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WHAT'S KNOWN ON THIS SUBJECT: Little is known about the influence of licensed characters on eating behavior. No published study has documented causal relationships between licensed characters appearing on food packaging and children's taste and snack preferences.



WHAT THIS STUDY ADDS: This study found a relationship between licensed characters appearing on food packaging and children's taste and snack preferences. Overall, children preferred the taste of foods and selected foods for snack more often when a character appeared on the packaging.

abstract

FREE

OBJECTIVE: The goal was to study how popular licensed cartoon characters appearing on food packaging affect young children's taste and snack preferences.

METHODS: Forty 4- to 6-year-old children tasted 3 pairs of identical foods (graham crackers, gummy fruit snacks, and carrots) presented in packages either with or without a popular cartoon character. Children tasted both food items in each pair and indicated whether the 2 foods tasted the same or one tasted better. Children then selected which of the food items they would prefer to eat for a snack.

RESULTS: Children significantly preferred the taste of foods that had popular cartoon characters on the packaging, compared with the same foods without characters. The majority of children selected the food sample with a licensed character on it for their snack, but the effects were weaker for carrots than for gummy fruit snacks and graham crackers.

CONCLUSIONS: Branding food packages with licensed characters substantially influences young children's taste preferences and snack selection and does so most strongly for energy-dense, nutrient-poor foods. These findings suggest that the use of licensed characters to advertise junk food to children should be restricted. *Pediatrics* 2010; 126:88–93

Among US preschool-aged children (2–5 years of age), obesity rates have more than doubled since the 1970s; among 6- to 11-year-old children, rates have more than tripled.¹ This has sparked concern regarding child-targeted marketing of nutritionally poor foods.^{2–6} The sharp increase in obesity prevalence has coincided with rapid growth in the food industry's budget for childhood marketing⁴; food and beverage companies spend more than \$1.6 billion per year on advertising targeted toward young consumers.⁷ Although television commercials remain the most-popular medium for food advertisers, marketing occurs via the Internet, movies, video games, text messaging, sponsorships, and character licensing agreements.⁷

Character licensing is a marketing strategy through which food companies place the image of a popular movie or television character on product packaging to promote that food product to children.⁸ The use of licensed characters has been criticized by scientific organizations and consumer advocacy groups,^{5,9,10} but little research exists on how character licensing affects children's eating habits and food preferences.

Although some individuals think that licensed characters should not be used to market any food products,^{5,11} there are some examples of characters appearing on healthier food items.⁶ For example, Sesame Street teamed with Apple & Eve in 1999 to promote a variety of character-themed fruit juices,¹² and it has licensed its characters to other healthier products.⁶ Similarly, Nickelodeon announced in 2005 that it would license characters to produce companies, to encourage healthier diets for children.¹¹ Soon thereafter, SpongeBob SquarePants and Dora the Explorer, characters that generate annual sales of branded goods of \$2 billion,¹⁰ began appearing

on packaging for spinach, carrots, and fruits.¹⁵ However, the impact these characters have on consumption of healthier foods remains largely unknown. Proprietary studies conducted by the Sesame Workshop¹⁴ found that the presence of an Elmo sticker on food packaging affected children's food selection behavior. In the no-sticker condition, 78% of participants chose a chocolate bar over broccoli. When Elmo was added to the broccoli package, however, one-half of the children chose the vegetable over the candy, although the authors did not measure taste perception in that study.

Although little is known about the influence of licensed characters on eating behavior, some studies have examined the effects of animated spokescharacters,^{6,15} such as Tony the Tiger for Kellogg's Frosted Flakes cereal. Spokescharacters seem to be more effective in creating favorable brand attitudes than verbal cues or any other form of information presented on a food package, which suggests that this also might be true for licensed characters.¹⁶ In addition, trust and familiarity with spokescharacters are tied to increased liking for the characters and the brands and products they promote.^{15,17,18} In other words, the more established and recognizable the spokescharacter is, the more effective it is in promoting sales of associated products.¹⁹

The use of licensed characters to promote foods to children may be particularly effective because children lack the ability to understand the persuasive intent behind advertisements.²⁰ By the age of 2 or 3 years, children can recognize and develop liking for familiar characters.²¹ At approximately the same age, most children can identify products in grocery aisles and request them by name.⁶ Additional research showed that, from the age of 2 years, children rated popular, brand-name

products as tasting better than store-brand equivalents.²² Robinson et al²³ demonstrated that children preferred the same foods when they were presented in McDonald's packaging, compared with nonbranded packaging. Young children may be especially susceptible to the effects of subtle marketing strategies because they can express desire for certain products and characters but are not old enough to be skeptical of commercial messages. Given the potential of licensed characters to influence children's choices, an understanding of their effects would help inform policy decisions regarding government regulation of food marketing to children.

For the current study, we adopted the research design described by Robinson et al²³ to examine whether licensed characters appearing on food packaging influence children's taste preferences and snack choices. We hypothesized that, when 4- to 6-year-old children were presented with 2 packages of the same food item, they would perceive the food item with a licensed character on the package as tasting better than the item presented without a character and they would be more likely to choose the food sample with a licensed character on it.

METHODS

Forty children (26 boys and 14 girls) and their parents were recruited from 4 child care centers in New Haven, Connecticut; 3 of the schools were university-affiliated. The directors of the child care centers sent letters to parents that introduced the study and contained informed consent forms and a parent questionnaire. The questionnaire included items such as the child's date of birth and race/ethnicity and the amount of time the child spent watching television and movies. All parent questionnaires were collected before the investigator's meeting with the children. Two

visits were made to each school, and all 40 children gave their verbal assent for participation in a food-tasting project. The Yale University Human Subjects Committee approved this study.

The 3 study foods were (1) graham crackers (Earth's Best Organic Crunchin' Grahams, Honey Sticks [Earth's Best, Boulder, CO]), a low-nutrient, low-energy product (serving size: 11 pieces [20 g]; 336 kJ, 5 g of sugar), (2) gummy fruit snacks (Surf Sweets Organic Fruity Bears [Surf Sweets, Prospect Heights, IL]), a low-nutrient, high-energy product (serving size: 4 pieces [40 g]; 546 kJ, 19 g of sugar), and (3) baby carrots (Earthbound Farm Organic, Earthbound Farms, San Juan Batista, CA), a high-nutrient, low-energy product (serving size: 3 oz [85 g]; 126 kJ, 4 g of sugar). All of the food samples were presented in the same clear packaging with the name of the food printed at the top. For all 3 pairs of food products, the packaging involved the same color, material, shape, font, and design. One package in each food pair, however, had a sticker that featured a licensed character affixed to the bottom left corner. When a child was presented with 2 identical portions of graham crackers, for example, both would be labeled "Graham Crackers" but one sample would include a sticker of a cartoon character and the other would not.

The 3 cartoon characters used in this study were Scooby Doo, Dora the Explorer, and Shrek. These characters were chosen because of their popularity among young children, their frequent appearance in television programs, commercials, and movies, and their common presence on items marketed to this age group.^{3,4,6,24,25} The size and general shape of all 3 stickers, as well as the characters' facial expressions, remained constant.

Each participant sat at a table across from the investigator, who began by

saying, "I am going to give you 2 foods to taste." The child was then presented with 2 samples of 1 of 3 food products. The 3 different food items were presented to each child in a randomized order, and the 3 licensed characters and 3 foods were paired randomly for each child. Therefore, participants were exposed to all 3 food conditions and all 3 characters but not in the same order or combination. Throughout the procedure, children could view only the food item they were currently evaluating.

The investigator placed the 2 food items on paper plates in front of the child and said, "I'd like you to take a bite of this food," pointing to one side of the table. The side of the table that was pointed to first was alternated, as was the side for the licensed-character sample. Next, the investigator pointed to the other sample on the table and said, "Now take a bite of this food." After the child finished tasting the 2 samples, the investigator asked the child, "Tell me if they taste the same to you, or point to the food that tastes the best to you." After recording the child's response, the investigator placed a smiley-face Likert scale, as a secondary measure of taste preference, in front of the child and asked, while pointing to one side of the tray, "How much do you like the way this food tastes? Do you love it, like it, it's OK, you don't like it, or you hate it?" After the child gave an answer, the investigator asked him or her to rate the taste of the other food sample by using the Likert scale. Next, the investigator asked, "If you had to pick one of these 2 foods for a snack, which one would you pick?" After the child's responses were recorded, the investigator repeated the procedure for the remaining food sample pairs. At the end of the study, the investigator presented the child with images of Scooby Doo, Dora, and Shrek and asked the child to identify

the characters and to rate how much he or she liked each character, by using the smiley-face Likert scale.

Our first hypothesis was that children, when presented with 2 samples of the same food item, would prefer the taste of the sample with a licensed character on the packaging. Preference for the licensed-character food was coded as +1, preference for the non-licensed-character food was coded as -1, and no preference/did not know was coded as 0. To test our first hypothesis, we averaged participants' answers across the 3 food categories, to create an average taste preference score between -1 and +1 for each child. We then performed a nonparametric Wilcoxon signed rank test by using the average taste preference variable and repeated the Wilcoxon signed rank test to examine the Likert scale ratings of average taste across the 3 food categories. We then analyzed taste preferences for each food product by performing a series of nonparametric McNemar tests. To test our second hypothesis, that children would be more likely to choose food samples that had licensed characters on them for snacks, we performed another series of McNemar tests for each food category. Exploratory analyses were conducted to determine whether television-watching time, movie-watching time, gender, age, race/ethnicity, and liking for and/or recognition of characters moderated taste preferences. Continuous variables were evaluated by using Spearman rank correlation, dichotomous variables were analyzed by using the Wilcoxon-Mann-Whitney *U* test, and categorical variables were analyzed by using the Kruskal-Wallis test.

RESULTS

Of the 80 families who received information about the study, 40 agreed to allow their children to participate. The

TABLE 1 Characteristics of 40 Preschool-Aged Children (4–6 Years of Age)

Age, mean ± SD (range), y	5.0 ± 0.7 (3.8–6.2)
Gender, n (%)	
Male	26 (65.0)
Female	14 (35.0)
Race/ethnicity, %	
White	50.0
Black	20.0
Hispanic	12.5
Asian/Pacific Islander	17.5
How often child watches television each day, %	
Never	7.5
<10 min	15.0
30 min	27.5
1 h	30.0
2 h	15
>2 h	5.0
How often child watches movies at home or in theaters, %	
Never	2.5
Once every 6 mo	15.0
Once per month	32.5
Once per week	35.0
Twice per week	5.0
>3 times per week	10.0
Child could identify Dora accurately, %	90
Child could identify Scooby Doo accurately, %	77.5
Child could identify Shrek accurately, %	60

participating children were ethnically diverse and ranged in age from 3.8 to 6.2 years (mean: 5.0 years; SD: 0.7 years) (Table 1).

The mean total taste preference score was 0.38 ± 0.52 (median: 0.33 [interquartile range: 0.00–1.00]), which, on the basis of the Wilcoxon signed rank test, was significantly greater than 0 ($z_1 = -3.66; P < .001$); this enabled us to reject the null hypothesis that children would show no taste preference for either food sample. These results indicated that children perceived the food items with licensed characters to taste better than those presented in plain packaging. These findings were replicated when children’s taste ratings measured as average scores from the Likert scale across the 3 food categories ($z_1 = -3.14; P = .002$)

were examined. Results of the McNemar tests indicated that children were significantly more likely to prefer the taste of graham crackers and gummy fruit snacks when a licensed character appeared on the package; this difference was nearly significant for the carrots.

An overall McNemar test, combining all snack choices, indicated that participants were significantly more likely to choose licensed-character food items for snacks ($\chi^2 (1) = 48.13; P < .001$). In addition, for each food product, children’s snack selection of licensed-character food samples was significantly greater than their selection of non-licensed-character food samples (72.5%–87.5%) (Table 2).

There were no significant associations between the possible moderating variables (television- or movie-watching time, age, race/ethnicity, gender, liking for characters, or ability to recognize characters) and total taste preference scores. Ninety percent of the children identified Dora the Explorer correctly, 77.5% identified Scooby Doo, and 60.0% identified Shrek.

DISCUSSION

This study provides empirical evidence illustrating a causal relationship between the appearance of licensed

characters on food packaging and children’s reported taste and snack preferences. Overall, children preferred the taste of a food when a licensed character appeared on it. The majority of participants favored the taste of the licensed-character samples according to all 3 taste comparisons (50%–55% indicated that the food with the character tasted better, 25%–37.5% indicated that the foods tasted the same, and 7.5%–25% indicated that the food without the character tasted better). Only the comparison for carrots did not reach statistical significance. In addition, the majority of children preferred the licensed-character snacks across all 3 food categories, with a range of 72.5% to 87.5% of children selecting the carrots, gummy fruit snacks, and graham crackers respectively, with a character on it. This preference was significant for the carrots as well as the gummy fruit snacks and graham crackers and indicates that even participants who did not prefer the taste of the licensed-character samples selected those samples for snacks over their equivalents in plain packages.

These findings are consistent with correlational data that suggested that the appearance of SpongeBob SquarePants on vegetables at Grimmway and Boskovitch Farms coincided with an in-

TABLE 2 Preschool-Aged Children’s Taste Preferences and Snack Choices

Food Item	n (%)			χ^2	P ^a
	Without Character	Taste Same	With Character		
Graham crackers					
Taste preference ^b	3 (7.5)	15 (37.5)	22 (55.0)	14.4	<.001
Snack choice ^b	5 (12.5)		35 (87.5)	22.5	<.001
Gummy fruit snacks					
Taste preference ^b	4 (10.0)	15 (37.5)	21 (52.5)	11.6	<.001
Snack choice ^b	6 (15.0)		34 (85.0)	19.6	<.001
Baby carrots					
Taste preference	10 (25.0)	10 (25.0)	20 (50.0)	3.4	.068
Snack choice ^b	11 (27.5)		29 (72.5)	8.1	.004

^a Nonparametric McNemar test.

^b Significant at $P < .05$ level.

crease in the sales of those items.^{11,13} Our study built on those findings by measuring the effects of licensed characters on children's perceptions of taste and their snack preferences for the same foods and across several types of foods. These data provide support for actions such as Walt Disney Company ending its 10-year contract with McDonald's.²⁶

Even with some industry-initiated efforts and the appearance of some characters on high-nutrient, low-energy products, the vast majority of the licensing market still involves junk foods. In 2007, 2 years after *SpongeBob SquarePants* and *Dora* began to appear on fruits and vegetables, 60% of grocery store products featuring Nickelodeon characters were still foods of poor nutritional value.^{25,27} In the same year, *Shrek* became a spokesperson for various US Department of Health and Human Services campaigns; simultaneously, however, his image appeared on products from Kellogg's, McDonald's, M&Ms, Cheetos, and Keebler.⁹ These inconsistencies, in which licensed characters are associated with both healthy and unhealthy foods, may send children mixed messages, and this remains an important area for future study. Our finding that the influence of licensed characters on taste perception was weakest for carrots suggests that placing licensed characters on healthy foods may not be an effective strategy to promote consumption of those foods and to combat consumption of nutritionally poor foods. However, it is also possible that we did not observe a significant difference in taste perception for carrots because of our small sample size. Despite the lack of a perceived taste difference, however, children were significantly more likely to choose carrots for snacks when licensed characters appeared on the packaging. It is also possible that carrots with licensed characters did not influence children's taste and snack preferences as greatly as the other 2 foods simply because children

are unaccustomed to seeing characters on vegetable packages. The children in this study are likely greatly accustomed to seeing character-branded cracker and gummy fruit snack products. Therefore, participants' greater preference for licensed-character graham crackers and gummy fruit snacks may reflect in part their inclination toward the familiar and expected. Similarly, the 11 participants who chose the plainly packaged carrots for snacks might have been acting on their preference for the typical and ordinary, rather than their liking for the featured character.

The moderator analyses did not reveal significant relationships between television- or movie-watching time, age, race/ethnicity, gender, or character liking or recognizability and taste preference. However, little variability existed because the majority of children recognized all of the characters, which were selected precisely because of their popularity among young children, their frequent appearance in television programs, movies, and commercials, and their common presence on items marketed to this age group.^{3,4,6,24} In addition, there was little variability in parents' reports of children's television- and movie-watching time. Only 3 parents reported that their children never watched television, and only 1 reported no movie-watching. These results suggested that our sample had sufficient exposure to television and movies to foster familiarity with the characters used in the study, but they made it difficult to determine whether children with no exposure would still respond to the appearance of licensed characters on food packaging.

An important study limitation was that the experimenter was not blinded to the hypotheses or the character manipulation. It is possible that the experimenter gave unintentional signals

that influenced the children's responses. The study's small sample size also made it difficult to measure different effects of characters among different populations. The study had a number of strengths, including use of a randomized design that manipulated only the presence of character images on the packaging, which enabled us to draw causal inferences. Other steps to prevent bias included not giving children feedback about their selections and presenting food samples in random order and position. Children were given the option of saying that the samples tasted the same, which allowed for falsification of our taste-preference hypothesis. We also coded choices conservatively to favor the null hypothesis; children who answered "I don't know" were included in the "taste the same" category.

CONCLUSIONS

Overall, our results provide evidence that licensed characters can influence children's eating habits negatively by increasing positive taste perceptions and preferences for junk foods. Given that 13% of marketing expenditures (\$208 million) targeting youths are spent on character licensing and other forms of cross-promotion,⁷ our findings suggest that the use of licensed characters on junk food packaging should be restricted. More than advocating the use of licensed characters for healthy foods, our findings point to the need to regulate and curtail the use of this marketing approach for high-energy, low-nutrient products. The results from this study also suggest that, if we removed preschool characters from unhealthy foods but left characters targeting older children, then those characters would still affect preschool-aged children. For example, *Scooby Doo* and *Shrek* influenced the preschool-aged children although they were less rec-

ognized by the children. This suggests that the restrictions on marketing should target older children as well as preschool-aged children.

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