# IF IT'S USEFUL AND YOU KNOW IT, DO YOU EAT?
# PRESCHOOLERS REFRAIN FROM INSTRUMENTAL FOOD

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Marketers, educators, and caregivers often refer to instrumental benefits to convince preschoolers to eat (e.g., “this food will make you strong”). We propose that preschoolers make inferences that if food is instrumental to achieve a goal, it is less tasty, and therefore they consume less of it. Accordingly, preschoolers (3-5 years old) rated crackers as less tasty and consumed fewer of them when the crackers were presented as instrumental to achieve a health goal (studies 1-2). In addition, preschoolers consumed fewer carrots when the carrots were presented as instrumental to knowing how to read (study 3) and count (study 4). This research supports an inference account for the negative impact of certain persuasive messages on consumption: preschoolers who are exposed to one association (e.g., between eating carrots and intellectual performance) infer another association (e.g., between carrots and taste) must be weaker.

If you are told you should try a certain food dish because it will make you strong, would you conclude it must not taste very good? If you are told you should date a certain person who is extremely gracious, would you conclude this person must not be very attractive? Most likely you would. In this research, we are interested in learning how early these inferences occur, and understanding the implications of these inferences on food consumption among preschoolers.

In particular, we ask what children, as young as three years old, learn from persuasive messages about food, and how these messages affect their consumption and enjoyment of food. We propose that young children infer from such messages that if a certain food is good for one goal, it cannot be a good means to achieve another goal. As such, if food is presented as making them strong, or as instrumental to a non-health goal such as knowing how to read, these children will conclude the food is not as tasty, and will therefore consume less of it, compared to when the food is presented with no accompanying message or as tasty.

We test these predictions among children three to five years old because they are at the beginning of learning about food-related persuasion attempts in person and through the media (Desrochers and Holt 2007; Powell, Szczypka, and Chaloupka 2007). As such, understanding information processing among these young children and how these messages affect their behavior is important. We focus on the food domain using different food items (crackers and carrots) and different messages (health- and academic-related, such as associating eating carrots with knowing how to count). By testing young children and using messages about academic, non-health goals, we are able to go beyond the learned-associations account. That account would suggest children learn through experience that food presented as healthy is less tasty, and as a result consume less of it. By contrast, we propose that no prior experience and learning is necessary for children to infer that if food serves an external goal, it is less tasty.

If our societal objective is to promote healthy eating by encouraging children to eat certain food and avoid other types of food, understanding how persuasion messages affect learning and consumption has important policy implications. Ultimately, we find that simply serving the food, without any message about the goal eating it might serve, increases consumption of healthy (e.g., carrots) or neutral (e.g., crackers) food items. Next, we review the literature on information processing and motivation related to our basic premise.

## THEORETICAL BACKGROUND

Our research focuses on how different messages about food affect the amount of that food preschoolers consume and how tasty they judge it to be. Specifically, we ask whether presenting the food as instrumental to achieving certain goals makes the food less desirable: Do children as young as three years old conclude that if the food is presented as instrumental (e.g., as making one strong, or as helping one know how to read), it must not be as tasty, and therefore they consume less of it? Understanding how these messages affect consumption is highly important, because children are frequently exposed to persuasion attempts through advertising about healthy and unhealthy food (Batada and Wootan 2007; Cairns, Angus, and Hastings 2009; Chapman et al. 2006; Moore and Rideout 2007) and are influenced by such advertisements and branding information (Borzekowski and Robinson 2001; Burr and Burr 1977; Jeffrey, McLellarn and Fox 1982; Levin, Petros, and Petrella 1982; Robinson et al. 2001; Roberto et al 2010; Wansink, Just, and Payne 2012)

To understand how food messages affect children's consumption decisions, we rely on a distinction between instrumental and experiential benefits and the notions of causal discounting

(Khemlani and Oppenheimer 2011) and dilution of means-goal association (Zhang, Fishbach, and Kruglanski 2007). Specifically, the actions in which consumers engage offer various types of benefits. Some are more experiential, and hence the benefit is an immediate part of pursuing the activity, and some are more instrumental and offer benefits only after the action is completed. Experiential benefits are an integral part of the activity itself and are realized at the time of pursing the activity, such as relaxing while reading a good book. Instrumental benefits, on the other hand, are realized only after the action is completed and are associated with the goal the action represents, such as appearing up to date after reading a bestseller (Csikszentmihalyi 2000; Deci and Ryan 1985; Harackiewicz and Sansone 1991; Higgins and Trope 1990; Lepper 1981; Rawsthorne and Elliot 1999).

When pursuing an activity mainly for the sake of pursuing it, the activity is considered experiential—the experience forms its end. When pursuing an activity mainly as a means to an end, the activity is instrumental for achieving the end and is considered extrinsically motivated (Choi and Fishbach 2011; Fishbach and Choi 2012; Shah and Kruglanski 2002). Importantly, the same activity can be more instrumental or experiential, depending on the context. For example, eating vegetables is instrumental in helping people stay in good shape and lose weight (a delayed reward), but it also provides a good experience for those who enjoy the taste of the vegetables (a benefit that is part of the activity).

For activities that offer both experiential and instrumental benefits, research has documented reduced enjoyment (i.e., experiential benefits) when individuals focus on the activity's instrumentality (Fishbach and Choi 2012). That is, individuals infer that an activity that offers instrumental benefits is less enjoyable. This type of inference involves a process similar to causal discounting, according to which the presence of one casual factor casts doubt on another

causal factor (Einhorn and Hogarth 1986; Kelley 1972). For example, the presence of peer pressure to purchase a certain brand casts doubt on the effect of personal preference on the purchase decision. Similarly, the principle of means-goals dilution suggests that adding goals casts doubts on the effectiveness of the common cause for each specific goal. Thus people perceive a means that serves more than one goal as less effective in achieving each goal (Zhang et al. 2007), and they may perceive an activity (i.e., means) that offers both experiential and instrumental benefits (i.e., goals) as offering less of each type of benefit.

The inference process involved in discounting of causes or effects (i.e., dilution) has been widely documented across various domains (Khemlani and Oppenheimer 2011; McClure 1998; Oppenheimer 2004), using adult participants (e.g., Hewstone 1994; Morris and Larrick 1995), school-age children (Karniol and Ross 1976; Sedlak and Kurtz 1981; Smith 1975; Wells and Shultz 1980) and even preschoolers (Kasin, Lowe, and Gibbons 1980). It implies that individuals infer that if an action is instrumental in achieving goal 1 (e.g., instrumental benefits), it cannot be as effective in achieving goal 2 (e.g., positive experience).

As a demonstration, research on over-justification has documented a similar inference process with children. Children expressed lower intrinsic motivation when offered a reward (e.g., stickers) for doing an otherwise intrinsically motivated action (e.g. drawing; see Deci 1971; Deci and Ryan 1985; Lepper, Greene, and Nisbett 1973; Ross 1975; Wells and Shultz 1980). Specifically, young children may infer that in the presence of the external reward, they have completed the task not because it was enjoyable, but rather because of the reward. Hence, when the reward is removed, they are no longer motivated to complete the task. Importantly, research on intrinsic motivation typically measured motivation after an external reward was introduced and then removed, allowing children to learn about their experience without, with, and then

again without the external reward. However, the mere introduction of the reward, even in the absence of hands-on learning about how removal of the reward would feel, might be sufficient to induce the inference that the action carries lower experiential benefits (Lepper et al. 1982).

## CHILDREN'S INSTRUMENTAL EATING

We focus on how messages about food affect young children's consumption and enjoyment of that food. In particular, we ask whether presenting food as instrumental to achieve a certain goal leads children to conclude the food cannot be an effective mean to achieve a taste goal, and therefore children consume less of that food. To answer this question, we first review research on presenting food as a contingency to receive a reward. In particular, a strategy parents and caregivers often employ is promising children a reward for finishing their food (e.g., "finish your vegetables and you will get dessert"). Building on the literature on discounting and over-justification reviewed above, one would expect that making the food instrumental to achieving future rewards would undermine the experience of enjoying the food, hence reducing the motivation to consume the food. Supporting this idea, several papers found decreased liking for the food when it was presented as contingent for receiving future rewards (Birch et al. 1982; Birch, Marlin, and Rotter 1984; Lepper et al. 1982; Newman and Taylor 1992). For example, Birch et al. (1982) found that when consumption of food was presented as contingent for getting a reward (e.g., playing), kids ranked it as less preferred. On the flip side, when consumption of food, even an unfamiliar one, was presented as a reward the child would receive upon completing a task, preference for that food increased (Birch 1981). Yet, in some cases, using

rewards may not undermine consumption of an initially less attractive food (Cooke et al. 2011; Wardle et al. 2003).

A special case of making food instrumental is presenting the food as instrumental to achieving a health goal. In general, branding can make food attractive (de Droog, Valkenburg, and Buijzen, 2011; Wansink et al. 2012); however, research has shown "healthy" branding sometimes undermines attractiveness, particularly with older children. For example, Miller et al. (2011) found that when general health claims about a cereal were presented on the package (e.g., "this is good for you"), children 8-12 years old were less likely to choose a healthy cereal over an unhealthy cereal. Wardle and Huon (2000) found that children 9-11 years old liked a drink labeled "new drink" more than the drink labeled "new health drink." When studying 3-5-year-old children, Robinson et al. (2007) found that children this age preferred sampled food items that were branded as McDonalds, which they may have been perceived as less healthy.

In our research, we ask what explains the above effects, and more broadly, whether children conclude that food items presented as instrumental in achieving any external goal (not only health goals) are less tasty. In general, eating provides experiential benefits (mainly taste) and instrumental benefits such as being strong. Achievement of these instrumental benefits is separated and conditioned on completion of the eating activity. Thus, attending to the instrumental benefits can make eating less enjoyable, by inducing the inference that if food serves one goal, it serves another goal to a lesser extent than if it does not serve the first goal.

Accordingly, we predict that marketing pitches emphasizing a food's instrumental rather than taste benefits, or not emphasizing benefits at all, would shift attention from the experience (i.e., enjoying the taste) to the instrumentality (e.g., promoting strength) of eating. Moreover, we

predict this shift in attention would decrease enjoyment of the food such that young consumers will rate it as less tasty and will therefore reduce current and planned consumption of the item.

To test whether children indeed engage in such an inference-making process, we need to study young children who had less opportunities to learn existing cultural associations (e.g., between taste and health), and we need a context in which food is presented as instrumental to a goal for which children have no preexisting associations (e.g., knowing how to read). In particular, the research reviewed so far shows that when food consumption is presented as a contingency for a reward or as instrumental to achieve a health goal, it may reduce preference and liking. However, when adults presented food as a contingency to receive a reward (e.g., the over-justification paradigm), children could have relied on a previously learned norm that if they receive a reward for consumption, they must not like the food (Birch et al. 1982), and when adults presented food as healthy, children could have already had strong preexisting associations between being rewarded for eating the less tasty food and between healthy food and less tasty food.

Therefore, we study young preschoolers who have weaker preexisting associations due to their young age. We first use a health goal and test whether making food instrumental in achieving a health goal reduces consumption. We then use novel food-goals associations, such as that eating certain foods will make children know how to read or to count, and test whether making eating these foods instrumental in achieving these goals reduces consumption. This paradigm allows us to test the inference-making hypothesis in a clean manner: if children as young as three years old make online inferences based on discounting, they will conclude that when foods are presented as instrumental, the foods cannot be as tasty, and therefore they will consume less.

## THE PRESENT RESEARCH

To test our hypotheses, we collected data from preschoolers at a local daycare across four studies and several pretests. Unlike most prior research that did not use actual consumption as the main dependent measure (or did not find an effect on consumption; see Bloom-Hoffman et al. 2004), we measured actual consumption of several food items in our studies. Actual consumption is a preferred dependent variable among these young children because it does not rely on the child's developing cognitive abilities to rate food items, and it has the highest external validity because it mirrors actual behavior, whereas preferences and even choice might not be perfect predictors of actual consumption.

The first two studies test whether preschoolers consume less and are less likely to choose for future consumption crackers that were presented as instrumental to being healthy, compared to tasty and neutral frames. The second study generalizes this effect to younger children, ages three to four, and also explores whether these children judge health-framed food as less tasty, which in turn reduces consumption of this food.

Studies 3 and 4 test our prediction using non-health messages. Study 3 tests whether presenting eating baby carrots as instrumental to knowing how to read reduces planned consumption of the carrots, compared to when the carrots are presented as tasty or with no message. Finally, study 4 tests whether presenting eating the baby carrots as instrumental in learning how to count reduces actual consumption among three- to four-year-olds compared to a neutral frame.

## STUDY 1: "MAKES YOU STRONG" FRAME UNDERMINES CONSUMPTION

This study tests our hypothesis that presenting food that is otherwise desirable as instrumental to achieving health goals decreases present and planned consumption. In searching for suitable food items, we conducted several pretests. An initial pretest with parents revealed that children are frequently exposed to persuasion attempts to eat more vegetables. Specifically, we find that 75% of the 89 parents of children in the relevant age group we surveyed said the one item they often try to convince their children to eat by saying it is healthy was vegetables (e.g., corn, spinach, carrots, and cauliflower). The remaining 25% wrote other items (e.g., fruits, dairy, meat, $X^2(1) = 22$, $p < .001$).

We chose to use a neutral product, Wheat Thins crackers, because we needed a product (1) that children do not usually associate with health arguments, (2) we could truthfully represent and that could be perceived as both healthy and tasty, and (3) for which we could accurately measure consumption. An additional pretest with eight mothers of children in the relevant age group confirmed these moms thought their children would *like* the Wheat Thins crackers, ($M$ = 5.78, $SD$ = 1.2, $t$ (8) = 4.44, $p < .01$) and would think these crackers were *healthy* ($M$ = 5.13, $SD$ = 0.83, $t$ (8) = 3.81, $p <.01$) and *tasty* ($M$ = 5.78, $SD$ = 0.97, $t$ (8) = 5.48, $p < .01$). Significance tests are based on a one-sample t-test against the midpoint, 4, on a 7-point scale (1 = *not at all*, 7 = *very much*).

Preschoolers in our main study consumed the Wheat Thins crackers after receiving a message presenting the crackers as instrumental to achieving a health goal, or as tasty, or with no

message (manipulated between subjects). We operationalized the health goal as "being strong and energetic" based on a pilot with 56 children (age range: 4-5 years, 47% female), in which we asked what they thought and knew about healthy eating. Fifty-four percent indicated eating healthy means being strong/good for you/makes you grow/gives energy, 24% indicated it means eating vegetables (with some overlap with the first category, such that some children indicated healthy eating means getting strong and eating vegetables), 17% gave various answers (e.g., "don't eat dessert"), and 12% did not give an answer or said they did not know. Thus the most frequent interpretation of healthy is being strong and energetic, so we used this meaning as our operationalization of healthy.

The message about the crackers was embedded in a story the experimenter told the children. We chose to use storytelling as the experimental procedure, because listening to a story in the classroom is a routine activity for children in this daycare, and familiarity with the situation is critical for research with children (e.g., Peracchio 1990). We predicted the health message would decrease present and planned consumption compared with the taste and control messages.

## Method

Sixty-six children (age range: 4.5-5.5 years, 63% female) completed the experiment in one of three message conditions: healthy versus yummy versus control, manipulated between subjects. Each participant completed the study individually in a designated part of the classroom. In the "healthy" and "yummy" conditions, the experimenter read the children a story about Tara, who ate Wheat Thins crackers before going to play (see figure 1). Depending on the condition, a

different message was presented. In particular, in the "healthy" condition, the story presented the crackers as instrumental to being strong (the story read, "Tara felt strong and healthy, and she had all the energy…"), as did the experimenter, who pointed to her own arm muscles when reading that sentence. To verify the child understood the story, the experimenter asked after reading it, "Did you know that Wheat Thins crackers are good for your health?"

In the "yummy" condition, the story emphasized the crackers' taste benefits ("Tara thought the crackers were yummy, and she was happy…"), as did the experimenter, who pointed to her own stomach when reading that sentence. As in the "healthy" condition, the experimenter asked after reading the story, "Did you know that Wheat Thins crackers are yummy?" Both appeals (healthy and yummy) were emotionally equivalent and presented similar pictures of a smiling girl. No story was used in the control condition.

Insert figure 1 about here

In all conditions, the experimenter then offered the child the chance to eat Wheat Thins crackers. To minimize interaction between the experimenter and the child during eating, the experimenter invited the child to move to another table labeled as the "eating station," where a bowl with 15 crackers sat. The number of crackers the child ate served as our dependent variable to measure consumption.

When the children finished eating, they moved back to the main experiment table to choose between a bag of Wheat Thins crackers and a bag of Ritz crackers to take home. The choice of crackers served as our dependent variable to measure planned consumption. The experimenter then thanked participants, gave them a small thank-you gift and the crackers they chose, and had them return to class activities.

## Results and Discussion

Seven children, roughly equally distributed across conditions, did not want to eat at all (e.g., one had an upset stomach, another wanted to leave), and two children (from the "yummy" condition) were highly distracted, resulting in a valid sample of 57 children. Including everyone in the analysis does not significantly affect the results.

*Consumption*: As predicted, children in the "healthy" condition ate fewer crackers than children in the "yummy" and "control" conditions ($M_{healthy}$ = 3.1, $SD$ = 3.25; $M_{yummy}$ = 7.2, $SD$ = 6.13; $M_{control}$ = 9.07, $SD$ = 5.6, $F(2, 54) = 6.94$, $p < .01$). Planned contrasts revealed a significant difference between the "healthy" and "control" conditions ($t(54) = 3.7$, $p < .005$) and between the "healthy" and "yummy" conditions ($t(54) = 2.67$, $p < .05$), but not between the "yummy" and "control" conditions ($t < 1$). This finding supports our consumption hypothesis that health messages reduce consumption among young children.

*Choice*: We find a marginal effect of the message manipulation on choice between the Wheat Thins and Ritz crackers ($X^2(2) = 4.63$, $p$ =.09). Consistent with our prediction, children in the "healthy" condition planned to consume the Wheat Thins crackers less than those in the "yummy" condition, as they were less likely to choose them over the Ritz crackers ($M_{healthy}$ = 32% vs. $M_{yummy}$ = 65%, $X^2(1) = 4.62$, $p < .05$). Children in the control condition were in the middle (46%) and not significantly different from those in the "yummy" and "healthy" conditions. Current consumption was positively correlated with planned consumption ($r(57)$ = .42, $p < .005$).

Although the choice results mirror the difference in consumption between the "healthy" and "yummy" conditions, we do not replicate the difference between the "healthy" and "control" conditions, possibly due to the fact that the choice variable is a binary, weaker variable. Also, a desire for variety, which might be orthogonal to the experimental manipulation, could also be a driver in the choice of the Ritz crackers.

*Post measure*: To tease apart the online-inference and the learned-associations accounts, we approached 35 of those who originally participated in the "healthy" and "yummy" conditions one to three weeks after they had completed the above procedure (the remaining 7 children were not in the classroom at the time the second session was conducted). These children then completed the control-condition procedure (i.e., eating crackers and post-eating choice). As a recall measure, the experimenter asked participants at the end of the session, "A few weeks ago I read you a story about Tara and these crackers. Do you remember what Tara thought about these crackers?" and recorded the open-ended responses. As in the first part, the experimenter then thanked the children and gave them a small thank-you gift and the crackers they chose.

If children make online inferences about the food items, we should not find an effect of the health message after the two-week delay, because the message is no longer at their focus of attention. Supporting our prediction, we found an interaction between the message and time of measurement ($F(1,33) = 8.27$, $p < .01$; figure 2). Whereas at $t_1$, participants in the "healthy" condition consumed less than those in the "yummy" condition , at $t_2$, we found no differences in consumption between participants who originally were in the "healthy" and "yummy" conditions ($M_{healthy} = 7.31$ vs. $M_{yummy} = 7.86$; $t < 1$). Moreover, children who originally were in the "healthy" condition increased their consumption from $t_1$, that is, immediately after the appeal ($M = 3.18$) to $t_2$, that is, approximately two weeks after the appeal ($M = 7.31$; $t(16) = 3.95$, $p < .005$),

whereas consumption of those originally in the "yummy" condition did not change ($t < 1$). . Similarly, whereas at $t_1$ participants in the "healthy" condition were less likely than those in the "yummy" condition to choose the Wheat Thins crackers over the Ritz crackers, at $t_2$ we found no difference in choice between participants who originally were in the "healthy" and "yummy" conditions ($M_{healthy}$ = 53% vs. $M_{yummy}$ = 66%,$X^2(1) < 1$). Finally, we found no differences in consumption between children who remembered the message correctly (53% of those originally in the "healthy" condition and 47% in the "yummy" condition) and those who did not (*ps*>.28). Taken together, these results suggest health information reduces current and planned consumption among children only when such information is salient at the time of consumption (i.e., at $t_1$, when children consumed the crackers immediately after hearing the story). When the health information is not salient, even if the child can retrieve it, it does not affect consumption; thus attention to healthfulness, rather than knowledge about it, causes the effect. This finding is consistent with an online-inference account, whereby the instrumentality of the food needs to be emphasized at the time of consumption, and not with a learned-association account, according to which mere knowledge about the health benefits would lead to reduced consumption.

To summarize, the results of our first study confirm our hypothesis that presenting food as instrumental to achieving a health goal (i.e., being strong) decreases preschoolers' tendency to consume it, leading to decreased current and planned consumption. After a two-week delay, we find no effect of the health message. Whereas this null effect is consistent with our online-inference account, one could wonder about the long-term effects of our manipulation. Note that our manipulation was rather minor – a single exposure to a subtle message. Other health messages to which children are exposed are probably repeated multiple times over the children's

daily life (e.g., every meal); thus we could possibly expect long-term effects even though we did not observe them in our study.

Insert figure 2 about here

## STUDY 2: "MAKES YOU STRONG" FRAME UNDERMINES CONSUMPTION AND EVALUATION OF TASTE

Our second study had two main goals. First, we test whether preschoolers experience healthy-framed foods as less tasty and therefore decrease their consumption. We predict that presenting the food as instrumental to achieving the health goal undermines the food's perceived taste, and the result is lower consumption. Second, we examine whether the effect of reduced consumption is replicable among younger children (ages 3-4).

As before, we operationalized the health goal as "being strong." To verify children this age understand the term "healthy" similarly to the older group, we asked 26 children (age range: 3.5-4.5 years, 52% female) what they think and know about healthy eating. Thirty-nine percent indicated eating healthy means being strong/good for you/makes you grow, 29% indicated it means eating vegetables or fruits (with some overlap with the first category, such that some children indicated healthy eating means being strong and eating vegetables), 18% did not give an answer, 7% gave various answers ("cereal," "soup"), and 7% said they did not know. Thus the most frequent interpretation of healthy is being strong and energetic (39%), followed by eating vegetables (29%).

To test our predictions, the main study we conducted was similar to our first study, with several modifications. First, we included post-eating liking measures to assess taste perception. Second, because in study 1 “yummy” and “control” messages had similar effects on consumption, we compared a message containing only health information with a control message that did not present the crackers as instrumental. In particular, unlike study 1, where the control condition did not present any message, in this study, the control condition presented a similar message to the one in the health condition, but without presenting the crackers as instrumental.

## Method

Forty-nine children (age range: 3-4 years; 41% female) were assigned to either a healthy-frame or control-frame condition. Two experimenters collected the data (one was blind to the research hypothesis and one was not). No effects involving the experimenter were significant, and thus this factor is not discussed further.

All participants first went through a preliminary training procedure for the “hand-opening” measure (Egan and Diermeier, 2012; for a similar approach, see also Kassin and Lowe 1979; Smith 1975), which we later used to measure liking. Specifically, the experimenter first asked the children if they liked puppies, and then asked them to show how much they liked puppies by opening their hands. The experimenter explained that if they liked puppies a lot, they should open their hands wide, but if they did not like them very much, they should open their hands a little. The children then opened their hands accordingly, and the experimenter measured the hand spans using a measuring tape. The experimenter repeated the same procedure with spiders, to train the children how to use their hand spans when they did not like an item. In some

cases, children did not like puppies or did like spiders, so the experimenter replaced puppies with other non-food liked items (e.g., cats, going to the beach) and replaced spiders with other non-food disliked items (e.g., germs, going to the dentist). Finally, the experimenter measured the full span of their hands to serve as a baseline.

Then, depending on the experimental condition, the experimenter read a story that either presented the food as instrumental to achieving health goal or not (figure 3).

As in study 1, the experimenter then offered all children the opportunity to eat the crackers from the story. After finishing eating, the children returned to the main experiment table, where they were asked to evaluate the crackers on three measures: (1) Smiley scale (Birch, Zimmerman and Hind 1980; Macklin and Machleit 1990): The experimenter asked the child to indicate which face represented how much they enjoyed the crackers (see figure 4). If they liked the crackers a lot, they were told to choose the right-most face. If they did not like the crackers, they were told to choose the left-most face. And if they liked the crackers only somewhat, or were not sure, they were instructed to choose the middle face. (2) Similarity scale: The experimenter asked the children to place a model of the Wheat Thins crackers on a scale, where one side was marked with a picture of ice cream and another side with a picture of an onion (see figure 4). A pretest with 17 moms of children in the relevant age group showed ice cream and onions are the food items children in this age group like and dislike the most, respectively. The assumption in this scale is that placing the model close to the ice cream (onion) indicated the child's increased (decreased) liking of the crackers. For this assumption to be valid, the experimenter first verified the child indeed liked ice cream and disliked onions. In the rare cases in which the child liked onions (all participants liked ice cream), we instead used eggplants or mushrooms. (3) Hand-opening measure: The experimenter asked the children to indicate by

opening their hands how yummy these crackers were, and then measured their open span with a measuring tape. The experimenter then thanked participants, gave them a small thank-you gift, and had them return to class activities.

Insert figures 3 and 4 about here

## Results and Discussion

Two children did not want to eat at all (one from each condition), and three children (two from healthy and one from control conditions) were highly distracted (e.g., left in the middle of the experiment), resulting in a valid sample of 44 children. Including everyone in the analysis does not significantly affect the results.

As predicted, children in the "healthy" condition ate fewer crackers than children in the "control" condition ($M_{healthy}$ = 4.67, $SD$ = 5.54; $M_{control}$ = 10.00, $SD$ = 5.93; $t(42) = 3.07$, $p <$ .005), extending study 1's results to a younger population.

To assess liking, we first obtained a measure of the hand-opening measure by dividing children's responses to the "how yummy" question by the overall span of their hands, resulting in a score between 0 (no liking) and 1 (highest liking possible). Then, after standardizing all three variables (hand-opening, smiley, and similarity scales), we created an average score (Cronbach's alpha = .54). As predicted, participants in the "healthy" condition liked the crackers less than those in the "control" condition, though the effect is only marginally significant ($M_{healthy}$ = -.196, $SD$ = .93; $M_{control}$ = .197, $SD$ = .37; $t(42) = 1.86$, $p$ =.07). To test whether liking

mediates the effect of framing on consumption, we also establish the effect of the proposed mediator (liking) on the dependent variable, consumption, controlling for the framing manipulation ($t(41) = 2.08$, $p < .05$), in addition to establishing above the (marginal) effect of the framing manipulation on liking. Following the bootstrapping procedure (Preacher and Hayes 2004; Zhao, Lynch and Chen 2010) with 5,000 resamples and setting a 95% confidence interval, we find significant mediation (B = .99, Low C.I. = .0634, High C.I. = 2.507).

To summarize, our second study replicates the effect of health (vs. neutral) message on consumption, such that a health message decreases consumption. Additionally, we find support for the process by which health messages reduce food consumption: presenting food as instrumental to achieving health goals decreases enjoyment of the crackers, such that those in the health-goal condition experienced the crackers as less tasty. The experience of worse taste, in turn, led to decreased consumption.

Our first two studies established that when food is presented as instrumental to achieving a health goal, children three to five years old judge the food as less tasty (study 2) and as a result consume less of it compared to when the food is presented as tasty (study 1) or with no message (studies 1 and 2). We argue this reaction is due to an online-inference process in which these children engage, such that they conclude that if the food is presented as instrumental in achieving one goal (e.g., health), the food cannot be instrumental in achieving another goal (i.e., good taste). However, an alternative account would be that children already consider healthy food to be less tasty, because they learned through experience that the healthy food they are served (e.g., vegetables) is usually less tasty, and often they are convinced through rewards to consume it. To address this alternative, we conducted our study with young children who had less opportunity to learn about cultural associations between health and taste.

To further rule out this alternative account, in studies 3 and 4, we used goals that children do not spontaneously associate with the food—knowing how to read and count. If we still find that making food instrumental to achieving these new goals reduces consumption, we will have support for an online-inference account, because such a finding will further validate the idea that children conclude that if food serves one goal (helps you know how to read), it cannot serve another goal (e.g., taste good). The learned-associations account will not be able to explain such a result, if children do not have preexisting associations between the food and the new goals.

## STUDY 3: "HELPS YOU READ" FRAME UNDERMINES PLANNED CONSUMPTION

In study 3, we test whether presenting carrots as instrumental to knowing how to read reduces planned consumption. If children engage in a discounting-type inference, they will conclude that if the carrots are good for one goal (knowing how to read), they cannot be as good in serving another goal (taste good). We used planned (instead of real) consumption, to further establish that the effect of instrumental goals occurs already in the planned-consumption phase, before children actually consume the food.

To verify that children do not have a pre-existing association between eating carrots and knowing how to read, we asked 38 children (age range: 4-5 years, 40% female) whether eating carrots can help them know how to read. We find that even when presented with a question that implies a carrots-reading association, 66% believed carrots cannot help them know how to read ($X^2$ (1) = 3.79, $p$ = 0.05). In the main experiment, as detailed below, we manipulate whether children receive information about the carrots being instrumental to knowing how to read, the

carrots being yummy, or a neutral message, and measure how many carrots the children plan to eat.

## Method

We randomly assigned 57 children (age range: 4-5 years, 46% female) to one of three conditions: yummy, read, and control. Each participant completed the study individually in a separate classroom. As in studies 1 and 2, an experimenter, blind to the research hypotheses, read the children a story about Tara, who eats baby carrots for a snack before going out to play. In the "read" condition, the story read that Tara knows that eating the baby carrots will help her know how to read; in the "yummy" condition, the story read that Tara knows that the baby carrots will be yummy and fun; and in the "control" condition, we provided no additional information about the baby carrots (see figure 5). Note that we set the message such that we do not directly make a false statement (i.e., eating carrots will help you know how to read). Rather, we present what the girl in story, Tara, thinks about the carrots.

The experimenter then presented the child a bowl with 15 wooden baby carrots and said, "Let's pretend these are the carrots from the story. Do you want to eat these carrots? How many do you want to eat? Please take out of the bowl the baby carrots you want to eat." The experimenter then waited for the child to take out of the bowl the baby carrots s/he wanted to eat. This amount served as our dependent variable of planned consumption. The experimenter debriefed children in the "read" condition that eating baby carrots is indeed good for them but does not help them know how to read. The experimenter then thanked participants, gave them a small thank-you gift, and had them return to class activities.

Insert figure 5 about here

Results and Discussion

As predicted, children in the "read" condition said they wanted to eat fewer carrots than children in the "yummy" and "control" conditions ($M_{read}$ = 3.58, $SD$ = 2.38; $M_{yummy}$ = 6.53, $SD$ = 4.68; $M_{control}$ = 7.11, $SD$ = 4.77, $F(2, 54) = 4.05$, $p < .05$). Planned contrasts revealed a significant difference between the "read" and "control" conditions ($t(54) = 2.65$, $p < .05$) and between the "read" and "yummy" conditions ($t(54) = 2.22$, $p < .05$), but not between the "yummy" and "control" conditions ($t < 1$).

Using a new food-goal combination, this study extends the results found in study 1, where the children in the instrumental, "healthy" condition consumed significantly less than children in the "yummy" and "control" conditions that did not differ from each other. Thus we are able to generalize our effect to intellectual, non-health goals, such that when food is presented as instrumental, children plan to consume less of it.

## STUDY 4: "MAKES YOU COUNT" FRAME UNDERMINES CONSUMPTION

Our final study had two main goals. First, we wanted to generalize the effect to another non-health goal—learning to count. Second, we examine whether the effect of reduced consumption following a message about a non-health goal is replicable among younger children (ages 3.5-4.5).

To test our predictions, we ran a study similar to our third study, with several modifications. First, instead of presenting the carrots as instrumental to knowing how to read, we presented them as instrumental to knowing how to count, which, based on interviews with teachers at the daycare, is an age-appropriate goal. Second, because in study 3 "yummy" and "control" frames had similar effects on consumption, we compared a message containing only the counting goal to a control message that did not emphasize any goals the carrots represent. Finally, in this study, we measured actual consumption of real carrots.

To verify that children do not have preexisting associations between eating carrots and learning how to count, we asked 17 children (age range: 3.5-4.5 years, 47% female) whether eating carrots can help them know how to count better, less, or no difference. We used this multiple-response question to reduce demand effects, where children just might say "yes" regardless of the question. We counterbalanced the order in which the question was asked (i.e., whether "better" or "less" appeared first). We find that 82% of the children said eating carrots makes no difference when learning how to count, compared to 18% who said they would help them know how to count better ($X^2$ (1) = 7.118, $p < .01$), suggesting children indeed do not have preexisting associations between eating carrots and knowing how to count. The order in which alternatives were presented had no effect. In the main experiment, as detailed below, we manipulate whether children receive information about the carrots being instrumental to knowing how to count or not, and measure how many carrots they eat.

## Method

We randomly assigned 46 children (age range: 3.5-4.5 years; 50% female) to one of two conditions: Count and Control. Two experimenters, both blind to the research hypotheses,

collected the data. No effects involving the experimenter were significant, and thus this factor is not discussed further.

Each participant completed the study individually in a separate classroom. Similar to the procedure in previous studies, the experimenter read the children a story about Tara, who eats baby carrots for a snack before going out to play. In the Count condition, the story read, “Tara knows that eating the baby carrots will help her know how to count to 100.” The control condition provided no additional information about the baby carrots (see figure 6).

Insert figure 6 about here

In both conditions, the experimenter next offered the child baby carrots to eat. As in previous studies, the experimenter invited the child to move to another table labeled as the “eating station,” where a bowl with 42 grams (about 20) of petite baby carrots sat. To make consumption easier and faster, we used petite baby carrots that are narrower and shorter than regular baby carrots. The amount of grams the child ate served as our dependent variable to measure consumption. To further minimize interaction with the child, the experimenter read a book to act distracted while the child was at the eating station.

After finishing eating, the child returned to the main experiment table. The experimenter debriefed children in the count condition that eating baby carrots is indeed good for them but does not help them learn how to count. The experimenter then thanked participants, gave them a small thank-you gift, and had them return to class activities.

## Results and Discussion

Five children did not want to eat at all (three from the control condition and two from the count condition), resulting in a valid sample of 41 children. Including everyone in the analysis does not significantly affect the results.

As predicted, children in the "count" condition ate fewer carrots than children in the "control" condition ($M_{count}$ = 7.58 grams, $SD$ = 9.7; $M_{control}$ = 17.09 grams, $SD$ = 15.55; $t(39)$ = 2.33, $p < .05$). Thus we generalize our effect to another non-health-related goal, knowing how to count, and show that making the carrots instrumental to achieving this goal reduces actual consumption among children three and a half to four and a half years old.

## GENERAL DISCUSSION

Across four studies, using various food items and various goal-related messages, we find consistent evidence that making food instrumental in achieving a goal, relative to presenting the food as yummy or with no message, decreases preschoolers' consumption (current and planned) by leading to lower taste ratings. When food is presented as instrumental, children conclude it cannot be as tasty, and therefore they reduce consumption.

Our first study finds that children between four and a half and five and a half years old consume less and are less likely to choose the consumed crackers when these crackers are presented as instrumental to being healthy (i.e., "makes you strong"), as compared to when no information is presented or the crackers are presented as tasty. Our second study extends the effect on consumption to children three to four years old, showing also that presenting the food as instrumental leads to perceiving the crackers as less tasty compared to control. Moreover, the reduced liking for the health-framed crackers mediates the effect on consumption. Our third study generalizes the effect to non-health goals and finds that when food is presented as

instrumental to knowing how to read, children four to five years old report they would consume fewer carrots. Our fourth study extends this result to another non-health goal and shows that when carrots are presented as instrumental to learning how to count, children between three and a half and four and a half years old consume fewer carrots.

Using a highly important context—food consumption by preschoolers—with clear practical, medical, and policy implications, we are able to shed light on information processing among young children.

## Relation to Prior Research and Boundary Conditions

Prior research on over-justification focused on the role of rewards, showing that rewards often undermine intrinsic motivation once removed, especially among young children (e.g., Lepper et al., 1973). Building on this literature, one can think of the goals we used in our research to associate the food with (being healthy, knowing how to read, knowing how to count) as rewards, which in turn decrease intrinsic motivation. Against this view, we argue our studies also presented taste benefits ("yummy" condition, studies 1 and 3), which can be construed as rewards, but had no effect on consumption relative to the no-message condition. Importantly, even if the goals formed a psychological reward, we find a decrease in consumption (i.e., lower intrinsic motivation) while the goal-message is in place, and no effect when it is removed (per the second measurement in study 1). These findings are not consistent with prior research on over-justification, which used a paradigm of introducing and then removing a reward and found a decrease in motivation once the reward was removed but not while it was in place.

A potential alternative explanation for our results could be that children this age simply do not value the goals we used (being strong and healthy, knowing how to read, knowing how to count), and therefore they ignored the information presented to them. Yet not caring about these goals would not explain why, across all studies, children reduced consumption compared to a control or taste-frame condition and concluded the food was less tasty (study 2). In fact, we would predict similar effects for goals children do not care about at all. We nonetheless wanted to test whether children value the goals we have used. In a post-test we conducted with 26 children three and a half to four and a half years old and 27 children four to five years old, we asked children to indicate the importance of various goals (e.g., being strong, being handsome/pretty, having a lot of friends, knowing how to read, knowing how to count), using the hand opening-measure described in study 2.We find no difference in the importance these children assign to these various goals, suggesting the goals we used are at least as important as more mundane goals such as being handsome/pretty or having a lot of friends.

Our research explores how children respond to persuasive messages about food. However, because parents and caregivers serve as the gatekeepers of the food served to young children, also understanding how adults are influenced by marketing messages is important. For the most part, presenting food as healthy undermines consumption and liking among adults (Raghunathan, Naylor and Hoyer 2006), though in some cases, it can increase consumption (Provencher, Polivy and Herman 2008; Wansink and Chandon 2006), especially among dieters (Irmak, Vallen, and Robinson 2011). These mixed effects could potentially suggest that health messages increase the likelihood that caregivers would offer the food but also that when caregivers offer healthy food to children, they subtly communicate their low liking. The mixed effects among adults further reflect the complex set of considerations adults take into account

when deciding what and how much to consume (Chandon and Wansink 2007a; Coelho Do Vale, Pieters, and Zeelenberg 2008; Vartanian, Herman, and Wansink 2008). When studying the effect of health and non-health messages on children's consumption and enjoyment of food, also studying how parents respond to such messages would be useful, because their response could interact with the direct effect of the message the child receives.

Another important question arising from this research is what constitutes as healthy among young children. In this research, we used one aspect of healthy food, namely, food that makes one feel "strong and healthy and gives energy." Future research can look into whether other aspects of healthiness, such as "good for you" or "helps you stay in shape," also have a similar negative effect among young children. Presumably, a more complex perception of health, which relies on actual fat and calorie content and complex implicit associations (Chandon and Wansink 2007b; Finkelstein and Fishbach 2010), develops at a later age. Therefore, among older children, who process information in a more complex manner (John 1999), acquire information differently (Peracchio 1992) and might rely less on taste when making food decisions due to higher self-control, we may find different results.

## Marketing Implications

Our findings contribute to the understanding of what affects young children's motivation and consumption behavior, as well as how health-related and non-health messages affect their behavior. With increasing rates of obesity (Brownell and Horgen 2004; Chandon and Wansink 2012; Hill and Peters 1998) and childhood obesity (Hedley et al. 2004; Troiano and Flegal

1998), understanding how to help children eat healthier food is crucial (for a review, see Birch and Fisher 1999). Prior research suggested several interventions, including increasing the accessibility of certain food items (Hearn et al., 1998; Just and Wansink 2009; Reicks et al. 2012) or using appropriate role models (Birch, 1980). Our research suggests that when encouraging children to eat healthy (or neutral) food, making the food instrumental may backfire. Emphasizing the taste benefits, assuming they are credible, or even not mentioning the benefits at all, is superior to making the food instrumental to achieving certain goals in terms of encouraging consumption and creating a positive experience. This conclusion is consistent with Reicks et al. (2012), who find that merely placing pictures of vegetables on school lunch trays, without any accompanying messages, increased consumption of vegetables.

Marketing food as instrumental in achieving certain goals may still have a positive impact on consumption among children, by influencing caregivers to purchase and serve this food. Caregivers affect children's food choices by making specific foods available, by acting as models for their children, and by adjusting their behavior in specific situations (Young, Fors, and Hayes 2004). Our conclusion refers to marketing pitches directed at the children: we find that when serving food to preschoolers, it is best not to present the food as instrumental to any goal.

# REFERENCES

Batada, Ameena and Margo G. Wootan (2007), "Nickelodeon Markets Nutrition-Poor Foods to Children," *American Journal of Preventive Medicine*, 33, 48–50.

Birch Leann L. (1980), "Effects of Peer Models' Food Choices and Eating Behaviors on Preschoolers' Food Preferences," *Child Development,* 51, 489–96.

Birch, Leann L. (1981), "Generalization of a Modified Food Preference," *Child Development*, 52, 755-58.

Birch, Leann L., Diane W. Marlin, and Laurie Kramer (1982), "Effects of Instrumental Eating on Children's Food Preferences," *Appetite*, 3, 125–34.

Birch, Leann L., Diane W. Marlin, and Julie Rotter (1984), "Eating as the "Means" Activity in a Contingency: Effects on Young Children's Food Preference," *Child Development*, 55 (2), 431-43.

Birch, Leann L., Sheryl I. Zimmerman, and Honey Hind (1980), "The Influence of Social-Affective Context on the Formation of Children's Food Preferences," *Child Development*, 51 (3), 856-61.

Birch, Leann L. and Jennifer O. Fisher (1999), "Development of Eating Behaviors Among Children and Adolescents," *Pediatrics*, 101,539-49.

Birch, Leann L. (1999), "Development of Food Preferences," *Annual Review of Nutrition,* 19, 41–62.

Bloom-Hoffman, Jessica, Constance Kelleher, Thomas J. Power, and Stephen S. Leff (2004), "Promoting Healthy Food Consumption among Young Children: Evaluation of a Multi-Component Nutrition Education Program,' *Journal of School Psychology*, 42, 45-60.

Borzekowski, Dina L.G. and Thomas N. Robinson (2001), "The 30-second Effect: An Experiment Revealing the Impact of Television Commercials on Food Preferences of Preschoolers," *Journal of the American Dietetic Association*, 101 (1), 42-6.

Brownell, Kelly D. and Katherine B. Horgen (2004), *Food Fight: The Inside Story of the Food Industry, America's Obesity Crisis, and What We Can Do About It*, Chicago, IL: Contemporary Books.

Burr, Pat L. and Richard M. Burr (1977), "Parental Responses to Child Marketing," *Journal of Advertising Research*, 17 (6), 17-20.

Cairns, Georgia, Kathryn Angus, and Gerard Hastings (2009), "The Extent, Nature and Effects of Food Promotion to Children: A Review of the Evidence to December 2008", *World Health Organization.*

Chandon, Pierre and Brian Wansink (2007a), "Is Obesity Caused by Calorie Underestimation? A Psychophysical Model of Meal Size Estimation," *Journal of Marketing Research*, 44 (February), 84–99.

_____ (2007b), "The Biasing Health Halos of Fast-Food Restaurant Health Claims: Lower Calorie Estimates and Higher Side-Dish Consumption Intentions," *Journal of Consumer Research*, 34 (October), 301-14.

_____ (2012), "Does Food Marketing Need to Make us Fat? A Review and Solutions," *Nutrition Reviews*, 70 (10), 571-93.

Chapman, Kathy, Penny Nicholas, Debbie Banovic, and Rajah Supramaniam (2006), "The Extent and Nature of Food Promotion Directed to Children in Australian Supermarkets," *Health Promotion International*, 21, 331–39.

Choi, Jinhee and Ayelet Fishbach (2011), "Choice as an End versus a Means." *Journal of Marketing Research, 48,* 544-54.

Coelho Do Vale, Rita, Rik Pieters, and Marcel Zeelenberg (2008), "Flying under the Radar: Perverse Package Size Effects on Consumption Self-Regulation," *Journal of Consumer Research*, 35 (October), 380–90.

Cooke, Lucy J., Lucy C. Chambers, Elizabeth V. Añez, Helen A. Croker, David Boniface, Martin R. Yeomans, and Jane Wardle (2011), "Eating for Pleasure of Profit: The Effect of Incentives on Children's Enjoyment of Vegetables," *Psychological Science*, 22 (2), 190-96.

Csikszentmihalyi, Mihaly (2000), "Beyond Boredom and Anxiety," San Francisco, CA, US: Jossey-Bass.

Deci, Edward L. (1971), "Effects of Externally Mediated Rewards on Intrinsic Motivation," *Journal of Personality and Social Psychology*, 18 (1), 105-15.

Deci, Edward L. and Richard M. Ryan (1985), *Intrinsic Motivation and Self-Determination in Human Behavior*. New York: Plenum Press.

Desrochers, Debra M. and Debra J. Holt (2007), "Children's Exposure to Television Advertising: Implications for Childhood Obesity," *Journal of Public Policy & Marketing*, 26 (2), 182-201.

de Droog, Simone M., Patti M. Valkenburg, and Moniek Buijzen (2011), "Using Brand Characters to Promote Young Children's Liking of and Purchase Requests for Fruit," *Journal of Health Communication*, 16,79–89.

Egan Brad, Louisa C. and Daniel Diermeier (2012), "Culture, Development, and Zero-Sum Thought," working paper, Bryn Mawr College, Bryn Mawr, PA 19010.

Einhorn, Hillel J. and Robin M. Hogarth (1986),"Judging Probable Cause," *Psychological Bulletin*, 99, 3–19.

Finkelstein, Stacey R. and Ayelet Fichbach (2010), "When Healthy Food Makes You Hungry," *Journal of Consumer Research,* 37 (October), 357-67.

Fishbach, Ayelet and Jinhee Choi (2012), "When Thinking About Goals Undermines Goal Pursuit," *Organizational Behavior and Human Decision Processes*, 118 (1), 99-107.

Harackiewicz, Judith M. and Carol Sansone (1991), "Goals and Intrinsic Motivation: You Can Get There From Here," in Advances in Motivation and Achievement, Martin L. Maehr, Paul R. Pintrich (Eds.), Vol. 7JAI, Greenwich, CT (1991), pp. 21–49.

Hearn, Marsh D., Tom Baranowski, Janice Baranowski, Colleen Doyle, Matthew Smith, Lillian S. Lin, and Ken Resnicow (1998), "Environmental Influences on Dietary Behavior among Children: Availability and Accessibility of Fruits and Vegetables Enable Consumption," *Journal of Health Education, 29*(1), 26–32.

Hedley Allison. A,Cynthia L. Ogden, Clifford L. Johnson, Margaret D. Carroll, Lester R. Curtin, and Katherine M. Flegal (2004), "Prevalence of Overweight and Obesity among US Children, Adolescents, and Adults, 1999-2002," *Journal of the American Medical Association,* 291(23), 2847-50

Hewstone, Miller (1994), "Revision and Change of Stereotypic Beliefs: In Search of the Elusive Subtyping Model," *European Review of Social Psychology,* 5, 69‑109.

Higgins, E. Tory and Yaacov Trope (1990), "Activity Engagement Theory: Implications of Multiply Identifiable Input for Intrinsic Motivation," in *Handbook of Motivation and Cognition: Foundations of Social Behavior,* Vol. 2, E. Tory Higgins and Richard

Hill, James O. and John C. Peters (1998), "Environmental Contributions to the Obesity Epidemic," *Science*, 280 (5368), 1371-74.

Irmak, Caglar, Beth Vallen, and Stefanie R. Robinson (2011), "The Impact of Product Name on Dieters' and Nondieters' Food Evaluations and Consumption," *Journal of Consumer Research*, 38 (August), 390-405.

Jeffrey Balfour, D., Robert W. McLellarn, and Daniel T. Fox DT (1982), "The Development of Children's Eating Habits: The Role of Television Commercials," *Health Education Behavior, 9*, 78-93.

John, Deborah R. (1999), "Consumer Socialization of Children: A Retrospective Look at Twenty-Five Years of Research," *Journal of Consumer Research,* 26 (December), 182-213.

Just, David R. and Brian Wansink (2009), "Smarter Lunchrooms: Using Behavioral Economics to Improve Meal Selection," *Choices*, 24, 1-6.

Karniol, Rachel and Michael Ross (1976), "The Development of Causal Attributions in Social Perception," *Journal of Personality and Social Psychology,* 34, 455- 64.

Kasin Saul M., Charles A. Lowe, and Fredrick X. Gibbons (1980), "Children's Use of the Discounting Principle: A Perceptual Approach," *Journal of Personality and Social Psychology*, 39 (4), 719-28.

Kelley, Harold H. (1972), "Causal Schemata and the Attribution Process," In E. E. Jones, D. E. Kanouse, H. H. Kelley, R. S. Nisbett, S. Valins, & B. Weiner (Eds.), *Attribution: Perceiving the causes of behavior* (pp. 151– 174). Morristown, NJ: General Learning Press.

Khemlani, Sangeet S. and Daniel M. Oppenheimer (2011), "When One Model Casts Doubt on Another: A Levels-of-Analysis Approach to Causal Discounting," *Psychological Bulletin*, 137 (2), 195-210.

Lepper, Mark R. (1981), "Intrinsic and Extrinsic Motivation in Children: Detrimental Effects of Superfluous Social Controls," In W. A. Collins (Ed.), *Minnesota Symposium on Child Psychology* (Vol. 14). Hillsdale, N.J.: Erlbaum, 1981.

Lepper, Mark R., David Greene, and Richard E. Nisbett (1973), "Understanding Children's Intrinsic Interest with Extrinsic Reward: A Test of the "Overjustification" Hypothesis," *Journal of Personality and Social Psychology*, 28 (1), 129-37.

Lepper, Mark R., Gerald Sagotsky, Janet L. Dafoe, and David Greene (1982), "Consequences of Superfluous Social Constraints: Effects of Young Children's Social Inferences and Subsequent Intrinsic Interest," *Journal of Personality and Social Psychology*, 42, 51-65.

Levin, Stephen R., Thomas V. Petros, and Florence W. Petrella (1982), "Preschoolers' Awareness of Television Advertising," *Child Development*, 53 (4), 933-37.

Macklin, M. Carole and Karen A. Machleit (1990), "Measuring Preschool Children's Attitude," *Marketing Letters*, 1 (3), 253-65.

McClure, John (1998), "Discounting of Causes of Behavior: Are Two Reasons Better than One?," *Journal of Personality and Social Psychology, 74*, 7–20.

Miller, Elizabeth G., Kathleen Seiders, Maureen Kenny, and Mary E. Walsh (2011), "Children Use of Package Nutritional Claim Information," *Journal of Consumer Behaviour*, 10, 122-32.

Moore, Elizabeth S, Victoria J. Rideout (2007), "The Online Marketing of Food to Children: Is It Just Fun and Games?," *Journal of Public Policy & Marketing* 26, 202–220.

Morris, Michael. W. and Richard P. Larrick (1995), "When One Cause Casts Doubt on Another: A Normative Analysis of Discounting in Causal Attribution," *Psychological Review, 102,* 331–55.

Newman Joan and Alan Taylor (1992), "Effect of a Means: End Contingency on Young Children's Food Preferences," *Journal Experimental Child Psychology,* 64,200–16.

Oppenheimer, Daniel. M. (2004), "Spontaneous Discounting of Availability in Frequency Judgment Tasks," *Psychological Science,* 15, 100–5.

Peracchio, Laura A. (1990), "Designing Research to Reveal the Young Child's Emerging Competence", *Psychology and Marketing*, 7 (4), 257-76.

Peracchio, Laura A. (1992), "How Do Young Children Learn to Be Consumers? A Script-Processing Approach", *Journal of Consumer Research*, 18 (March), 425-40.

Powell, Lisa M., Glen Szczypka, and Frank J. Chaloupka (2007), "Adolescent Exposure to Food Advertising on Television," *American Journal of Preventive Medicine*, 33 (4), 251-56.

Preacher, Kristopher J. and Andrew F. Hayes (2004), "SPSS and SAS Procedures for Estimating Indirect Effects in Simple Mediation Models," *Behavior Research Methods,* 36 (4), 717-31.

Provencher, Véronique, Janet Polivy, and C. Peter Herman (2008), "Perceived Healthiness of Food. If It's Healthy, You Can Eat More!" *Appetite* 52, 340–44.

Raghunathan, Rajagopal, Rebecca W. Naylor, and Wayne D. Hoyer (2006), "The Unhealthy = Tasty Intuition and Its Effects on Taste Inferences, Enjoyment, and Choice of Food Products," *Journal of Marketing,* 70 (4), 170-84.

Rawsthorne, Alird J. and Andrew J. Elliot (1999), "Achievement Goals and Intrinsic Motivation: A Meta-Analytic Review," *Personality and Social Psychology Review*, 3, 326–44.

Reicks, Marla, Jospeh P. Redden, Traci Mann, Elton Mykerezi, and Zata Vickers (2012), "Photographs in Lunch Tray Compartments and Vegetable Consumption among Children in Elementary School Cafeterias," *The Journal of the American Medical Association*, 307 (8), 784-85.

Roberto, Christina A., Jenny Baik, Jennifer L. Harris, and Kelly D. Brownell, (2010), "Influence of Licensed Characters on Children's Taste and Snack Preferences, *Pediatrics*, 126 (1), 88-93.

Robinson, Thomas. N., Dina L. G. Borzekowski, Donna M. Matheson , and Helena C. Kraemer ( 2007 ), "Effects of Fast Food Branding on Young Children's Taste Preferences," *Archives of Pediatrics & Adolescent Medicine* , 161 , 792 – 7.

Robinson, Thomas N., Melissa N. Saphir, Helena C. Kraemer, Ann Varady, and K. Farish Haydel (2001), "Effects of Reducing Television Viewing on Children's Request for Toys: A Randomized Controlled Trial," *Developmental and Behavioral Pediatrics*, 22 (3), 179-84.

Ross, Michael (1976), "The Self-Perception of Intrinsic Motivation, "In J. H. Harvey, W. J. Ickes, & R. F. Kidd (Eds.), *New Directions in Attribution Research* (Vol. 1). Hillsdale, N.J.: Erlbaum.

Shah, James Y. and Arie W. Kruglanski (2002), "Priming Against Your Will: How Accessible Alternatives Affect Goal Pursuit," *Journal of Experimental Social Psychology*, 38 (4), 368-83.

Sedlak, Andrea J. and Susan T. Kurtz (1981), "A Review of Children's Use of Causal Inference Principles," *Child Development*, 52 (3) 759-84.

Smith, Michael C. (1975), "Children's Use of the Multiple Sufficient Cause Schema in Social Perception, *Journal of Personality and Social Psychology*, 32 (4), 737 – 47.

Troiano, Richard P. and Katherine M. Flegal (1998), "Overweight Children and Adolescents: Description, Epidemiology, and Demographics," *Pediatrics*, 101, 497–504.

Vartanian, Lenny R., Peter C. Herman, and Brian Wansink (2008), "Are We Aware of the External Factors That Influence Our Food Intake?" *Health Psychology*, 27 (5), 533-38.

Wansink, Brian and Pierre Chandon (2006), "Can "Low-Fat" Nutrition Labels Lead to Obesity?" *Journal of Marketing Research*, 43 (4), 605-17.

Wansink, Brian, David R. Just, and Collin R. Payne (2012), "Can Branding Improve School Lunches?," *Archives of Pediatric Adolescent Medicine*, 166(10), 967-68.

Wardle, Jane, Monica, L. Herrera, Lucy J. Cooke, and E. Leigh Gibson (2003), "Modifying Children's Food Preferences: The Effects of Exposure and Reward on Acceptance of an Unfamiliar Vegetable," *European Journal of Clinical Nutrition*, 57, 341–48.

Wardle, Jane and Huon, Gail (2000), "An Experimental Investigation of the Influence of Health Information on Children's Taste Preferences," *Health Education Research*, 15 (1), 39-44.

Wells, Diane and Thomas R. Shultz (1980), "Developmental Distinctions between Behavior and Judgment in the Operation of the Discounting Principle," *Child Development*, 51 (4), 1307-10.

Young, Elizabeth M., Stuart W. Fors, and David M. Hayes (2004), "Associations between Perceived Parent Behaviors and Middle School Student Fruit and Vegetable Consumption," *Journal of Nutrition Education and Behavior,* 36 (2), 2-12.

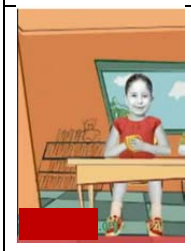
Zhao, Xinshu, John G. Lynch, and Qimei Chen (2010), "Reconsidering Baron and Kenny: Myths and Truths about Mediation Analysis," *Journal of Consumer Research*, 37 (August), 197-206.

Zhang, Ying, Ayelet Fishbach, and Arie W. Kruglanski (2007), "The Dilution Model: How Additional Goals Undermine the Perceived Instrumentality of a Shared Path," *Journal of Personality and Social Psychology, 92*, 389-401.

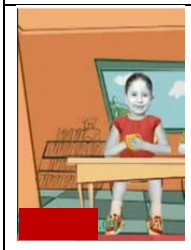
FIGURE 1:

STORIES USED IN STUDY 1 (THERE WAS NO STORY IN THE NO-FRAME, CONTROL CONDITION)

Healthy condition (M (consumption) = 3.1 crackers)

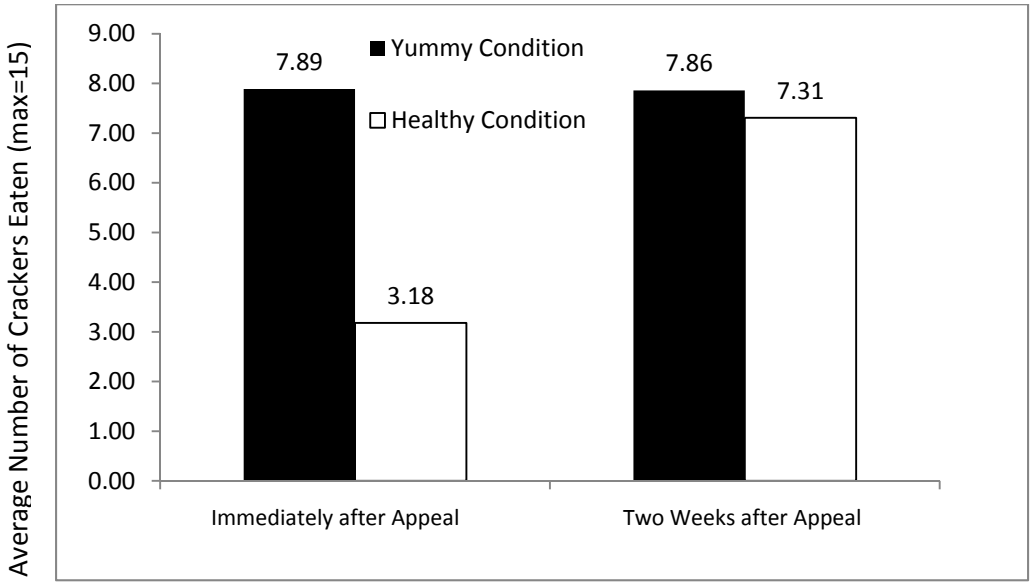
| This is Tara. Tara likes to eat a snack before she goes out and play. | Today Tara ate the 'Wheat Thins Crackers' for snack. | Tara felt strong and healthy, and | She had all the energy she needed to play outside. |
|---|---|---|---|
|  |   |  |  |

Yummy condition (M (consumption) = 7.2 crackers)

| This is Tara. Tara likes to eat a snack before she goes out and play. | Today Tara ate the 'Wheat Thins Crackers' for snack. | Tara thought the crackers were yummy, | And she was happy to play outside. |
|---|---|---|---|
|  |   |  |  |

Control condition, no story (M (consumption) = 9.07 crackers)

FIGURE 2:
HEALTH FRAME DECREASES CONSUMPTION ONLY WHEN ACCESSIBLE DURING CONSUMPTION (STUDY 1)

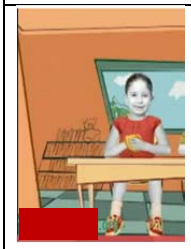



*Note*: Of the 57 children who completed the first session ($t_1$), 35 participated in the second session ($t_2$), of which 17 were originally in the "healthy" condition and 18 in the "yummy" condition. Values in $t_1$ represent the average number of crackers eaten during the first session by children who proceeded to complete the second session.

FIGURE 3:

STORIES USED IN STUDY 2

Health Condition (M (consumption) = 4.67 crackers)

| This is Tara. Tara likes to eat a snack before she goes out and play. | Today Tara ate the 'Wheat Thins Crackers' for snack. | Tara felt strong and healthy, and | She had all the energy she needed to play outside. |
|---|---|---|---|
|  |  |  |  |

Control Condition (M (consumption) = 10.00 crackers)

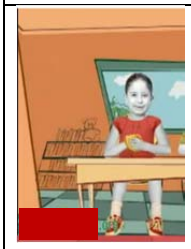
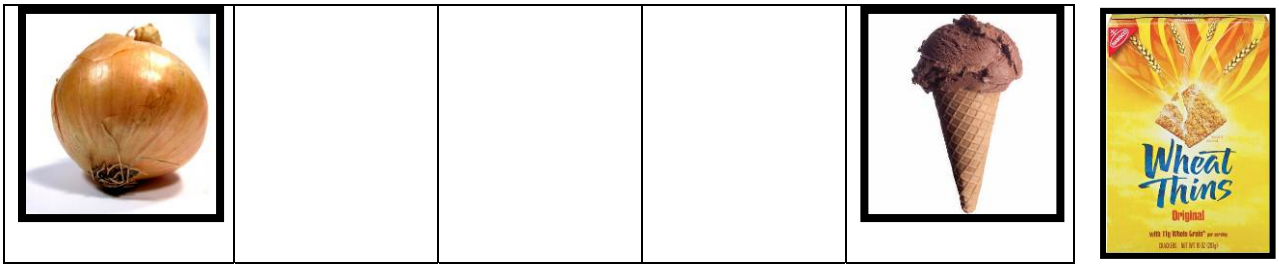
| This is Tara. Tara likes to eat a snack before she goes out and play. | Today Tara ate the 'Wheat Thins Crackers' for snack | And she went to play outside. |
|---|---|---|
|  |  |  |

FIGURE 4:

POST-EATING MEASURES USED IN STUDY 2

Smiley Scale:

Illustration of the Similarity Scale:

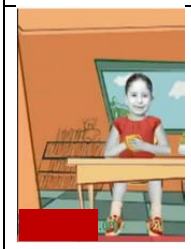



* Children place a card with the picture of the Wheat Thins crackers on one of the empty boxes. If they think the crackers are similar to ice cream [onion], thus indicating liking [disliking], they place the crackers next to the ice cream [onion], or in the middle if they are not sure.

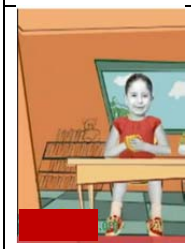
FIGURE 5:

STORIES USED IN STUDY 3

Read condition (M (planned consumption) = 3.58 carrots)

| This is Tara. Tara likes to eat a snack before she goes out and play. | Today Tara plans to eat baby carrots for snack. | Tara knows that eating the baby carrots will Help her know how to read | So she eats them and goes to play outside |
|---|---|---|---|
|  |  |  |  |

Yummy condition (M (planned consumption) = 6.53 carrots)

| This is Tara. Tara likes to eat a snack before she goes out and play. | Today Tara plans to eat baby carrots for snack. | Tara knows that eating the baby carrots will be yummy and fun, | So she eats them and goes to play outside |
|---|---|---|---|
|  |  |  |  |

Control condition (M (planned consumption) = 7.11 carrots)

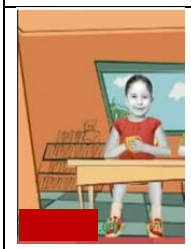
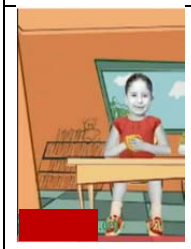
| This is Tara. Tara likes to eat a snack before she goes out and play. | Today Tara plans to eat baby carrots for snack. | So she eats them and goes to play outside |
|---|---|---|
|  |  |  |

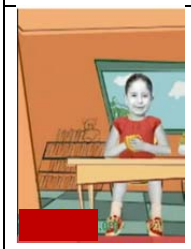
FIGURE 6:

STORIES USED IN STUDY 4

Count condition (M (consumption) = 7.58 grams carrots)

| This is Tara. Tara likes to eat a snack before she goes out and play. | Today Tara plans to eat baby carrots for snack. | Tara knows that eating the baby carrots will help her know how to count to 100 | So she eats them and goes to play outside |
|---|---|---|---|
|  |  |    |  |

Control condition (M (consumption) = 17.09 grams carrots)

| This is Tara. Tara likes to eat a snack before she goes out and play. | Today Tara plans to eat baby carrots for snack. | So she eats them and goes to play outside |
|---|---|---|
|  |  |  |