Published in final edited form as:

J Nutr Educ Behav. 2020 January ; 52(1): 80–86. doi:10.1016/j.jneb.2019.09.013.

Impact of Animal Characters at Zoo Concession Stands on Healthy Food Sales

Allison Karpyn, PhD,

University of Delaware, Associate Director, Associate Director, Center for Research in Education and Social Policy, Assistant Professor, Education & Human Development and Behavioral Health & Nutrition

Ginnie Sawyer-Morris, MS,

University of Delaware, Graduate Research Assistant, Human Development and Family Sciences

Sara Grajeda, PhD,

University of Delaware, Research Associate, Center for Research in Education and Social Policy

Katherine Tilley, BA,

University of Delaware, Graduate Research Assistant, Center for Research in Education and Social Policy

Henry Wolgast

University of Delaware, Undergraduate Research Assistant, Center for Research in Education and Social Policy

Abstract

Objective: The primary objectives of the study were to examine 1) how increased availability of healthier items at a zoo concession stand affects sales and 2) how animal character marketing on zoo menu boards affects sales revenue.

Design: An ABABABAB intervention was conducted over an 8-week period. On alternating weeks, zoo animal characters were systematically paired with and removed from healthy food items on a zoo concession menu board. Sales and revenue data were analyzed using frequencies, a Poisson regression model, and a negative binomial regression model, respectively.

Results: Newly introduced healthy items represented 8.2% of sales and 4.9% of revenue. Healthy item unit sales were significantly higher ($p = .006$) during the weeks animal cartoon characters were displayed, although there was no impact on revenue.

Conclusions and Implications: Findings suggest non-branded character marketing is a viable strategy for promoting healthy products in family-friendly venues where concessions are sold.

karpyn@udel.edu, 610-909-3154.

Declaration of Conflicting Interests

The authors have not stated any conflict of interest

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Introduction

Ensuring that healthy food is available in the environments where people live, work, and play is a focal point of public health efforts aimed at reducing obesity and improving diet quality.^{1,2} In the U.S., 39.8% of adults are obese and 31.8% of children ages 2 to 19 are overweight or obese, a condition which increases risk for cardiovascular disease, cancer, and diabetes.³ Approaches to change the context in order to shift individual decisions toward healthy foods have been recommended by the Centers for Disease Control and Prevention (CDC) and others, representing a relatively efficient mechanism to impact population health.^{2,4} Indeed, in the past 8 years significant progress has been made to understand how increased access to healthier foods, inclusive of healthy food marketing, improves healthy food sales in schools,^{5,6} supermarkets,^{7,8} and corner stores.^{9–11} Healthy food marketing strategies such as manipulating price, suggesting trade-offs for healthier alternatives, and modifying product availability toward healthier selections have been found to impact healthier product sales in both corner store and supermarket interventions.¹¹ Yet, much less is known about the effective application of such strategies in the concessions industry,¹² a \$2 billion annual market best known for hot dogs, fries and candy.¹³

Parks and zoos represent a promising opportunity for the study of approaches to improve the healthfulness of foods at concessions. Worldwide, approximately 700 million people visit zoos and aquariums annually,¹⁴ many of whom are families with children.¹⁵ In the US, zoos annually provide nearly 165 million visitors with animal education, recreational opportunities, and conservation expertise regarding the habitats and diets of animals,¹⁵ yet concession venues in zoos and national parks are often exempt from federal nutrition regulations. The federal law regulating park concessions, called the National Park Service (NPS) Concessions Management Improvement Act, last revised in 1998, includes no guidelines related to nutritional offerings focusing instead on concession stand operations like pricing, permitting, and contracting. With regard to zoo concessions in particular, there are no federal or association policies or guidelines for recommended best practices for healthier concession practices at zoos. Unlike fast food, for example, zoo and park concessions are exempt from Food and Drug Administration (FDA) regulatory policies such as menu labeling.¹⁶

A relatively unexplored approach at zoos and in parks is the use of animals or animal characters to stimulate interest in healthy foods. Historically in other food marketing contexts, the strategic use of animals and animal-like characters has been effective as a mechanism to drive food choices, most often toward less healthy options (i.e., sugary cereals, snack foods and soda) among children.¹⁷ This strategy is called character marketing, an approach that employs a character, either branded (e.g., Tony the Tiger) or non-branded (e.g., cartoon lion) to promote the sales of food products. Notable global brands such as Coca-Cola, Frosted Flakes, and Cheetos have all successfully employed animals in their marketing of foods and beverages.¹⁷ However, despite their appeal in industry contexts, animal-based marketing techniques have not been well tested in public health as a mechanism to promote nutrient dense, lower-sugar foods.¹⁷ In their systematic review of peer-reviewed literature, Kraak and Story¹⁷ found that only 11 studies have used characters to promote healthy foods; among these, only 3 employed animal characters.^{18–20} Since their

review, an additional study was published demonstrating that children were 66% more likely to select a healthy item when it was paired with an animal character.²¹ To our knowledge no research has examined animal characters as a promotional approach to increase healthy food sales at concessions.

This pilot study responds to the need to understand the potential for healthier food sales in concessions and how animal characters can serve to market healthier foods. Specifically, the research examines 1) how increased availability of healthier items at a zoo concession stand affected sales; and, 2) how animal character marketing on menu boards and around the zoo affected sales revenue.

Methods

Approach and Research Design

In partnership with a local urban zoo (54,319 annual visitors) researchers implemented a marketing intervention using zoo animal characters (*Tastimals*), which were developed and pilot tested in an earlier phase of the work.²¹ In the previous phase, the research team examined whether children would be more likely to select healthy products (e.g., fresh fruit) when the product was paired with a *Tastimals* character than when available without the character image.²¹ In the prior study 2 *Tastimals* character images, the Tamarin and Green Iguana, were randomly paired with free fresh fruit during a Family Fun Night. Findings showed that significantly more products paired with a character were selected (62.38%) than the same products not paired (37.62%), $\chi^2 = 46.32$, $df = 1$, $p < .001$.²¹

To build on this earlier phase of the work, the research team met with stakeholders to identify whether any of the zoo's concession items met "healthy" criteria as defined by the CDC in their evaluation of the NPS concessions. Specifically the CDC adopted guidelines derived from the Nutrition Environment Measures Survey (NEMS)²² for use in national parks.²³ The CDC's report characterized *healthy* side items as those that were easily recognized as healthy (e.g., no sauce) and did not include main components that were high in fat and sodium (e.g., cheese, mayonnaise). In the current study, concession items were considered healthy if they met Tier 1 or Tier 2 criteria of the NEMS-V,²⁴ which includes fruits, vegetables, nonfat and low-fat dairy, and packaged items containing: < 200 calories per serving, 35% calories from total sugars except for yogurt with no more than 30 g of total sugars per 8-oz. portion as packaged, 10% calories from saturated fat and < 400 mg sodium, and 0 trans fat.

Prior to the intervention, the zoo concessions menu consisted only of high calorie, energy dense items none of which met the aforementioned guidelines. In consultation with prior recommendations,²⁵ input from a local dietitian, and staff at the zoo, the partners agreed to introduce 7 new healthy food items to the zoo concession stand menu. Items included single serve packages of almonds, applesauce, fresh fruit (apple, orange, or banana), *Quaker Chewy® Granola Bar, Low Sugar Variety* (< 7 grams of sugar per serving), *Uncrustables® Reduced Sugar Peanut Butter & Grape Spread Sandwich on Whole Wheat* (PB&J), single serving Pirate's Booty® popcorn snacks, and single serving yogurt (Go-Gurt®). From these items, 3 meal deal combos were also created: Combo 1 included PB&J and fresh fruit;

Combo 2 included a Granola bar, yogurt and fresh fruit; and Combo 3 included a granola bar, almonds and fresh fruit).

The marketing intervention employed an A-B-A-B design. During nonintervention (“A”) weeks, the newly available healthy items were sold at concession with no marketing treatment, and during intervention (“B”) weeks the same healthier items were available alongside the zoo animal marketing displayed on the menu boards (see Table 1 for *Tastimals* rotation schedule).

The zoo animal characters (see Figure 1) were also displayed on 2 A-frame stands as well as several window clings displayed at the ticket window and at the concession stand window. These display images of the character animals were only used to increase visibility of the characters and did not include a specific tie to the menu board items.

The daily sales totals of all concession stand products, including the healthy items, were recorded by the point of sales system operated by the zoo, over a 56 day period. Prices of the healthy and less healthy items were comparable (see Figure 2); to provide a comparison, the churro deal (2 churros) was priced at \$3.00 whereas a healthy combo deal was priced at \$3.25 (Combo meal 2: granola bar, Go-Gurt®, fresh fruit). Weekly, itemized daily register sales data (unit sales and revenue) were downloaded and provided to researchers by the zoo’s executive director. No qualitative data were collected for this study. Review by the IRB was not required for this study because human subjects were not involved, as per US Department of Health and Human Services guidelines (<http://www.hhs.gov/ohrp/policy/checklists/decisioncharts.html#c1>).

Analysis

Total unit sales, and sales revenue, of healthy and less healthy items were analyzed separately using descriptive analyses and generalized linear models in SAS 9.3. Sales quantity data were analyzed using a zero-inflated Poisson regression model, appropriate for predicting a variable of counts, or in this case, the number of items sold, since count data are typically skewed. Sales revenue data were analyzed with a zero-inflated negative binomial regression model since the sales revenue was greater than the number of items sold, indicating an increased variance, or spread, in revenue data than in total units sold.

Both the Poisson regression and the binomial regression models included a main effect to predict the likelihood of sales during intervention weeks (i.e., when the characters were on display) compared with sales during non-intervention weeks. A last main effect controlled for an increase in sales on Family Fun Nights for all items. An interaction effect between Family Fun Night and healthy items controlled for the increased tendency for zoo visitors to buy less healthy items (i.e., hotdogs) on Family Fun Nights due to the practice of combining a free hot dog and soda with the purchase of a ticket that night. The final interaction effect between the intervention and healthy items variables isolated the potential effect of the animal characters on healthy item sales when they were on display. The statistical significance threshold for predictors was set at $\alpha = .05$.

Results

During the 4 non-intervention weeks (i.e., weeks with no marketing), healthy food items accounted for 7.7% of total unit sales, and 4.3% of total sales revenue (See Table 2; Figure 3). As noted, healthy items were not available prior to study initiation. During intervention weeks (i.e., weeks with marketing treatment using animal characters), healthy item sales climbed to 8.2% of concession sales and 4.9% of concession revenue (see Table 2; Figure 3).

Of the 7 healthy food items available during intervention weeks, fresh fruit ($M = 2.0/\text{day}$, $SD = 3.0$) was the most frequently sold per day followed by Pirate's Booty® ($M = 1.3/\text{day}$, $SD = 1.6$) and almonds ($M = 1.3/\text{day}$, $SD = 3.5$); combination meal deals were less popular than individually sold healthy items as reported in Table 3.

A Poisson regression was run to predict the number of daily unit sales based on the number of concession items sold across the duration of the intervention (56 days). Consistent with descriptive results, findings from the unit sales regression analysis (see Table 4) revealed a statistically significant negative parameter estimate for the healthy item main effect ($p < .001$), indicating that healthy items were less popular than less healthy items overall. For the intervention/healthy item interaction, the regression analysis revealed a significant positive parameter estimate ($p = .006$) demonstrating that on intervention weeks, when animal characters were present, the average sales of healthy items increased by approximately 0.3 items per day or 2 items per week. Results also showed a significant positive main effect ($p < .001$) for Family Fun Night confirming higher sales for all items on those 2 particular days. In addition, individuals were less likely to buy healthy foods on Family Fun Night as shown by a negative interaction between the Family Fun Night and healthy item variables ($p < .001$).

The negative binomial regression predicted daily revenue from concession sales across the duration of the intervention (56 days). The regression analysis for daily revenue (see Table 5) revealed a statistically significant negative parameter estimate for the healthy item main effect ($p < .001$), meaning healthy items made less money daily (\$2.40) per item across all weeks. Further, the intervention did not have a significant effect on healthy item revenue. Results also showed a statistically significant positive parameter estimate for the Family Fun Night main effect ($p < .001$), yet the negative interaction between healthy items and Family Fun Night was not significant.

Discussion

This study demonstrates the viability of healthier menu items in zoo concessions and suggests the use of animal character marketing may contribute to improved healthy food sales above and beyond the impact of new healthy options alone. However, significant increases (or decreases) in revenue as a result of the introduction of healthier concession stand foods were not found.

While the dominance of less healthy selections in concession stands is relatively common and not limited to zoos, the present study suggests that the introduction of healthier items is feasible. Findings show the introduction of healthier products and meal deal combinations

resulted in no loss of revenue and produced a modest (although not statistically significant) increase in overall sales, with healthy item sales accounting for 7.7% of total unit sales. While moderate, the results are consistent with a growing body of evidence which points to the acceptability of healthier food policies and potential consumer interest in purchasing healthy meal and snack foods. In a retrospective study of children's meals purchased at Walt Disney World where a healthy food policy was implemented, guest acceptance rates for healthy sides and beverages were analyzed using purchase data; their findings showed that, across all restaurants, 47.9% and 66.3% of guests accepted healthy default sides and beverages, respectively. Another study examining national consumer preferences found that of 30,000 adults surveyed, 65% were interested in reducing the amount of fat in the foods they purchased.²⁶ Such preferences appear to transfer to the concession stand environment. A study of *Generation Y's* (born 1980–1995) consumer concession preferences indicate dissatisfaction with current less healthy offerings (82%) preferring instead items like salads, wraps, fresh fruit and sandwiches.²⁷

Less healthy food offerings are often coupled with robust marketing campaigns that employ character marketing to promote their brands and products (e.g., Coca-cola Polar Bear, M&M characters).¹⁷ Because these campaigns are often directed toward children, the National Academy of Medicine (previously the Institute of Medicine [IOM]) and U.S. White House Task Force (WHTF) to Prevent Childhood Obesity recently recommended that licensed cartoon characters should be used only to promote *healthy* foods to children.²⁸ Despite recent policy efforts, character marketing is still in practice rarely used to market healthy foods and much of the evidence detailing the potential impact of character marketing on healthy food purchases comes from lab-based studies. Within this body of work, findings show that both branded and non-branded characters^{29,30} positively influence children's willingness to try healthy items such as fruits and vegetables. Results from the current study are consistent with this body of work in that healthy food sales increased moderately when non-branded animal character marketing was used.

Limitations

This study is not without limitations. Although enhanced by its real-world context and implementation, results are limited to 1 Mid-Atlantic zoo with a relatively small concession stand operation. Additionally, it was not explicitly communicated to patrons which items were healthy versus less healthy. Instead, in alignment with the principals of behavioral economics,^{31,32} the *Tastimals* characters were used to subtly promote only the healthy items on the menu (see Table 1). While the study utilized 6 unique animal characters to promote sales of healthier items, the research design did not enable an animal-by-animal comparison of impact. This is important to note given that earlier studies have found that animal characters, when paired with conceptually congruent foods (i.e., Tamarin paired with a banana) can result in increased selection.^{21,30} Further, it is important to note that food choice is a complex process that is influenced by a number of factors, of which branding is a component part. Future studies should consider branding a key factor in their research design while acknowledging that other components (e.g, choice architecture) play a role as well. Given findings from the current study, multi-component studies inclusive of branding strategies may be an optimal solution for increasing the sales of healthy food items.

Implications for Research and Practice

Despite substantial efforts to improve the quality of food available to children, concession stand foods have largely been exempted from state and national policy. Approaches to address the policy gap often require strong partnership efforts across sectors including community groups, nutrition educators,³² food retailers, food distributors and manufacturers, child health advocates and others,²⁵ and may address the issue through voluntary, incentive-based^{5,6} or penalty-based tactics.¹⁶ Findings suggest that policy recommendations may benefit from incorporating both marketing and product availability strategies and should consider the use of animal characters, even if unbranded. Future studies could also consider whether the use of animal characters has different impacts on different types of concessions (e.g., schools, amusement parks, stadiums), or in other retail formats like corner stores and small grocery stores.

For zoos in particular, this study lends support for organizations like the American Zoological Association (AZA), representing over 250 zoos and aquariums in the United States and overseas, to undertake approaches which support healthier zoo concessions. Like the National Grocers Association's Live Balanced program³³ and the National Association of Convenience Stores, which has a toolkit for healthy convenience stores,³⁴ the AZA could consider implementing similar guidance to support healthier options.

Acknowledgements

Authors recognize the Delaware CTR ACCEL Program (U54-GM104941) for providing funding for this study. Authors also recognize undergraduate research assistants, Amanda O'Keeffe, Nicole Filion, and the support of project manager Tara Tracy's work on this study.

References

1. Johnson KA, Showell NN, Flessa S, et al. Do neighborhoods matter? A systematic review of modifiable risk factors for obesity among low socio-economic status Black and Hispanic children. *Child Obes.* 2018;15(2):71–86. 10.1089/chi.2018.0044 [PubMed: 30565954]
2. Frieden TR. A framework for public health action: The health impact pyramid. *Am J Public Health.* 2010;100(4):590–595. 10.2105/AJPH.2009.185652 [PubMed: 20167880]
3. Hales CM, Carroll MD, Fryar CD, Ogden CL. Prevalence of obesity among adults and youth: United States, 2015–2016. Hyattsville, MD: National Center for Health Statistics 288 <https://stacks.cdc.gov/view/cdc/49223> Published October 2017. Accessed August 21, 2019.
4. Tremmel M, Gerdtham U-G, Nilsson PM, Saha S. Economic burden of obesity: A systematic literature review. *Int J Environ Res Public Health.* 2017;14(4):435 10.3390/ijerph14040435
5. Hanks AS, Just DR, Brumberg A. Marketing vegetables in elementary school cafeterias to increase uptake. *Pediatrics.* 2016;138(2). 10.1542/peds.2015-1720
6. Velazquez CE, Black JL, Potvin Kent M. Food and beverage marketing in schools: A review of the evidence. *Int J Environ Res Public Health.* 2017;14(9). 10.3390/ijerph14091054
7. Foster GD, Karpyn A, Wojtanowski AC, et al. Placement and promotion strategies to increase sales of healthier products in supermarkets in low-income, ethnically diverse neighborhoods: A randomized controlled trial. *Am J Clin Nutr.* 2014;99(6):1359–1368. 10.3945/ajcn.113.075572 [PubMed: 24695894]
8. Page R, Montgomery K, Ponder A, Richard A. Targeting children in the cereal aisle: Promotional techniques and content features on ready-to-eat cereal product packaging. *Am J Health Educ.* 2008;39(5):272–282. 10.1080/19325037.2008.10599050

9. Gittelsohn J, Laska MN, Karpyn A, Klingler K, Ayala GX. Lessons learned from small store programs to increase healthy food access. *American Journal of Health Behavior*. 2014;38(2):307–315. 10.5993/AJHB.38.2.16 [PubMed: 24629559]
10. Cavanaugh E, Green S, Mallya G, Tierney A, Brensinger C, Glanz K. Changes in food and beverage environments after an urban corner store intervention. *Prev Med*. 2014;65:7–12. 10.1016/j.ypmed.2014.04.009 [PubMed: 24732720]
11. Hartmann-Boyce J, Bianchi F, Piernas C, et al. Grocery store interventions to change food purchasing behaviors: A systematic review of randomized controlled trials. *Am J Clin Nutr*. 2018;107(6):1004–1016. 10.1093/ajcn/nqy045 [PubMed: 29868912]
12. Laroche HH, Ford C, Hansen K, et al. Concession stand makeovers: A pilot study of offering healthy foods at high school concession stands. *J Public Health*. 2015;37(1):116–124. 10.1093/pubmed/fdu015
13. Severson K. Late to the game, football stadiums aim for better food. *The New York Times* <https://www.nytimes.com/2017/01/30/dining/football-stadiums-food.html> Published January 30, 2017. Accessed September 3, 2019.
14. Gusset M, Dick G. The global reach of zoos and aquariums in visitor numbers and conservation expenditures. *Zoo Biol*. 2011;30(5):566–569. 10.1002/zoo.20369 [PubMed: 21136509]
15. Reinhard EM, Vernon CL, Bronnenkant K, Heimlich JE, Deans NL. Why Zoos and Aquariums Matter: Assessing the Impact of a Visit to a Zoo or Aquarium Why zoos and aquariums matter: Assessing the impact of a visit to a zoo or aquarium. Silver Spring, MD: Association of Zoos and Aquariums
16. Food and Drug Administration, Health and Human Services. Food Labeling; Nutrition Labeling of Standard Menu Items in Restaurants and Similar Retail Food Establishments. Services, Department of Health and Human 2014–27833, 71155–71259 (2014). <https://www.federalregister.gov/documents/2014/12/01/2014-27834/food-labeling-calorie-labeling-of-articles-of-food-in-vending-machines>.
17. 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(2):107–126. 10.1111/obr.12237 [PubMed: 25516352]
18. Neeley SM, Schumann DW. Using animated spokes-characters in advertising to young children: Does increasing attention to advertising necessarily lead to product preference? *J Advert*. 2004;33(3):7–23. 10.1080/00913367.2004.10639166
19. Roberto CA, Baik J, Harris JL, Brownell KD. Influence of licensed characters on children's taste and snack preferences. *Pediatrics*. 2010;126(1):88–93. 10.1542/peds.20093433 [PubMed: 20566614]
20. Ülger B. Packages with cartoon trade characters versus advertising: An empirical examination of preschoolers' food preferences. *J Food Prod Mark*. 2008;15(1):104–117. 10.1080/10454440802470649
21. Karpyn A, Allen M, Marks S, et al. Pairing animal cartoon characters with produce stimulates selection among child zoo visitors. *Health Educ Behav*. 2017;44(4):581–589. 10.1177/1090198116679359 [PubMed: 27866159]
22. Glanz K, Sallis JF, Saelens BE, Frank LD. Nutrition Environment Measures Survey in Stores (NEMS-S): Development and evaluation. *Am J Prev Med*. 2007;32(4):282–289. 10.1016/j.amepre.2006.12.019 [PubMed: 17383559]
23. Goodman AB, Blanck HM, Wong D, Rausch KM. National Summary of Data Centers for Disease Control and Prevention (CDC) – National Park Service (NPS) Healthy Foods Evaluation. Centers for Disease Control and Prevention and the National Parks Service; :24 <https://www.med.upenn.edu/nems/docs/NPSNationalReport-FinalCleared.pdf>. Published 2011.
24. Voss C, Klein S, Glanz K, Clawson M. Nutrition Environment Measures Survey–Vending: Development, dissemination, and reliability. *Health Promot Pract*. 2012;13(4):425–430. 10.1177/1524839912446321 [PubMed: 22764138]
25. The Fairmount Park Conservancy and The Food Trust. Creating healthy concessions: A resource guide. Philadelphia, PA; :1–16. https://www.jumpinforhealthykids.org/userfiles/file/news/Creating_Healthy_Concessions_Resource_Guide.pdf. Published 2012.

26. Nielsen. We are what we eat: Healthy eating trends around the world. New York, NY: The Nielsen Company
27. Sukalakamala P, Sukalakamala S, Young P. An exploratory study of the concession preferences of generation y consumers. *J Foodserv Bus Res.* 2013;16(4):378–390. 10.1080/15378020.2013.824278
28. White House Task Force on Childhood Obesity. Solving the problem of childhood obesity within a generation. Washington, D.C. https://letsmove.obamawhitehouse.archives.gov/sites/letsmove.gov/files/TaskForce_on_Childhood_Obesity_May2010_FullReport.pdf Published May 2010. Accessed December 13, 2018.
29. Smits T, Vandebosch H. Endorsing children's appetite for healthy foods: Celebrity versus non-celebrity spokes-characters. *Communications.* 2012;37(4):371–391. 10.1515/commun-2012-0021
30. de Droog SM, Buijzen M, Valkenburg PM. Use a rabbit or a rhino to sell a carrot? The effect of character–product congruence on children's liking of healthy foods. *J Health Commun.* 2012;17(9):1068–1080. 10.1080/10810730.2011.650833 [PubMed: 22650613]
31. Franck K. 2016 DELPHI study summary: Barriers, facilitators, and training needs for successful PSE implementation in SNAP-ED and EFNEP. Washington, D.C.: Regional Nutrition Education Center of Excellence-Policies, Systems, and Environmental Change Center <https://snapedpse.org/wp-content/uploads/2017/08/RNECE-PSE-Delphi-summary-2016.pdf> Published April 2016. Accessed July 3, 2019.
32. Liu PJ, Wisdom J, Roberto CA, Liu LJ, Ubel PA. Using behavioral economics to design more effective food policies to address obesity. *Appl Econ Perspect Policy.* 2014;36(1):6–24. 10.1093/aep/ppt027
33. Strange L. About Live.Balanced. National Grocers Association. <https://www.nationalgrocers.org/health-and-wellness> Published 2018. Accessed November 19, 2018.
34. Lenard J, Schnare C. 8 ways to grow healthy sales. *Natl Assoc Conv Stores Mag NACS.* 8 2016:30–36.

Figure 1.
Cartoon images of Tastimals characters displayed on the concessions menu as well as throughout the zoo.

SNACKS		MEAL DEALS	
Fresh Fruit	\$1.00	Peanut Butter & Jelly Sandwich with Fruit & Small Water	\$4.25
Squeezable Applesauce	\$1.00		Combo Deal 1
No spoon needed			
Pirate's Booty	\$1.25	\$3.25	Granola Bar Yogurt & Fruit & Small Water
White cheddar puffed rice		Combo Deal 2	
Granola Bar	\$0.75		
Go-gurt Yogurt	\$0.75	Fruit, Almond Pack, Granola Bar & Small Water	\$3.50
Almond Pack	\$1.00		Combo Deal 3
PB&J	\$2.50		
Chips	\$1.00	\$4.25	Hot Dog, Chips & Small Water
Hot Pretzels	\$2.00	Combo Deal 4	
Hot Dog	\$2.50		
Pizza	\$3.50	DRINKS	
Pizza Pretzels	\$3.25	Water Small \$1.00 / Large \$2.00
Popcorn	\$1.00	Juice/Iced Tea	\$2.00
Mini-melts	\$4.00	Soda	\$2.50
Ice Cream	\$2.00, \$2.50, \$4.00	Powerade	\$2.00
Churros	\$2.00 or 2 for \$3.00	Coffee / Hot Cocoa	\$1.50

Figure 2.
Zoo concessions menu.

Figure 3.
Weekly revenue variability of healthy and less healthy zoo concessions items.

Table 1**Tastimals Character Marketing Rotation Schedule**

Week #/Date	Fresh Fruit	Pirate's Booty®	Go-Gurt®	PB&J	Combo Meal 1	Combo Meal 2
Week 2 [*] : 7/8–7/14 (B)	Capybara	Sloth	Red Panda	Macaw	Iguana	Tamarin
Week 4: 7/22–7/28 (B)	Tamarin	Capybara	Sloth	Red Panda	Macaw	Iguana
Week 6 [*] : 8/5–8/11 (B)	Iguana	Tamarin	Capybara	Sloth	Red Panda	Macaw
Week 8: 8/19–8/25 (B)	Macaw	Iguana	Tamarin	Capybara	Sloth	Red Panda

Note. Healthy food items were available during both non-intervention (A) and intervention (B) weeks, however zoo animal characters (i.e., marketing treatment) were paired with healthy items only on intervention (B) weeks. Combo Meal 1 = PB&J and fresh fruit; Combo Meal 2 = Granola bar, Go-Gurt®, and fresh fruit. The healthy items (fresh fruit, Pirate's Booty®, Go-Gurt®, PB&J, Combo Meal 1, and Combo Meal 2) were systematically paired with a *Tastimals* character for 1 week intervals. These character-product pairings rotated on alternating weeks.

^{*} Indicates Family Fun Night took place during this week.

Table 2

Total Sales and Revenue of Healthy and All Items by Intervention Weeks

	<u>Unit Sales (% of all)</u>		<u>Revenue (% of all)</u>	
	Non-Intervention Weeks	Intervention Weeks	Non-Intervention Weeks	Intervention Weeks
Healthy Items	179 (7.7%)	253 (8.2%)	\$226.12 (4.3%)	\$289.08 (4.9%)
Total, all items	2,311	3,094	\$5,245.11	\$5,955.58

Note. Frequencies and percentages reported for unit sales and revenue on non-intervention and intervention weeks.

Table 3

Sales for Healthy Food Items and Healthy Meal Deals

Menu Item	Total Units Sold	Sales Per Day	
		<i>M</i>	<i>SD</i>
Fresh Fruit	109	2.0	3.0
Pirates Booty	72	1.3	1.6
Almonds	71	1.3	3.5
Applesauce	51	0.9	1.4
Granola Bar	38	0.7	1.1
PB&J	34	0.6	1.0
Yogurt	27	0.5	0.8
Meal Combo 1	16	0.3	0.6
Meal Combo 2	8	0.1	0.4
Meal Combo 3	6	0.1	0.5

Note. Combo 1: PB&J (peanut butter and jelly sandwich) and fresh fruit; Combo 2: granola bar, yogurt, and fruit; Combo 3: fruit, almonds, and granola bar.

Table 4

Poisson Regression Model Predicting Daily Unit Sales

Parameter	Estimate	Standard Error	Wald χ^2	P-value
Intercept	1.3369 **	0.0217	3810.41	< .001
Intervention	−0.0177	0.0314	0.32	0.57
Healthy Item	−1.7735 **	0.0778	519.41	< .001
Intervention/Healthy Item Interaction	0.2873 *	0.1054	7.42	.006
Family Fun Night	1.7899 **	0.0404	1965.17	< .001
Family Fun Night/Healthy Item Interaction	−1.1220 **	0.1910	34.51	< .001

*
 $p < .01$,**
 $p < .001$

Table 5

Negative Binomial Regression Model Predicting Daily Revenue

Parameter	Estimate	Standard Error	Wald χ^2	P-value
Intercept	2.1930 **	0.0750	854.32	< .001
Intervention	−0.0056	0.1081	< .001	.96
Healthy Item	−2.3960 **	0.1450	272.98	< .001
Intervention/Healthy Item Interaction	0.1998	0.2066	0.94	.33
Family Fun Night	1.0632 *	0.2882	13.61	.002
Family Fun Night Interaction/Healthy Items	−0.6042	0.5316	1.29	.26

*
 $p < .01$,**
 $p < .001$