Character Apps for Children's Snacks: Effects of Character Awareness on Snack Selection and Consumption Patterns

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Abstract

Objective: Media characters are used to market snacks that are typically of poor nutritional value, which has been linked to childhood obesity. This study examines whether children's snack selections and consumption patterns are influenced by an app depicting a popular children's media character, as well as the role that children's awareness of the character plays. The results can increase our understanding of how to encourage healthier snack selection and consumption in newer game-based marketing venues, such as apps.

Materials and Methods: Four- and 5-year-old children ($N = 132$) played a bowling game on an iPad with no character or with a character holding either healthier or unhealthy snacks. After app-play, children selected and consumed healthier or unhealthy snacks. Children's awareness of the character was measured by children's verbalizations of the character's name during or after app-play.

Results: An ordered logistic regression found no significant effect of treatment conditions compared with the control group. Within treatment conditions, *awareness* of the character led to selection and consumption of more healthy snacks in the healthier condition (odds ratio $\beta = 10.340$, $P = 0.008$), and of unhealthy snacks in the unhealthy condition (odds ratio $\beta = 0.228$, $P = 0.033$), but children were *unaware* that the character influenced their decisions.

Conclusions: Results suggest that young children will choose and consume healthier, not just unhealthy, products when they are aware that a popular character in an app is associated with the snack, potentially leading to healthier eating patterns.

Keywords: Food marketing, Obesity, Young children, Media characters, Apps, Nutrition

Introduction

CHILDHOOD OBESITY AFFECTS over 17% of children in the United States,[1] leading to short- and long-term health risks, high healthcare costs, and negative impacts on national productivity.[2] An Institute of Medicine review linked child-directed advertising of unhealthy products to children's subsequent poor food and beverage choices.[3] One resulting recommendation was to use media characters, who generally sell unhealthy products, to market healthier foods and beverages to children.[3] Our purpose was to examine *how* a popular U.S. media character embedded in an app game (i.e., product placement) influences young children's choices and consumption of snacks that vary in nutritional quality.

Media characters, who are ubiquitous in children's lives, may have untapped potential to improve children's snack choices if they brand healthier products. Licensed characters from popular children's television programs are rented for a fee, or companies create their own characters, often to brand unhealthy products like boxes of heavily sugared cereals.[4] Media characters sell products and are themselves products, to be bought and sold. These characters can influence children's liking of products. Specifically, children are more likely to prefer snacks and pay more attention to products when branded by a popular media character compared with no character or an unfamiliar character.[5,6] In the context of advergames (i.e., games that market products to children through product placement), older children can be swayed by exposure to a character toward either healthier or unhealthy product consumption.[7]

Repeated exposure to messages is an effective marketing technique, especially for children under 8 years of age with limited cognitive abilities to process advertisments.[8] Regulations have placed limits on children's exposure to television

advertisements, including practices such as host selling (the program host markets the product) and product placement.[9] However, these kinds of rules are less prevalent in newer gaming media, where fun experiences, such as advergames, can be played as long as desired.[8] At present, the underlying processes these young consumers use to understand product placement in advergames remain poorly understood.

According to the *mere exposure effect*, children select snacks ''sold'' by characters in an advergame because positive feelings toward the character enhance positive feelings toward the associated snacks over repeated exposures.[8,10,11] While it has been hypothesized that this process occurs implicitly (i.e., nonconsciously), children's prior experiences with popular characters traversing multiple platforms may help characters become part of conscious, explicit memory.[12]

Auty and Lewis's model of how product placement influences young consumer's choices predicts that a character and associated product enter a child's implicit memory through ''incidental exposure,'' through an experience like an advergame.[11] Through repeated exposure to snacks, the *mere exposure effect* leads children to select the marketed snacks without explicitly knowing why.[11] Compared with older children, for example, younger children exposed to branded versus nonbranded product placement in a movie clip were less likely to recall the brand name of the product. However, they were just as likely to select the product for themselves, particularly if they had previously seen the clip.[10]

Are children also unaware of onscreen media characters? Young children frequently and repeatedly experience fun, popular characters labeled by name onscreen, which may bring characters into children's explicit memories through verbal labeling techniques.[11] The link between explicit memory and conscious awareness of media characters with products may nudge children to select products that a character sells.[11] This process should operate similarly whether the branded products are healthier or unhealthy. Consistent with this thesis, branded characters influence children's selections of both healthier and unhealthy snacks, particularly after repeated exposure.[5,9,13] The character, however, must be age appropriate[6] and paired with the product frequently to impact children's health-related behaviors.[8]

Advergames can be integrated into mobile gaming apps or electronic games on ''sticky'' websites, which are built to hold a user's attention. Although advergames have primarily been used to promote unhealthy products,[14,15] advergames that promote healthier snack choices increase children's selection and consumption of healthier snacks,[7,16] and encourage healthier eating behaviors.[17] Advergames may, then, be considered serious games that can improve players' health-related behaviors.[18]

This study examined if young children's snack choices and consumption patterns could be influenced by exposure to a popular media character, *Dora the Explorer*™,[19] an animated Hispanic 7-year-old girl from a Nickelodeon educational cartoon. In two treatment conditions, Dora™ was depicted holding snacks that were either healthier or unhealthy in an advergame-app. The control group played the same app without Dora or snacks depicted. We were interested in whether awareness of Dora's presence in the app affected snack choices. Three conditions—Dora healthier products, Dora unhealthy products, and control—were compared. We hypothesized that: (1) if all processing is implicit, then children in the Dora healthier products condition will be more likely to choose healthier snacks compared with children in the Dora unhealthy products condition, with the control group's selections falling between the two treatment conditions; and (2) if character processing is explicit and product choice is implicit, children who are aware of Dora in the app will be more likely to select snacks Dora is depicted with compared with children who are unaware of Dora, but neither group will be explicitly aware of the persuasive influence of the character.

Materials and Methods

Participants

One hundred thirty-two 4- and 5-year-old children (M_{age} = 4.80, SD = 0.48 years; 55% male) were recruited from 14 childcare facilities in a large metropolitan area. Four served low-income families (51% of the sample), and 10 served middle-income families (49% of the sample). There were no significant differences in snack selection ($P > 0.5$) or awareness of Dora ($P > 0.6$) by childcare center. The sample was composed of Caucasian American (35.0%), Hispanic American (29.5%), other or mixed ethnicity (16.0%), African American (15.0%), and Asian American (4.5%) children. Parents' reported education level included no school (1%), some high school (9%), high school diploma (13%), some college (8%), college degree (29%), graduate school/professional degree (31%), or no response (9%).

The University Institutional Review Board approved the study protocol. The participants' parents provided demographic information and written informed consent, and participants provided verbal assent.

iPad app conditions

Action Bowl, a bowling app created by *Atomic Bullfrog LLC*, was adapted for use in this study. The app resembled a traditional bowling game with 2 balls per frame, 10 frames per game, with spares and strikes. The game screen depicted a bowling ball at the beginning of the lane, with 10 pins at the end of the bowling alley. Children could position the ball by moving it left and right with their finger and were required to use a swiping gesture on the screen to roll the ball. Once the ball was rolled, a zoomed-in image of the pins appeared as the ball knocked them down. Children used an iPad 2 to play the advergame with a display screen of 9.5 inches by 7.31 inches.

The app was adapted in experimental conditions to include a 3.75 by 3.50-inch image of *Dora the Explorer* on the bowling alley that appeared in front of the pins. In the healthier product condition, Dora held a banana or orange juice, in turn, each time the child rolled a bowling ball toward the pins. In the unhealthy product condition, the image alternated between Dora holding potato chips or a soda. According to nutritional guidelines from the National Heart, Lung, and Blood Institute of the NIH,[20] bananas are a GO item to be consumed almost anytime, and 100% orange juice is a SLOW item to be consumed sometimes. Chips and sodas are both rated as WHOA items, to be consumed once in a while.

Children could observe Dora with a food or beverage a maximum of 42 times in the treatment groups. Children in the control group did not see Dora or snacks depicted.

Procedure

Within sex, children were randomly assigned to one of three conditions: Dora with healthier products, Dora with unhealthy products, or the control group. Each child played the app during a videotaped session in a quiet room at their childcare facility.

Children initially played an app called *Papertoss* on an iPad to familiarize them with the swiping gestures required to roll the ball in the bowling app. Next, the experimenter opened the bowling app on the iPad and demonstrated how to aim and swipe the ball. The *Dora the Explorer* character was not present in the demonstration. Children then played the bowling app twice in succession.

Snack choices. After app-play, each child made a food (small banana or 1-ounce bag of Lay's potato chips) and drink choice (8-fluid-ounce carton of Tropicana 100% orange juice or 7.50-fluid-ounce can of Coca-Cola). The order of food and drink choice was randomized within condition. The number of healthier snacks a child selected was coded as 0 (chips and soda), 1 (chips *and* orange juice or banana *and* soda), or 2 (banana and orange juice).

Children's reasons for snack selection and awareness of snacks. After snack choices, the experimenter asked why children selected specific foods and drinks. These questions were to assess children's explicit awareness of the link between Dora and the snacks. The reasons for children's snack selections were categorized into five possible categories: (1) don't know/no reply/nonsense reply, (2) like the item/taste/experience (e.g., I've had this before), (3) social influence (e.g., sibling likes the product), (4) snacks were shown onscreen, or (5) Dora was shown onscreen. Interrater reliability was substantial for food reasoning, Cohen's $\kappa = 0.80$, $P < 0.01$, and drink reasoning, Cohen's $\kappa = 0.85$, $P < 0.01$.

Using videos of children's sessions, any *spontaneous utterance* in which children labeled the names of the snack items Dora was depicted holding during app-play were coded. Interrater reliability was perfect (Cohen's $\kappa = 1.00$, $P < 0.01$).

Awareness of Dora. Any *spontaneous utterance* in which children labeled Dora by name during app-play was coded from videos of the sessions. Interrater reliability was substantial (Cohen's $\kappa = 0.81$, $P < 0.01$). After snack selection, the experimenter asked children if they saw anyone on the bowling alley in the app they played, and if so, who did they see. If children said ''Dora,'' they were coded as remembering that she was in the app. This *free recall* measure was coded for reliability from videos of the experimental session (Cohen's $\kappa = 0.90$, $P < 0.01$).

Free recall and spontaneous utterances of Dora's name during app play were combined to create a composite score of awareness of Dora's presence in the app. If children either spontaneously labeled Dora by name while playing, or recalled she was present in the app after app play, they were considered *aware* of Dora in the app. Children who did not name or recall Dora were considered *unaware* of her presence.

Results

Children played the advergame for ~ 5 minutes ($M = 5.56$, $SD = 1.36$ minutes; $N = 132$). One child was excluded from analyses because she was an outlier in the amount of time to complete the task. Total time playing the app did not significantly differ by condition.

Hypothesis 1: *If Only Implicit Processing Is Involved, Children in the Dora Healthier Versus Unhealthy Products and Control Conditions Will Be More Likely to Select Healthier Snacks.*

There was no effect of either treatment condition when compared with the control group in an ordered logistic regression predicting the number of healthier snacks selected (0, 1, or 2) by children, and the two treatment groups did not differ significantly from each other, $\chi^2 (2) = 2.11$, $P = 0.35$. Thus, Hypothesis 1 was not supported.

Hypothesis 2: *If Character Processing Is Explicit and Product Choice Is Implicit, Children Who Are Aware of Dora in the App Will Be More Likely to Select Snacks Dora Is Depicted with Compared with Children Who Are Unaware of Dora, But Neither Group Will Be Explicitly Aware of the Persuasive Influence of the Character.*

Table 1 displays the percentage of children who selected 0, 1, or 2 snacks by condition and awareness of Dora's presence. Overall, 31% (27 of 87) of children in the treatment conditions were aware of Dora. Only 4 of 87 children spontaneously labeled snacks during app-play.

Table 2 displays the results of an ordered logistic regression, predicting the number of healthier snacks selected (0, 1, or 2) by children. The independent variables were condition and whether children were aware of Dora. Consistent with Hypothesis 2, the overall model was statistically significant, $\chi^2 (3) = 7.68$, $P = 0.05$. The significant main effect of awareness of Dora's presence was qualified by a significant interaction of condition and awareness of Dora's presence. Children who were aware of Dora were more likely to be influenced by products she was holding, be they healthier or unhealthy, when compared with children who were unaware of her presence. Within the healthier condition, children who were aware of Dora were 10.34 times more likely to select healthier snack items than those who were unaware of her, $P = 0.008$. By contrast, children who were aware of Dora's presence in the app in the unhealthy condition were 0.77 times less likely to select healthier snack items relative to those who were unaware of Dora, $P = 0.033$ (Table 2).

No child provided reasoning for selecting a snack that involved Dora, whether they demonstrated awareness of Dora or not. Nor did any children refer to snacks being on the screen as a reason for their snack selections. Of the 27 children who had noticed that Dora was in the game, 75.9% said that they liked the food/taste/experience, 14.8% reported a social influence, and 9.3% didn't know why, had no reply, or gave a nonsense answer. Of the 60 children who had not noticed that Dora was in the game, 65.8% said they liked the food/taste/experience, 23.3% did not know why, had no reply, or gave a nonsense answer, and 10.8% reported a social influence.

Discussion

Children are inundated by marketing practices in which media characters are used to influence preferences and consumption of foods and beverages, many of which are low in nutritional value.[3,8] How children process the characters

TABLE 1. PERCENT OF CHILDREN SELECTING 0, 1, OR 2 HEALTHIER SNACKS BY AWARENESS OF DORA IN THE APP AND CONDITION

	Number of healthier snacks selected		
	0	1	2
Healthier condition[a]			
Overall (n=44)	30	64	7
Children aware of Dora™ (n=15)	13	80	7
Children not aware of Dora (n=29)	38	55	7
Unhealthy condition[b]			
Overall (n=43)	37	51	12
Children aware of Dora (n=12)	58	42	0
Children not aware of Dora (n=31)	29	55	16
Control condition[c]			
Overall (n=44)	21	68	11

[a]Children in the healthier condition were predicted to select and consume a higher number of healthier snacks.
[b]Children in the unhealthy condition were predicted to select and consume a lower number of healthier snacks, that is, select and consume a higher number of unhealthy snacks.
[c]Children in the control condition were predicted to select and consume healthier snacks at a rate in between that selected and consumed by children in the healthier and unhealthy conditions.

TABLE 2. ORDERED LOGISTIC REGRESSION ANALYSIS PREDICTING THE NUMBER OF HEALTHIER SNACKS SELECTED AND CONSUMED BY CHARACTER AWARENESS AND TREATMENT CONDITIONS (N=87)

Predictor	Odds ratio β[a]	SE	P
Healthier condition[b]	0.552	0.313	0.295
Awareness of Dora in the App[c]	0.228*	0.158	0.033
Awareness of Dora in the App[c,]* Healthier condition[b]	10.340**	9.171	0.008
Cut 1[d]	−1.090	0.439	
Cut 2[d]	2.044	0.535	
Pseudo R^2	0.04		

The number of healthier snacks selected was coded as 0 (chips and soda selected), 1 (one healthier item [banana, orange juice] and one unhealthy item [chips, soda] selected), or 2 (banana and orange juice selected).
[a]Odds ratios indicate an increased likelihood of being in a higher category if the odds ratio is >1, and indicate a decreased likelihood of being in a higher category if the odds ratio value is <1.
[b]The healthier condition is coded as 1; Unhealthy condition is coded as 0 and is the omitted reference group.
[c]Awareness of Dora in the app is coded as 1 if children indicated they were aware Dora was present in the app; awareness of Dora in the app is coded as 0 if they were not aware Dora was present in the app and is the omitted reference group.
[d]The cut points represent the various levels of the response variable when the constant is set to zero.
*$P \leq 0.05$, **$P \leq 0.01$.
SE, standard error.

and the snacks marketed to them has been less clear. The current study sheds light on this question and provides evidence that conscious awareness of media characters influences snack selection and consumption without children understanding the role of media characters in their decisions.

According to product placement theory and the *mere exposure effect*, the association of a popular character with snacks should implicitly influence children's subsequent selection of that product for consumption.[11] The assumption has been that implicit memory is more integral in this process than explicit memory.[11] In our study, children who were aware that Dora was in the bowling app were more likely to select the products that she was associated with, whether the products were healthier or unhealthy. Awareness of Dora occurred rather quickly with almost one-third of 4- to 5-year-old children verbalizing her name during or after only 5 minutes of app-play. However, children who were aware that Dora was onscreen did not link her association to specific snacks with their own snack decisions. Instead, their rationale for product choices most often involved liking the item, the taste, or the experience. Our findings provide a glimpse of how quickly children are influenced by the branded characters that pervade their everyday media experiences.

By contrast, we found little support for implicit processing for children who were unaware of Dora's presence in the app.[11] In fact, children exposed to Dora holding snacks, but who did not verbalize that they saw Dora during or after app-play, made similar snack selections to those in the control group who were not exposed to Dora. Our findings differ from others by linking explicit knowledge of the character's presence onscreen with actual snack selections. Nevertheless, our results are consistent with prior findings of implicit processing of snack choices

because conscious awareness of Dora did not translate into an understanding of her persuasive influence on their decisions.[10]

Our findings also add to a growing body of literature indicating that children will choose and consume healthier, not just unhealthy, foods and beverages when products are branded by a popular media character.[7,16,21] Consistent with our findings, 9- to 10-year-old children selected and consumed products presented in an advergame that were either healthier or unhealthy depending on what the character "consumed" during gameplay.[7] These older children played the game for almost 10 minutes, twice the amount of time that children played the bowling app in the current study.

At an applied level, our findings inform researchers, business leaders, and policy makers about how media characters can be used to encourage healthier nutritional practices that can potentially reduce childhood obesity rates. Games for health can be effective in increasing healthier eating behaviors in older children,[7] and they can yield similar effects for younger children if they promote awareness of branded characters. Whether children's selections are for healthier or unhealthy snacks depends on what the character is doing with products[7] or what kind of snack a character is branding, as demonstrated here.

One strength is that the character was age appropriate and generally well liked by young children,[19] which is important when using media characters to market healthier snacks.[6] Another strength is that we tested snack choices that resulted in actual consumption of snacks, not hypothetical choices.

One limitation was that we did not examine exactly where children were fixating their visual looks on the screen,[6] and

how visual fixation relates to conscious or nonconscious processing of messages during product placement. Future research could use an eye-tracking machine to determine where children are focusing their gaze during app play.[6,22] Another future research direction is whether an advertising literacy intervention may teach children to be more explicitly aware that characters are trying to sell products.

In conclusion, children's processing of foods and beverages during product placements can be influenced by awareness of a character, but children may not be able to understand the association that the character has to selling targeted products. Even so, popular media characters can be powerful aids in selling healthier products, in promoting healthier consumption patterns, and in combating the childhood obesity epidemic to create a healthier nation.

Author Disclosure Statement

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References

1. Skinner AC, Perrin EM, Skelton JA. Prevalence of obesity and severe obesity in US children, 1999–2014. Obesity 2016; 24:1116–1123.
2. Koplan JP, Liverman CT, Kraak VI. Preventing childhood obesity: Health in the balance: Executive summary. J Am Diet Assoc 2005; 105:131–138.
3. McGinnis J, Gootman J, Kraak V. *Food Marketing to Children and Youth: Threat or Opportunity IOM Report*. Washington, D.C.: National Academies Press; 2006.
4. Galloway DP, Calvert SL. Media characters as spokespeople in U.S. grocery stores: Promoting poor nutritional messages to children. J Obes Weight Loss Ther 2013; 4:212.
5. Kraak VI, Story M. Influence of food companies' brand mascots and entertainment companies' cartoon media characters on children's diet and health: A systematic review and research needs. Obes Rev 2015; 16:107–126.
6. Ogle AD, Graham DJ, Lucas-Thompson RG, Roberto CA. Influence of cartoon media characters on children's attention to and preference for food and beverage products. J Acad Nutr Diet 2017; 117:265–270.e2.
7. Pempek T, Calvert SL. Tipping the balance: Use of advergames to promote consumption of nutritious foods and beverages by low-income African American children. Arch Pediatr Adolesc Med 2009; 163:633–637.
8. Calvert SL. Children as consumers: Advertising and marketing. Future Child 2008; 18:205–234.
9. Montgomery K. Digital kids: The new on-line children's consumer culture. In: *Handbook of Children and Media*. edited by D. Singer and J. Singer; Thousand Oaks, CA: Sage; 2001.
10. Auty S, Lewis C. Exploring children's choice: The reminder effect of product placement. Psychol Mark 2004; 21:697–713.
11. Auty S, Lewis C. ''The delicious paradox'': Preconscious processing of product placements by children. In: *The Psychology of Entertainment Media: Blurring the Lines between Entertainment and Persuasion*. edited by L.J. Shrum; Mahwah, NJ: Lawrence Erlbaum; 2004:117–133.
12. Calvert SL, Richards MN. Children's parasocial relationships. In: Jordan AB, Romer D (eds). *Media and the Well-Being of Children and Adolescents*. New York: Oxford University Press; 2014:187–200.
13. Montgomery K. Safeguards for youth in the digital marketing ecosystem. In: *Handbook of Children and Media*. edited by D. Singer and J. Singer; Thousand Oaks, CA: Sage; 2012:631–648.
14. Alvy LM, Calvert SL. Food marketing on popular children's web sites: A content analysis. J Am Diet Assoc 2008; 108:710–713.
15. Lee M, Choi Y, Quilliam ET, Cole RT. Playing with food: Content analysis of food advergames. J Consum Aff 2009; 43:129–154.
16. Harris JL, Speers SE, Schwartz MB, Brownell KD. U.S. food company branded advergames on the internet: Children's exposure and effects on snack consumption. J Child Media 2012; 6:51–68.
17. Byrne S, Gay G, Pollack JP, et al. Caring for mobile phone-based virtual pets can influence youth eating behaviors. J Child Media 2012; 6:83–99.
18. Baranowski T, Blumberg F, Buday R, et al. Games for health for children-current status and needed research. Games Health J 2016; 5:1–12.
19. Richards MN, Calvert SL. Parent versus child report of young children's parasocial relationships in the United States. J Child Media 2016; 10:462–480.
20. National Heart, Lung, and Blood Institute. We Can! GO, SLOW, and WHOA foods. Published 2013. https://www.nhlbi.nih.gov/health/educational/wecan/downloads/go-slow-whoa.pdf (accessed November 15, 2017).
21. Keller LK, Kuilema GL, Lee N, et al. The impact of food branding on children's eating behavior and obesity. Physiol Behav 2012; 106:379–386.
22. Kirkorian HL, Anderson DR, Keen R. Age differences in online processing of video: An eye movement study. Child Dev 2012; 83:497–507.

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