

The Impact of Temporal Focus in Food Advertising on Delay Discounting and Consumption

Blaire Crockett

The University of Michigan

Mentor: Ashley Gearhardt, Ph.D

ABSTRACT

The rates of obesity among adults have exponentially increased over the last three decades. This is of major concern as obesity increases the likelihood of developing chronic (e.g. hypertension, diabetes) or even potentially fatal diseases (e.g. cancer, stroke, heart attack). Previous research has suggested that advertising of foods high in calories and low in nutrition may be contributing to the increasing rates of obesity. However, there has been no clear understanding of the mechanism through which food advertising increases risk of obesity. One possible mechanism is that some advertisements may shift temporal focus to the present, rather than the future. Past research has suggested that temporal focus on the present discounts future consequences (which can be assessed by the delay discounting task) and is related to riskier health behaviors (e.g., excess food consumption, smoking). Thus, advertisements that focus on the present instead of the future (“Live for Now”) may increase the likelihood of poor health decisions. However, individuals who are more skeptical of advertising may be less impacted and protected from these negative health behaviors. In the current study, we aim to examine the effects of food advertising among 112 college students at the University of Michigan. Participants were assigned to either a condition where they viewed a Pepsi “Live for Now” advertisement (shifts temporal focus to the present) or a control Pepsi “It's the Cola” condition and completed a delay discounting task and a food consumption task. Those in the “Live for Now” condition did not show great delay discounting or overall food consumption, but there was a significant increase in Pepsi consumption relative to the control group. These relationships were not moderated by advertising skepticism. These findings suggest that food advertising focusing on the present may be a contributing factor to the tendency to consume products that may be pleasurable in the moment but have long-term negative health consequences.

Keywords: obesity, soda, temporal focus, delay discounting, advertising skepticism

The Impact of Temporal Focus in Food Advertising on Delay Discounting and Consumption

INTRODUCTION

Obesity

Over the last 30 years, rates of obesity have continually increased across the United States, with adult obesity prevalence increasing from 19.8% in 2000 (Mokdad et al., 2003) to over 36.5% in 2014 (Ogden et al., 2015). This number is expected to continue to rise with over 86% of adults projected to be obese/overweight by the year 2030 (Wang, Beydoun, Liang, Caballero, & Kumanyika, 2008). There is evidence to support that due to the effects of obesity there has been a slow deceleration in life expectancy for recent generations compared to historical patterns (Olshansky et al., 2005). The high rates of obesity are of public health concern because obesity is strongly associated with increased risk of negative health outcomes such as diabetes, hypertension, heart disease, some cancers, gallstones, and stroke (Field et al., 2001; Sturm, 2002). The U.S. is currently spending about 21% of medical expenditure on obesity related illnesses every year (Cawley & Meyerhoefer, 2012). This number has dramatically increased from 9.1% in 1998 and is expected to rise with the rates of obesity continuing to increase over time (Wang et al., 2008). The prevalence of food advertising has been identified as one potential factor that may be influencing the increased rates of obesity. However, previous research has not identified the mechanisms through which food marketing may be increasing risk; this limits our ability to develop more effective interventions.

Food Advertising

One approach to combatting the rising rates of obesity is to focus on policies related to food advertising. The U.S. has one of the highest rates of food advertisements in the world and food accounts for 40% of all advertisements (Story & French, 2004). The amount of food

advertising in our environment has increased along with the rates of obesity (Hoek & Gendall, 2006; Lobstein & Dobb, 2005). Overall food advertising spending increased almost 20% from \$9.8 billion to \$11.6 billion between 1995 and 1999 (Anderson & Butcher, 2006). The vast majority (83%) of foods that are advertised are calorically dense, but nutrient poor, being high in fat and sugar and low in fiber (Harrison & Marske, 2005; Harris, Bargh, & Bronell, 2009). Powell and Harris (2013) report that there has been pressure on the industry to reduce food advertising to children as a strategy to prevent and reduce obesity rates in this age group. However, even though there has been some reduction in the amount of advertisements that specially target children, the overall amount food advertising has increased 21% (Powell & Harris, 2013; Andreyeva, Kelly & Harris, 2011).

There is evidence that exposure to food advertisements may increase food consumption in both children and adults. Harris et al. (2009) found that children consumed 45% more food when viewing a television show that included food advertising relative to non-food advertising. Halford et al. (2007) found similar results of overall increased caloric consumption in children following exposure to food advertisements. The effect of food advertisement on obesity has been seen in children; however, among the studies that examine how exposure to food advertising impacts caloric intake in adults, the findings are mixed. One prior study has found that adults consumed more food when exposed to food advertising compared to control advertising (Harris et al., 2009). However, in a study by Wonderlich-Tierney, Wenzel, Wal, & Wang Hall (2013), there were no significant differences in food intake among those who viewed a sitcom embedded with either food commercials, neutral commercials, or no commercials at all. Given these mixed results and the increased risk for obesity during adulthood (Ferraro et al., 2003), further research on how advertising impacts food intake in adults is needed. Additionally, little is known about

the specific mechanisms driving the association between food marketing and increased caloric consumption, which limits our ability to develop effective interventions that target food advertising.

Temporal Focus/Delayed Discounting

Food marketing may increase like likelihood of excess food consumption by priming reward mechanisms in the brain in those at risk for weight gain (Yokum, Gearhardt, Harris, Brownell, & Stice, 2014). However, another potential mechanism that has not previously been explored is that food advertising may increase food intake is through the changing of temporal focus. Temporal focus is defined as whether an individual is attending to their past, present, or future (Shipp, Edwards, & Lambert, 2009). Decision making varies when attending to different time periods, or when temporal focus is shifted. Individuals are less likely to engage in risky behavior when focusing on the future and more likely to engage in risky behavior when focusing on the present (Zimbardo & Boyd, 2015). For example, a person may be less likely to save for retirement and instead make larger purchases when not focused on the future consequences of that behavior.

Individuals differ in the degree to which they focus on the present relative to the future. One way to capture this is by measuring delayed discounting, which is an individual's preference for smaller (but more immediately available rewards) relative to larger (but delayed) rewards (Weller, Cook, Avsar, & Cox, 2008). Individuals who exhibit more delay discounting display a greater preference for the smaller, immediate rewards and discount the larger, delayed rewards. A typical example of the delay discounting task would ask, "Would you rather gain \$20 now or gain \$75 three weeks from now?". It is important to note that every individual discounts the future to some degree, some more than others. For example, there is evidence to suggest that

children are likely to discount the future more compared to young adults (Green, Fry, and Myerson, 1994). Petry and Casarella (1999) examined the rates of delay discounting among problem gambling substance abusers (i.e. alcohol, cocaine, heroin) and gambling non-substance users. The control group (no history of gambling or substance problems) did discount the future to a small degree, but the problem gambling/substance abusers showed significantly higher and more rapid rates of delay discounting (Petry & Casarella, 1999). Additionally, research suggests that people who discount the future more, do so even if the immediate reward (e.g., eating a tasty cookie) is not aligned with their long term goals and interests (e.g., losing weight) (Radu et al., 2011). This may be due to the prioritization of short term rewards over the consequences associated with that decision in the future. Overall, findings suggest that individuals differ in the degree to which they discount the future and those who discount the future the most are at a greater risk for engaging in risky behaviors, such as gambling, excessive alcohol intake, risky sexual behavior, and overeating (Weller et al. 2008).

While there are individual differences in tendencies to discount the future, the degree that an individual discounts the future can be shifted by exposure to stimuli that emphasize different mindsets. For example, exposure to episodic future thinking (EFT) is an approach to reduce the degree that the future is discounted (Daniel, Stanton, & Epstein, 2013). EFT requires an individual to project themselves into the future. Research suggests that this influences decision making more towards long term benefits and reduced delayed discounting (Daniel et al., 2013). A shift in an individual's focus towards the future is associated with a decrease in alcohol consumption and increase in the value of future monetary rewards among individuals with alcohol addiction (Snider, LaConte, & Bickel, 2016). Researchers have found similar results among smokers who shift their focus to the long-term consequences of smoking, and in turn,

experience reduced craving (Kober, Kross, Mischel, Hart, & Ochsner, 2010). Previous studies have found that women with obesity compared to healthy weight controls showed greater rates of delayed discounting when focusing on long term rewards relative to immediate rewards in the present (Daniel et al., 2013). Overall, when temporal focus shifts to the future, individuals are less likely to engage in maladaptive behavior (Daniel et al., 2013; Snider et al., 2016).

The goal of the food industry is to increase the consumption of products (e.g., high calorie foods) that are rewarding in the short term, but may have significant health consequences in the future. Thus, marketing approach may try to impact temporal focus using the exact opposite tact of EFT and attempt to emphasize the short term rewards in the present. This may lead people to be more likely to make short term decisions that are rewarding in the present and be more likely to discount future consequences. In 2012, PepsiCo launched a global campaign called “Live for Now”. This campaign was centered about the desire to live in the moment and capture the excitement in the present time. The “Live for Now” advertisements might shift focus to the present moment and increase the tendency to discount the future and engage in increased caloric intake.

Advertising Skepticism

There may be factors that could protect individuals against the impact of food advertising. One theory in the current literature is skepticism toward advertising. Obermiller and Spangenberg (1998) define advertising skepticism as the tendency not to believe various claims presented in advertising in the media. The theory proposes that people who are skeptical of advertising will be buffered from the effects of the advertisements because they are less likely to focus their attention on the information presented (Obermiller, Spangenberg, & McLachlan, 2005). There is evidence that individuals with higher advertisement skepticism are less likely to

believe advertising and informational claims (Obermiller et al., 2005). However, there has been no empirical investigation on whether individuals high in advertising skepticism would be less likely to be affected by food advertising and less likely to have overall increased caloric consumption.

Present Study

In the present study we aim to more fully identify the mechanisms through which food marketing may shift temporal focus and increase caloric intake. Our first aim is to investigate in a sample of 112 young adults whether exposure to food advertising that emphasizes a present temporal focus (i.e., PepsiCo's "Live for Now" advertisement) relative to a control condition (i.e., PepsiCo advertisement with no temporal focus) is related to greater delay discounting. Our second aim is to examine whether exposure to PepsiCo's "Live for Now" advertisement relative to a control "It's the Cola" condition is associated with increased Pepsi consumption and greater caloric intake. Finally, we investigate whether advertising skepticism moderates these associations, with individuals with higher advertisement skepticism being less likely to exhibit increases in delay discounting and caloric intake in response to the "Live for Now" advertisement.

METHODS

This study was reviewed and approved by the Institutional Review Board at the University of Michigan. All participants provided informed written consent for their participation in this study.

Participants

One hundred and twelve participants were recruited from the University of Michigan Introductory Psychology Subject Pool to participate in a study about aesthetic preferences and

decision making. Participants were excluded for dietary restrictions that prevented them from eating food provided in the study (i.e., vegetarian, lactose intolerance, gluten intolerance, and vegan) ($n = 4$), failing attention checks (i.e., failed to correctly identify which slogan they viewed in the study) ($n = 6$), and experimenter error ($n = 6$). The final sample included 96 participants with ages ranging from 17-24 ($M = 18.46$, $SD = .97$). BMI ranged from 17.20 to 39.72 ($M = 23.90$, $SD = 3.82$), 58.33% were female ($n = 56$), and the sample included a variety of ethnicities (58.33% White, 6.25% African American, 27.08% Asian/Pacific Islander, 2.08% Arabic, and 6.25% Mixed/Other). There were no significant differences between condition for BMI, age, sex, and ethnicity ($p's > .05$).

Procedure

Condition prime and Delay Discounting. After consenting to participate in the study about aesthetic preferences and decision making, participants completed a questionnaire asking about their current mental state (e.g. stress and irritability) and hunger. They reported their level of hunger on a visual analog scale (VAS) that ranged from *most full* (-100) to *most hungry* (100). Participants then were informed that a video would begin to play, and their opinions about the video would be asked later in the study. Each participant was randomly assigned to watch a Pepsi advertisement with images featuring either the slogan “Live for Now” or “It’s the Cola”. The advertisements were exactly the same (e.g., same actors, music, visual images, etc.), except the slogan differed to reflect the different conditions. To increase participant engagement with the advertisement, participants rated the advertisement on how much they liked the video and how much they liked the song in the video on a five point Likert scale ranging from *liked a great deal* to *dislike a great deal*. Participants then completed an adjusting delay discounting task

where they were asked to choose between receiving an amount of money now or a greater amount of money after a certain delay.

Food consumption. Participants were then taken to a new room where they completed second hunger VAS rankings. To ensure the conditioned prime (“Live for Now” vs. “It’s the Cola”), participants were asked to rank three images seen in the previously watched advertisement from *most favorite* (1) to *least favorite* (3). Participants saw either images with the “Live for Now” or “It’s the Cola” slogan depending on their assigned condition. For example, a person who was assigned the “Live for Now” condition, ranked three images, all with the “Live for Now” slogan. Next, a research assistant brought in a tray for participants to taste six different food and drink items (i.e., water, Pepsi, Lays potato chips, M&Ms, grapes, and multi-seed crackers). The order of presentation was randomized prior to each session. For each food, there was a standardized taste test sample, as well as a larger bowl with the item. Participants were asked to taste each sample and then rate the sample for how much they liked it and how much they wanted to have more from *greatest dislike* (-100) to *greatest like* (100).

Following the standardized taste test, the participant completed an ad libitum consumption period where they were told they would have to wait until the next room was available. The participant was informed they were welcome to snack on the foods while waiting and the researcher would return when the room was available. The researcher left the room for eight minutes.

After the ad libitum food consumption period, the participant was brought back to the original room to complete a survey questionnaire which included demographics, food preferences, health perceptions, and various personality measures. Finally, the participant’s height and weight were measured in order to calculate BMI.

Measures

Adjusting delay discounting task

Reward-related impulsivity was measured using an adjusting delayed discounting task (ADDT) (Myerson, Green, & Warusawitharana, 2001). Participants were asked to choose between an immediate monetary reward and another monetary reward which is delayed (e.g., gain \$50.00 in 6 months or gain \$25.00 now). Delays included 1 day, 2 days, 1 week, 2 weeks, 1 month, and 6 months, and the participant completed 35 trials. Participants were told they would not be receiving the amount of money shown, but to act as though they were actually getting the amounts shown. The task produced a k value for each participant, which represented the switch point when the participant shifted preferences from the immediate present rewards to the future rewards. The higher the k value, the faster the decrease in the monetary value of the reward relative to the delay (Petry & Casarella, 1999). In other words, individuals with higher k values are more likely to discount the future and prefer more immediate rewards. Ten participants were excluded from only the analyses that included delay discounting. Of these 10, six participants had missing delay delayed discounting data and four had outlying delay discounting data as indicated by the thresholds set in prior research (Johnson & Bickel, 2008). The k value remained skewed following the removal of outliers, so these data were log transformed.

Advertising skepticism

Participant skepticism toward advertising was measured using the Advertising Skepticism Scale (SKEP Scale) (Obermiller & Spangenberg, 1998). Items were measured on a Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale asked nine questions related to the participant's feelings towards advertising (i.e., "Advertising is generally

truthful”, “I believe advertising is informative, and “Advertising is a reliable source of information about the quality and performance of products”).

Pepsi preferences

Each participant was asked how often they drink regular and diet soda from a scale ranging from *never* to *everyday*. A maximum soda frequency score was created based on the highest frequency selected on either of the two questions. For example, if a participant self-reported drinking regular soda *2-3 times a month*, but self-reported drinking diet soda *4-6 a week*, their max soda frequency was *4-6 times a week*.

Food consumption

In order to calculate total amount of calories consumed, pre and post weights of all the foods and drinks were taken during the food consumption portion of the study. Foods were weighed in grams (to the nearest tenth of a gram), and caloric intake was calculated by subtracting the post-weight of the foods from their pre-weight and multiplying by the calories per gram of the total portion. Food weights and caloric values are shown in Table 1. Further, the protocol was designed to be completed in the afternoon (between 2 pm and 5 pm), as this is the most frequent period for snacking (Cross, Babicz, & Cushman, 1994). However, 35 participants completed the protocol in the morning, which is the least frequent time of day for snacking (Cross et al., 1994). To reduce the impact of time of day on the outcome variables, participants who had completed the protocol in the morning were excluded from the Pepsi and food consumption analyses, but were retained for other analyses (i.e., delay discounting by condition).

Hunger

In order to assess hunger levels, the participant was asked to rate their hunger on a scale from *most full* (-100) to *most hungry* (100).

Participant Body Mass Index (BMI)

Participant height and weight were measured to perform BMI calculations (kg/m^2). Measurements were collected using O'Leary Acrylic Stadiometer and Detecto Portable Scale in centimeters and kilograms (rounding to the nearest tenth).

Data Analytic Plan

To identify potential covariates, we conducted one-way analysis of variance (ANOVAs) and chi-square analyses to determine whether demographic variables differed by condition. We did this separately for the delay discounting analyses and the food consumption analyses, due to varying sample sizes related to missing data (see Table 2 for demographics for delay discounting and Table 3 for demographics by Pepsi and food consumption). No variables differed by condition (all $ps > .05$), thus demographics were not included as covariates in analyses. Next, we investigated potential covariates related to the dependent variables. Soda frequency was associated with delay discounting rates ($r = .24, p = .03$) and was included as a covariate for analyses regarding delay discounting rates. BMI ($r = .25, p = .05$) and soda frequency ($r = .31, p = .01$) were significantly correlated with consumption of Pepsi, thus were controlled for in the analyses regarding food consumption. Next, to account for covariates, linear regressions were conducted to investigate the differences between delay discounting by advertising condition (i.e. "Live for Now" or "It's the Cola") and the association between advertising condition (i.e. "Live for Now" or "It's the Cola") for both Pepsi consumption and overall caloric intake. Finally, interaction terms were created using the condition ("Live for Now" = 0, "It's the Cola" = 1) and the centered variable for advertising skepticism. We then investigated interactions to test whether effects were moderated by advertising skepticism.

RESULTS

Advertising condition predicting delayed discounting

Analyses revealed that only soda frequency was associated with delay discounting rates ($B = .003, p = .04, r_p = .22$). Condition did not significantly predict delay discounting rates ($B = -.005, p = .45, r_p = -.08$).

Advertising condition predicting delayed discounting moderated by advertising skepticism

When controlling for soda frequency ($B = .003, p = .03, r_p = .25$), regression analyses predicting delay discounting revealed a main effect of advertising skepticism ($B = -.002, p = .05, r_p = -.21$), but no main effect of condition ($B = -.004, p = .53, r_p = -.07$) and no significant interaction ($B = .001, p = .23, r_p = .13$). Thus, this interaction was not probed further for simple slopes.

Advertising condition predicting Pepsi intake and total caloric consumption

Analyses revealed that Pepsi intake was significantly associated with condition ($B = -4.98, p = .03, r_p = -.25$), such that the “Live for Now” condition consumed more Pepsi than the “It's the Cola” control condition. Pepsi intake was also significantly associated with soda frequency ($B = 1.16, p = .02, r_p = .27$) and marginally associated with BMI ($B = .56, p = .06, r_p = .21$). Total caloric consumption was not associated with condition, soda frequency, or BMI (all $ps > .25$).

Advertising condition predicting Pepsi intake and total caloric consumption moderated by advertising skepticism

When controlling for BMI ($B = .53, p = .09, r_p = .20$) and soda frequency ($B = 1.23, p = .02, r_p = .28$), regression analyses predicting Pepsi intake revealed a main effect of condition ($B = -4.92, p = .03, r_p = -.25$), but no main effect of advertising skepticism ($B = -.27, p = .34, r_p = -$

.11) and no significant interaction ($B = .29, p = .48, r_p = .08$). Thus, this interaction was not probed further for simple slopes.

When predicting total caloric consumption, there were no main effects of condition ($B = -25.25, p = .29, r_p = -.14$) or advertising skepticism ($B = .23, p = .94, r_p = .10$), and no significant interaction ($B = .31, p = .94, r_p = .01$). Thus, this interaction was not probed further for simple slopes.

DISCUSSION

In the present study, we investigated the effects of advertising on temporal focus and subsequent delayed discounting, Pepsi consumption, and overall food intake. We expected to see these relationships moderated by advertising skepticism. While we found that delayed discounting was moderated by advertising skepticism, we found that those who were in the “Live for Now” condition (which would increase a focus on the present) did not show increased delayed discounting or overall food intake, and these relationships were not moderated by advertising skepticism. We did see that individuals in the “Live for Now” condition displayed increased Pepsi consumption. However, this relationship was also not moderated by advertising skepticism.

It is important to note that both the “Live for Now” and “It’s the Cola” advertisements were identical, with the only difference between the two videos being the slogan. In the “Live for Now” condition that primed present focus, we did see greater Pepsi intake. This is consistent with findings from other studies that have suggested that when individuals focus on the present relative to the future, they are more likely to make decisions that favor short term rewards over long term consequences (Zimbardo & Boyd, 2015). Previous research has indicated that shifting temporal focus to the future has been shown to decrease cravings in smokers, decrease alcohol

consumption, and increase delay discounting among obese women relative to healthy controls (Daniel et al., 2013; Kober et al., 2010; Snider et al., 2016). Being exposed to the “Live for Now” advertisement might have increased this present focus and contributed to the greater intake of Pepsi. This is important in understanding some of the mechanisms through which certain advertisements may increase tendencies to consume products that may be bad for health and lead to negative health outcomes (such as obesity) in the future. Prior research has indicated that adolescents who exhibit the greatest reward-related neural response to food commercials are at the greatest risk for future weight gain (Yokum et al., 2014). It is possible that individuals who are more sensitive to the rewarding effects of Pepsi may need more cognitive resources to manage their consumption of this product, such as the ability to consider long-term negative consequences. Thus, individuals that find Pepsi more rewarding may be more prone to overindulge when exposed to marketing that shifts temporal focus to the present. Future research on the mechanisms of food marketing would benefit from investigating the interaction between reward responsivity and temporal focus. Additionally, future research should address whether episodic future thinking (EFT), or projecting oneself into the future, can counteract this effect. It is important to consider the strategy of focusing on the present is not specific to Pepsi and is also used to sell other products like alcohol (“Tomorrow is Overrated” – Jose Cuervo) and food (“What Are You Eating Today?” – Arby’s). Thus, the tendency for advertisers to focus on the present may encourage greater engagement with substances or activities that are rewarding in the present, but damaging in the long-term. Future research would benefit from examining whether the current findings generalize from soda to other items, such as alcohol and food.

Another potential focus of future research would be to investigate for whom this shift in temporal focus is possible and to what degree it could be beneficial or harmful. For example,

individuals with poor self-control who are prone to make riskier decisions may be more likely to engage in behaviors that negatively impact their long-term health when there is a present temporal focus. In contrast, some individuals may exhibit excessive self-control that is related to a rigid tendency to focus on the future and virtuous outcomes and never make decisions that focus on present reward (i.e., hyperopia) (Kivetz & Simonson, 2002). Hyperopia is related to an increased tendency to experience regret and feelings of missing out on life (Kivetz & Keinan, 2006). For more hyperopic individuals, subtle primes to shift their focus to the present may be unsuccessful. However, if they are useful in lessening their hyperopia, this may reduce feelings of regret and improve their enjoyment of life. Future research would benefit from considering how the outcomes of shifting temporal focus may differ for individuals with over- versus under self-control.

However, it should be noted that that individuals in the “Live for Now” condition did not show significantly decreased delay discounting relative to those in the “It’s the Cola” control condition. It may be that delay discounting is not the right metric to examine shifts in temporal focus in this domain. In order to accurately assess the shifts in temporal focus and the degree to which an individual prefers immediate rewards over future consequences, a different delayed discounting measure will need to be used. The measure used in this study focuses on monetary gains instead of food rewards. It could be that the advertising doesn't have a broad enough effect to influence monetary delayed discounting, but may influence delayed discounting related to food. Additionally, the delay discounting task used in this study may not be sensitive enough to pick up small shifts in temporal focus. Future research might consider using alternative metrics of temporal focus, such as food-based delay discounting task. We also noted that this condition did not result in greater intake of all foods, but was specific to Pepsi, which further highlights

that the effects may be specific to the item being advertised. Perhaps to be even more specific, a Pepsi-specific delay discounting task should be used to assess shifts in temporal focus.

Further, although we did see that being skeptical of advertising to be associated with delay discounting, we did not find that being skeptical of advertising was protective against the effects of advertising shown in the “Live for Now” condition. Although previous research has hypothesized that those who are highly skeptical of advertising may be protected against the effects of advertising (Obermiller et al., 2005), there has been no prior investigation as to whether being skeptical of advertising predicts behavioral responses in response to advertising. The findings in the current study do not provide support for theories proposed that increasing skepticism might be an effective strategy to combat advertising. Although future research is needed, the current study suggests that this may not be sufficient to protect individuals against the effects of advertising. Considering how prevalent advertising for foods high in calories and how in nutrition is, we need to develop policy or intervention strategies to address this public health concern.

There are a number of limitations to consider with this study. To begin, all of the participants were drawn from University of Michigan’s Psychology Subject Pool, and this could be viewed at as a sample of convenience. Although there was a relatively even split of men and women (58% female), the majority of the sample was White or of European decent. While this sample matched the demographic make-up of the University of Michigan, this decreased the external validity of the results. In addition, the sample was generally healthy, with the average BMI being 23.90 ($SD = 3.82$). A follow-up study would need to recruit participants from a different sample in order to represent the true demographic composition of the U.S., along with different ages, a wider range of BMI, and to include individuals with varying levels of clinical

eating pathology. Second, since we are in a controlled environment, it is difficult to determine how temporal focus and delayed discounting would play out in the real world. Participants may be less inclined to answer truthfully due to demand characteristics and awareness of being part of a psychology study. During the ad libitum food consumption portion of the study, participants may have displayed eating patterns that are different than if they were in an uncontrolled laboratory environment.

In summary, although individuals in the “Live for Now” condition did not have an overall increased caloric intake, there was an increase in Pepsi consumption. This suggests that advertisements that focus on the present time period might increase consumption of substances that are not good for long-term health. It does not appear that being more skeptical of advertising is protective, suggesting a push to restrict advertising of high calorie and low-nutrient foods, especially to more vulnerable populations like children and teens. This research highlights the importance of looking at the content of advertisements to more fully understand the mechanisms through which advertising may be increasing risky healthy behaviors, and thus, may improve our ability to implement effective public health interventions.

REFERENCES

- Anderson, P. M., & Butcher, K. F. (2006). Childhood Obesity: Trends and Potential Causes. *The Future of Children*, 16(1), 19-45.
- Cawley, J., & Meyerhoefer, C. (2012). The medical care costs of obesity: an instrumental variables approach. *Journal of Health Economics*, 31(1), 219-230.
- Cross, A. T., Babicz, D., & Cushman, L. F. (1994). Snacking patterns among 1,800 adults and children. *Journal of the American Dietetic Association*, 94(12), 1398-1403.
- Daniel, T. O., Stanton, C. M., & Epstein, L. H. (2013). The future is now: Comparing the effect of episodic future thinking on impulsivity in lean and obese individuals. *Appetite*, 71, 120-125.
- Ferraro, K. F., & Kelley-Moore, J. A. (2003). Cumulative Disadvantage and Health: Long-Term Consequences of Obesity?. *American Sociological Review*, 68(5), 707-729.
- Field, A. E., Coakley, E. H., Must, A., Spadano, J. L., Laird, N., Dietz, W. H., Rimm, E., & Colditz, G. A. (2001). Impact of Overweight on the Risk of Developing Common Chronic Diseases During a 10-year period. *Archives of Internal Medicine*, 161(13), 1581-1586.
- Green, L., Fry, A. F., & Myerson, J. (1994). Discounting of Delayed Rewards: A Life-Span Comparison. *Psychological Science*, 5(1), 33-36.
- Halford, J. C., Boyland, E. J., Hughes, G., Oliveira, L. P., & Dovey, T. M. (2007). Beyond-brand effect of television (TV) food advertisements/commercials on caloric intake and food choice of 5–7-year-old children. *Appetite*, 49(1), 263-267.
- Harris, J. L., Bargh, J. A., & Brownell, K. D. (2009). Priming Effects of Television Food Advertising on Eating Behavior. *Health Psychology*, 28(4), 404-413.

- Harrison, K., & Marske, A. L. (2005). Nutritional Content of Foods Advertised During the Television Programs Children Watch Most. *American Journal of Public Health, 95*(9), 1568-1574.
- Hoek, J., & Gendall, P. (2006). Advertising and Obesity: A Behavioral Perspective. *Journal of Health Communication, 11*(4), 409-423.
- Johnson, M. W., & Bickel, W. K. (2008). An Algorithm for Identifying Nonsystematic Delay-Discounting Data. *Experimental and Clinical Psychopharmacology, 16*(3), 264.
- Kivetz, R., & Keinan, A. (2006). Repenting Hyperopia: An Analysis of Self-Control Regrets. *Journal of Consumer Research, 33*(2), 273-282.
- Kivetz, R., & Simonson, I. (2002). Self-Control for the Righteous: Toward a Theory of Precommitment to Indulgence. *Journal of Consumer Research, 29*(2), 199-217.
- Kober, H., Kross, E. F., Mischel, W., Hart, C. L., & Ochsner, K. N. (2010). Regulation of craving by cognitive strategies in cigarette smokers. *Drug and Alcohol Dependence, 106*(1), 52-55.
- Lobstein, T., & Dobbins, S. (2005). Evidence of a possible link between obesogenic food advertising and child overweight. *Obesity Reviews, 6*(3), 203-208.
- Mokdad, A. H., Ford, E. S., Bowman, B. A., Dietz, W. H., Vinicor, F., Bales, V. S., & Marks, J. S. (2003). Prevalence of obesity, diabetes, and obesity-related health risk factors, 2001. *JAMA, 289*(1), 76-79.
- Myerson, J., Green, L., & Warusawitharana, M. (2001). Area Under the Curve as a Measure of Discounting. *Journal of the Experimental Analysis of Behavior, 76*(2), 235-243.
- Obermiller, C., & Spangenberg, E. R. (1998). Development of a Scale to Measure Consumer Skepticism Toward Advertising. *Journal of Consumer Psychology, 7*(2), 159-186.

- Obermiller, C., Spangenberg, E., & MacLachlan, D. L. (2005). Ad Skepticism: The Consequences of Disbelief. *Journal of Advertising*, *34*(3), 7-17.
- Ogden, C. L., Carroll, M. D., Fryar, C. D., & Flegal, K. M. (2015). Prevalence of obesity among adults and youth: United States, 2011–2014. *NCHS data brief*, *219*(219), 1-8.
- Olshansky, S. J., Passaro, D. J., Hershow, R. C., Layden, J., Carnes, B. A., Brody, J., Hayflick, L., Butler, R. N., Allison, D. B., & Ludwig, D. S. (2005). A Potential Decline in Life Expectancy in the United States in the 21st Century. *New England Journal of Medicine*, *352*(11), 1138-1145.
- Petry, N. M., & Casarella, T. (1999). Excessive discounting of delayed rewards in substance abusers with gambling problems. *Drug and Alcohol Dependence*, *56*(1), 25-32.
- Radu, P. T., Yi, R., Bickel, W. K., Gross, J. J., & McClure, S. M. (2011). A Mechanism for Reducing Delay Discounting by Altering Temporal Attention. *Journal of the Experimental Analysis of Behavior*, *96*(3), 363-385.
- Shipp, A. J., Edwards, J. R., & Lambert, L. S. (2009). Conceptualization and measurement of temporal focus: The subjective experience of the past, present, and future. *Organizational Behavior and Human Decision Processes*, *110*(1), 1-22.
- Snider, S. E., LaConte, S. M., & Bickel, W. K. (2016). Episodic Future Thinking: Expansion of the Temporal Window in Individuals with Alcohol Dependence. *Alcoholism: Clinical and Experimental Research*, *40*(7), 1558-1566.
- Story, M., & French, S. (2004). Food advertising and Marketing Directed at Children and Adolescents in the US. *International Journal of Behavioral Nutrition and Physical Activity*, *1*(3), 1-17.
- Sturm, R. (2002). The Effects of Obesity, Smoking, and Drinking on Medical Problems and

- Costs. *Health Affairs*, 21(2), 245-253.
- Wang, Y., Beydoun, M. A., Liang, L., Caballero, B., & Kumanyika, S. K. (2008). Will All Americans Become Overweight or Obese? Estimating the Progression and Cost of the US Obesity Epidemic. *Obesity*, 16(10), 2323-2330.
- Weller, R. E., Cook, E. W., Avsar, K. B., & Cox, J. E. (2008). Obese women show greater delay discounting than healthy-weight women. *Appetite*, 51(3), 563-569.
- Wonderlich-Tierney, A. L., Wenzel, K. R., Vander Wal, J. S., & Wang-Hall, J. (2013). Food-related advertisements and food intake among adult men and women. *Appetite*, 71, 57-62.
- Yokum, S., Gearhardt, A. N., Harris, J. L., Brownell, K. D., & Stice, E. (2014). Individual Differences in Striatum Activity to Food Commercials Predict Weight Gain in Adolescents. *Obesity*, 22(12), 2544-2551.
- Zimbardo, P. G., & Boyd, J. N. (2015). Putting Time in Perspective: A Valid, Reliable Individual-Differences Metric. In *Time Perspective Theory; Review, Research and Application* (pp. 17-55). Springer International Publishing.

Table 1. Food weights and caloric value for taste test and ad libitum portions

Item	Standardized Taste Test		Ad Libitum Amount Available	
Pepsi	23.67g	10 cal	331.33g	140 cal
Water	23.67g	0 cal	331.33g	0 cal
Lays potato chips	2.63g	15 cal	52.50g	300 cal
M&Ms	3.00g	15 cal	100.00g	500 cal
Grapes	5.80g	4 cal	179.80g	124 cal
Multi-seed crackers	3.21g	15 cal	41.73g	195 cal

Table 2. Descriptive characteristics based on condition for delay discounting aim

	Live for Now (<i>N</i> = 42)	It's the Cola (<i>N</i> = 41)
Sex		
Male	18 (42.9%)	18 (43.9%)
Female	24 (57.1%)	23 (56.1%)
Ethnicity		
White	19 (45.24%)	28 (68.3%)
African-American	3 (7.1%)	3 (7.3%)
Arabic	0 (0.0%)	1 (2.4%)
Asian/Pacific Islander	16 (38.1%)	8 (19.5%)
Mixed/Other	4 (9.5%)	1 (2.4%)
Age	<i>M</i> = 18.51 (<i>SD</i> = .95)	<i>M</i> = 18.47 (<i>SD</i> = 1.11)
BMI	<i>M</i> = 24.23 (<i>SD</i> = 4.52)	<i>M</i> = 23.18 (<i>SD</i> = 2.67)

Table 3. Descriptive characteristics based on condition for Pepsi and food consumption aim

	Live for Now (<i>N</i> = 33)	It's the Cola (<i>N</i> = 32)
Sex		
Male	13 (39.4%)	11 (34.4%)
Female	20 (60.6%)	21 (64.6%)
Ethnicity		
White	14 (42.4%)	22 (68.8%)
African-American	2 (6.1%)	1 (3.1%)
Arabic	1 (3.0%)	1 (3.1%)
Asian/Pacific Islander	13 (39.4%)	7 (21.9%)
Mixed/Other	3 (9.1%)	1 (3.1%)
Age	<i>M</i> = 18.40 (<i>SD</i> = 1.00)	<i>M</i> = 18.34 (<i>SD</i> = .70)
BMI	<i>M</i> = 24.15 (<i>SD</i> = 4.42)	<i>M</i> = 23.07 (<i>SD</i> = 2.99)