



Food Consumption in Popular Children's TV Shows and Food Choice Awareness of Pediatric Viewers

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Abstract

Background: Evidence linking television viewing to childhood obesity has been extensive. Our objective was to examine the content of popular children's programming and document the food choices made by on-screen characters and the potential influences of these choices on young children.

Methods: Research personnel evaluated depictions of food consumption in 60 episodes of popular children's shows. Parents of children aged 3 to 10 years completed a survey by asking their children about their favorite television characters' food choices and the rationale behind these choices. Children were classified into four BMI subgroups, and the food choices of the characters named by survey participants were compared by thematic analysis.

Results: A total of 91.7% of episodes depicted food consumption. Of these, 59.3% were classified as "junk foods". Parents (n=626) reported that their children recalled their favorite characters' food preferences 95% of the time. Of those preferences, 46% were considered "junk foods", with the predominant child-identified rationale behind character food consumption being "because they like it" (53%). While 21.9% of parents of healthy weight children reported that their child recognized characters who favored desserts/treats, this percentage was significantly greater among underweight (28.4%, $p=0.037$), overweight (30.3%, $p=0.033$), and obese children (28.2%, $p=0.012$).

Conclusion: Most of the food instances depicted on the television programs examined were considered "unhealthy". The overwhelming majority of parents reported that their child watched and remembered portrayals of food consumption. Children with higher BMIs noticed according to their parents' reporting unhealthy food instances at a higher rate. Addressing unhealthy food choices made by characters on popular children's television is essential to promoting healthier food choices among young children.

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Received Date: 24 Dec 2018

Accepted Date: 29 Jan 2019

Published Date: 31 Jan 2019

Citation:

Milanaik R, Das P, Shah J, Fruitman K, Goldman J, Sood N, et al. Food Consumption in Popular Children's TV Shows and Food Choice Awareness of Pediatric Viewers. Clin Pediatr. 2019; 2: 1010.

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Abbreviations

MTurk: Amazon Mechanical Turk; HIT: Human Intelligence Task; BMI: Body Mass Index

Introduction

The World Health Organization has identified childhood obesity as one of the most serious public health challenges of the 21st century [1]. Over the past two decades, the prevalence of obesity in the United States has more than doubled for children aged 2 to 5 years (5.0% to 12.4%) and 6 to 11 years (6.5% to 17.0%), and more than tripled for adolescents aged 12 to 19 years (5.0% to 17.6%) [2]. These rising rates are alarming due to the numerous health consequences facing obese children, ranging from diabetes to high blood pressure. Obese children are more likely to stay obese into adulthood and continue to suffer from chronic conditions like heart disease and osteoarthritis, as well as face various socio-emotional problems associated with negative stereotyping, bullying, and social discrimination [2-4].

Previous literature has documented an association between obesity risk and electronic media usage among children [5-7]. Television viewing, in particular, has been associated with poorer health outcomes as access to television shows moves to ubiquitous streaming platforms and screen time as a whole increases [8]. By three months of age, 40% of infants have been exposed to television and by 24 months of age, 90% are regular viewers [9].

Studies have investigated the potential causal mechanisms of this relationship between screen

Table 1: Analysis questions for instances of food consumption observed in popular children's television programming.

S. No.	Analysis Questions for Each Instance of Food Consumption
1	What type of character was portrayed? (protagonist, antagonist, supporting protagonist, supporting antagonist, neutral character, other)
2	What types of foods were consumed? (balanced meal, fast food, health snacks such as fruits
3	and vegetables, healthy snacks such as popcorn and peanuts, unhealthy snacks such as chips, unhealthy snacks such as candy, desserts, none, other)
3	What were the reactions from the characters themselves to the foods eaten? (positive, negative, none)
4	What were the reactions from the other characters to the foods eaten (positive, negative none)
5	Where were the characters eating? (home, school, workplace, sit-down restaurant, fast food restaurant, specialty food store (ice cream parlor, smoothie shack, on-the-go, other)
6	What were the reasons for eating said foods (regular nutrition, celebratory eating, consolatory eating, snacking outside regular mealtime, other)

time and childhood obesity. Some theories contend that television viewing contributes to obesity due to its nature as a sedentary activity. Others highlight the prevalence of calorically-dense fast food choices during advertisement slots [10-12]. Few, if any, studies, however, have taken an observational learning approach and examined the powerful influence of TV characters in children's shows themselves, who many kids look to as role models, perhaps, of unhealthy food consumption [13].

In a two-part study design, this study first observes and categorizes the food choices made by characters in storylines on popular children's television series. Secondly, it asks parents to survey their children aged 3 to 10 years to determine recall of consumption behaviors among these characters. Together, these two parts of the study elucidate how character food consumption was depicted in popular children's TV shows and what information was received and retained by children upon watching these TV shows.

Methods

The methodology for this study was divided into two components. In part I, researchers analyzed TV episodes for characteristics of the food depicted. In Part II, parents were surveyed to identify the impact of character food preferences on children.

Part 1

Researchers reviewed a total of 60 episodes of each of randomly selected television shows that were running on Nickelodeon, Disney Channel, and PBS-three popular children's TV networks-in 2017, including live action and animated series. Each instance of food consumption by a character was analyzed for the 7 questions denoted in Table 1 and the answers were subsequently recorded. Thematic analysis was conducted on the type of foods consumed in the food scene to identify the mainstream food types frequently shown on TV. As many cartoons/fantasy shows may contain "non-real" food types, imaginary food items were assigned to the closest category based on its appearance (ex: "Krabby Patties" were classified in the same way as hamburgers).

Part 2

Recruitment: A survey was distributed through Amazon Mechanical Turk (MTurk), an online workforce available through Amazon.com which is free for both participants and researchers to join. MTurk is the most widely used crowdsourcing market for academic research and it allows for national sampling that is reasonably representative of the current US population, yielding data of similar reliability to more traditional data collection techniques [14,15].

This study was made publicly available to any MTurk user and, upon completion; participants were compensated \$0.25 for their

time. Though any user could access the initial parts of the survey, pre-screening questions were asked to establish parental status, age of children, age of participant, and ability to read English. Participants who did not provide food-meals or snacks-to their children, were less than 18 years of age, or did not have a child between 3 and 10 years old were excluded and did not fill out the rest of the survey. IP addresses of survey responses were analyzed to remove possible duplicate responses and the content of responses themselves was examined to ensure proper completion.

Survey design: Participants were taken to the Survey Monkey platform to complete the survey. They were first asked questions to confirm that they met the inclusion criteria as well as to ensure that they had a child between the ages of 3 and 10 years capable of answering the survey questions. Parents were instructed to ask their child the survey questions and input their child's answers on their behalf.

The first page of TV-based survey questions asked,

Please ask your child the following questions about three of his/her favorite TV characters who eat food. (For ex.: Thomas the Tank Engine is one of our favorite characters too, but he doesn't eat food, so this does not count. However, Popeye loves spinach and eats it to get strong!).

For each character, parents typed in their child's responses for the character's name and favorite food and then selected the motivation for eating said food from multiple choices. This survey design can be found in Table 2. This process was repeated for each child between the ages of 3 to 10 years, with up to 3 characters reported for each child between these ages.

Parents were also asked demographic questions regarding the height, weight, and age of their children. Body Mass Index (BMI) was then calculated from parent-reported height and weight to classify each child as obese, overweight, normal, or underweight based on the growth chart released by the Center for Disease Control and Prevention [16].

Data analysis

Descriptive statistics were computed using standard methods for proportions, means, and medians to represent child's demographic information and recollection of TV character's favorite foods. As this was a pilot study interested in descriptive statistics and not hypothesis testing, sample size calculations did not apply. Within each BMI subgroup (obese, overweight, normal, and underweight), children's self-reported TV characters' food choices were characterized by thematic analyses using the same criteria, methods, and researchers from Part 1.

Results

Part 1

Of the 60 episodes watched, 91.7% (n=55) contained food instances. A total of 91 food instances were recorded, with many episodes containing more than one food instance. In these instances, 81.6% of the foods were consumed by a protagonist lead character or a supporting protagonist. Of the food instances observed, 59.3% involved unhealthy junk food options such as “fast food”, “dessert”, “candy”, and “chips”. Overall, 67.4% of the time, the food consumption was perceived positively by the characters themselves. Furthermore, the food consumption was perceived positively by the other characters involved in the scene 49.0% of the time. Most of the food consumption happened at “home” (61.2%), at a “social setting” (8.2%), at a “specialty restaurant” (6.1%), or at a “fast food restaurant” (6.1%). Only 24.5% of the food instances reflected food consumption during regular mealtimes, while the most cited reason for food consumption was “snacking outside regular mealtimes” (42.9%).

Part 2

In total, effective responses were filled out by parents on behalf of 626 children between the ages of 3 and 10 years. According to parental reporting of the demographic characteristics of their children, 56% of children were female; 50% white, 25% black, 15% Asian and 10% mixed race; the mean age was 6.2 years. The BMI of each of the children was calculated using their height, weight, gender, and age. The following BMI ranges were determined using cut offs defined by the CDC growth chart: underweight, normal/healthy, overweight, and obese [16]. Of the 626 children, 17.0% (n=106) were underweight, 42.1% (n=264) fell within the normal range, 9.7% (n=61) were overweight, and 31.3% (n=196) were obese. This demographic information can be found in Table 2.

In total, information on 1,800 characters on popular children’s television shows was collected *via* parental reporting of their children’s recollection. 95% (n=595) of the children were reported by their parents to be able to recall their favorite characters’ preferred food choice. Of the food preferences identified by the children and reported by their parents, 46% of the foods were characterized as “junk foods”. These foods included “Krabby Patties”, pizza, and donuts. The most frequently cited reason that parents reported their children gave for their characters’ food consumption choices was “because they like it” (53%), while the reasons “because they are hungry” and “because they are good for you” combined only encompassed 25% of the responses.

It was noted that while both the 42.5% (n=112) of the children categorized as normal/healthy and 42.9% of the children categorized as underweight listed characters that ate unhealthy foods, this percentage was significantly higher among overweight (54.5%, $p=0.005$), and obese children (49.8%, $p=0.010$). A closer thematic analysis showed that 21.9% of the normal weight children specifically listed characters who ate desserts or treats, but that this percentage was significantly higher among underweight (28.4%, $p=0.037$), overweight (30.3%, $p=0.033$), and obese children (28.2%, $p=0.012$).

Discussion

Instances of unhealthy food consumption were depicted in an overwhelming majority of children’s television shows observed. In most of these instances, the food was consumed by the protagonist or the lead character who perceived their food experience in a positive light.

Table 2: Demographics of children whose parents responded on their behalf.

	Count	Percent
Responses	626	-
Gender		
Male	276	44.1
Female	350	55.9
Race		
White	313	50
Black	156	24.9
Asian	93	14.9
Mixed Race	62	9.9
Body Mass Index		
Underweight	106	17
Normal/Healthy	264	42.1
Overweight	61	9.7
Obese	196	31.3

Considering how endearing and memorable these characters are, their behaviors may affect children’s own beliefs about these foods. As a result, children may view unhealthy food choices positively and seek to emulate similar unhealthy eating habits. This highlights an instance of observational learning, where children surrounded by influential models and characters they admire such as those on children’s television shows may observe and encode their behaviors, only to imitate them at a later time [17].

With food and beverage advertisers spending \$2 billion dollars a year on television food marketing campaigns directed at young audiences, the amount of unhealthy food exposure for children is concerning [18]. A 2015 study by Emond et al. [19] reported that products like ready-to-eat cereals, sugar-sweetened beverages, and children’s yogurt tend to receive the most airtime, despite many of these products not meeting the nutritional guidelines set by the Interagency Working Group, a U.S. federal group charged with improving the quality of foods marketed to children on television. A report from the UConn Rudd Center for Food Policy & Obesity determined that only 4 out of 80 baby and toddler snacks met nutritional standards, while 50% of baby food snacks and 83% of toddler food snacks reportedly contained added sweeteners [20]. This contrasts sharply to media representation of healthy foods, which are advertised less than 3% of the time on television [21].

The malleability of children in being influenced by television has been well documented, especially with regards to advertisements on food preferences and consumption. Studies have shown that children may request and consume more calorically dense and nutrient poor food products following increased exposure to junk food and fast food advertisements [22-25]. Results from a survey of 12,000 secondary school students indicate that greater exposure to commercial television was associated with a higher likelihood of consuming unhealthy foods [26]. Previous research has demonstrated that even very young children who are exposed to persuasive television advertisements can develop food cravings for unhealthy foods that they never tasted [27].

The influence of well-known television characters on children adds another level of concern for parents. The results from this study indicate that the overwhelming majority of children remember the

food consumption choices of their favorite characters. The impact of licensed character food branding on children's food preferences and intake has been extensively investigated, with studies showing clear associations between mascot-promoted foods and poor children's diets. A 2010 study showed that food products marketed by popular cartoon characters were perceived as more tasty and appealing than the same foods that were marketed without characters on the packaging. Moreover, children overwhelmingly selected foods that were marketed with licensed characters on them, highlighting how familiar character branding can affect consumption behaviors [28].

The American Academy of Pediatrics (AAP) recognizes the powerful role that media can play in contributing to the development of child and adolescent obesity. The AAP has recommended that screen time be avoided from birth to 18 months as a means of limiting exposure to junk food advertisements, and a 2011 policy statement ultimately concluded that there is sufficient evidence to warrant a ban on junk food or fast-food advertising in children's television programming altogether [23]. To date, some attempts have been made towards tackling obesity by reducing marketing campaigns that promote unhealthy food environments towards children. In 2006, the Walt Disney Corporation established nutritional guidelines that banned the licensing of Mickey Mouse and other iconic Disney characters for foods that did not to meet minimum nutrition requirements [29]. These standards placed limitations on the amount of fat, added sugar, and calorie content of food products sold at Disney business centers [30]. Subsequently in 2012, Disney announced that it would phase out all junk-food advertisements on its child-directed television channels as well those that have played alongside Saturday morning cartoons airing on ABC stations owned by the corporation [31]. The difference these efforts can make is evidenced by a U.S. Jurisdiction in Santa Clara, CA where a ban on toy collectibles of popular children's characters paired with unhealthy food resulted in restaurants showing a 2.8 to 3.4 fold improvement in Children's Menu Assessment scores [32]. Working together to propose changes to food portrayals on popular children's television shows can help build a foundation for nutritious diets early on in children's development, and characters could serve as role models for healthy eating habits and behaviors [33-35].

Conclusion

While the negative impact of television advertisements targeted towards youth has been well documented, this is the first study showing the potentially powerful influence of portrayals of food consumption on popular children's television programs on children. The results of this study highlight not only the high instance of non-nutritious foods on children's television programming, but more alarmingly, how extensively children remember their favorite television characters' food choices. Health professionals play a pivotal role in helping shape the eating habits of children. Discussions of these findings with parents can help build understanding of how foods eaten by characters on popular children's television programming may impact youth consumption patterns. The American Academy of Pediatrics should urge television corporations to reconsider in-episode food content in order to foster healthier food preferences among young children.

Contributors' Statements

Dr. Milanaik conceptualized and designed the study, coordinated and supervised data collection, carried out the initial analysis, and

critically reviewed the manuscript for important intellectual content.

Mr. Das, Mr. Shah, Ms. Fruitman, Mr. Goldman, and Ms. Sood assisted in the data collection and analysis, drafted the initial manuscript, and reviewed and revised the manuscript.

Ms. Zhu assisted in the data collection, performed the statistical analysis, and reviewed and revised the manuscript.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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