TEMPTING FOODS AND THE JUNK FOOD MYTH

by

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ABSTRACT

One roadblock to healthy eating is the belief that healthy foods are more expensive than foods with added fats and sugars. However, much evidence suggests that healthy eating is actually less expensive (Carlson & Frazoa, 2012), raising the possibility that endorsement of this belief might stem from people's desire to justify eating unhealthy foods. We tested this hypothesis across four studies examining the relationship between one's desire to eat unhealthy foods and their endorsement of the Healthy Eating is Expensive Heuristic (HEEH). Study 1 found the HEEH is predictive of poorer eating habits and higher Body Mass Index (BMI). The results of studies 2 and 3 revealed that the presence of tempting junk food cues in one's environment increases people's endorsement of the HEEH. Study 4 extended these results by examining the impact one's level of food restraint (i.e. whether they are a restrained or unrestrained eater) on the effects observed in studies 2 and 3. As predicted, unrestrained eaters responded to the food cues by greater endorsement of the HEEH. Restrained eaters responded by demonstrating a lesser endorsement of the HEEH. Results support the hypothesis that one's desire to eat unhealthful foods may play an important role in perpetuating the belief that healthy foods are more expensive than less healthful options.

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INTRODUCTION

Overweight and Obesity in the United States

More than two thirds of adults 20 years and over in the United States (69.0%) are overweight or obese (Ogden, Carroll, Kit, & Flegal, 2014). The CDC defines overweight as having a body mass index of 25 or higher and obese as having a body mass index of 30 or higher. Both of these conditions significantly increase the risk of contracting three of the five leading causes of preventable death in the United States: heart disease, stroke, and some forms of cancer (Yoon, Bastian, Anderson, Collins, & Jaffe, 2014). The aggregate national cost of overweight and obesity combined was $113.9 billion in 2008 alone. This accounts for approximately 5.0-10% of U.S. health care spending (Tsai, Williamson, & Glick, 2011). All existing evidence implies that this epidemic carries significant costs not only for the individuals afflicted, but also for the general public.

Among other causes, research has cited the intake of fats, snacks, sugar-rich foods, soft drinks, and fast foods to be associated with greater energy intake, higher body mass index (BMI), and obesity (Astrup, 2001; Binkley, Eales, & Jekanowski, 2000; Bowman & Vinyard, 2004; Bowman, 2004; Bray & Popkin 1998; Lin & Morrison 2002; Ludwig, Peterson, & Gortmaker, 2001; Malik, Schulze, & Hu, 2006). In addition to being predictive of greater energy intake overall, consumption of these foods decreases one's ability to satisfy dietary recommendations for fruits and vegetables (Fox, 2001; Gidding et al. 2006; Krebs-Smith, Cook, Subar, Cleveland, Friday, & Kahle, 1996; Lin, Guthrie, & Frazao, 2001; McDowell, Briefel, Alaimo, Bischof, Caughman, Carroll, & Johnson, 1994; Munoz, Krebs-Smith, Ballard-Barbash, & Cleveland, 1997; Pesa & Turner 2001). One of the reasons people are eating poorly is because there are a

number of roadblocks to eating healthy. The existing research has examined barriers such as environmental factors like limited access to fresh produce in 'food deserts' (areas without ready access to fresh healthy foods), and personal taste preferences for energy-dense foods (Shepherd, Harden, Rees, Brunton, Garcia, Oliver, & Oakley, 2006).

We posit that another roadblock to eating healthy is the belief that doing so is expensive. Food research has demonstrated that people hold 'lay beliefs' regarding the price of healthy eating (Rozin, Fischler, Imada, Sarubin, & Wrzesniewski, 1999; Barrios, Bayarri, Carbonell, Izquierdo, & Costell, 2008) which guide our behavior (Beydoun, Powell, & Wang, 2008; Ollila 2011; Azzurra & Paola, 2009; Powell & Han, 2011; McFarren & Mukhopadhyay, 2013). A survey of 2,967 adults found that second to taste, cost is the most important influence on food choice (Glanz, Basil, Maibach, Goldberg, & Snyder, 1998). Several other studies have also cited price as a highly important influence on people's food choices (Bowman, 2006; Brug, Lechner, & De Vries, 1995; Drewnowski, 2004; Powell & Chaloupka, 2009).

Studies have compared the prices of healthy and less healthy foods using three price metrics: the price of food energy ($/calorie), the price of edible weight ($/100 edible grams), and the price of an average portion ($/average portion). Results indicate that eating healthy is actually *less expensive* than eating junk food in all regards but the price of food energy (Carlson & Frazoa, 2012). Most previous research that found healthy foods to be more expensive only considered the price per calorie metric; however, this measure is not reflective of dietary recommendations. For example, non-fat milk has a higher price per calorie than 2% milk, but most health experts recommend drinking non-fat or 1% milk. Regardless of the debate regarding the true cost of eating healthy, the high amount of public discourse on this matter leads people to form their own lay beliefs. We posit that people's *belief* that eating healthy is pricey may pose a

barrier to making responsible food choices.

Motivated Beliefs Bias Perception

Humans live in extremely complex environments, and it is well known that our minds are incapable of processing all of the stimuli we encounter on a daily basis. Because our attention is limited, we have developed mental shortcuts or heuristics to efficiently navigate our world. One shortcut that has been favored by natural selection is assuming that our beliefs are correct. For example, a person in the natural world who assumes that all unfamiliar food is inedible (person A) has an adaptive advantage over a person who lacks this assumption and needs to test each food they encounter to determine its edibility (person B). Even though person A's belief is technically *wrong,* not *every* food they encounter in their life could kill them, assuming this belief is correct at face value will prevent them from the fate of person B who could perish after eating just one bad berry (Lord & Taylor, 2009).

Research indicates that our beliefs are subject to 'context effects,' which change our perception and evaluation of stimuli, depending on which characteristics about our assumptions have been made momentarily salient (Lord & Taylor, 2009; Schwarz, 2000; Neuberg & Schaller, 2013). This perceptual change has been shown to occur without our conscious awareness (Greenwald & Banaji, 1995). One such context effect may be our motivational state. For example, experimental evidence has shown that under the motivational state of mating, women are more willing to take risks (such as tanning or taking diet pills) to make themselves more attractive to potential mates (Hill & Durante, 2011). From studies like this, we draw the conclusion that our beliefs change based on our motivational state in ways that promote our pre-existing goals.

The theory of planned behavior suggests that people will engage in a behavior (here, healthy eating) if they believe that there are few obstacles in the way of promoting the behavior. Research suggests that perceived control over a health-related goal as well as an intention to reach this goal significantly predict actualization (Godin & Kok, 1996; Schifter & Ajzen, 1985). However, an often overlooked aspect of the relationship between beliefs about subjective ease of a behavior and the behavior itself is that a person's beliefs about the subjective ease of a behavior may themselves be motivated by other often unconscious desires. Accordingly, the second goal of the current research was to examine whether the presence of tasty food cues in one's environment may play a role in influencing people's beliefs about the subjective ease of eating healthy.

We predict that the presence of tasty food cues in one's environment may activate individuals' consumption motivation and thereby change their beliefs about the barriers to healthy eating in order to justify the unconscious goal of calorie consumption. We predicted that the belief that eating healthy is more difficult and expensive than eating junk food would be predictive of poorer eating habits and higher BMI. Additionally, we predicted that tasty food cues would influence the degree to which people endorse beliefs that promote unhealthy eating. Specifically, we predicted that exposure to tasty food cues would lead people to believe that eating healthy is more difficult and expensive than eating less healthy foods.

STUDY 1

Study 1 was designed to examine whether participants' lay beliefs about the costs of healthy eating are associated with BMI and healthy eating habits. We predicted that participants' endorsement of the HEEH would be predictive of body weight and healthy eating behaviors. Specifically, we predicted that the belief that eating healthy is expensive would be associated with higher body mass and less healthy eating habits.

Method

Participants. Participants were 74 workers from Amazon's Mechanical Turk (47 female) ranging in age from 19–45 years (M_{age} = 30.28 years, SD = 7.05) who participated in the study in exchange for compensation.

Procedure. To assess whether participants' lay beliefs about the costs of healthy eating are associated with eating habits and BMI, we administered a questionnaire that asked participants about each of these constructs. We measured participants' endorsement of the HEEH by asking participants to indicate their agreement to the following statements on a 1 – 7 Likert-type rating scale (1: strongly disagree and 7: strongly agree): (a) "Fresh fruits and vegetables are expensive," (b) "Eating healthy is expensive," (c) "Eating junk food is expensive" (reverse scored). Participants' healthy eating habits were measured by asking participants to self-report on the healthfulness of their diet [How healthy is your diet? 1: Very Unhealthy, 7: Very Healthy] and by using the Adolescent Food Habits Checklist, which assesses eating behavior by measuring dietary fat and fiber intake, fruit and vegetable consumption, and dietary restraint. The score indicates the number of 'healthy' responses made by the participants.

Results and Discussion

We first calculated participants' BMI from measured height and weight, as weight(lb)/[height(in)]^2*703. Overweight was defined as a BMI between 25.0 and 29.9, and obese was defined as a BMI of 30.0 or above, according to the weight status categories defined by the CDC. We next created composite variables for participants' beliefs about the costs of healthy eating ($\alpha = .70$) and their self-reported healthy eating habits using the AFCH ($\alpha = .823$) by averaging participants' scores within each measure.

We then examined partial correlations (controlling for age and gender) between participants' beliefs about the costs of healthy eating, their healthy eating habits, and BMI. Results revealed a positive correlation between the belief that healthy eating is expensive and BMI, $r(68) = .30$, $p = .05$ and a negative correlation between the belief that healthy eating is expensive and self-reported healthy eating behavior, $r(68) = -.35$, $p = .05$, and scores on the AFCH, $r(68) = -.46$, $p < .01$.

Taken together, the findings provide evidence that lay beliefs about the costs of healthy eating are associated with less healthful eating and higher BMI. Specifically, these results demonstrate that participants with a higher body mass index and poorer eating habits are the most likely to endorse the HEEH.

STUDY 2

Study 1 indicated a correlation between the lay beliefs of the costs of eating healthy and participants' body mass; specifically, people who believe healthy food to be expensive tend to be heavier. This may suggest that an effective way to improve healthy eating and decrease obesity would be to change people's beliefs about the costs of healthy eating. However, given the high hedonic reward value that comes from eating highly palatable food, it is similarly plausible that people who wish to eat unhealthy foods simply change their beliefs about the costs of healthy eating to justify consumption on unhealthful food options. To investigate these questions, we had participants report on their endorsement of the HEEH in a room that smelled of freshly baked chocolate chip cookies or in an unscented room. We predicted that participants who filled out a survey about the costs of healthy eating in a room that smelled of freshly baked cookies would report that eating healthy is more expensive than would participants who answered the questions in an unscented room.

Method

Participants. Participants were 63 non-dieting undergraduates (55 female) ranging in age from 17–35 years (M_{age} = 19.52 years, SD = 2.83) who participated in the study in exchange for partial course credit.

Procedure. Participants came into the laboratory and were told that they would be participating in a survey on knowledge about current events and health information. Half of the participants (n = 30) filled out the survey in the laboratory room while chocolate chip cookies were being surreptitiously baked in a small oven hidden under a desk at the front of the room. The other half filled out the survey in the same laboratory room, but with no cookies baking. After indicating their gender, age, and body weight, participants were asked to indicate their

agreement to the following three items on a seven-point Likert-type rating scale (1: strongly disagree and 7: strongly agree): (a) "Fresh fruits and vegetables are expensive", (b) "Eating healthy is expensive" (c) "Eating junk food is expensive" (reverse scored). Participants then reported on the degree to which they stay informed about nutrition information by responding to the question "Do you stay informed about nutrition information" [1: Not at all, 7: Very Much] before being thanked, debriefed, and dismissed.

Cookie Scent Procedure. We created a cookie-scented room by covertly baking cookies in the room in which participants completed the survey. To this end, a small Oster Toaster Oven (model number: TSSTTVDFL1) was hidden underneath a desk at the front of the experiment room out of participants' view. Sessions were 30 minutes long and were conducted over a period of several days, running 3-5 sessions concurrently each day. Each session included a maximum of 8 participants. Twenty minutes prior to each block of daily sessions, the researcher running the experiment baked a batch of six Nestle Toll House Dark Chocolate Delight cookies at 350 degrees Fahrenheit for 14 minutes to fill the experiment room with the cookie scent. To maintain the cookie scent throughout each experiment session, another batch of six cookies was started right before participants entered the room. These cookies were baked at a reduced temperature (300 degrees Fahrenheit) so that they could stay in the oven for the entire 30-minute session duration without burning. With each new session, a new batch of cookies was baked. To mask the true purpose of the experiment, a handmade sign advertising a club meeting with free cookies was placed at the front of the room. The researcher running the session did not mention the meeting or cookie smell, but if participants inquired, they nonchalantly referred them to the sign. Once all participants finished the survey and exited the room, the researcher removed the cookies from the oven and prepared the next batch for the following session.

Results and Discussion

We first averaged together our three dependent measures to create a composite measure of participants' beliefs that healthy eating is expensive (α= .70). We then entered this variable as the dependent measure into an independent samples t-test with testing room (cookie scented versus neutral room) as the predictor[1]. Results revealed that participants who filled out the questionnaire in the cookie scented room were significantly more likely to believe that eating healthy is more expensive than participants who filled out the survey in the unscented room (M_{cookie} = 6.16, SD = .89; $M_{control}$ = 5.52, SD = 1.14; $t(61) = 2.49$, $p = .02$, $d = .63$). These results support the hypothesis that food cues in one's environment may impact one's attitudes and in ways that justify and potentially encourage unhealthful eating behaviors. That is, these results suggest that beliefs about food and the cost of healthy eating may not reflect an objective evaluation of evidence about the costs of healthful versus unhealthful foods. Instead, beliefs about the costs of healthy eating may be motivated by one's desire to eat unhealthful foods

STUDY 3

Study 3 was designed to extend the results of our first two studies by examining a potential moderating factor in the relationship between tasty food cues in the environment and people's beliefs about the cost of healthful eating: one's desire to eat something unhealthy in the presence of a food cue. If the results of Study 2 emerged in response to people changing their beliefs about healthy eating in ways that would justify eating unhealthful foods in the presence of a tasty food cue, we should find that the results are driven by those individuals who most want to eat something unhealthy in response to such a cue. Study 3 examined this possibility.

Method

Participants. Participants were 66 undergraduates (43 female) ranging in age from 18-23 years (M_{age} = 19.86 years, SD = 1.25; 30 in the cookie condition) who indicated that they were not on a diet. All students received partial course credit in exchange for their participation.

Procedure. The procedures and materials were the same as in Study 2. The only exception was that participants were asked to report on their current desire to eat in the demographic portion of the survey. Specifically, participants were asked if they were to eat something right now, would they like to eat something healthy or something unhealthy (anchors 1: Something Healthy, 7: Something Unhealthy).

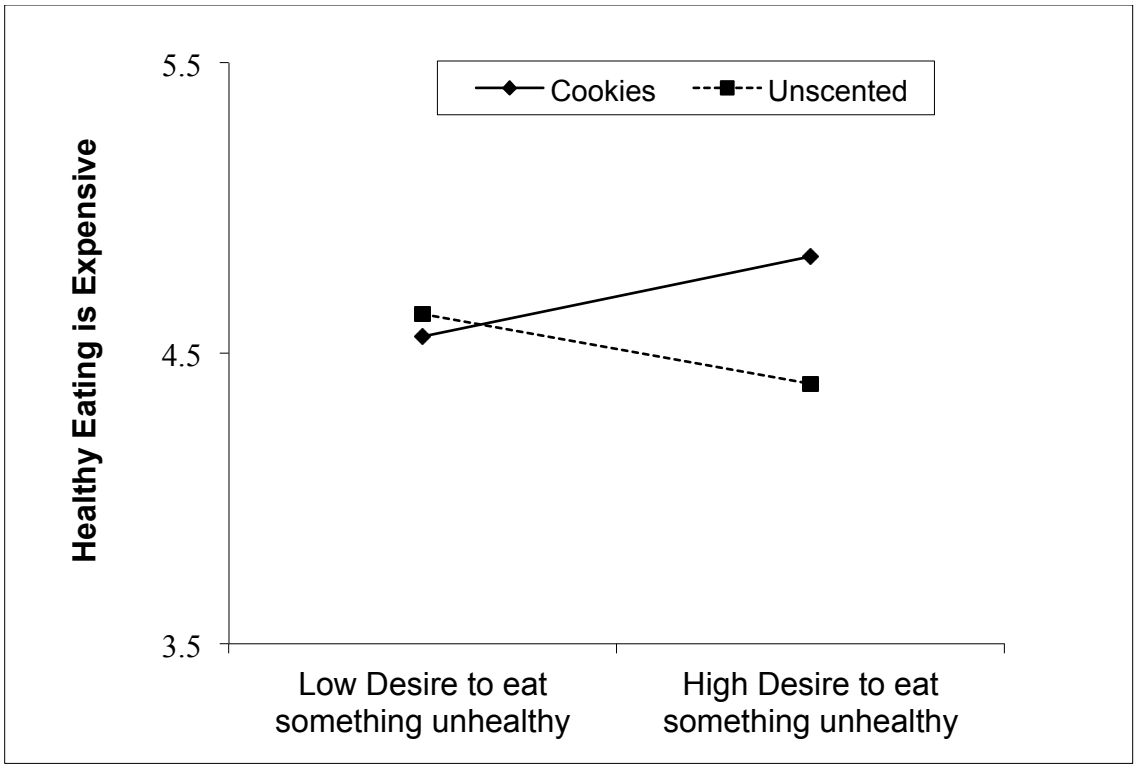
Results and Discussion

As in Studies 1 and 2, we first averaged together our three dependent measures to create a composite measure of participants' beliefs that healthy eating is expensive. Before running our primary statistical model, we tested whether there was a main effect of testing room on participants' desire to eat something unhealthy by entering participants' desire to eat something into an independent samples t-test with testing room (cookie scented versus neutral room) as the

predictor. Results revealed no room-based differences in the desire to eat something unhealthy (M_{cookie} = 2.90, SD = 1.54; $M_{control}$ = 2.97, SD = 1.44, p = .52).

Next, we used multiple regression to test whether participants' desire to eat something unhealthy would interact with the presence of a tasty food cue to impact their beliefs about the cost of healthy eating. The belief that eating healthy is expensive was regressed on room condition (dummy coded) and participants' desire to eat something unhealthy (centered) in the first step, and the interaction between these variables in the second step. Participants' nutrition knowledge (centered) was also entered into the first step to control for differences in health beliefs stemming from participants' existing nutrition knowledege[2].

Results revealed a main effect of room condition (cookie scented versus control) on participants' beliefs about the costs of healthy eating (M_{cookie} = 4.71, SD = .38; $M_{control}$ = 4.53, SD = .37, b = -.20 (SE = .10), t(61) = -2.00, p = .05). Further, this main effect was qualified by a significant interaction between room condition and participants' desire to eat something unhealthy, b = -.14 (SE = .07), t(61) = -2.04, p = .05 (see Figure 2). Regions of significance tests revealed that – for those participants who reported wanting to eat something unhealthy (1 SD above the mean) – being in the cookie scented room led to greater endorsement of the belief that eating healthy foods is expensive, b = -.40 (SE = .14), t(61) = -2.89, p = .005 (see Figure 2). No such pattern was observed among those who reported a low desire to eat something healthy (I SD below the mean), b = .004, p = .9



The results of this study found continuing support for the hypothesis that food cues in one's environment may change peoples' beliefs about the costs of healthy eating. Specifically, this study found that individuals with low desire to eat unhealthy foods did not tend to endorse the HEEH more in the cookie scented room. Conversely, those with a high desire to eat unhealthy foods were more likely to endorse the HEEH in the cookie scented room than the neutral room. This provides evidence that one's unconscious desire to justify eating unhealthy foods may perpetuate the belief that eating healthy eating healthy is more expensive than less healthy options

STUDY 4

Study 4 was designed to extend the results of the first three studies by examining whether food cues in one's environment have a different impact on one's beliefs about the costs of healthy eating depending on whether one is a restrained eater. We predicted that we would replicate the results of experiments 2 and 3, showing that unrestrained eaters – when filling out their surveys in a cookie-scented room – will report that eating healthy is more expensive than would participants who answered the questions in an unscented room. Conversely, we predicted that restrained eaters would respond in the opposite way. According to Herman and Polivy (1984), restrained eaters are less sensitive to internal stimuli (i.e. hunger), but more sensitive to external stimuli (i.e. the presence of food) than non-restrained eaters. Consistent with this idea, research finds that restrained eaters have relatively higher levels of salivation to food cues than their counterparts, despite being less likely to indulge (Klanjer, Herman, Polivy, & Chabra, 1981). Restrained eaters, in their attempt to tightly regulate their calorie intake, often rely on a number of rules that help inhibit food intake when in the presence of food cues. Accordingly, we predicted that – unlike unstrained eaters who have been found to exhibit greater endorsement of the HEEH in the face of a tempting food cue – restrained eaters would exhibit a cognitive shift that provides a *barrier* to unhealthy temptations. Specifically, we predicted that restrained eaters would be less likely to endorse the belief that eating healthy is expensive in the cookie scented room compared to the unscented room.

Method

Participants. Participants were 138 undergraduates (113 female) ranging in age from 18–23 years (M_{age} = 18.78 years, SD = 1.07) who participated in the study in exchange for partial course credit. Approximately half of participants in each condition were restrained eaters (n =

67, 38 in the cookie scented room condition). Participants were designated as being restrained / unrestrained eaters based on their response to a pre-screen survey administered at the beginning of the semester that asked participants "Would you consider yourself to be a restrained eater?" [1: Yes, 2: No].

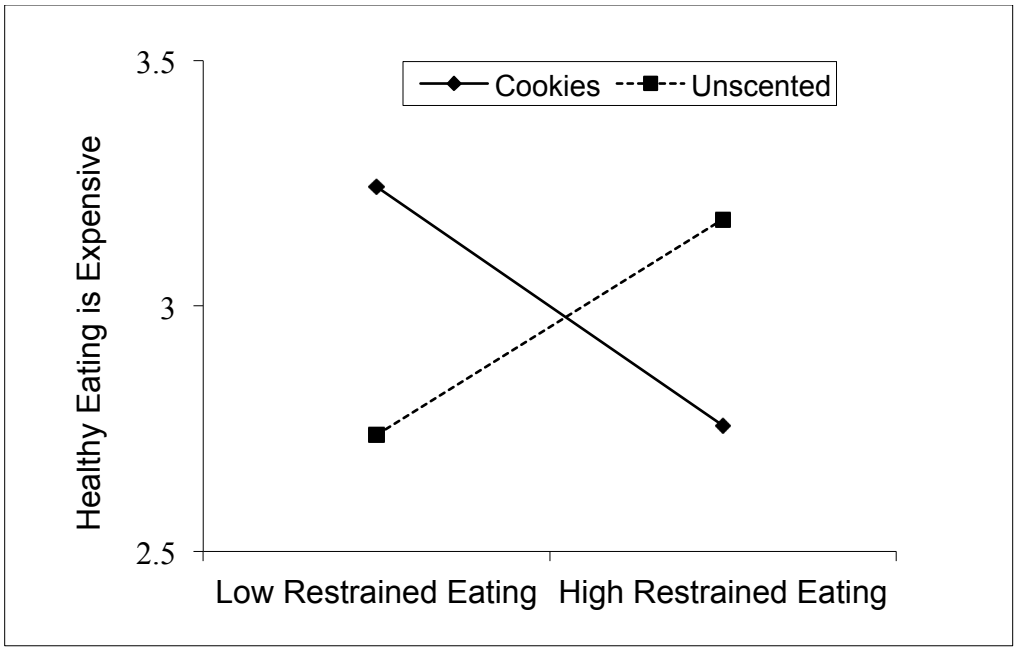
Procedure. The methods, materials, and procedures were the same as Study 3 except that, at the end of the study, participants were asked to answer questions measuring their degree to eating restraint. Specifically, participants answered the following questions from the dieting subscale of the restrained eating orientation scale: "Are you dieting right now"? [1: yes, 2: no, reverse scored], "Would you consider yourself to be a restrained eater" [1: yes, 2: no, reverse scored], and "How conscious are you of what you are eating" [anchors: 1: not at all, 4: extremely] (Polivy et al., 1979). These scores were standardized and averaged to create our continuous measure of eating restraint ($\alpha = .60$)[3].

Results and Discussion

As in our first three studies, we first averaged together our three dependent measures to create a composite measure of participants' beliefs that healthy eating is expensive. Next, we used multiple regression to test whether the presence of a tasty food cue would interact with participants' eating restraint scores to impact their beliefs about the cost of healthy eating. The belief that eating healthy is expensive was regressed on room condition (dummy coded) and participants restrained eating scores (centered) in the first step, and the interaction between these variables in the second step[4].

Results revealed a significant interaction between room condition and participants' restrained eating scores, $b = .62$ ($SE = .21$), $t(133) = 2.93$, $p = .004$ (see Figure 3). Regions of significance tests revealed that – for unrestrained eaters (1 *SD* below the mean) – being in the

cookie scented room led to greater endorsement of the belief that eating healthy foods is expensive, b = -.51 (SE = .22), t(133) = -2.29, p = .03 (see Figure 3). Conversely, for restrained eaters (I SD above the mean) - being in the cookie scented room led to marginally less endorsement of the belief that eating healthy foods is expensive, b = .42 (SE = .23), t(133) = -1.87, p = .06.



This study provides further evidence that people's food beliefs shift in the presence of tasty environmental food cues in order to justify their own specific calorie consumption goals. For restrained eaters-whose goal is to resist the temptation to eat unhealthy foods- being in the presence of tasty environmental food cues leads to a cognitive shift that provides a barrier to unhealthy temptation. In this case they are *less* likely to endorse the belief that eating healthy is more expensive than junk food. Conversely, for unrestrained eaters-whose goal is to eat tasty foods- being in the presence of tasty environmental food cues leads to a cognitive shift that facilitates unhealthy eating. In this case they are *more* likely to endorse the belief that eating healthy is more expensive than junk food

GENERAL DISCUSSION

From an evolutionary perspective, it is adaptive for humans to use mental shortcuts or heuristics to navigate our environments efficiently. Natural selection has favored the general assumption that the beliefs we hold are correct, and we subsequently use these beliefs to guide our daily behavior. Research has experimentally demonstrated that beliefs are subject to context effects, such as our motivational state, which change our perception of environmental stimuli in ways that promote our subconscious pre-existing goals (Greenwald, 1995; Hill & Durante, 2011). Research has also indicated that people form their own lay beliefs regarding the price of eating healthy, which guide our behavior (Rozin, Fischler, Imada, Sarubin, & Wrzesniewski, 1999; McFarren & Mukhopadhyay, 2013). Guided by these insights, the current research examined whether people's unconscious desires to eat unhealthy foods influence their beliefs about the subjective ease of eating healthy. Additionally, the present studies examined the effect of environmental food cues on people's endorsement of the healthy eating is expensive heuristic (HEEH).

Across 4 studies, we found evidence that people's unconscious desires to eat unhealthy food may impact their beliefs about the cost of eating healthy and subsequent food choices. Specifically, our first study found that endorsement of the HEEH is associated with a higher BMI and poorer eating habits. The subsequent studies experimentally demonstrated that in the presence of environmental food cues (i.e. the smell of baking chocolate chip cookies), people change their beliefs about the cost of eating healthy in ways that promote their specific calorie consumption goals. For restrained eaters whose goal is to restrict calorie consumption, being in the presence of these cues led to a decrease in support for the HEEH. Conversely, for

unrestrained eaters, being in the presence of tasty food cues led to an increase in support for the HEEH.

Taken together, our results provide evidence that people's beliefs about the cost of eating healthy influence their actual eating habits. Further, the current results suggest that people's beliefs about food are not objective; they change in the presence of environmental food cues differentially based on one's own underlying calorie consumption goals. To our knowledge, this is some of the first empirical research to examine the role that environmental food cues play in the formation of beliefs regarding the subjective ease of eating healthy. Our findings set the stage for new research into proactive strategies aimed at minimizing the olfactory output of fried food vendors, especially in school cafeterias. Together, this research adds to a growing literature on motivated perception (Hill & Durante, 2011), barriers to healthy eating (Raghunathan, Naylor, & Hoyer, 2006), and the differential impact of environmental food cues for restrained versus unrestrained eaters (Fedoroff, Polivy, & Herman, 1997; Polivy, Herman, & Coelho, 2008).

Limitations and Future Directions

Although the current studies represent an important step in determining the effects of underlying desires to eat unhealthily on the formation of beliefs about the ease of healthy eating, future experiments are needed to examine more fully the nature of this relationship. For example, in Study 1 we found that (as predicted) individuals with a higher body mass index and poorer eating habits were more likely to endorse the healthy eating is expensive heuristic. However, in Study 4, we found that restrained eaters in the neutral condition were more likely to endorse the HEEH than unrestrained eaters. This is surprising because restrained eaters are those who intentionally restrict calorie intake, and we would expect them to have a *low* body mass index

and good eating habits. We hypothesize that this contradictory pattern of results is due to our difference in sample population from Study 1 to Study 4. The sample for Study 1 was gathered using Amazon's Mechanical Turk and reflects a much more socioeconomically diverse population than the undergraduate population used in Study 4. We posit that although the general population views high price as a deterrent from purchasing healthy foods, the more affluent students used in Study 4 may view paying a high price for healthy foods as an indulgence in a luxury. And although this finding was surprising, it does not negate the result of beliefs shifting in the presence of environmental food cues based on the differential underlying goals of restrained versus non-restrained eaters in Study 4.

The current results are limited in that they could have potentially excluded some members of the population. Although we tried to use a highly generalizable population for our preliminary correlational study, we could not include those who do not have access to a computer because the survey was administered online. Therefore, our results may not exactly replicate when using a more diverse study population. Despite these limitations, this research contributes to a growing body of research on the effects of environmental food cues on eating habits (Fedoroff, Polivy, & Herman, 1997; Polivy, Herman, & Coelho, 2008).

The current research raises questions about the potential of using environmental food cues to impact eating behavior. Future studies could examine the effects of using healthy food cues (i.e. the smell of citrus or vegetables) on people's eating behavior. The current research also highlights the importance of the olfactory output of food vendors on eating habits. This information could be used to introduce policy changes regarding olfactory output in food deserts or school cafeterias, for example. Each of these lines of research has the potential to offer critical new insights into the development of healthy eating behaviors among the overweight and obese.

NOTES

1 – Because research indicates that individuals' level of nutritional knowledge has an impact on their beliefs about healthy eating (Azzurra & Paola, 2009), we ran a statistical model in which we included participants' self-reported nutritional knowledge as a covariate. Results revealed that participants' nutritional knowledge was not a significant predictor of participants' beliefs about the costs of healthy eating, $F(1, 60) = 1.26$, $p = .27$ and that our main effect of room condition on participants' beliefs about the costs of healthy eating persisted even after controlling for this variable $F(1, 60) = 7.18$, $p = .01$.

2 – Participants' self-reported nutritional knowledge was also included as a covariate in Study 3 because it was found to be predictive of participants' beliefs about the costs of healthy eating, $b = -.13$ ($SE = .04$), $t(61) = -3.22$, $p = .002$.

3 – Because our measure of restrained eating had marginally acceptable reliability, we also ran our analyses as a 2 (Condition) X 2 (Restrained Eater) univariate ANOVA, where participants' designation as a restrained eater (or unrestrained eater) was determined by the answer to the same one-item measure used to determine their eligibility for participation in the study (i.e., "Would you consider yourself to be a restrained eater?" [1: Yes, 2: No]. Results of our 2 (Condition) X 2 (Restrained Eating) univariate ANOVA revealed a significant interaction between Condition and Restrained Eating, $F(1, 135) = 6.89$, $p = .01$. Probing this interaction revealed a similar pattern of results as that observed in our target analysis. For unrestrained eaters, filling out the questionnaire in the cookie scented room led to greater endorsement of the belief that eating healthy is more expensive than eating unhealthy foods ($M_{cookie} = 5.91$, $SD = .86$; $M_{control} = 5.45$, $SD = .84$; $F(1, 68) = 3.66$, $p = .03$). Conversely, for restrained eaters, filling

out the questionnaire in the cookie scented room led to lesser endorsement of the belief that eating healthy is more expensive than eating unhealthy foods (M_{cookie} = 5.42, SD = 1.12; $M_{control}$ = 5.77, SD = .73; $F(1, 67) = 2.28$, $p = .13$), although this difference was not statistically significant.

4 – (Study 4) Nutrition Knowledge wasn't included as a covariate, here, because it did not have an impact on our DV ($r = .07$, $p = .75$)

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