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Peer influence on youth's snack purchases: A laboratory analog of convenience store shopping

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Abstract

Objective: This paper reports the results of two experiments using a laboratory analog to examine the influence of taxes and subsidies on youth's snack food purchases when alone (Experiment 1) and when in the presence of a same-gender peer (Experiment 2).

Method: Adolescents (12–14-years-old) completed a purchasing task, during which prices of snack foods were manipulated, either alone in Experiment 1 ($N=37$) or in the presence of an unfamiliar peer in Experiment 2 ($N=52$).

Results: In both experiments, purchases of unhealthy snacks decreased and purchases of healthy snacks increased when the price of unhealthy snacks were taxed (increased). In Experiment 1 (alone), participants did not purchase more healthy snacks when the price of these snacks were subsidized (decreased). However, in Experiment 2 (when participants were in the presence of a peer), participants purchased more healthy snacks when these snacks were subsidized.

Conclusion: Taxes and subsidies affect adolescents' snack purchasing, as does the presence of peers. The results of this study highlight factors that influence healthy and unhealthy snack purchasing behavior in young adolescents.

Keywords

Peer influence; Snack food purchases; Adolescent

1. Introduction

Snack foods are a major source of calories in most youths' diets (Summerbell, Moody, Shanks, Stock, & Geissler, 1995), with adolescents consuming on average 500 kcal of

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Contributors

Dr. Salvy was involved in study design, procurement of grant funds, statistical analysis and writing the manuscript. Ms. Kluczynski contributed to statistical analysis, and writing of the manuscript. Ms. Nitecki implemented the study protocol and contributed to preparation of the manuscript. Ms. O'Connor assisted and contributed to preparing the manuscript for submission.

Conflict of interest

All authors declare that they have not conflicts of interest.

unhealthy foods daily (Briefel, Wilson, & Gleason, 2009). These energy-dense foods are often consumed in excess of energy needs possibly resulting in positive energy balance (i.e., more energy consumed than expended) and increased body weight (McCrory et al., 1999). Studying snack purchases in adolescents is of particular interest because of the greater prevalence of overweight/obesity during this developmental period (Dietz, 1994; Dietz & Gortmaker, 2001; Dietz & Robinson, 2005), and also because of greater concern with weight-related issues during adolescence (Cooper & Goodyer, 1997). Furthermore, investigating the context of adolescent snack purchases (e.g., source, location) is important to further understand the factors that predict unhealthy snack consumption.

Recently, several large national food consumption surveys revealed that youth are consuming more energy from food sources within their community, with as much as 33% of adolescents' daily energy intake consumed away from home (Poti & Popkin, 2011). Though "fast food" options were responsible for a large portion of this energy consumption, store-bought foods remained the predominant source of youths' energy intake (Poti & Popkin). As adolescents' access to food outside the home increases, so too does the variety of both unhealthy and healthy snacks present in competitive vendors such as convenience stores and fast food restaurants. Therefore, it is important to understand the factors that may influence which snacks youth choose to purchase.

One factor that is known to influence consumption of different food items is to manipulate cost, as a consistent body of research has shown a strong relationship between cost and types of food purchases (Brownell & Horgen, 2003; Cinciripini, 1984; Faith, Fontaine, Baskin, & Allison, 2007; Jacobson & Brownell, 2000). Subsidizing, or decreasing, the price of healthy foods increases purchases of these foods, while taxing, or increasing, the price of unhealthy foods results in decreased purchases of these foods (Epstein, Dearing, Paluch, Roemmich, & Cho, 2007; Epstein et al., 2006; Faith et al., 2007; French, 2003). Previous research has defined two processes underlying this relationship. The first, same-price elasticity, refers to the process whereby increasing the price of a commodity results in reduced consumption of it (Bickel, Madden, & Petry, 1998). In addition, cross-price elasticity refers to the relationship between two similar goods where purchase of one increases as cost of the other increases. For example, when unhealthy foods are taxed and the cost of healthy foods is subsidized, healthy food purchases increase (Epstein et al., 2007). Taken together, these and other studies illustrate that adolescents are sensitive to price manipulations and will choose healthier foods when these foods are subsidized (French, Jeffery, Story, Hannan, & Snyder, 1997; French, Story, et al., 1997).

For adolescents, another powerful influence on food selection and food consumption is the social context (Salvy, Coelho, Kieffer, & Epstein, 2007; Salvy, Kieffer, & Epstein, 2008; Salvy, Romero, Paluch, & Epstein, 2007). Peers exert a substantial influence on many aspects of adolescent behavior (Parker, Rubin, Price, & DeRosier, 1995; Rubin, Coplan, Chen, Buskirk, & Wojslawowicz, 2005; Rubin et al., 2004). As adolescents become more autonomous, they spend a substantial amount of time with their friends and peers (Bukowski, Hoza, & Boivin, 1994; Rubin et al., 2004). Eating is an important form of socialization and recreation, and peers and friends have been shown to impact youths' energy intake (Romero, Epstein, & Salvy, 2009; Salvy, Coelho, et al., 2007; Salvy, Kieffer, et al.,

2008; Salvy, Romero, et al., 2007; Salvy, Vartanian, Coelho, Jarrin, & Pliner, 2008) and selection of healthy foods (Salvy, Howard, Read, & Mele, 2009; Salvy, Kieffer, et al., 2008). In a series of studies we found that the presence of peers and friends reduced energy intake, (Romero et al., 2009) and promoted healthier food choices (Salvy, Elmo, Nitecki, Kluczynski, & Roemmich, 2010; Salvy, Howard, et al., 2009; Salvy, Kieffer, et al., 2008). For instance, we have shown that, during a 30-min free-choice period, overweight youth ate 400 kcal more when alone than when with peers (Salvy, Coelho, et al., 2007; Salvy, Kieffer, et al., 2008), and that peers and friends shifted youth's food selection toward healthier food options (Salvy, Howard, et al., 2009; Salvy, Kieffer, et al., 2008). Furthermore, using a behavioral economic framework, we found that youth substitute food for social activities when the cost of social time with peers was constrained, and that they substitute food for social activities with an unknown peer when the cost of food increases. However, when interacting with a friend was the alternative, participants did not substitute food for social interactions suggesting that when youth have access to friends, children find spending time with friends more reinforcing than food (Salvy, Nitecki, & Epstein, 2009). Research on the influence of peers on adolescents' snack purchases is lacking, which is surprising considering that a large percentage of unhealthy foods are consumed outside of the home environment (Nielsen, Siega-Riz, & Popkin, 2002; Poti & Popkin, 2011), likely while in the presence of other adolescents.

This paper reports the results of two experiments using a laboratory analog of convenience store shopping to examine predictors of youth's snack purchases. We examined the impact of price manipulation (increased and decreased price of the food items) and individual characteristics (gender and weight) on purchases of unhealthy and healthy snack food purchases in adolescents. In Experiment 1, female and male adolescents completed the purchasing task alone. In Experiment 2, female and male participants completed the purchasing task in the presence of an unfamiliar same-aged peer (Experiment 2).

2. Experiment 1

Adolescents involved in this study participated in an experimental analog purchasing task alone. Adolescents were provided with a fixed income to purchase snack foods in a free choice paradigm, with both unhealthy and healthy options available. Prices of each category of snacks (healthy or unhealthy) were manipulated (i.e., taxed or subsidized) during each trial such that when one type of snack was taxed or subsidized, the price of the alternative snack food remained at the referent price (i.e., current price at local convenience stores). It was hypothesized that when unhealthy snacks were taxed, the purchases of unhealthy snacks would subsequently decrease, while the purchases of healthy snacks would increase. Similarly, it was also hypothesized that when healthy snacks were subsidized, the purchases of healthy snacks would increase, while the purchases of unhealthy snacks would decrease.

3. Method

3.1. Participants

Thirty-seven 12–14-year-olds participated in this study. Eligibility criteria included having a BMI above the 5th percentile and below the 95th percentile. Underweight youths (BMI

below the 5th percentile) were considered ineligible. Children who are at a “healthy weight” have a BMI above the 5th percentile to less than the 85th percentile for children of their age. “Overweight” refers to children whose BMI-for-age is in the 85th to less than the 95th percentiles. Children in this range are comparable to adults with a BMI of 25 to 29.9. In children, “obesity” corresponds to a BMI-for-age equal to or greater than the 95th percentile. This is comparable to adults with a BMI of 30 or more.

Children who had an upper respiratory distress or illness, a current psychopathology or developmental disability, and/or who were currently on medication or had a medical condition that could influence sense of smell, taste, or activity level (e.g., methylphenidate) were not eligible to participate in the study. Participants were also required to report at least moderate liking of all foods used (see Table 1) in the food purchasing task.

Participants were recruited from newspaper ads, flyers, and from our database of families who have volunteered for previous laboratory studies. Parents were interviewed by phone to ascertain their child's height, weight, a brief medical history, and ethnic background. Adolescents who met the eligibility criteria described above were then scheduled to come to the laboratory for one study visit. Participants were instructed not to eat or drink anything (except water) for the 2 h prior to visiting the laboratory. The Children and Youth Institutional Review Board of the University at Buffalo approved all procedures used in this study and all applicable institutional and governmental regulations concerning the ethical use of human volunteers were followed throughout this study.

3.2. Procedures

Upon arriving at the laboratory, written informed consent was obtained from parents and assent to participate was obtained from adolescents. Participants completed a same-day food recall to verify that they had not consumed food or drink (except water) 2 h prior to the experiment. Participants were then brought into the experimental room and spent 15 min putting together a puzzle to standardize their preceding activities; after which they participated in the food purchasing task.

3.3. Food purchasing task

The experimental room was set up to simulate a convenience store with healthy ($N=7$) and unhealthy ($N=7$) snacks displayed on tables around the room (see Table 1 for nutritional information). To distinguish between healthy and unhealthy snacks, a calories-for-nutrients (CFN) score was computed for each food. CFN is an index of the number of calories needed to obtain an additional 1% of the recommended daily values (DV) of 13 key nutrients (Drewnowski, 2005). CFN scores provide a detailed assessment of the nutritional adequacy of foods, while still preserving the important notion of maximizing the nutrients for the energy of the foods. Low scores correspond to healthier food items and suggest that fewer calories are needed to obtain key nutrients (low calories-for-nutrients; LCFN); whereas high scores indicate unhealthy food items and suggest that more calories are needed to obtain these nutrients (high calories-for-nutrients; HCFN). The LCFN snacks presented in this study had CFN values less than or equal to 90 (range: 0–90) and the HCFN snacks had CFN values greater than 90 (range: 91–280).

Each participant completed nine purchasing trials in total and prior to the start of each, the experimenter set the prices for each individual item. During one of the nine trials, prices of all displayed items were equal to current price at local convenience stores (i.e., the referent price). The average referent prices of the HCFN and LCFN snacks were \$1.13 and \$0.84, respectively. During four of the nine trials, all HCFN snacks were fixed at the referent price while the prices of LCFN snacks randomly raised (taxed) or lowered (subsidized) by 25% or 50%. During four of the remaining trials, all LCFN snacks were fixed at the referent price while the prices of all HCFN snacks were raised or lowered by 25% or 50%. The order of the price change conditions was counterbalanced and the price manipulations within each condition were randomized to ensure that ordering effects did not bias the results. Color-coded price cards were displayed in front of each snack to indicate the percentage reduction (in green) or increase (in red), if any, from the referent price.

The experimenter instructed participants that there would be nine purchasing trials during which they had the opportunity to buy any of the displayed items they chose. Two of each item were available for participants to purchase. Participants were given a study income of \$3.00 during each trial to use toward purchasing snacks, and were told to imagine that they were hungry as they were coming home from school and stopped by a convenience store to purchase something to eat. During each trial, participants indicated a purchase by placing their desired item in a shopping basket. The experimenter recorded the amount of each item purchased and tracked the amount of money participants had left to spend. If the participant's purchases exceeded the study income, the experimenter informed them of the overage and the participant was asked to choose an item to put back.

At the end of the experimental session, height and weight measurements were taken, and participants were debriefed about the nature of the experiment and compensated with a \$15.00 gift card for a shopping mall.

3.4. Measurement

3.4.1. Snack liking—Prior to the experiment, participant's liking of the 14 experimental snacks was assessed via a 7-point Likert scale ranging from 1 (do not like) to 7 (like a lot). To be eligible for participation, a score of 4 or higher for each snack available was required.

3.4.2. Same-day food recall—To ascertain whether participants complied with the 2-hour fasting requirement prior to the experiment, participants were asked to list all foods and beverages they consumed that day and the approximate time of consumption for each.

3.4.3. Anthropometrics—Weight was measured to the nearest 0.1 kg and height was measured to the nearest 0.1 cm using a digital scale and a stadiometer, respectively. On the basis of the height and weight data, the BMI were calculated according to the following formula: $BMI = kg/m^2$. The BMI-for-age percentile (z-score BMI, zBMI) was used to interpret the BMI number because BMI is both age- and sexspecific for children and teens. These criteria are different from those used to interpret BMI for adults, which do not take into account age or sex. Age and sex are considered for children and because the amount of body fat changes with age and the amount of body fat differs between girls and boys (Kuczmarski et al., 2002). Youth are considered normal-weight if their zBMI is between the

15th and <85th and overweight if they have a zBMI between the 85th and the 95th percentiles (Ogden et al., 2002). These are the current guidelines for weight in children and adolescents set forth by the Centers for Disease Control (Kuczmarski et al., 2002).

3.5. Analytic plan

To determine which variables predicted snack food purchases, separate mixed regression models (MRMs) were tested in SAS (SAS, 2009) with random intercepts, fixed effects, and unstructured covariance. MRMs allow for estimating the parameters of the regression model and the variance components that account for data clustering in repeated measures within the same individuals (Gibbons & Hedeker, 1994). First, mixed regression was used to examine the univariate relationship between snack price and amount of HCFN and LCFN snack purchases. The amount of snacks purchased was quantified and examined as both the number of snack items purchased and the amount of kcal purchased. The natural logarithm of items and kcal purchased was entered into MRMs. Next, multivariate MRMs were used to identify predictors of HCFN and LCFN snack purchases (items and kcal). The following predictors were added to the multivariate MRMs: snack price (i.e., percentage change in price of snacks based on the referent price), sex, zBMI, and alternate snack purchases (e.g., LCFN snack purchases were examined as a predictor of HCFN snack purchases). Example of an MRM for HCFN snack purchases:

$$\begin{aligned} \text{Ln(HCFN snack purchases in kcal)} = & \beta_0 + \beta_1(\text{Ln HCFN snack price}) \\ & + \beta_2(\text{sex}) + \beta_3(\text{zBMI}) \\ & + \beta_4(\text{Ln LCFN snack purchases in kcal}). \end{aligned}$$

In the above model, β_1 represents same-price elasticity or the relationship between change in price for HCFN snacks and HCFN snacks purchases. β_4 represents cross-price elasticity or the relationship between change in price for HCFN snack and LCFN snacks purchases.

4. Results

4.1. Individual characteristics

The average age of participants in Experiment 1 was 13.54 years ($SD=0.93$) and 48.65% ($N=18$) of the sample was male. The average BMI was 25.82 kg/m² ($SD=11.56$) and the average zBMI was 1.12 ($SD=1.32$).

4.2. HCFN items purchases

Table 2 presents snack food items purchased as a function of price. There was an inverse relationship between the number of HCFN snack items purchased and number of LCFN snack items purchased ($\beta=-0.14$, $SE=0.06$, $p=0.015$) such that fewer HCFN snack items were purchased when more LCFN snack items were purchased.

4.3. HCFN kilocalories purchases

The price of HCFN snacks and the amount of kilocalories from LCFN snacks purchased significantly predicted the amount of kilocalories from HCFN snacks purchased. In other words, fewer kilocalories from HCFN snacks were purchased when HCFN snacks were

taxed ($\beta=-5.13$, $SE=1.08$, $p<0.001$) and also when more kilocalories from LCFN snacks were purchased ($\beta=-0.63$, $SE=0.10$, $p<0.001$).

4.4. LCFN items purchases

The number of LCFN snack items purchased was inversely predicted by the price of LCFN snacks (Table 3). In other words, more LCFN snack items were purchased when LCFN snacks were subsidized ($\beta=-0.60$ ($SE=0.14$), $p<0.001$).

4.5. LCFN kilocalories purchases

The amount of kilocalories from LCFN snacks purchased was inversely predicted by kilocalories from HCFN snack purchases, such that more kilocalories from LCFN snacks were purchased when fewer kilocalories from HCFN snacks were purchased ($\beta=-0.27$ ($SE=0.07$), $p=0.004$).

5. Experiment 2

Experiment 2 was completed to extend the results of Experiment 1 and to determine if the presence of an unfamiliar same-age, same-sex peer influences adolescent's snack food purchases. Experiment 2 was identical to Experiment 1 except that adolescents participated in the experimental analog purchasing task with a peer. Similar to Experiment 1, it was hypothesized that snack price would predict snack purchases, and that the presence of a peer would influence participants' price sensitivity. Also, it was hypothesized that peer's snack purchases would be correlated, such that pairs of peers purchasing snack items together would purchase similar amounts of HCFN and LCFN snacks.

6. Method

6.1. Participants

Fifty-two 12–14-year-olds participated in this study. Eligibility criteria and recruitment procedures were identical to those described for Experiment 1. Eligible children were randomly paired with and scheduled to participate with an unfamiliar same-aged (1 year difference) peer. The Children and Youth Institutional Review Board of the University at Buffalo approved all procedures used in this study and all applicable institutional and governmental regulations concerning the ethical use of human volunteers were followed throughout this study.

6.2. Procedure

All procedures, including the food purchasing task, were identical to Experiment 1 with the following exceptions. So that each pair of participants could become acquainted with one another, participants were brought into the experimental room and spent 15 minutes working on a puzzle together. Next, peers completed the food purchasing task independently, but in the presence of one another. In other words, each peer received their own study income of \$3.00, price manipulations were made, and adolescents were told to shop for what they wanted at the same time. Anthropometric measures were taken at the end of the experimental session and were identical to those described for Experiment 1. Participants

were then debriefed about the nature of the experiment and were compensated with a \$15.00 gift card for a shopping mall.

6.3. Measurement

The measures used to assess liking of study foods, compliance with the 2-hour fasting requirement and anthropometry were identical to those used for Experiment 1.

6.4. Analytic plan

Univariate mixed regression was used to examine the relationship between snack price and amount of HCFN and LCFN snack purchases (items and kcals). Multivariate mixed regression was used to identify predictors of HCFN and LCFN snack purchases with random intercepts, fixed effects, and unstructured covariance. The dependent variables and predictor variables entered into each model were identical to those in Experiment 1. Intraclass correlation coefficients (ICC) were computed to determine if peer's snack purchases were related.

7. Results

7.1. Individual characteristics

The average age of participants in Experiment 2 was 13.45 years ($SD=1.07$) and 50% ($N=26$) of the sample was male. The average BMI was 23.20 kg/m² ($SD=7.75$) and the average zBMI was 0.70 ($SD=1.13$), which is in the healthy weight range (i.e., 5th and <85th BMI percentile).

7.2. Purchases by price

7.2.1. HCFN items purchases—Table 2 presents snack food items purchased as a function of price. Fewer HCFN snack items were purchased when more LCFN snack items were purchased ($\beta=-0.15$, $SE=0.05$, $p=0.003$).

7.2.2. HCFN kilocalories purchases—Fewer kilocalories of HCFN snacks purchased were predicted by taxing HCFN snacks ($\beta=-4.32$, $SE=0.97$, $p<0.001$), greater zBMI ($\beta=-0.54$, $SE=0.17$, $p=0.002$), and greater kilocalories of LCFN snacks purchased ($\beta=-0.55$, $SE=0.08$, $p<0.001$).

7.2.3. LCFN items purchases—The number of LCFN snack items purchased was predicted by price of LCFN snacks and by the number of HCFN snack items purchased. More LCFN snack items were purchased when LCFN snacks were subsidized ($\beta=-0.48$, $SE=0.11$, $p<0.001$) and when less HCFN snack items were purchased ($\beta=-0.39$, $SE=0.10$, $p=0.003$). This pattern of results is contrary to our findings in Experiment 1, in which participants' purchases were not sensitive to the price manipulation. In addition, upon analyzing kilocalories from LCFN snack purchases the same pattern of results emerged.

7.2.4. LCFN kilocalories purchases—The significant predictors of kilocalories from LCFN snacks purchased included the price of LCFN snacks, and the kilocalories from HCFN snacks purchased (Table 2). More kilocalories of LCFN snacks were purchased when

LCFN snacks were subsidized ($\beta=-1.02$, $SE=0.45$, $p=0.026$) and when fewer kilocalories of HCFN snacks were purchased ($\beta=-0.25$, $SE=0.07$, $p=0.005$).

7.2.5. Intradynamic relationship between partners' purchases of HCFN and LCFN snacks—Adolescents' purchases of kilocalories from HCFN snacks ($ICC=0.18$ (95% CI : 0.09, 0.27), $p<0.001$) and the number of HCFN snack items ($ICC=0.15$ (95% CI : 0.06, 0.24), $p<0.001$) purchased were positively correlated with those of their peer. Similarly, adolescents' purchases of LCFN kilocalories ($ICC=0.32$ (95% CI : 0.23, 0.39), $p<0.001$) and the number of LCFN snack items ($ICC=0.32$ (95% CI : 0.24, 0.40), $p<0.001$) purchased were positively correlated with those of their peer.

8. General discussion

The current studies used a laboratory analog of convenience store shopping to examine factors influencing adolescents' purchases when alone (Experiment 1), and when in the presence of a same-aged, same-sex peer (Experiment 2). Consistent with previous research on food purchasing in youth (Epstein et al., 2006), we found that price manipulations influenced adolescents' purchases of HCFN and LCFN snacks.

Experiments 1 and 2 demonstrated both same-price elasticity, such that fewer kilocalories of HCFN snacks were purchased when HCFN snacks were taxed, and cross-price elasticity, where fewer kilocalories of HCFN snacks were purchased when more kilocalories of LCFN snacks were purchased. These findings are consistent with those of other laboratory analog purchasing studies which have found that taxing less healthy foods is associated with fewer purchases of these foods and greater purchases of healthy snacks (Epstein et al., 2007). Similarly, studies using aggregate (Jensen & Smed, 2007) and household consumption data (Chouinard, Davis, LaFrance, & Perloff, 2007), have shown that taxing unhealthy foods is associated with decreased consumption of these foods.

We also found that more kilocalories of LCFN snacks were purchased when LCFN snacks were subsidized in Experiment 2, but not in Experiment 1. Subsidizing healthy foods has been shown to be associated with increased purchases (Epstein et al., 2007; French, Jeffery, et al., 1997; French, Story, et al., 1997), and increased consumption of healthier foods (Herman, Harrison, Afifi, & Jenks, 2007). Conceivably, participants might have been more sensitive to the price manipulation of healthy foods while in the presence of a peer, as a result of impression management, which refers to the processes by which individuals attempt to control the impressions that other people form of them (Leary & Kowalski, 1990). In general, conveying a good impression through eating appears to involve eating less (Vartanian, Herman, & Polivy, 2007) or healthier (Salvy, Howard, et al., 2009; Salvy, Kieffer, et al., 2008). These selfpresentational concerns may not be misguided as the consumption of unhealthy foods is a recognized contributing factor to the worldwide obesity epidemic. Therefore, curtailing or inhibiting the purchasing of less healthy foods and selecting healthier food options when this makes more economical sense would be tantamount to conveying a positive impression. In this study, adolescents may have been more sensitive to the decrease in price of healthier foods, leading them to alter their purchases in front of their peers as a means of conveying an image of healthier eating. This

possibility was further supported by our finding indicating that youth with a greater zBMI purchased less unhealthy snacks in Experiment 2 (i.e., kilocalories of HCFN snacks was negatively related to zBMI; $\beta=-0.54$, $SE=0.17$, $p=0.002$). Research shows that overweight individuals may be more sensitive to impression management motives and tend to suppress their eating in the presence of others (de Luca & Spigelman, 1979; Maykovich, 1978). Although our results are consistent with the impression management literature, this experiment was not designed to test this hypothesis.

As expected, Experiment 2 showed that partners' purchases of HCFN and LCFN snacks were positively related, suggesting that peers may influence each other's purchasing of snack foods through modeling or matching of purchases. Previous research has demonstrated that peers influence each other's food selection (Salvy, Howard, et al., 2009; Salvy, Kieffer, et al., 2008) and energy intake (Romero et al., 2009; Salvy, Coelho, et al., 2007; Salvy, Kieffer, et al., 2008; Salvy, Vartanian, et al., 2008). The results of the current study extend these previous findings by indicating that social influence also impacts youth's snack purchases.

There are several limitations to this study. Youth interacting in their natural environment are presented with a much wider variety of snacks than were used in this study. Conceivably, providing more snack options may have revealed different or more subtle patterns of results. Additionally, since participants were not given the opportunity to consume the snacks that they purchased during the study session, we cannot know if their purchases reflect typical snack consumption. Although snack purchases and consumption are likely to be related, dietary assessment is needed to confirm this possibility. Furthermore, since there was no control group in Experiment 2, we could not determine how much of the association between snack purchases and price was explained by the presence of the peer during the purchasing task. Studies using a within-subjects study design in which each participant completes the study session alone on one occasion and with a peer on another occasion are needed. Finally, previous research indicated that the influence of a friend is different from the influence of an unfamiliar peer on food intake (Salvy, Howard, et al., 2009) suggesting that the same may be true for food purchasing and thus warrants future investigation.

One strength of conducting a laboratory analog study includes being able to manipulate food prices which would otherwise be difficult and costly in more naturalistic settings (Kagel & Roth, 1995; Schram, 2005). These findings underscore the importance of considering the influence of peers in studying food purchasing in youth, especially since adolescents consume a large number of calories outside the home environment (Nielsen et al., 2002; Poti & Popkin, 2011), and will continue to do so as they become adults. There is emerging evidence that youth's social network may be uniquely relevant and influential to their eating behavior and choice of activities. Individuals are influenced by the eating and activity norms set by those around them (Kubik, Lytle, & Fulkerson, 2005). The results of this study suggest that taxing unhealthy foods can decrease purchases of these foods and that peers and subsidies might be influential in promoting increased purchase of healthy foods.

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Table 1

Nutritional information for Low-Calorie- (LCFN) and High-Calorie-for-Nutrient (HCFN) snack foods used in this study.

	Serving size (g)	Energy per serving (kcal)	Fat (g)	Carbohydrates (g)	Protein (g)
<i>LCFN snack foods</i>					
Apple ^a	182	95	0	25	0
Banana ^a	126	112	0	29	1
Orange ^a	184	86	0	22	2
Dole® Diced peaches ^b	113	70	0	18	1
Sorrento® Cheese Stick ^c	56	80	12	2	14
JELL-O® Fat-free chocolate pudding ^d	106	60	1	12	2
Special K® Bar ^e	23	90	1.5	18	1
<i>HCFN snack foods</i>					
Lay's® potato chips ^f	53.1	280	4	30	20
Doritos® ^f	74.4	150	2	17	8
Chips Ahoy® chocolate chip cookies ^d	40	190	2	27	9
Hershey's® chocolate bar ^g	43	210	3	26	13
Starburst® fruit chews ^h	59	236	0	48.7	5.2
M&M's® chocolate candies ^h	47.9	250	4	47.9	13.7
Rice Krispies Treats® ^e	22	90	>1	17	2.5

^aWegmans Food Markets Inc., Rochester, NY.

^bDole Food Company, Inc., Westlake Village, CA.

^cLactalis Retail Dairy, Inc., Buffalo, NY.

^dKraft Foods, Northfield, IL.

^eKellogg Co., Battle Creek, MI.

^fFrito-lay, Plano, TX.

^gThe Hershey Co., Hershey, PA.

^hMars Inc., McLean, VA.

Table 2

Snack food purchases (lsmeans^a±SE) as a function of the change in snack food price for Experiment 1.

Price	Experiment 1 (alone; N=37)	
	Kcal	Items
HCFN snack foods		
↑ by 50%	89.73±26.88	0.49±0.13
↑ by 25%	176.97±26.88	0.84±0.13
Referent	185.59±19.07	1.00±0.09
↓ by 25%	253.73±26.88	1.24±0.13
↓ by 50%	382.49±26.88	2.03±0.13
P-value ^b	< 0.001	< 0.001
LCFN snack foods		
↑ by 50%	60.76±15.51	0.70±0.18
↑ by 25%	66.22±15.51	0.78±0.18
Referent	91.88±10.44	1.10±0.12
↓ by 25%	133.86±15.51	1.54±0.18
↓ by 50%	182.16±15.51	2.22±0.18
P-value ^b	<0.001	<0.001

^aLeast squares means calculated using mixed regression.

^bP-value for regressing snack food price on snack food purchases (kcal or items).

Table 3

Snack food purchases (lsmeans^a±SE) as a function of the change in snack food price for Experiment 2.

Price	Experiment 2 (social; N = 52)	
	Kcal	Items
HCFN snack foods		
↑ by 50%	92.15±23.95	0.54±0.12
↑ by 25%	154.62±23.95	0.77±0.12
Referent	211.97±15.47	1.10±0.08
↓ by 25%	287.81±23.95	1.42±0.12
↓ by 50%	373.35±23.95	1.85±0.12
P-value ^b	<0.001	<0.001
LCFN snack foods		
↑ by 50%	43.44±11.24	0.50 (0.13)
↑ by 25%	48.27±11.24	0.60 (0.13)
Referent	90.52±7.20	1.09 (0.08)
↓ by 25%	117.90±11.24	1.42 (0.13)
↓ by 50%	136.08±11.24	1.65 (0.13)
P-value ^b	<0.001	<0.001

^aLeast squares means calculated using mixed regression.

^bP-value for regressing snack food price on snack food purchases (kcal or items).