Accepted Manuscript

Children's purchase behavior in the snack market: Can branding or lower prices motivate healthier choices?

Monika Hartmann, Sean B. Cash, Ching-Hua Yeh, Stefanie C. Landwehr, Anna R. McAlister

PII: S0195-6663(17)30557-3

DOI: 10.1016/j.appet.2017.06.014

Reference: APPET 3520

To appear in: *Appetite*

Received Date: 8 April 2017

Revised Date: 3 June 2017

Accepted Date: 14 June 2017

Please cite this article as: Hartmann M., Cash S.B., Yeh C.-H., Landwehr S.C. & McAlister A.R., Children's purchase behavior in the snack market: Can branding or lower prices motivate healthier choices?, *Appetite* (2017), doi: 10.1016/j.appet.2017.06.014.

Children's purchase behavior in the snack market: Can branding or lower prices motivate healthier choices?

Monika Hartmann[a], Sean B. Cash[b*], Ching-Hua Yeh[a], Stefanie C. Landwehr[a], and Anna R. McAlister[c]

[a] Institute for Food and Resource Economics, University of Bonn, Nussallee 21, D-53115 Bonn, Germany, monika.hartmann@ilr.uni-bonn.de (MH), chinghua.yeh@ilr.uni-bonn.de (CHY), stefanie.landwehr@ilr.uni-bonn.de (SCL)

[b] Friedman School of Nutrition Science and Policy, Tufts University, 150 Harrison Avenue, Boston, MA 02111 USA

[c] Curtis L. Gerrish School of Business, Endicott College, 376 Hale Street, Beverly, MA 01915 USA, amcalister@endicott.edu

* Corresponding author: sean.cash@tufts.edu

Children's purchase behavior in the snack market:

Can branding or lower prices motivate healthier choices?

Abstract

Background: Children's dietary-related diseases and their associated costs have expanded dramatically in many countries, making children's food choice a policy issue of increasing relevance. As children spend a considerable amount of money on energy-dense, nutrient-poor (EDNP) products, a better understanding of the main drivers of children's independent food purchase decisions is crucial to move this behavior toward healthier options.

Objective: The objective of the study is to investigate the role of branding and price in motivating children to choose healthier snack options.

Methods: The study investigates snack choices of children ages 8 to 11, using a survey and a purchase experiment. The research took place in after-school programs of selected schools in the Boston area. Participants included 116 children. Products in the choice experiment differed on three factors: product type, brand, and price. Data were analyzed using aggregated and mixed logit models.

Results: Children's purchase decisions are primarily determined by product type (Importance Value (IV) 56.6%), while brand (IV 22.8%) and price (IV 20.6%) prove to be of less relevance. Only those children who state that they like the familiar brand reveal a preference for the branded product in their purchase decision. Price is a significant predictor of choice when controlling for whether or not children obtain an allowance.

Conclusion: It is not simple brand awareness but a child's liking of the brand that determines whether a brand is successful in motivating a child to choose a product. The extent of children's experience with money influences their price responsiveness. To the extent that children who receive an allowance are primarily the ones buying food snacks, higher prices for EDNP snacks could be successful in motivating children to choose a healthier option.

Key words: children's food preference, children as consumers, discrete choice experiment, aggregated and mixed logit models, marketing, branding

Introduction

In recent years, the incidence and prevalence of children's dietary-related diseases and their associated costs have grown dramatically in many countries, making children's food choice a policy issue of increasing relevance (CDC, 2015). To improve children's eating habits, various school-based interventions have been implemented in several countries (e.g., De Sa & Lock, 2008; Evans et al., 2012). However, those efforts might be offset by compensatory behavior of children at other times of the day (i.e., the consumption of energy-dense, nutrient-poor (EDNP) foods before or after school). This holds especially as children have a considerable amount of money at their disposal. Much of this is spent on food, especially on EDNP products (Borradaile et al., 2009; Cash & McAlister, 2011). Measures such as regulating food advertisements to children, as well as the implementation of fat or sugar taxes, acknowledge the direct and indirect economic activities of young consumers. The former is motivated by the fact that food advertising and branding of products directed at children are omnipresent, address children via different media and are primarily used to promote EDNP food and drinks (regarding TV advertisements see e.g. Batada, et al., 2008; Calvert, 2008; Gantz, et al., 2007; Hastings, et al., 2006; Matthews, et al., 2005; regarding online-marketing see e.g. Alvy & Cavert, 2008; Calvert, 2008; Culp et al., 2010; Lee et al., 2009; Lingas et al., 2009; Mallinckrodt & Mizerski, 2007; regarding product packaging see foodwatch, 2012; Harris et al., 2009a; Harris et al., 2009b; Maschkowski et al., 2014; Mehta et al., 2012). Furthermore, this widespread food marketing has been shown to influence children's food preferences and consumption patterns (Boyland & Halford, 2012; Cairns et al., 2012; Cornwell & McAlister, 2013; Cornwell, McAlister & Polmear-Swendris, 2014; Elliott, 2008; Forman et al., 2009; Harris et al., 2009; IOM, 2006; Keller et al., 2012; McNeal & Li, 2003; Mehta et al., 2012). By targeting food ads directly to children, companies strive to increase children's brand awareness and their emotional attachment to products (Connor, 2006). Research shows that children as young as two to four years of age recognize brands

(McAlister & Cornwell, 2010; Valkenburg & Buijzen, 2005) and that the branding of products has an influence on children's preferences and product choice (Robinson et al., 2007; Wansink et al., 2012; Forman et al., 2009; Keller et al., 2012; Mallinckrodt & Mizerski, 2007). Moreover, Forman et al. (2009) found that children's brand awareness was considerably higher for unhealthy food.

Only few studies have directly investigated the relevance of price to children's food choice, with somewhat inconsistent results. Some studies argue that prices might play only a minor role in children's food purchase decisions since children have no long-term financial obligations, less market experience, less developed cognitive capacities, and rather impulsive behavior (Cash & McAlister, 2014; Farrell & Shields, 1997). Empirical research investigating children's price responsiveness focuses mainly on middle- and high-school children. Findings on the relevance of prices for children's food choice show that children react to prices and that price adjustments can induce unexpected substitution effects that are influenced by children's budgets. With respect to the purchase of EDNP products, the availability of attractive alternatives seems to be of greater relevance for children's food choices than price (e.g., Brown & Tammineni, 2009; Epstein et al., 2006a; Epstein et al., 2006b; French et al., 1997, 2001; Heard et al., 2016; Kocken et al., 2012).

Overall, the literature on children's price responsiveness and brand awareness is scarce. The former is especially true for younger children (elementary school). With the exception of a handful of studies that examine the ways in which cartoon characters and brand logos increase children's interest in healthy food products (e.g., Robinson et al., 2007), relatively few studies have examined how branding might be used to increase the appeal of healthy foods among young children. Heard et al. (2016) investigated the behavior of 7- to 12-year-olds in a virtual store and considered specific branded products and on-package promotions (for possible prizes) in a budget-constrained simulation, but did not vary the price of the items offered to children. To date, no study has investigated the interacting effects of

price, brand, and product type on children's purchase decisions in an experimental framework.

Given this background, the present study seeks to address the research question: What roles do branding and price play in motivating children to choose healthier snack options?

Method

Data collection and survey instruments

The study involves quantitative and qualitative elements to investigate the food choices of children ages 8 to 11. The research took place in after-school programs of selected schools in the Boston area. The study received human subjects approval from the Institutional Review Board at [university name redacted for review]. Both parental informed consent and child participant assent were obtained prior to data collection.

The quantitative part of the study involved 116 children and consisted of three tasks: a survey, two cognitive tests, and a purchase experiment. First, children filled out a pencil-and-paper questionnaire[1] (task 1), which asked about whether they receive pocket money or an allowance and how they spend it, their food preferences and consumption habits, their knowledge and liking of brands, their nutritional knowledge as well as information on demographic characteristics such as age and gender. This was followed by two cognitive tests (task 2). Children were then provided with a small remuneration ($2.00) for their participation in these tests, which was framed explicitly as compensation for their work so far. This was done to underscore that the money to be used in the purchase choices later was actually their own money that they had earned.

In the third task - an incentive-compatible discrete choice experiment (DCE) - children were given a choice between two products, along with a "no purchase" option. Products differed on three factors, namely, healthfulness (i.e. chocolate chip cookie as a less healthy

[1] The questionnaire had been tested in a pilot study in Germany and was adapted to the US environment.

snack option, and apple slices and a tube of drinkable strawberry yogurt as the healthier snack options)[2], brand (i.e. McDonald's or generic), and price (i.e. $0.30, $0.50, or $0.70) (see Table 1). McDonald's was selected as the brand of interest here as previous studies confirmed widespread high awareness of the McDonald's brand among children (e.g., Forman et al., 2009; McAlister & Cornwell, 2010). The price range considered in the study reflected the current market prices of the products selected at the time of data collection, while allowing sufficient variation for meaningful analysis.[3] The "no purchase" option was included as it allows children to opt out if none of the snacks looked appealing to them or if the snacks were too expensive. Omission of the opt-out possibility might lead to biased results as it forces children to make a choice that they may not make in the marketplace.

Table 1. Attribute and attribute levels used in DCE

Attributes	Levels
Product	1. Chocolate Chip Cookie 2. Apple Slices 3. Strawberry Tube Yogurt
Brand	1. McDonald's 2. Generic
Price	1. 0.30 US Dollar 2. 0.50 US Dollar 3. 0.70 US Dollar

The combination of all attributes and levels in the study resulted in 18 (3*2*3) possible profiles and thus 324 potential choice pairs. Such a full factorial design is generally impractical in terms of respondent fatigue, and especially inappropriate for use with children whose attention spans are limited. Thus, a fractional orthogonal *D-optimal* choice experimental

[2] Products' weight and calories: Chocolate chip cookies: McDonald's 30g, 170 calories; Generic 27g, 150 calories. Apple slices: McDonald's 34g, 15 calories; Generic 51g, 25 calories. Strawberry yogurt: McDonald's: 64g, 50 calories; Generic 64 g, 70 calories.

[3] Actual market price per item for generic products ranged from $0.23 to $0.56 when purchased in multi-unit packages at the time of data collection. Market prices for the McDonald's products ranged between $0.59 and $0.69 but was as low as $0.50 when more than one item was bought (e.g. price for 4 cookies amounted to $2.00).

127 design was generated from the attributes and attribute levels using NGENE software package
128 version 1.1 (ChoiceMetrics, 2014). The experimental design used had a D-error[4] (or its
129 inverse, D-efficiency or D-optimality) of 0.142 and consisted of 10 paired choices. These 10
130 paired choices were presented to each participant via picture cards with the products displayed
131 in their real size. We manipulated some of the images so that the products only differed with
132 respect to the attributes investigated in the experiment (e.g., nutrition claims were removed
133 from packaging; see Appendix). Thus, for each of the ten choice tasks, the children were
134 presented with large laminated pictures of the items labeled with a price. The children were
135 asked to choose item A, item B, or a choice of neither. The children's choices were recorded
136 on separate cards by the interviewer in full view of the children. An example of the choice task
137 recording cards used with the children is shown in Figure 1. At the end of the simulation, one of
138 the choices made by the child was randomly chosen by shuffling the ten recording cards on
139 which the choices were documented. The child had to buy this food item. After the children
140 obtained their product we asked them their satisfaction with the choice made, whether they
141 had tried any of the products from the choice experiment before and their general liking of
142 McDonald's.
143

[4] Huber and Zwerina (1996) pointed out that when the four criteria of orthogonality, level balance, minimal overlap, and utility balance are jointly satisfied, then an experimental design with a minimal D-error can be achieved.

	Option A	Option B	Option C
Product	Chocolate Chip Cookie 	Apple Slices 	None
Price	$0.30	$0.70	
I would choose →	☐	☐	☐

144

145 **Figure 1. Example of a recording card used in the choice task**

146

147 Before starting the purchase experiment, children had been trained so that they
148 understood the binding nature of their choice through the random selection of one of the
149 choice recording cards. In other words, children were trained to understand that one of the
150 choices would be selected at the end of the experiment and they would be expected to actually
151 use their money to make the purchase (or would go without a snack if the "opt out" option
152 had been selected). Having children understand the binding nature of their choices throughout
153 the experiment was essential to ensure incentive-compatibility of the choice task. This ensures
154 that children were choosing options on each trial that were reflective of autonomous choices
155 they would make in an actual purchase setting, where money would be surrendered in order to
156 receive the chosen snack (or opting out of purchase means not receiving a snack).

157 Prior to the quantitative study, we used a different sample of children to pretest the
158 brand, price range, and products selected for the discrete choice analysis through two focus
159 group discussions with children of the same age, in order to assist us in designing a reasonable
160 attribute set. There were four children[5] in each of the two focus group discussions. The results
161 reveal that children know McDonald's and recognize the selected McDonald's products. The
162 stated opinion regarding this fast food brand was generally (though not entirely) positive. The

[5] We had planned to conduct two focus groups with up to 6 children in each. Due to absences of children in the after-school programs or missing parental consent only four children took part in each of the discussions.

children considered the selected products - apple slices, strawberry tube yogurt and chocolate chip cookies - as attractive for purchase though not every child was interested in every product. In both focus groups, children expressed an especially high preference for apple slices. In a hypothetical question regarding which of the three snacks they would buy, most of the children specified apple slices, irrespective of the branding of the product. At the end of the focus group discussion, children were invited to select one of the six products (three snacks, each from a generic brand and from McDonald's) to take home. Most children chose the chocolate chip cookie, counter to their earlier stated choice. When confronted with this inconsistency between their stated preference (apple slices) and their revealed preference (chocolate chip cookies), children mentioned various reasons such as *having already had fruits as an afternoon snack* or that they *felt like having a cookie* at that particular moment. Regarding brand, children opted largely for the McDonald's version of the respective product.

The focus group discussions also served as a means to gain insights into children's willingness to pay for the different snack products. We did not provide any prices to anchor the children, but instead asked them to note on a piece of paper how much they would be willing to pay for the respective products. Prices ranged considerably. However, of those children interested in buying a product, most were willing to pay between $0.50 and $2.00 for each of the six products.

Finally, one of the aims of the group discussion was to check whether our manipulated pictures of the products would lead to any disappointment or change in their preference ranking, once children saw the real products. This, however, proved not to be the case. In summary, the focus group discussion confirmed the appropriateness of the quantitative study and our chosen stimuli.

Statistical analysis

Discrete choice experiments (DCE) have become an established tool for obtaining insights into consumer preferences and are nowadays also extensively applied in

environmental, medical and political research. So far, however, this method has rarely been employed in studies involving children (Cash et al., 2013). The method of DCE is based on Lancaster's (1966) new demand theory, which assumes that consumers derive utility from the underlying characteristics of a product or a service, and on the Random Utility Theory (RUT) introduced by Thurstone in 1927 and extended by McFadden (1973).

In this study, children's preferences for different snack products are analyzed based on a series of snack purchase choices, each with different choice pair combinations and an opt-out alternative. The modeling approach decomposes latent, unobservable utility (U_{itj}) associated with each child *i* for alternative *j* in the choice task *t* into a deterministic (X_{itj}) and a stochastic portion (ε_{itj}):

$$U_{itj} = \beta_i X_{itj} + \varepsilon_{itj} \quad (1)$$

where X_{itj} is a vector of observed variables, β_i is a vector of individual-specific parameters reflecting the degree of the attributes preference, and ε_{itj} is the independent and identically distributed error term representing the unexplainable component. In line with the RUT, it is assumed that each child maximizes her or his utility by selecting the snack product in each choice set that provides her/him with the greatest utility.

We estimated four different choice models. DCE data were first analyzed using the aggregate-level logit model over the whole sample, as a part-worth main effect model. Calculated part-worth utilities reveal information on the values the children assigned to each attribute level and thus provide a general picture of children's snack preference. However, in aggregate-level logit models error terms are under the assumption that the unobserved stochastic portions are distributed according to a Type I extreme value distribution. Thus, the coefficients of variables that enter the model are identical for all participants in the study, implying that children with the same observed characteristics have the same values for each factor of the model. Furthermore, for aggregate-level logit models the 'independence from

irrelevant alternatives' (IIA) assumption holds implying in our study that the odds of choosing snack 1 over snack 2 should not depend on whether some other snack 3 is present or absent (Train, 2009).

To test the stability of our results, a second model (Model 2), the Mixed Logit Model, was applied to overcome the aforementioned limitations. Partworth utility values were estimated taking into account the heterogeneity of children regarding their preferences for snacks (Train, 2009). Models 3 (a-c) and 4 are again aggregate level logit models with the former differentiating children according to who does or does not receive an allowance (Model 3a and Model 3b) and the latter including covariates such as liking of McDonald's and liking the products under investigation (Model 4). Due to the small sample size, we have set the significance level for reporting at $p < 0.1$.

Results

A total of 116 children took part in the quantitative survey. Of these, only 101 respondents (87.1%) met all criteria for being included in subsequent data analysis. These criteria were (a) there were no missing data across all 10 trials of the choice task, and (b) the child chose a product (as opposed to a "neither") response on at least one trial. Participating children were on average 9.3 years old (*SD* = 0.92) and girls were overrepresented in the final sample (56.4% girls, 38.6% boys and 5.0% missing values).

The majority of children (58.4%) stated that they enjoy going to McDonald's. Most children said that they like or even "like a lot" those products we selected for the choice experiment (top 2 boxes on a five point Likert scale: 83.2% chocolate chip cookies; 79.2% sliced apples; 55.5% strawberry tube yogurt). The majority of children (62.4%) receive allowance from their parents and 25.7% of kids obtain it on a regular basis. Moreover, only 3.0% of the children indicated that they have no experience in buying food, 15.8% only spend their money if an adult is present, and 41.6% state that they ask for permission before spending their allowance (but are not required to have an adult present), while 30.7% of the

240 interviewed children can allocate their spending money on their own. See Table 2 for a
241 summary description of the participant sample.
242

Table 2. Sample structure and descriptive information

Number of respondents	101	
	Freq.	**(%)**
Gender		
Male	39	38.6
Female	57	56.4
Missing	5	5.0
Age		
8 years	20	19.8
9 years	43	42.6
10 years	26	25.7
11 years	12	11.9
Get Allowance		
No	35	34.7
Yes	63	62.4
Missing	3	3.0
What is true regarding purchase decision		
No experience in buying food	3	3.0
Purchase only if adult present	16	15.8
Ask for permission but purchase alone	42	41.6
Decide on my own what I purchase	31	30.7
Missing answer	9	8.9
Like to go to McDonald's		
Yes	59	58.4
No	40	39.6
Don't know	2	2.0
Like the following food items (Chose "like it" or "like it a lot" from 5 point Emoticon scale of like it a lot to don't like it at all)		
Chocolate Chip Cookies	84	83.2
Apple Slices	80	79.2
Strawberry Yogurt	56	55.5

The empirical models estimated in this study are based on the choice experiment structure depicted in Table 1. According to the results for the aggregate-level logit model (model 1), only product type and brand were significant (see Table 3). The positive sign for chocolate chip cookies (0.65; $p < 0.000$) shows that children preferred this snack product compared to apple slices and strawberry tube yogurt (-0.23; $p = 0.02$ and -0.42; $p = 0.01$, respectively). The coefficient of McDonald's is negative, implying that, for the specific

products in our choice set, children are more likely to choose the generic brand compared to McDonald's. Price shows the expected negative sign but is not significant (-0.12; p = 0.10).

Table 3. Aggregate-level logit and mixed logit model

	Model 1 Aggregate-level logit model			Model 2 Mixed logit model			
N	**101**			**101**			
RLH	**0.365**			**0.597**			
	Utilities	**SE**	**p-value**	**Average Importance**	**SD**	**Average Utilities**	**SD**
Product type				56.60	19.98		
Cookies	0.65	0.08	0.00			65.79	81.35
Apple slices	-0.23	0.09	0.02			-20.63	48.44
Strawberry yogurt	-0.42	0.11	0.01			-45.16	53.89
Brand				22.77	14.33		
McDonald's	-0.15	0.08	0.06			-19.11	35.66
Generic	0.15	0.08	0.06			19.11	35.66
Price	-0.12	0.09	0.10	20.63	15.70	-11.40	37.28
None	0.15	0.07	0.04			12.87	156.92

The mixed logit analysis[6] (Model 2; Table 3) that considers heterogeneity in preferences for primary school students' snack choice confirms the findings of the aggregate logit model: the product type has, on average, the highest relative importance (attribute importance: 56.60%), followed by the brand (attribute importance: 22.77%) with the price being of least importance (attribute importance: 20.63%). Children showed by far the highest preference for cookies while strawberry tube yogurt was the least preferred product type. As already indicated by the results of the aggregate logit model, children were not in favor of McDonald's labeled products.

Estimating a linear main effects aggregate level logit model for the whole sample (Model 3a; Table 4) confirms the previous results of the respective part-worth model (Model 1). Segmenting the sample into two groups, one with children who receive allowance (Model

[6] In model 2, for comparability part-worth utilities are reported as rescaled normalized zero-centered measure.

3b) and the other consisting of children who do not (Model 3c), reveals that in this case price does predict choice (children with an allowance: -0.09; p = 0.099; children without an allowance: (0.18; p = 0.02). However, while the coefficient for price is as expected negative in the case of children that receive an allowance, it is positive for the other group – suggesting that children who do not receive allowance do not fully understand the implication that a higher price has for a budget constraint and may instead interpret price as a signal of quality.

Table 4. Aggregate Level Logit Models (whole sample, getting allowance, not getting allowance) (Models 3a to 3c)[a]

	Model 3a Total sample N = 101			**Model 3b Getting allowance N = 63**			**Model 3c Not getting allowance N = 35**		
Log likelihood for the initial model	-1928.64			-1203.01			-668.34		
Log likelihood for the restricted model	-1803.19			-1128.03			-620.08		
Pseudo R2	0.07			0.06			0.07		
LR test	250.9			149.96			96.52		
	Coef.	**SE**	**p-Value**	**Coef.**	**SE**	**p-Value**	**Coef.**	**SE**	**p-Value**
Constant	-0.73	0.07	0.00	-0.72	0.08	0.00	-0.81	0.11	0.00
Product	-0.65	0.05	0.00	-0.58	0.06	0.00	-0.72	0.09	0.00
Brand	0.77	0.06	0.00	0.82	0.08	0.00	0.73	0.11	0.00
Price	0.02	0.05	0.72	-0.09	0.06	0.10[b]	0.18	0.08	0.02

[a]Coding of attribute levels lower to higher according to Table 1; b) p = 0.099.

Finally, the aggregate level logit model for the whole sample (Model 3a) is extended by including children's stated preference for the brand McDonald's and for the different products; linking stated preferences for the brand to the attribute brand, and for the specific product (e.g., liking of chocolate chip cookies) to the attribute level of the product (e.g., chocolate chip cookies); and considering whether children obtain allowance and linking this variable with the price attribute. Thus, this model allows for a better understanding of the drivers for children's product choice.

Table 5. Aggregate Level Logit Models with covariates and interaction (Model 4) [a]

	Model 4 N = 101		
Log likelihood for the initial model	-1814.07		
Log likelihood for the restricted model	-1644.73		
Pseudo R2	0.09		
LR test	338.66		
	Coef.	**SE**	**p-Value**
Constant	-0.16	0.37	0.66
Product	**-0.68**	0.16	0.00
Like Choc. Chip Cookie (1 = Yes (Top 2 Boxes))	**-0.15**	0.05	0.00
Like Apple Slices (1 = Yes (Top 2 Boxes))	-0.07	0.05	0.16
Like Strawberry Tube Yogurt (1 = Yes (Top 2 Boxes))	-0.05	0.03	0.14
Product Choc. Chip Cookie * Like Choc. Chip Cookie	**0.48**	0.07	0.00
Product Apple Slices * Like Apple Slices	**0.37**	0.06	0.00
Product Strawberry Tube Yogurt * Like Strawberry Tube Yogurt	**0.41**	0.09	0.00
Brand (0 = McDonald's)	**0.50**	0.19	0.01
Like to go to McDonald's (1 = Yes)	**0.24**	0.12	0.05
Brand * Like to go to McDonald's	**-0.24**	0.09	0.01
Price	**-0.25**	0.10	0.00
Get allowance (1 = Yes)	0.16	0.13	0.22
Price * Get allowance	**-0.13**	0.08	0.09

[a]Coding of attribute levels lower to higher according to Table 1

The results illustrated in Table 5 reveal that controlling for (dis)liking of products and brands leads to significant main effects for all three attributes with the one for product being negative (product: -0.68; $p < 0.001$), confirming that chocolate chip cookies is liked most compared to apple slices and strawberry tube yogurt. Brand reveals a significant positive sign (brand: 0.50; $p = 0.01$), indicating a preference of children in our sample for the generic branded product. The variable price is significant and negative (price: -0.25; $p < 0.001$). In addition, interaction effects of product with liking (Product Choc. Chip Cookie * Like Choc. Chip Cookie: 0.48; $p < 0.001$; Product Apple Slices * Like Apple Slices: 0.37: $p < 0.001$; Product Strawberry Tube Yogurt * Like Strawberry Tube Yogurt: 0.41; $p < 0.001$), brand

with liking to go to McDonald's (-0.24; p = 0.01) as well as price and getting an allowance (-0.13; p = 0.09) are significant. The latter implies that those children obtaining allowances are more price-sensitive than children who do not receive an allowance. The former indicates that, for example, children who stated that they liked a specific product (e.g., chocolate chip cookies), or liked McDonald's have a higher probability of choosing that specific product or brand if a choice set with that product or brand being presented.

Discussion and conclusions

The results of our experiment and survey demonstrate that children's purchase decisions are primarily determined by product type, with most children in this sample showing a high and significant preference for chocolate chip cookies. In addition, our findings reveal that liking is of considerable importance for the product type children choose, an outcome that is in line with previous studies. Brug et al. (2008), De Bourdeaudhuij et al. (2008) and Rasmussen et al. (2006) found a positive association between liking and consumption of fruits and vegetables. McKinley et al. (2005) also stress the relevance of taste and product liking for children's product choice. Those researchers showed in their qualitative study that children seem to be especially "reluctant to 'risk' spending their money on something that was not guaranteed to taste good" (McKinley et al., 2005, p. 547).

Our results show that the generic product variants are preferred over the McDonald's products across the whole sample. This is true despite 100% awareness of the McDonald's brand among the children. One interpretation of this result could be that children, though they are aware of and like McDonald's, do not care for the products we selected from that brand. However, for our sample we can show that about 40% of the children do not like to go to McDonald's (i.e., a general tendency to avoid McDonald's is seen in these children,

317 irrespective of the products offered in this study).[7] These findings indicate that, in terms of
318 children's purchase decisions, awareness of a brand is not sufficient to motivate purchase. The
319 brand and the respective product need to be attractive and liked by children in order to
320 motivate them to buy the branded product. In fact, children have a preference for an unknown
321 generic brand compared to a well-known one such as McDonald's if they dislike McDonald's.
322 However, children liking McDonald's is positively associated with their choice of products
323 from this brand.

324 The role of price in children's food purchase decisions reveals a rather heterogeneous
325 picture. Price proves to be non-significant in all models not controlling for whether or not
326 children obtain an allowance. Splitting the sample into children that receive an allowance and
327 those who do not reveals that both groups are price sensitive but only the former group as
328 expected. Children who receive an allowance have, as expected, a negative price reaction –
329 implying that higher prices would lead to lower consumption. In contrast, children who do not
330 receive an allowance seem to react counter to standard expectation in that higher prices
331 induce higher consumption. One possible explanation for this disparity is that for those
332 children with the least experience, price may function primarily as an indicator of quality
333 rather than information about affordability. These results indicate that the extent of children's
334 experience with money influences their price responsiveness. In fact, previous studies indicate
335 that allowances can play an important role in developing budgeting skills with children that
336 receive an allowance being more capable in dealing with money (Abramovitch et al., 1991).

337 The findings of this study should be interpreted with attention to a few limitations.
338 First, our analysis is limited to only one well-known brand, a rather small price range and a
339 specific budget the children can use. For a better understanding of the relevance of brand and

[7] We asked the children without any reference to a product: Do you like to go to McDonald's? The high share of 40% responding "no" is likely not representative for all US children ages 8 to 11 and may be an anomaly in the location where the study was conducted.

price in children's purchase decisions around snack foods, additional research is needed. It is recommended that future studies should vary the budget available to the children and the prices of the products. In addition, future work should consider other products and brands. Second, all children saw the identical laminated pictures in the same order. Given the relatively small sample size, we followed Bliemer and Rose's (2005) approach and generated a single version efficient design for an unlabeled choice experiment. Because the experiment was carried out as paper and pencil exercise with special attention paid to presenting the choice tasks in a format accessible to children, randomization was considered impracticable. A third limitation is that we relied on a convenience sample from after-school programs in one region only. Hence, the results obtained in this study most likely are not representative of all American children ages 8 to 11.

Several of our findings have relevance for health-oriented policy interventions. First, it is not simple brand awareness but a child's liking of the brand that determines whether a brand is successful in motivating a child to choose a product and potentially a healthier option, suggesting that attempts to promote healthier foods through branding can backfire for a portion of children. Second, the extent of children's experience with money influences their price responsiveness. In this respect, price seems to play an essential role among children though in a different way for those who receive an allowance than for those who do not. To the extent that the former are primarily the ones buying food snacks, higher prices for EDNP snacks could be successful in motivating children to choose the healthier option. The role of autonomous food purchasing decision in out-of-school settings remains an important – and understudied – area of influencing children's dietary health.

Acknowledgements

This work was supported by a grant from the German Research Foundation [grant number HA 1811/11-1], with additional support from the National Institute of Food and

366 Agriculture, U.S. Department of Agriculture [award number 2014-69001-21756]. The authors
367 acknowledge the excellent research assistance of [names redacted for review].

368

References

Abramovitch, R., Freedman, J.L. and Pliner, P. (1991). Children and money: Getting an allowance, credit versus cash, and knowledge of pricing. *Journal of Economic Psychology 12*(1), 27-45.

Alvy, L.M., Calvert, S.L. (2008). Food marketing on popular children's web sites: A content analysis. *Journal of the American Dietetic Association, 108*, 710-713.

Batada, A., Seitz, M.D., Wootan, M.G., Story, M. (2008). Nine out of 10 food advertisements shown during Saturday morning children's television programming are for foods high in fat, sodium, or added sugars, or low in nutrients. *Journal of the American Dietetic Association, 108*(4), 673–78.

Bliemer, M. C., & Rose, J. M. (2005). Efficiency and sample size requirements for stated choice studies. *Institute of Transport Studies and Logistics Working Paper.*

Borradaile, K.E., Sherman, S., Vander Veur, S.S., McCoy, T., Sandoval, B., Nachmani, J., Karpyn, A., & Foster, G.D. (2009). Snacking in children: The role on urban corner stores. *Pediatrics, 124*(5), 1293-1298.

Boyland, E.J. & Halford, J.C.G. (2012). Television advertising and branding: Effects on eating behavior and food preferences in children. *Appetite, 62*(1), 236–241.

Brown D.M. & Tammineni S.K. (2009). Managing sales of beverages in schools to preserve profits and improve children's nutrition intake in 15 Mississippi schools. *Journal of the American Dietetic Association, 109*, 2036–2042.

Cairns, G., Angus, K., Hastings, G., & Caraher, M. (2012). Systematic reviews of the evidence on the nature, extent and effects of food marketing to children. A retrospective summary. *Appetite, 62*(1), 209-215.

Calvert, S.L. (2008). Children as consumers: Advertising and marketing. *Future of Children, 18*(1), 205-234.

Cash, S.B., WL Adamowicz, W.L., Allen, S., McAlister, A.R. (2013). Children's response to food price and warning interventions when purchasing snack foods. *Canadian Journal of Diabetes, 37,* S273.

Cash, S.B., & McAlister, A.R. (2011). *Influence of Developmental Differences on Children's Response to Information on Foods*. Project Report USDA/ERS Agreement Number 59-5000-0-0075.

ChoiceMetrics (2012). *Ngene 1.1.1 User Manual & Reference Guide*. Choice Metrics, Ltd.

CDC (2015). *Childhood Obesity Facts*. Available online at http://www.cdc.gov/healthyschools/obesity/facts.htm; last accessed 05/19/2016.

Connor, S. M. (2006). Food-related advertising on preschool television: Building brand recognition in young viewers. *Pediatrics 118*(4), 1478-1485.

Cornwell, T. B., McAlister, A. R. (2013). Contingent choice: Exploring the relationship between sweetened beverages and vegetable consumption. *Appetite, 62,* 203-208.

Cornwell, T. B., McAlister, A. R., Polmear-Swendris, N. (2014). Children's knowledge of packaged and fast food brands and child BMI: Why the relationship matters for policy makers. *Appetite, 81*(1): 277-283.

Culp, J., Bell, R.A., Cassady D. (2010). Characteristics of food industry web sites and "advergames" targeting children. *Journal of Nutrition Education and Behavior, 42*(3), 197-201.

De Sa, J., & Lock, K. (2008). Will European agricultural policy for school fruit and vegetables improve public health? A review of school fruit and vegetable programmes. *European Journal of Public Health, 18*(6), 558-568.

Elliott, C. (2008): Marketing fun foods: A profile and analysis of supermarket food messages targeted at children. *Canadian Public Policy, 34*(2), 259-273.

Epstein, L.H., Dearing, K.K., Handley, E.A., Roemmich J.N., & Paluch, R.A. (2006a) Relationship of mother and child food purchases as a function of price: A pilot study. *Appetite, 47*(1), 115-118.

Epstein, L.H., Handley, E.A., Dearing, K.K., Cho, D.D., Roemmich, J.N., Paluch, R.A., Raja, S., Pak, Y., & Spring, B. (2006b), Purchases of food in youth: Influence of rice and income. *Psychological Science, 17*(1), 82-89.

Evans, C.E.L., Christian, M.S., Cleghorn, C.L., Greenwood, D.C., & Cade, J.E. (2012). Systematic review and meta-analysis of school-based interventions to improve daily fruit and vegetables intake in children 5 to 12 y. *American Journal of Clinical Nutrition, 96*(4), 889-901.

Farrell, L., & Shields, M. (2007), Children as consumers: Investigating child diary expenditure data. *Canadian Journal of Economics, 40*(2), 445-467.

foodwatch (2012): Report 2012 – Kinder kaufen. Wie die Lebensmittelindustrie Kinder zur falschen Ernährung verführt, Eltern täuscht und die Verantwortung abschiebt. Available online at http://www.foodwatch.org/uploads/media/20120302_foodwatch-Report_Kinder-kaufen_ger.pdf; last accessed 5/19/2016.

Forman, J., Halford, J.C.G., Summe, H., MacDougall, M., & Keller, K. (2009). Food branding influences ad libitum intake differently in children depending on weight status. Results of a pilot study. *Appetite, 53*, 76–83.

French, S.A., Jeffery, R.W., Story, M., Breitlow, K.K., Baxter, J.S., Hannan, P., & Snyder, M.P. (2001). Pricing and promotion effects on low-fat vending snack purchases: The CHIPS Study. *American Journal of Public Health, 91*(1), 112-117.

French, S.A, Story, M., Jeffery, R.W., Snyder, P., Eisenberg, M., Sidebottom, A., & Murray D. (1997). Pricing strategy to promote fruit and vegetable purchase in high school cafeterias. *Journal of the American Dietetic Association, 97*, 1008-1010.

Gantz, W., Schwartz, N., Angelini, J.R., & Rideout, V. (2007). *Food for Thought: Television Food Advertising to Children in the United States*. Henry J. Kaiser Family Foundation.

Harris, J.L., Pomeranz, J.L., Lobstein, T., & Brownell, K.D. (2009a). A crisis in the marketplace: How food marketing contributes to childhood obesity and what can be done. *Annual Review of Public Health, 30*, 211-225.

Harris, J.L., Schwartz, M.B., & Brownell, K.D. (2009b). Marketing foods to children and adolescents: licensed characters and other promotions on packaged foods in the supermarket. *Public Health Nutrition, 13*(3), 409–417.

Harris, J.L., Speers, S.E., Schwartz, M.B., & Brownell, K.D. (2012). US food company branded advergames on the Internet: Children's exposure and effects on snack consumption. *Journal of Children and Media, 6*(1), 51-68.

Hastings, G., McDermott, L., Angus, K., Stead, M., & Thomson, S. (2006), *The extent, nature and effects of food promotion to children: A review of the evidence*. World Health Organization, Geneva, Switzerland.

Heard, A.M., Harris, J.L, Liu, S., Schwartz, M.B., & Li, X. (2016). Piloting an online grocery store simulation to assess children's food choices. *Appetite, 96*, 260–267.

Huber, J.,Zwerina, K. (1996). The importance of utility balance in efficient choice designs. *Journal of Marketing Research, 33*(3), 307-317.

IOM (2006). *Food Marketing to Children and Youth: Threat or Opportunity?*, Washington D.C.

Keller, K.L, Kuilema, L.G., Lee, N., Yoon, J., Mascaro, B., Combes, A.-L., Deutsch, B., Sorte, K., & Halford, J.C.G. (2012). The impact of food branding on children's eating behavior and obesity. *Physiology & Behavior, 106*(3), 379-386.

Kocken, P. L., Eeuwuk, J., Van Kesteren, N. M. C., Dusseldorp, E., Buus, G., & Bassa-Dafesh, Z. (2012). Promoting the purchase of low-calorie foods from school vending

machines: A cluster-randomized controlled study. *Journal of School Health, 82*(3), 115–22.

Lancaster, K. J. (1966). A new approach to consumer theory. *The Journal of Political Economy*, 132-157.

Lee, M., Choi, Y., Quilliam, E.T., & Cole, R.T. (2009). Playing with food: Content analysis of food advergames. *Journal of Consumer Affairs, 43*(1), 129-154.

Lingas, E.O., Dorfman, L., & Bukofzer, E. (2009). Nutrition content of food and beverage products on web sites popular with children. *American Journal of Public Health, 99*(3), 587-592.

Mallinckrodt, V., & Mizerski, D. (2007). The effects of playing an advergame on young children's perceptions, preferences, and requests. *Journal of Advertising 36*(2), 87-100.

Maschkowski, G., Hartmann, M., & Hoffmann, J. (2014). Health-related on-pack communication and nutritional value of ready-to-eat breakfast cereals evaluated against five nutrient profiling schemes. *BMC Public Health, 14*: 1178, 1-11.

Matthews, A., Cowburn, G., Rayner, M., Longfield, J., & Powell, C. (2005). The marketing of unhealthy food to children in Europe. Report of the Euopean Heart Network. Brüssel.

McAlister, A.R., & Cornwell, T.B. (2010). Children's brand symbolism understanding. Links to theory of mind and executive functioning. *Psychology & Marketing, 27*: 203–228.

McFadden, D. (1973). Conditional logit analysis of qualitative choice behavior. In Zarembka, P. ed. Frontiers in econometrics. Academic Press.

McKinley, M. C., Lowis, C., Robson, P. J., Wallace, J. M. W., Morrissey, M., Moran, A., & Livingstone, M. B. E. (2005). It’s good to talk: Children’s views on food and nutrition. *European Journal of Clinical Nutrition, 59*, 542-521.

McNeal, J. U., & Li, M.F. (2003). Children’s visual memory of packaging. *Journal of Consumer Marketing, 20*(5), 400-427.

Mehta, K., Phillips, C., Ward, P., & Coveney, J. (2012): Marketing foods to children through product packaging: Prolific, unhealthy and misleading. *Public Health Nutrition, 15*(9), 1763-1770.

Jacobs, K., & Petermann, F. (2005). Rechenfertigkeiten- und Zahlenverarbeitungs-Diagnostik für die 2. bis 6. Klasse (RZD 2-6), Hogrefe Verlag, Göttingen.

Robinson, T.N., Borzekowski, D.L., Matheson, D.M., & Kraemer, H.C. (2007). Effects of fast food branding on young children's taste preferences. *Archives of Pediatrics and Adolescent Medicine, 161*(8), 792–97.

Thurstone, L. L. (1927). A law of comparative judgement. *Psychological Review, 34*(4), 273,-286.

Train, K.E. (2009). *Discrete choice methods with simulation.* Cambridge University Press.

Valkenburg, P.M., & Buijzen, M. (2005). Identifying determinants of young children's brand awareness: Television, parents, and peers. *Journal of Applied Developmental Psychology 26*(4), 456-468.

Wansink, B., Just, D., & Payne, C.R. (2012). Can branding improve school lunches? *Archives of Pediatrics & Adolescent Medicine, 166*(10), 967-968.