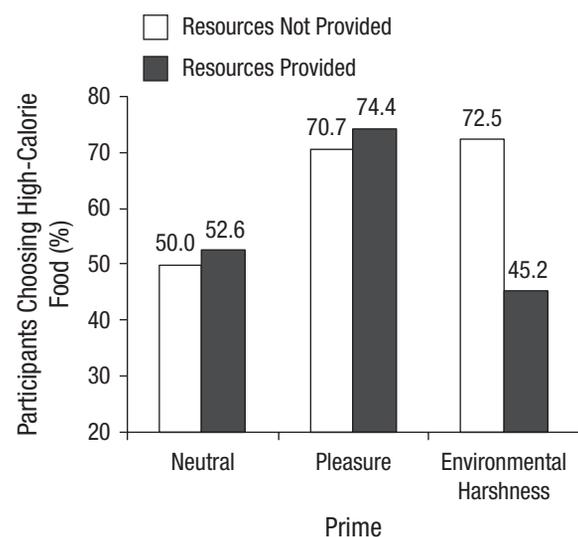
## Results and discussion

A pretest ( $N = 60$ ) showed that, compared with participants who were not exposed to the harshness prime, those who were perceived the environment to be harsher (pleasure condition:

$M = 5.05$ ,  $SD = 2.04$ ; neutral condition:  $M = 5.38$ ,  $SD = 2.33$ ; environmental-harshness condition:  $M = 7.17$ ,  $SD = 1.89$ ),  $F(2, 57) = 5.56$ ,  $p = .006$ , and resources to be scarcer (pleasure condition:  $M = 5.19$ ,  $SD = 2.09$ ; neutral condition:  $M = 5.52$ ,  $SD = 2.02$ ; environmental-harshness condition:  $M = 7.33$ ,  $SD = 1.85$ ),  $F(2, 57) = 6.34$ ,  $p = .003$ . Priming did not influence stress, hunger, mood, or arousal (all  $F$ s  $< 1$ ).

A binary logistic regression revealed an interaction between the priming and resource conditions,  $\chi^2(1, N = 238) = 4.00$ ,  $p = .045$  (Fig. 2). Participants in the neutral condition were as likely to select the cupcakes when resources were provided (52.6%) as when they were not (50.0%),  $\chi^2(1, N = 238) = 0.05$ ,  $p = .82$ . Participants in the pleasure condition were as likely to select the cupcakes when resources were provided (74.4%) as when they were not (70.7%),  $\chi^2(1, N = 238) = 0.13$ ,  $p = .72$ . Participants in the environmental-harshness condition were less likely to select the cupcakes when resources were provided (45.2%) than when they were not (72.5%),  $\chi^2(1, N = 238) = 6.27$ ,  $p = .012$ . Perceived filling capacity fully mediated the impact of resources on choice in the environmental-harshness condition, Sobel  $z = 2.09$ ,  $p = .036$ , but not in the pleasure condition, Sobel  $z = 0.24$ ,  $p = .81$ , or the neutral condition, Sobel  $z = 0.23$ ,  $p = .82$ .

These results demonstrate that behavior consistent with a fast life-history strategy is different from a mere willingness to indulge, because the present-time orientation associated with a fast life-history strategy is focused on acquiring resources, not on taste or pleasure seeking. The results also support the prediction that providing people with resources, even a small amount, can decrease behavior consistent with a fast life-history strategy.



**Fig. 2.** Percentage of participants who chose high-calorie food as a function of priming (neutral vs. pleasure vs. environmental harshness) and resource availability (resources not provided vs. resources provided) in Study 2.

### Study 3

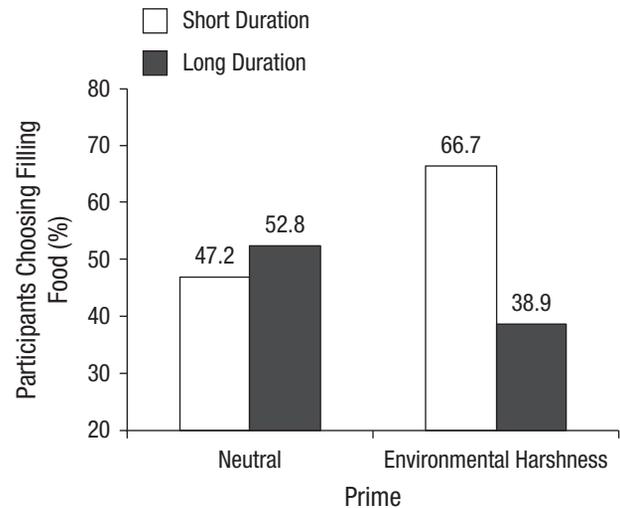
Study 3 investigated whether activating concepts of long and short duration could moderate the effect of an environmental-harshness prime on food choice. We predicted that the extent to which people choose food on the basis of its filling capacity should depend on whether they are thinking about the present or future. A fast life-history strategy is oriented toward the present (Griskevicius, Tybur, et al., 2011) and should therefore lead people to strive to consume the greatest possible amount of calories immediately. If activation of the concept of environmental harshness indeed prompts people to adopt a fast life-history strategy and focus on the present, then the concurrent activation of the concept of long duration should make people think about how to best use resources in the long term. This goal can be achieved with consumption of healthy food. Therefore, we predicted that people primed with the concept of environmental harshness and with the concept of long duration would be more likely to choose a food item that is healthy than one that is unhealthy.

### Method

Participants were 144 students enrolled in an introductory marketing class (44.8% female, 55.2% male) who participated in exchange for course credit. The design was a 2 (prime: environmental harshness vs. neutral)  $\times$  2 (duration: short vs. long) between-subjects design. The first task was a duration-priming task. We told participants the purpose of the first task was to examine their perceptions of a series of 15 items (e.g., a nap, a green light at a stoplight, a talk with mom, a fortnight). Participants in the short-duration condition were asked to rank the items according to how short their duration was, and participants in the long-duration condition were asked to rank the items according to how long their duration was (Block, 1990). The second task was the same priming task used in Study 2, except that participants chose between a Caesar salad and a turkey-and-cheese sandwich rather than a garden salad and cupcakes. A pretest ( $N = 40$ ) showed that the turkey-and-cheese sandwich was perceived to be more filling ( $M = 7.10$ ,  $SD = 1.35$ ) than the Caesar salad ( $M = 5.83$ ,  $SD = 1.85$ ),  $t(39) = -4.26$ ,  $p < .001$ , and less healthy ( $M = 6.00$ ,  $SD = 1.50$ ) than the Caesar salad ( $M = 3.38$ ,  $SD = 1.93$ ),  $t(39) = -5.61$ ,  $p < .001$ .

### Results and discussion

A binary logistic regression indicated an interaction between the prime and duration factors,  $\chi^2(1, N = 144) = 4.02$ ,  $p = .045$  (Fig. 3). Participants who had been exposed to the neutral prime were as likely to choose the sandwich in the short-duration condition (47.2%) as in the long-duration condition (52.8%),  $\chi^2(1, N = 144) = 0.22$ ,  $p = .64$ . In the environmental-harshness condition, however, participants in the short-duration condition were more likely to choose the sandwich (66.7%) than were those in the long-duration condition (38.9%),  $\chi^2(1, N = 144) = 5.57$ ,  $p = .018$ . These results are



**Fig. 3.** Percentage of participants who chose filling food as a function of environmental priming (neutral vs. environmental harshness) and primed concept of duration (short duration vs. long duration) in Study 3.

evidence that activation of the concept of environmental harshness, when coupled with thoughts about long duration, may increase people's tendency to choose healthy food items.

### General Discussion

In these studies, we examined how food choices and food consumption were influenced by exposure to information associated with environmental harshness. Results supported the prediction that information associated with environmental harshness encourages behavior consistent with a fast life-history strategy, reflected in the choice of foods perceived to be filling and high in calories. Because people are exposed to this type of information on a daily basis, behavior consistent with a fast life-history strategy may be more common than has been predicted by life-history theory, according to which one's environment when growing up is the primary determinant of life-history-strategy selection (Belsky et al., 2010; Nettle, 2010). It seems that different factors in people's current environment can activate behaviors consistent with different strategies. Therefore, it is important for researchers of life-history theory to consider people's immediate environment (e.g., do people work in competitive industries, and are they exposed to a great amount of news on the difficulties of surviving in a world of scarce resources?) and how this environment influences behavior.

Although we have shown that environmental primes have at least a temporary influence on behavior, it is unclear whether this influence would remain over the long term. Frequent exposure to environmental primes may interact with one's natural tendency to adopt a slow or a fast life-history strategy. Primes associated with a fast strategy may have an additive effect on people with a natural fast-strategy tendency and a weaker effect on people with a slow-strategy tendency.

This research also has implications for research on self-control and individual welfare. Choosing high-calorie food

may not always be the result of a willingness to indulge and seek pleasure (Tice, Bratslavsky, & Baumeister, 2001). In our studies, the selection of high-calorie foods was predicated not on taste but on perceptions of resource scarcity. This pattern implies that people selected high-calorie foods with a functional, not hedonic, motive in mind. The good intentions behind these choices could still have negative consequences, because foods that are high in calories are often unhealthy (Drewnowski & Specter, 2004; Scheier, 2005). An additional implication of these findings is that posting caloric values on menus of certain restaurants, as has been done in New York City (Elbel, Kersh, Brescoll, & Dixon, 2009), may not decrease peoples' consumption of high-calorie foods; in fact, making the high number of calories in a food item salient may draw people to it. Therefore, despite the fact that life-history strategies are meant to be adaptive in function, the wide availability of unhealthy high-calorie foods can make them potentially maladaptive (Pinel, Assanand, & Lehman, 2000). The key is to understand that the choice of unhealthy food is not always the result of a willingness to indulge but can sometimes be the result of exposure to information suggesting environmental harshness.

Finally, although the environmental-harshness primes in these studies did not seem to increase people's levels of stress, it is possible that frequent exposure to information associated with environmental harshness increases stress and influences food choice in a fashion consistent with our pattern of findings. This possibility is important, given that previous research has been inconclusive about whether elevated stress leads to an increase or a decrease in the number of calories people consume (Oliver, Wardle, & Gibson, 2000; Torres & Nowson, 2007). Although stress can have many causes, determining the instances in which environmental harshness can cause stress would contribute to theory on stress and food choice and would have practical implications for people's well-being. Previous research may have been inconclusive because the effects of stress are context dependent, leading to lower calorie consumption in some environments but higher calorie consumption in others.

### Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

### Note

1. Gender did not influence the results in any of the three studies.

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