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**DOES OUTDOOR FOOD & BEVERAGE ADVERTISING TARGET  
YOUTH?**

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**DOES OUTDOOR FOOD & BEVERAGE ADVERTISING TARGET  
YOUTH**

**by**

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## **Dedication**

Dedicated to my parents, Hongai Shi and Boping Xie, for your endless love and support throughout my life. Thank you both for giving me strength to chase my dreams and achieve my academic goals. I love you to the moon and back.

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## **Abstract**

# **DOES OUTDOOR FOOD & BEVERAGE ADVERTISING TARGET YOUTH?**

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**Introduction:** Youth are particularly susceptible to Food and Beverage (F&B) advertising. This is problematic as targeted F&B marketing has been considered as a potent contributor to childhood obesity. However, most research has focused on television and digital advertising while outdoor F&B advertising has received less attention. Therefore, to better understand if food marketing is directed toward youth, this study aimed to determine if outdoor F&B ads were more pervasive near youth-serving institutions than community-serving institutions in Austin.

**Methods:** Secondary data from the Outdoor MEDIA study, a study designed to document and code F&B ads within a half-mile of 33 middle schools (MS), 13 high schools (HS), and 8 hospitals in Central Texas. One-way ANOVA tests were used to compare mean differences in total F&B ads, fast-food ads, and F&B ads containing price information across MS, HS, and hospitals. Linear regression analyses were conducted to determine if the F&B advertising varied with school type controlling for school-level socioeconomic

status (SES). The chi-square test was used to compare proportions of fast-food ads and price-information ads in all F&B ads across MS, HS, and hospitals.

**Results:** No significant mean difference in F&B ads was found across the MS, HS and hospitals. However, lower SES schools were exposed to significantly higher numbers of price information F&B ads. Across the institution types, the proportion of fast-food ads out of all ads was less prevalent around HS compared to MS (44.0% vs. 50.4%,  $p < 0.05$ ) and to Hospitals (44.0% vs. 49.8%,  $p < 0.05$ ). The proportion of price information ads was greater near HS compared to MS (22.3% vs. 18.3%,  $p < 0.05$ ) and to Hospitals (22.3% vs. 14.7%,  $p < 0.05$ ), and the proportion near MS (18.3%) was greater than Hospitals (14.7%) ( $p < 0.05$ ).

**Conclusion:** Nearly half of F&B ads belong to the fast-food category across all institution types. Also, as a commonly used marketing method, the proportion of price information F&B ads near schools was notably higher than hospitals. Future policies regarding outdoor advertising should focus on the reduction of the frequency of unhealthy foods as well as price promotion strategies near youth-serving areas in the United States.

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## **BACKGROUND**

### **Chapter 1: Introduction**

In the United States, childhood and adolescent obesity have reached epidemic levels, which millions of people's lives are being affected. The prevalence of childhood obesity for any age group has increased dramatically since 1988 (Ogden et al., 2016), and the obesity rate for children and adolescents has more than tripled since the 1970s (Hales et al., 2018). The Centers for Disease Control and Prevention (CDC) in 2017 reported that there were about 13.7 million children and adolescents affected by obesity which comprises 18.5% of the U.S. population, however, the prevalence is the highest for adolescents aged 12 to 19 at 20.6% (Hales et al., 2017). Although the obesity prevalence among American youth appears to have been stabilizing over the past few years (Ogden et al., 2014; Ogden et al., 2015; Ogden et al., 2016), rates are still remarkably higher than those of earlier generation (Ogden et al., 2014). Texas ranked sixth among all states in highest rates of childhood obesity (Parker et al., 2010). The Robert Wood Johnson Foundation (RWJF) recorded in their State of Childhood Obesity report that there 15.5% of Texas youth aged 10 to 17 were obese in 2018.

Childhood obesity can lead to both short-term and long-term adverse health consequences physically and psychologically. Overweight or obese children are at higher risk for developing chronic diseases including hypertension, type 2 diabetes, heart disease, gallbladder disease, osteoarthritis, sleep apnea, respiratory problems, and even certain cancers (WHO, 2010). In the US, about 60% of children who are overweight or obese have at least one CVD risk factor (Hruby & Hu, 2015). Cardiorespiratory fitness is the lowest in the last six decades, with only 40% of youth having healthy fitness, which is believed to be caused by obesity and increased time spent in sedentary behaviors (Raghuveer et al., 2020).

In recent years, there has been an increasing prevalence of type 2 diabetes mellitus among young people internationally, primarily due to obesity (Einarson et al., 2018). In addition to physical wellness, child obesity also negatively affects psychological development, such as self-esteem, social isolation, discrimination, depression, internalizing and externalizing disorders, as well as high-risk behaviors such as smoking and alcohol abuse (Pulgaron, 2013; Schwimmer et al., 2003; Strauss, 2000; Wang & Lim, 2009). More concerning, overweight or obese kids are at higher risk of adult obesity and chronic disease when compared to their health or underweight counterparts (Lee, 2008; Reilly et al., 2005; WHO, 2010). Nearly 80% of adolescents aged 10 to 14 years with obesity are at particular risk of remaining adults with obesity (Ahmad et al., 2010). Childhood obesity was also found to have a profound influence on mortality and morbidity throughout adulthood (Must & Strauss, 1999; Reilly & Kelly, 2011). These trends could seriously jeopardize the future health of the U.S. population and produce substantial burdens on the health care system (Afshin et al., 2017). Economic data showed that the obesity-associated annual hospital costs among children and adolescents rocketed from \$35 million in 1979–1981 to \$127 million in 1997–1999 (based on 2001 constant U.S. dollars), which has more than tripled over the past two decades (Wang & Dietz, 2002). Obesity has become the most significant preventable cause of the burden of disease in many regions of the United States (Lopez et al., 2006; Hoad et al., 2010). Due to adverse health outcomes and significant economic consequences, childhood obesity prevention and management should be considered as a public health priority.

Despite an overall high prevalence of childhood obesity, there are large variations in prevalence between regions across and within countries. In general, prevalence varies by age, sex, ethnicity, socioeconomic status, and geographic area (Tremblay et al., 2005; Zhang, & Wang, 2004 ; Willms et al., 2003; Svensson et al., 2011; Peterlin et al., 2010;

Wang & Lim, 2012). There is a growing recognition that the unequal distribution and inequitable patterning of child obesity are inadequately explained by individual-level factors. Instead, some researchers believed that childhood obesity should be considered an outcome of the complex system factors operating at broader social levels (van der Horst et al., 2007; Friel et al., 2007). Researchers have increasingly moved from studying individual level factors to measuring environmental influences, such as studying what kind of obesogenic marketing environment surrounds children (Harris et al., 2009). They suggest the current obesity pandemic was profoundly shaped by local environments (Swinburn et al., 2011). As a result, using an ecological approach to understand factors that impact childhood and adolescent diet behaviors is critical to study the determinants of childhood obesity (Campbell, 2016; Story et al., 2009). The understanding of the major determinants of child obesity has significance for the actions needed to relieve, or even reverse the pandemic.

One environmental factor—pervasive food marketing—has been suggested as an upstream and dominant determinant of childhood obesity. Advertising is a central type of marketing activity for the US food industry (McCall, 2003). Associations between food & beverage (F&B) advertising and childhood obesity have been well demonstrated (Andreyeva et al., 2011; Chou et al., 2008). The WHO (2016) reported that the marketing of energy-dense, nutrient-poor (EDNP) foods and beverages is a major driver leading to the increase of childhood obesity. In the U.S., when controlling for other factors, people who live in areas with 10% more food advertising have 1.05 greater odds of obesity when compared to their counterparts who live in the environment with a lower frequency of food advertisements (Lesser et al., 2013). A positive correlation between the density and proximity of fast-food outlets and children’s increased BMI has also been demonstrated (Crawford et al., 2008). Moreover, international research has highlighted how widespread

food marketing keeps up with a general increase in weight gain across a population (Anderson & Butcher, 2006; Jeffery & Utter, 2003; French et al., 2001). In particular, unhealthy food advertising has been proposed as a significant factor in explaining rapidly increasing rates of childhood obesity (Hawkes, 2006). Most research has aimed to explain how food advertising impacts children's body weight by studying the relationship between children's exposure to food advertising—especially the advertisements for unhealthy food—and children's food preferences and choices, purchase behaviors, and food consumption (Hawkes, 2006; Andreyeva et al., 2011; Pearce et al., 2009; Harris et al., 2009; Institute of Medicine of the National Academies, 2006). However, so far, most research has only focused on television food advertising (Dalton et al., 2017; Emery et al., 2007; Zimmerman & Bell, 2010; Gorn & Goldberg, 1982; Balfour et al., 1982). While direct evidence that consistent F&B marketing to children causes childhood obesity is limited, a WHO/FAO consultation report suggests that there are sufficient indirect sources of evidence to state that greater exposure to food marketing is correlated with an increased risk of obesity (Nishida et al., 2004).

Children and young adolescents are particularly vulnerable to food advertisements, because they are still developing advanced cognitive abilities needed to process information (John, 1999; McGinnis et al., 2006). For this reason, they are susceptible to persuasive messages used in advertisements and less likely to make appropriate decisions (Institute of Medicine [IOM], 2006; John, 1999; Roedder, 1981). For instance, young children in the 'pre-cognition' stage are often not able to clearly identify the differences between television commercials and television program content (Carter et al., 2011). They consistently interpret marketing as factual (Ludvigsen & Scott, 2009). Before children develop key cognitive abilities, they always like the products that they see most frequently in advertisements and associate the products with positive experiences (Ludvigsen & Scott,

2009). Even until early adolescence, children still can be persuaded by emotional messages in advertising and remain less likely to comprehend or evaluate the advertising as compared to adults (Story & French, 2004). Given the ubiquity of F&B advertisements always representing minimally nutritious products, the negative impact of advertising on the diet of American children is not surprising (Boyland & Whalen 2015; Andreyeva, 2011; Buijzen et al., 2008; Harris et al., 2009). Therefore, the widespread marketing of unhealthy foods that targets children and adolescents and takes advantage of their cognitive limitations can be viewed as exploitative and unfair.

Over the past two decades, US youth have constantly and increasingly been targeted with intensive and pervasive F&B marketing and advertising through multiple techniques and channels (Valkenburg, 2000; Grier & Kumanyika, 2008). Specifically, extensive marketing of unhealthy food and drinks to American young people ages 2 to 17 remains a primary public concern. It was found that the food companies had spent more than \$1.6 billion in 2006 on reaching children and adolescents with specialized food marketing, which includes almost \$900 million in targeting directly at children under the age of 12 years (Federal Trade Commission, 2008), and this expenditure rose to \$2 billion in 2012 (Federal Trade Commission, 2017). Additionally, most of the food advertisements targeted to youth promote the consumption of high-calorie and low-nutrient foods (Harris et al., 2009; Powell et al., 2013). For instance, fast-food products constituted 24% of the total youth marketing expenditures directed at U.S. youth between 2 and 17 years old (Federal Trade Commission, 2012). Advertising for sweetened children's drinks was up to 21 million in 2018 (Harris et al, 2019) and nutrition analyses document the poor quality of these marketed drinks (Harris, 2014).

Extensive food marketing is directed toward children because marketers have long known that brand preference begins in advance of consumer behavior (Story & French,

2004). Early exposure builds brand awareness and recognition and develops brand preference and brand loyalty during childhood and adolescence. Targeted youth could easily become future adult consumers (McNeal & McNeal 1999; Story & French, 2004). Not only do children and adolescents themselves spend billions of dollars annually (Strasburger, 2001), but a lifetime customer is estimated to be worth \$100,000 to a retailer (McNeal & Yeh, 1993). Undoubtedly, this is why food companies aggressively pursue efforts to reach consumers starting from childhood.

Given price is considered as the central dimension related to food choices (Glanz et al., 1998) and that youth are a price sensitive population (Ding, 2003; Ross & Chaloupka, 2003), promotions or price strategies are a commonly used marketing technique to reach and attract young people (Wilkie, 1997; Huang et al., 2014). Empirical work demonstrated that signs associated with promotions might have a stand-alone effect in stimulating sales (Inman et al., 1990). For instance, promotion signs were found to influence consumer's purchase decisions, and some consumers may mistakenly believe that only reduced prices are featured (Grover & Srinivasan, 1989; Inman & McAlister, 1993). It was assumed that consumers may consider the item based on the price information and hence alter their choice behavior (Inman & McAlister, 1993). Several population-based intervention studies examined the effect of price strategies on promoting the choice of targeted foods, and the results showed that price promotions are an effective advertising method in community-based settings including worksites and schools (French et al., 2001; French et al., 1997; Hannan et al., 2002). The findings were generalizable across various foods and consistent across populations and socioeconomic groups. In a major review of the food marketing to children, Hastings et al (2003) suggested that promotional activities play an essential role in affecting children's food choices. Unfortunately, much of the literature studying youth-oriented marketing techniques always emphasize taste, fun, novelty, humor, nutrition or

items with brand logos (Cairns et al., 2013; Harris, Bargh, et al., 2009; Harris, Pomeranz, et al., 2009; Jenkin et al., 2014; Mehta et al., 2012), and little attention has been paid to marketing using pricing strategy among youth.

While research related to the influence of F&B advertising on childhood obesity remains in the early stages, several behavior theories have been proposed to explain the underlying mechanism. Advertising likely affects children's dietary behaviors through directly increasing food purchases and through indirectly affecting their normative beliefs to accept the consequences of eating sort type of food regularly without negative feelings. Ehrenberg (1974) argued that advertising is a form of operant conditioning, which could “nudge” consumer behavior by normalizing and increasing the salience of advertised products (Barnard and Ehrenberg, 1997). As illustrated in the ecological models of obesity disparities, inference of causality and social norms theory (Heaney and Israel, 2008), children’s dietary behaviors are heavily influenced by food environments across various levels, such as food specific community environment (e.g., restaurants or grocery stores) and consumer environments (e.g., food availability or accessibility, food affordability and promotional activities) (Ding et al., 2012; Story et al., 2008; Brownell & Walsh, 2017). Thus, the initiation of unhealthy eating behavior may develop in an environment where such behavior is accepted, taken as normal, or even treated as desirable. If children are surrounded by many high-fat, high-calorie food advertisements in their daily life, they may be more likely to believe the advertisements reflect the actions of the majority of people and come to take such unhealthy food as a “normal” diet. Furthermore, Gerbner’s cultivation theory states that the media influences people’s views, attitudes, and beliefs and that the media cultivates people’s desire to emulate those seen on television or in advertisements, which in turn changes behaviors (Gerbner et al., 2002).

One form of advertising that has received very little consideration from researchers, despite its ubiquitous impact on customers, is outdoor advertising. Outdoor advertising refers to billboards, posters, or other signage located in local communities, stores, schools, and any visible location when people are out of their home (Kelly et al., 2008). Outdoor advertising has several attractive characteristics as a marketing tool: messages can approach a broad, unlimited audience, messages are high-visibility, and messages run continuously. When compared to other types of marketing, outdoor advertisements have the unique capability to geographically direct potential consumers and to create an immediate effect on product recognition and brand awareness (Bhargava and Donthu, 1999). In addition, outdoor advertisements have what the advertising industry calls a high “impression rate;” meaning that such advertisements achieve continuous exposure as people have a tendency to look at the same advertisements consistently and repeatedly while traveling to and from home, work, or school (Luke et al., 2000). In the case of children and adolescents, food advertisements near schools can be viewed over and over again because of the static location of outdoor advertisements, and because of the established routes students take to school. Such increased chronic cues with food choices may lead to changes in students’ dietary behaviors, consistent with some behavior theories that “repeated exposure to food advertising can affect food preferences through its influence on normative beliefs” (Heshmat, 2011, p. 66). Poulos and Pasch (2015) have also suggested that outdoor food advertisements may influence childhood and adolescent attitudes and behaviors through peripheral learning, which is defined as learning from the environment around students. Peripheral learning is considered as a significant factor that can develop and change individual attitudes and behaviors (Petty and Cacioppo, 1986). Given the significant potential impact and broad commercial landscape of outdoor food advertising, food companies have spent substantial sums to reach youth directly in the local

community, including in stores, restaurants, child-serving organizations and schools. According to an Out of Home Advertising Association of America (OAAA) report, in 2018, outdoor advertisement spending hit a new annual peak of \$8 billion in the US and has been predicted to grow to \$11.5 billion in 2022 (Global Entertainment & Media Outlook report, 2018). These marketing budgets suggest that children and teens can be exposed to a great amount of outdoor F&B advertising in their daily lives.

Only a few studies have considered outdoor food & beverage advertising specifically near youth-serving areas (Kelly et al., 2008, Kelly et al., 2015, Maher et al., 2005, Herrera and Pasch, 2018, Hillier et al., 2009; Zenk and Powell, 2008; Adams, 2011), and most of the research only focuses on schools without including other institutions as comparable groups to examine if the advertising near schools were more pervasive than other non-youth-serving institutions. Thus, to better understand whether food marketing is directed toward a general audience or is specifically targeted to children, this current study sought to assess and compare outdoor food advertisements between youth-serving institutions (schools) and community-serving institutions (hospitals). In addition, no study to date has explored differences in the prevalence of food & beverage advertising between types of youth-serving institutions (e.g., middle school vs high school). However, comprehension of advertising may differ at each stage of cognitive development in childhood. For instance, young adolescents (11-12 years) can apply multidimensional thinking to comprehend or evaluate advertising, and old adolescents are always persuaded by the emotive messages of advertising (Strasburger, 2001). Although little is known of how advertising impacts youth differently on their developmental stage, it has commonly been assumed that younger adolescents are more likely to be influenced, and they are more susceptible and vulnerable to food advertising than their older peers. Therefore, it reasonable to suspect that if food marketing distinguishes between students by age, marketers will

target their content more heavily to areas near middle school than those near high schools. Finally, most similar studies have only focused on one single advertising variable (e.g., the total volume) but did not include other advertising elements such as advertising category (e.g., fast-food) or strategy (e.g., price information). Therefore, to address the current research gap and to provide a more comprehensive understanding of outdoor advertising environments, this study seeks to examine if outdoor F&B advertisements are located disproportionately in school areas and targeted directly toward youth—with an emphasis on reaching young children. This study aims to 1) quantify the number and type of outdoor F& B advertising in three public environments: middle schools, high schools and hospitals in Austin; and 2) examine whether advertisements varied by location in terms of number, unhealthy type (e.g., fast-food ), and promotion strategy (e.g., price, combination deal).

## **Chapter 2: Study Aims and Hypotheses**

1. To determine if the volume of outdoor F&B ads, the volume of fast-food advertisements and the volume of F&B ads displaying with price information varies by middle schools, high schools, and hospitals in Austin, Texas.

Hypothesis 1: Middle schools will have the greatest total number of F&B advertisements, the greatest total number of fast-food advertisements and the greatest total number of F&B ads containing price information compared to high schools and hospitals respectively, followed by high schools, then hospitals.

2. To determine if the proportion of fast-food ads and the proportion of ads containing price information varies by middle schools, high schools and hospitals.

Hypothesis 2a: The proportion of fast-food ads near middle schools will be the highest compared to high schools and hospitals, followed by high schools, then hospitals.

Hypothesis 2b: The proportion of ads containing price information near middle schools will be the highest compared to high schools and hospitals, followed by high schools, then hospitals.

## **Chapter 3: Methods**

### **3.1 STUDY DESIGN**

This secondary data analysis used data collected for The Outdoor MEDIA (Measuring and Evaluating the Determinants and Influence of Advertising) study (Pasch & Poulos, 2013; Poulos & Pasch, 2015; Herrera & Pasch, 2015). Outdoor MEDIA was an observational study which was designed to document and explain the prevalence of outdoor F&B advertisements within a half-mile of 33 middle schools, 13 high schools and 8 hospitals in Central Texas. Photos of advertisements were collected and sorted by category, type, and subject using The Outdoor MEDIA DOT (Direct Observation Tool) and coded based on the descriptive themes created for this research.

### **3.2 STUDY SUBJECTS**

In this study, institutions (hospitals, middle and high schools) are the unit of analysis. All F&B advertisements (n=6,810) within a half-mile radius of 33 middle schools, 13 high schools and 8 hospitals in central Texas were documented and described.

### **3.3 DATA COLLECTION**

To collect data, researchers created maps that represented the streets located within a half-mile radius (800m) of each data collection institution. Then, they made driving directions and photographed each FB advertisement. Finally, they documented descriptive information objectively by using an electronic tool that was developed for the Outdoor MEDIA study (Pasch and Poulos 2013; Poulos and Pasch 2015).

A half-mile radius was selected for three primary reasons. First, based on current research, the optimal mean range of buffers was suggested to be 904 meters (Davis and Carpenter 2009; Hillier et al. 2009; Walton et al., 2009; Adams et al., 2011; Day and Pearce

2011). However, 904 meters (0.56 miles) is not the most practical unit for a study conducted in Austin, Texas and its environments. Thus, a half-mile, which is roughly equivalent to 800 meters, was used as the measure for this study. Second, a half-mile (or 800-meter) is a reasonable distance for an individual to walk from their residence to public institutions. Multiple research has indicated that fast-food restaurants or groceries are systematically focused within a short walking distance of schools (Zenk & Powell, 2008; Davis & Carpenter, 2009). Moreover, a range of walkability indices have been linked with active transport in adults and adolescents (Carlson et al., 2015;) Children and young adults have also been found to be most likely to walk to school if their residences are located within 800-meter (Oliver et al., 2014). Finally, the practicability and reliability of an 800-meter buffer had been supported by pilot data collection. More detail on data collection methodology can be found in Pasch and Poulos (2013) and Poulos and Pasch 2015.

Maps were created by outlining an 800-meter circular buffer surrounding schools and hospitals by ESRI ArcGIS (Environmental Systems Resource Institute, 2010). Also, turn-by-turn driving directions were included to make certain that the data collection team systematically drove down every possible street (Poulos and Pasch, 2015). During field data collection, data collectors followed the driving directions down each street located within the 800-meter radius of each institution. Global positioning system (GPS) coordinates and two Garmin eTrex (Garmin, 2010) handheld devices were put to use for checking the location of advertisements. When data collectors saw a food and beverage advertisement or establishment, they would take a photo, document the GPS coordinate and data collection record using an iPod touch. If the 800-m buffer intersected with another street or the buffer's end point was difficult to discern, data collectors chose the closest appropriate stopping point such as the next block. All data were collected and completed electronically using The Outdoor MEDIA Direct Observation Tool (DOT).

### 3.4 MEASURES

Data were collected and processed based on the category, type, and subject of advertisement for this study. For the purpose of this study, an “advertisement” refers to any signage promoting food or beverage that was freestanding or not directly placed on the establishment building (e.g., signs on gas pumps, sidewalks, A-frames, banners, billboards). Once field data collection was finished, advertisements were coded for content. For this study, the themes of “fast-food advertisements” and “ads containing with price information” were used. Fast food ads were ads that were associated with a fast food establishment. A fast food establishment was defined as a food outlet where food is ordered from a counter. “Price information” was defined as an advertisement that displays information relating to costs, combo deals, or value of an item.

#### *Variables*

##### *Dependent Variables*

*Total Number of Overall Food & Beverage (F&B) Advertisements.* Counts of outdoor F&B advertisements were calculated as the total number of F&B advertisements documented around the observed hospitals, middle and high schools within a one-half mile radius.

*Total Number of Overall Fast Food Advertisements.* Counts of outdoor F&B advertisements located on outlets defined as fast food (i.e., where food is ordered from a counter) were calculated as the total number of F&B advertisement coded as “fast food.”

*Total Number of Price information Advertisements.* Similarly, counts of outdoor F&B advertisements that display information relating to costs, combo deals, or value of item were calculated as the total number of F&B advertisement coded as “price information.”

##### *Independent Variables*

*Middle schools.* Thirty-three middle schools located in the Austin, Texas area were included in the present study.

*High schools.* Thirteen high schools located in the Austin, Texas area were included.

*Hospitals.* Nine hospitals located in the Austin, Texas area.

*School-level Socio-economic status:* Percentage of students eligible for free or reduced-priced (FRL) with the schools was obtained from the Texas Education Agency for each school and included as a continuous covariate.

### **3.4 DATA ANALYSIS**

Descriptive statistics were calculated for total numbers and mean numbers of the following variables: total overall F&B ads, fast-food ads, and F&B ads displaying price information. To compare mean differences in total F&B ads, fast-food ads, and F&B ads containing price information across middle schools, high schools, and hospitals, a one-way analysis of variance (ANOVA) was conducted. Further, a multiple linear regression analysis was conducted to examine if there were differences in food and beverage advertising by school type controlling for school-level socioeconomic status (SES), as previous research has found differences based on SES. Hospitals were not included in the regression models as SES data was not available. The regression models were run for each outcome for a total of three models (i.e., total ads, fast-food ads, and ads with price information).

To examine if the proportion of fast-food ads and ads with price information in all F&B ads varied across middle schools, high schools, and hospital, a chi-square test was used. Partitions of  $\chi^2$  method was used for post-hoc tests to compare pair-wise differences

between groups (middle school, high school, and hospitals). All analyses were conducted with SPSS Version 26 (SPSS, 2019).

## Chapter 4: Result

Table 1: Characteristics of Middle Schools, High Schools, and Hospitals and Food and Beverage Advertising

	Free or Reduced lunch	Overall F&B ads Counts			Fast-food ads Counts				F&B ads with price information Counts			
		%	N	M	SD	N	M	SD	% of total F&B ads	N	M	SD
Middle school n=33	58.2	3899	118.2	146.0	1964	59.5	91.3	50.4	715	21.7	27.4	21.7
High school n=13	61.5	1855	142.7	142.3	817	62.9	76.9	44.0	414	31.9	40.2	31.9
Hospital n=8	-	1056	132.0	144.1	526	65.8	90.5	49.8	155	19.4	18.9	19.4
Total n=54	-	6810	126.1	142.5	3307	61.2	86.4	48.6	1284	23.8	29.8	23.9

A total of 33 middle schools, 13 high schools, and 8 hospitals in Central Texas were included in the analysis. A total of 6,810 food & beverage advertisements, 3,307 fast-food ads, and 1,284 F&B ads displaying price information were identified within a half-mile of sampled institutions. Middle schools had a total of 3,899 F&B ads, 1,964 fast-food ads, and 715 F&B ads with price information. High schools had a total of 1,855 F&B ads, 817 fast-food ads, and 414 F&B ads with price information. Hospitals had a total of 1,056 F&B ads, 526 fast-food ads, and 155 F&B ads with price information (see Table 1).

Across all types of institutions, almost half of all ads were for fast food products: middle schools (50.4%), high schools (44.0%), and hospitals (49.8%). For middle schools, 21.7% of the total F&B ads had price information; for high schools, 31.9% contained price information; and for hospitals, 19.4% of ads contained price information (see Table 1).

For the total number of F&B ads, there was no statistical evidence for mean differences among the middle schools ( $M = 118.2$ ), high schools ( $M = 142.7$ ) and hospitals ( $M = 132.0$ ),  $F(2, 51) = .1, p = >.05$ . For fast-food ads, the mean number of fast-food ads within a half-mile of hospitals was 65.8, within a half-mile of middle schools the mean was 59.5, and within a half-mile of high schools the mean was 62.9. These differences were not significantly different  $F(2, 51) = .0, p = >.05$ . For F&B ads displaying price information, the mean number around high schools were 31.9, the mean number around middle schools were 21.7, and the mean number around hospitals was 19.4; however, these differences were not statistically significant:  $F(2, 51) = .6, p = >.05$ . In the regression model to examine differences in F&B ads by school type controlling for socioeconomic status, there was no significant difference in the mean of F&B ads by school type ( $b = -15.9, t = -1.4, p >.05$ ).

The proportion of fast-food ads out of all F&B ads within a half-mile of the middle schools, high schools, and hospitals was 50.4%, 44.0%, and 49.8% respectively. The proportional difference across the three types of institutions was significant,  $\chi^2(2, N = 6810) = 20.9, p < 0.001$ . Post hoc comparisons revealed that the proportion of fast-food ads near high schools (44.0%) was significantly lower than middle schools (50.4%) and hospitals (49.8%).

Ads containing price information accounted for 22.3% of all F&B ads near high schools, 18.4% of all F&B ads around middle schools, and 14.7% of all F&B ads around hospitals. The proportional difference across three types of was significant,  $\chi^2(2, N = 6810) = 27.3, p < 0.001$ . Post hoc comparisons revealed that the proportion of ads containing price information around high schools (22.3%) was significantly higher compared to middle schools (18.3%) and hospitals (14.7%), while the middle schools had a significantly higher proportion as compared to hospitals.

## Chapter 5: DISCUSSION

In this study, no differences in the mean number of outdoor F&B advertising (e.g. overall ads number, overall fast-food ads, overall F&B ads containing price information) were reported between youth-serving institutions (middle and high schools) and community-serving institutions (hospitals). Although there were no statistically significant differences in total F&B ads, there were differences in the types of advertising. Specifically, middle schools and hospitals had a higher proportion of fast-food ads as compared to high schools. High schools and middle schools had a significantly higher proportion of F&B ads containing price information as compared to hospitals, and high schools had a significantly higher proportion of price information ads as compared to middle schools. Further, the number of F&B ads containing price information was significantly correlated with socioeconomic characteristics of schools, suggesting students who attend schools with a greater percentage of students receiving free or reduced-price lunch may be exposed to more F&B ads. Therefore, we recommend that some marketing of foods and beverages may be not directed toward a general audience but appears to target select vulnerable populations including youth.

Findings from this study did not show that F&B ads are more prevalent among child-serving institutions as compared to more general community-serving institutions, which may be attributed to several reasons. First, because a limited number of hospitals are enrolled in the study, the hospitals may not be truly representative of community-serving institutions. Compared to 46 schools, only 8 hospitals were studied in Austin. Although the data in each group met the ANOVA assumption, the imbalanced sample size could increase bias and influence results. Future research should consider choosing other types of community-serving institutions (e.g., residential communities) that may include more

available samples and makeup to equal comparable groups. Second, another potential explanation is that some environmental factors confound the relationship between institution type and advertising exposures. Previous research has found that socioeconomic status (Johnston et al., 2007; Latimer, 2013; Terry-McElrath et al., 2014), racial/ethnic background (Nanney et al., 2013; Larson et al., 2014), and geographic location (Adachi-Mejia et al., 2013; Caspi et al., 2015) were closely correlated with food and beverage advertising near school areas, which suggests that study context and potentially confounding characteristics of the school environment may influence findings. For instance, Kelly et al. (2008) found that there were proportionally fewer unhealthy food advertisements in high-SES versus low-SES neighborhoods around schools in Australia, while Maher et al. (2005) found significantly more ‘unhealthy’ food advertisements in high-SES versus low-SES neighborhoods near schools in New Zealand. Conversely, a study in Minnesota found that areas, where schools prohibited advertising, did not vary with school type (Larson et al., 2014), and similar results can be seen in a Polish study that failed to find differences in advertising by school type (Mazur et al., 2008).

Across all three types of institutions in this study, nearly half of all F&B ads belong to the fast-food category. Notably, the proportion of fast-food ads near middle schools was significantly higher than near high schools, although not substantially different from hospitals. First, compared to senior high school students, this result may suggest the food marketers are intensifying efforts to target early adolescent youth in middle schools. This is alarming because younger adolescents can be more vulnerable to misleading advertising than older adolescents due to their underdeveloped cognitive abilities (Institute of Medicine, 2006; John, 1999; Roedder, 1981). However, as youth age, even over a school year, they can become more disbelieving of advertising claims. The level of skepticism toward advertising was positively correlated to having a more adult understanding of

advertising tactics (Boush et al., 1994), and older adolescents are able to articulate a critical understanding of advertising and predict the intentions of the advertisers (Livingstone & Helsper, 2004). Thus, high school students may be more skeptical of fast-food advertising and have a greater capacity to resist its influence than middle schools. Taken together, because advertisers are aware of that high school students are better able to discern marketing tactics, and they may be less likely to target areas with greater amounts of older youth. These might explain the lowest fast-food ads proportion near high schools.

Moreover, the large proportion of fast-food ads near both middle (50.4%) and high schools (44.0%) suggests student are exposed to a considerable amount of unhealthy food marketing. This is in line with previous research findings that fast-food products are promoted to youth in general (Chester & Montgomery, 2007; Finkelstein et al., 2008) and advertisements touting high-calorie and low-nutrient foods occur with high density and frequency around public areas serving children (Maher et al., 2005; Hillier et al., 2009; Zenk and Powell, 2008; Adams et al., 2011). The significantly higher prevalence of fast food advertisements does not meet government recommendations for a balanced diet near schools when compared with other areas (Adams et al., 2011; Maher, 2005). Additionally, several studies have quantified children's and adolescents' exposure to advertising, showing that increased exposure to unhealthy food advertisements facilitates the unhealthy food intake (Boyland & Halford, 2013; Costa et al., 2012; Cervi et al., 2017). In the current study, when one of every two F&B ads they see daily is for fast-food options, youth can easily consider fast-food choices as normative and acceptable, which may lead to less-healthy eating behavior and, consequently, the development of obesity. All the above points to the importance of public policies that regulate the content of outdoor F&B advertising near schools. Although there are no specific standard regulations in U.S. (Yale Rudd Center for Food Policy and Obesity, 2013), zoning regulations and school policies

have been used to limit the availability and advertising of unhealthy foods within and near school grounds in other countries (Korean Ministry of Food and Drug Safety, 2010; World Health Organization Western Pacific Region, 2012).

Contrary to our hypothesis, this study did not show that hospitals, being non-youth-serving institutions, had a significantly lower proportion of fast-food advertising than middle and high schools. However, the proportion of fast-food ads near hospitals was significantly higher when compared to high schools. People who go to the hospital to receive outpatient services or to visit a sick patient may be at greater risk for stress. For example, those receiving outpatient services are typically under stress while meeting with nurses and physicians, waiting for results and/or a diagnosis, or suffering pain from an illness. Similarly, people who are visiting their relatives or friends in hospitals may also be at increased risk for stress and worry. The linkage between one's psychological state and unhealthy food consumption has been under investigation in recent years. Symptoms of stress, depression, and disappointments were found to cause an inclination to eat high calorie and non-nutritious foods (Vilija & Romualdas, 2014; Tariq et al., 2019; Maier, et al., 2015). Maier and colleagues (2015) suggested stress may undermine self-control through strengthening the impact of immediately rewarding attributes and they advised to stay away from junk food when people are under pressure. Therefore, fast-food ads around hospitals may serve as a cue for those visiting or in the hospital to crave less healthy food options as a means of coping with a stressful or depressing situation. Moreover, visitors may bring unhealthy food to patients in hospitals, who therefore can be considered as a nutritionally-vulnerable people group. While diet is strongly related to care, treatment, and recovery, poor nutrition seems to be an important issue in hospitals where 40% of adults and 15% of children are reported to be undernourished (Davis & Bristow, 1999). Therefore, the high frequency of fast-food ads near hospitals could influence individual food choices,

which may deteriorate health conditions. Future studies might investigate this situation in more depth.

The proportion of F&B ads containing price information near middle schools or high schools was significantly greater than near hospitals, and the proportion of F&B ads containing price information near high schools was significantly higher than around middle schools, suggesting price strategies were particularly pervasive near high schools. The cost of food and beverages was found to be the most notable predictor of dietary choices, especially among those with limited incomes like youth (Power, 2005; Drewnowski & Specter, 2004). F&B ads containing price information or promotion were seen as a marketing strategy, which can be notably effective for appealing youth due to their state of dependence and limited allowance (Grier & Kumanyika, 2008; Wilkie, 1997). This present study found that pricing strategies are more commonplace among youth-serving institutions than community-serving institutions, which may reflect a larger trend of intensified commercial efforts to reach kids and teens (Federal Trade Commission, 2012). Such food marketing tactics not only could trigger youth to make unplanned purchases (Pasch et al., 2007; Moodie et al., 2013) but also could build brand awareness and develop brand preference during childhood and adolescence (McNeal 1999; Story & French, 2004). Although contrary to our hypothesis, this finding is in agreement with a previous study that showed that higher-grade schools reflected a more commercial landscape (Velazquez et al., 2015). There are several reasonable explanations. First, older students have greater access to money and opportunities where they can purchase food independently (Velazquez et al., 2015). Darling and colleagues (2006) likewise found that students with more spending money had higher odds of regularly buying food off campus. Second, older students may travel farther distances to school and are allowed off-campus more usual in the daytime owing to different policies between middle and high schools. For instance,

Velazquez and colleagues (2015) found secondary students had significantly higher odds of weekly off-campus food purchasing compared with students in elementary grades. In North America, students in secondary schools normally had more opportunities to buy food on campus than elementary schools (Rideout et al., 2007). Thus, it may make higher-grade schools more attractive to food and beverage companies that aim to promote their products and make use of the older students' purchasing capacity. Because a causal relationship between F&B marketing strategy and youth dietary habits has been suggested (Halford et al., 2008; Robinson et al., 2007), other types of F&B advertising strategies near schools need to be explored in future research.

Based on regression results, schools eligible for free or reduced-priced (FRL) lunch programs were found to be associated with the number of F&B ads containing price information. Specifically, as the percentage of students in the school who were eligible for FRL increased, so did the number of F&B ads contain price information. Given that FRL programs are often identified as a proxy for SES (U.S. Department of Education, 2006), the current study suggested that food and beverage marketing price promotion strategies are more prevalent in lower socioeconomic areas. Previously, a study showed that a higher prevalence of F&B advertising was found in lower-income communities no matter the race/ethnicity of the local residents (Isgor et al., 2016). A growing body of literature has documented how various types of advertising targeting income groups may contribute to socio-demographic disparities in obesity and non-communicable disease risk (Darmon & Drewnoswki, 2008). Comprehensive policies in low-income areas are needed to address these disparities.

The strengths of this study are noteworthy. First, unlike most research focusing on single elements of the advertising environment, this is the first study (to our knowledge) that compares volume and type of outdoor F&B ads across different types of institutions.

Second, the data was collected objectively using digital tools. Methods involved thorough training of research staff, pilot fieldwork, and reliability testing. Third, all ads were within feasible walking distance to and from the institutions. However, this study has some limitations. First, the sample size was relatively small (46 schools and eight hospitals), and all samples were taken in the Austin, Texas metropolitan area which may not be generalizable beyond a regional level. A larger, more demographically, and geographically-diverse sample, such as a nationally-representative sample, could be used in future work. This smaller sample size may have limited the ability to detect differences between institution type. Also, other community-serving institutions, such as parks or youth centers were not included but would be essential institutions to include in the future. Finally, as this was a cross-sectional study, data were collected at a single point in time. In spite of these limitations, this study adds to the existing literature by suggesting that a high proportion of fast-food ads in F& B advertising in public areas, and youth may be more heavily exposed to outdoor F&B marketing strategy when compared to other residents. Therefore, policies that restrict or regulate the advertising of food and beverage products near youth-serving institutions are needed.

## CONCLUSION

This study examined and compared the food and beverage advertising environment (total number and type for F&B ads) across youth-serving institutions (33 middle schools and 13 high schools) and community-serving institutions (8 hospitals) in Austin, Texas. These findings indicate that the proportion of fast-food ads compared to overall F&B ads near middle schools and hospitals was significantly greater than the same proportion near high schools. Also, the proportion of F&B ads containing price information around middle schools or high schools was significantly higher than around hospitals. These advertisements may motivate the purchase and consumption of less-healthy food, which has been suggested as a potential causal factor in weight gain and obesity. More research on the food marketing environments of youth and obesity is urgently needed. Future policies regarding outdoor advertising should focus on the reduction of the frequency of unhealthy foods as well as food marketing strategies near youth-serving areas. The findings of this study add to a growing body of evidence that outdoor advertising guidelines and regulations are required in the U.S.

## REFERENCES

- Adachi-Mejia, A. M., Longacre, M. R., Skatrud-Mickelson, M., Li, Z., Purvis, L. A., Titus, L. J., ... & Dalton, M. A. (2013). Variation in access to sugar-sweetened beverages in vending machines across rural, town and urban high schools. *Public Health, 127*(5), 485-491.
- Adams, J., & White, M. (2009). Socio-economic and gender differences in nutritional content of foods advertised in popular UK weekly magazines. *European Journal of Public Health, 19*(2), 144-149.
- Adams, J., Ganiti, E., & White, M. (2011). Socio-economic differences in outdoor food advertising in a city in Northern England. *Public Health Nutrition, 14*(6), 945-950.
- Ahmad, Q. I., Ahmad, C. B., & Ahmad, S. M. (2010). Childhood obesity. *Indian Journal of Endocrinology and Metabolism, 14*(1), 19.
- Afshin, A., Reitsma, M. B., & Murray, C. J. (2017). Health Effects of Overweight and Obesity in 195 Countries. *The New England Journal of Medicine, 377*(15), 1496.
- Anderson, P. M., & Butcher, K. F. (2006). *Childhood obesity: trends and potential causes. The Future of Children, 19-45.*
- Andreyeva, T., Kelly, I. R., & Harris, J. L. (2011). Exposure to food advertising on television: associations with children's fast food and soft drink consumption and obesity. *Economics & Human Biology, 9*(3), 221-233.
- Barnard, N., & Ehrenberg, A. (1997). Advertising: strongly persuasive or nudging? *Journal of Advertising Research, 37*, 21-32.
- Balfour Jeffrey, D., McLellarn, R. W., & Fox, D. T. (1982). The development of children's eating habits: the role of television commercials. *Health Education Quarterly, 9*(2-3), 78-93.
- Bhargava, M., & Donthu, N. (1999). Sales response to outdoor advertising. *Journal of Advertising Research, 39*(4), 7-7.
- Boush, D. M., Friestad, M., & Rose, G. M. (1994). Adolescent skepticism toward TV advertising and knowledge of advertiser tactics. *Journal of Consumer Research, 21*(1), 165-175.
- Boyland, E. J., & Halford, J. C. (2013). Television advertising and branding. Effects on eating behaviour and food preferences in children. *Appetite, 62*, 236-241.
- Boyland, E. J., & Whalen, R. (2015). Food advertising to children and its effects on diet: review of recent prevalence and impact data. *Pediatric Diabetes, 16*(5), 331-337.
- Brownell, K. D., & Walsh, B. T. (Eds.). (2017). *Eating disorders and obesity: A comprehensive handbook*. Guilford Publications.

- Buxton, C., & Hagan, J. E. (2012). A survey of energy drinks consumption practices among student-athletes in Ghana: lessons for developing health education intervention programmes. *Journal of the International Society of Sports Nutrition*, 9(1), 9.
- Buijzen, M., Schuurman, J., & Bomhof, E. (2008). Associations between children's television advertising exposure and their food consumption patterns: A household diary–survey study. *Appetite*, 50(2-3), 231-239.
- Cairns G, Angus K, Hastings G, Caraher M. Systematic reviews of the evidence on the nature, extent and effects of food marketing to children. A retrospective summary. *Appetite*. 2013; 62:209–15.
- Campbell, M. K. (2016). Biological, environmental, and social influences on childhood obesity. *Pediatric Research*, 79(1), 205-211.
- Caleyachetty, R., Echouffo-Tcheugui, J. B., Tait, C. A., Schilsky, S., Forrester, T., & Kengne, A. P. (2015). Prevalence of behavioural risk factors for cardiovascular disease in adolescents in low-income and middle-income countries: an individual participant data meta-analysis. *The Lancet Diabetes & Endocrinology*, 3(7), 535-544.
- Carlson, J. A., Saelens, B. E., Kerr, J., Schipperijn, J., Conway, T. L., Frank, L. D., ... & Sallis, J. F. (2015). Association between neighborhood walkability and GPS-measured walking, bicycling and vehicle time in adolescents. *Health & Place*, 32, 1-7.
- Carter, O. B., Patterson, L. J., Donovan, R. J., Ewing, M. T., & Roberts, C. M. (2011). Children's understanding of the selling versus persuasive intent of junk food advertising: Implications for regulation. *Social Science & Medicine*, 72(6), 962-968.
- Caspi, C. E., Davey, C., Nelson, T. F., Larson, N., Kubik, M. Y., Coombes, B., & Nanney, M. S. (2015). Disparities persist in nutrition policies and practices in Minnesota secondary schools. *Journal of the Academy of Nutrition and Dietetics*, 115(3), 419-425.
- Cairns, G., Angus, K., Hastings, G., & Caraher, M. (2013). Systematic reviews of the evidence on the nature, extent and effects of food marketing to children. A retrospective summary. *Appetite*, 62, 209-215.
- Cervi, M. M., Agurs-Collins, T., Dwyer, L. A., Thai, C. L., Moser, R. P., & Nebeling, L. C. (2017). Susceptibility to food advertisements and sugar-sweetened beverage intake in non-Hispanic black and non-Hispanic white adolescents. *Journal of Community Health*, 42(4), 748-756.
- Childhood Obesity Facts. (2019, June 24). Retrieved August 09, 2020, from <https://www.cdc.gov/obesity/data/childhood.html>

- Chester, J., & Montgomery, K. (2007). Interactive Food and Beverage Marketing: Targeting Children and Youth in the Digital Age” a report from Berkeley Media Studies Group.
- Chou, S. Y., Rashad, I., & Grossman, M. (2008). Fast-food restaurant advertising on television and its influence on childhood obesity. *The Journal of Law and Economics*, 51(4), 599-618.
- Costa, S. M. M., Horta, P. M., & dos Santos, L. C. (2012). Food advertising and television exposure: influence on eating behavior and nutritional status of children and adolescents. *Archivos latinoamericanos de nutricion*, 62(1), 53.
- Code, M. F. (2010). Ministry of Food and Drug safety. Republic of Korea.
- Crawford, D. A., Timperio, A. F., Salmon, J. A., Baur, L., Giles-Corti, B., Roberts, R. J., ... & Ball, K. (2008). Neighbourhood fast food outlets and obesity in children and adults: the CLAN Study. *International Journal of Pediatric Obesity*, 3(4), 249-256.
- Davis, B., & Carpenter, C. (2009). Proximity of fast-food restaurants to schools and adolescent obesity. *American Journal of Public Health*, 99(3), 505-510.
- Davis, A. M., & Bristow, A. (1999). *Managing nutrition in hospital: a recipe for quality* (p. 8). Nuffield Trust.
- Day, P. L., & Pearce, J. (2011). Obesity-promoting food environments and the spatial clustering of food outlets around schools. *American Journal of Preventive Medicine*, 40(2), 113-121.
- Dalton, M. A., Longacre, M. R., Drake, K. M., Cleveland, L. P., Harris, J. L., Hendricks, K., & Titus, L. J. (2017). Child-targeted fast-food television advertising exposure is linked with fast-food intake among pre-school children. *Public Health Nutrition*, 20(9), 1548-1556.
- Darmon, N., & Drewnowski, A. (2008). Does social class predict diet quality? *The American Journal of Clinical Nutrition*, 87(5), 1107-1117.
- Darling, H., Reeder, A. I., McGee, R., & Williams, S. (2006). Brief report: Disposable income, and spending on fast food, alcohol, cigarettes, and gambling by New Zealand secondary school students. *Journal of adolescence*, 29(5), 837-843.
- Ding, A. (2003). Youth are more sensitive to price changes in cigarettes than adults. *The Yale journal of biology and medicine*, 76(3), 115.
- Ding, D., Sallis, J. F., Norman, G. J., Saelens, B. E., Harris, S. K., Kerr, J., ... & Glanz, K. (2012). Community food environment, home food environment, and fruit and vegetable intake of children and adolescents. *Journal of Nutrition Education and Behavior*, 44(6), 634-638.
- Drewnowski, A., & Specter, S. E. (2004). Poverty and obesity: the role of energy density and energy costs. *The American Journal of Clinical Nutrition*, 79(1), 6-16.

- Einarson, T. R., Acs, A., Ludwig, C., & Panton, U. H. (2018). Prevalence of cardiovascular disease in type 2 diabetes: a systematic literature review of scientific evidence from across the world in 2007–2017. *Cardiovascular Diabetology*, *17*(1), 83.
- Ehrenberg, A. S. (1974). Repetitive advertising and the consumer. *Journal of Advertising Research*, *14*(2), 25-34.
- Ezzati, M., Lopez, A. D., Rodgers, A. A., & Murray, C. J. (2004). *Comparative quantification of health risks: global and regional burden of disease attributable to selected major risk factors*. World Health Organization.
- Emery, S. L., Szczypka, G., Powell, L. M., & Chaloupka, F. J. (2007). Public health obesity-related TV advertising: lessons learned from tobacco. *American Journal of Preventive Medicine*, *33*(4), S257-S263.
- Environmental Systems Resource Institute (ESRI). (2010). ArcMap 10.
- Federal Trade Commission. (2008). Marketing food to children and adolescents: A review of industry expenditures, activities, and self-regulation. *Washington, DC: Federal Trade Commission*, 149.
- Federal Trade Commission. (2017). A review of food marketing to children and adolescents: follow-up report. 2012. Washington, DC)[Google Scholar].
- Federal Trade Commission. A review of food marketing to children and adolescents: a follow-up report. 2012. [www.ftc.gov/reports/review-food-marketing-children-adolescents-follow-report](http://www.ftc.gov/reports/review-food-marketing-children-adolescents-follow-report).
- Finkelstein, D. M., Hill, E. L., & Whitaker, R. C. (2008). School food environments and policies in US public schools. *Pediatrics*, *122*(1), e251-e259.
- French, S. A., Story, M., & Jeffery, R. W. (2001). Environmental influences on eating and physical activity. *Annual Review of Public Health*, *22*(1), 309-335.
- French, S. A., Jeffery, R. W., Story, M., Hannan, P., & Snyder, M. P. (1997). A pricing strategy to promote low-fat snack choices through vending machines. *American Journal of Public Health*, *87*(5), 849-851.
- French, S. A., Jeffery, R. W., Story, M., Breitlow, K. K., Baxter, J. S., Hannan, P., & Snyder, M. P. (2001). Pricing and promotion effects on low-fat vending snack purchases: the CHIPS Study. *American journal of public health*, *91*(1), 112.
- Friel, S., Chopra, M., & Satcher, D. (2007). Unequal weight: equity oriented policy responses to the global obesity epidemic. *BMJ*, *335*(7632), 1241-1243.
- Fryar, C. D., Carroll, M. D., & Ogden, C. L. (2018). Prevalence of overweight, obesity, and severe obesity among children and adolescents aged 2–19 years: United States, 1963–1965 through 2015–2016.
- Garmin, 2010. Garmin eTrex Portable GPS Naviagtor.

- Gerbner, G., Gross, L., Morgan, M., Signorielli, N., & Shanahan, J. (2002). Growing up with television: Cultivation processes. *Media effects: Advances in Theory and Research*, 2, 43-67.
- Glanz, K., Basil, M., Maibach, E., Goldberg, J., & Snyder, D. A. N. (1998). Why Americans eat what they do: taste, nutrition, cost, convenience, and weight control concerns as influences on food consumption. *Journal of the American Dietetic Association*, 98(10), 1118-1126.
- Goodman, E., & Whitaker, R. C. (2002). A prospective study of the role of depression in the development and persistence of adolescent obesity. *Pediatrics*, 110(3), 497-504.
- Gorn, G. J., & Goldberg, M. E. (1982). Behavioral evidence of the effects of televised food messages on children. *Journal of Consumer Research*, 9(2), 200-205.
- Grier, S. A., & Kumanyika, S. (2010). Targeted marketing and public health. *Annual review of Public Health*, 31, 349-369.
- Grier, S. A., & Kumanyika, S. K. (2008). The context for choice: health implications of targeted food and beverage marketing to African Americans. *American Journal of Public Health*, 98(9), 1616-1629.
- Grier, S. A., Mensinger, J., Huang, S. H., Kumanyika, S. K., & Stettler, N. (2007). Fast-food marketing and children's fast-food consumption: exploring parents' influences in an ethnically diverse sample. *Journal of Public Policy & Marketing*, 26(2), 221-235.
- Grover, R., & Srinivasan, V. (1989). *Evaluating the effects of retail promotions in segmented markets*. Graduate School of Business, Stanford University.
- Hannan, P., French, S. A., Story, M., & Fulkerson, J. A. (2002). A pricing strategy to promote sales of lower fat foods in high school cafeterias: acceptability and sensitivity analysis. *American Journal of Health Promotion*, 17(1), 1-6.
- Hastings, G., Stead, M., McDermott, L., Forsyth, A., MacKintosh, A. M., Rayner, M., ... & Angus, K. (2003). Review of research on the effects of food promotion to children. *London: Food Standards Agency*.
- Hales, C. M., Fryar, C. D., Carroll, M. D., Freedman, D. S., & Ogden, C. L. (2018). Trends in obesity and severe obesity prevalence in US youth and adults by sex and age, 2007-2008 to 2015-2016. *Jama*, 319(16), 1723-1725.
- Hales, C. M., Carroll, M. D., Fryar, C. D., & Ogden, C. L. (2017). Prevalence of obesity among adults and youth: United States, 2015–2016.
- Halford, J. C., Boyland, E. J., Hughes, G. M., Stacey, L., McKean, S., & Dovey, T. M. (2008). Beyond-brand effect of television food advertisements on food choice in children: the effects of weight status. *Public Health Nutrition*, 11(9), 897-904.

- Harris, J. L. (2014). *Sugary drink FACTS 2014: Sugary drink marketing to youth: Some progress but much room to improve*. Rudd Center for Food Policy and Obesity.
- Harris, J. L., & Graff, S. K. (2012). Protecting young people from junk food advertising: implications of psychological research for First Amendment law. *American Journal of Public Health, 102*(2), 214-222.
- Harris, J. L., Bargh, J. A., & Brownell, K. D. (2009). Priming effects of television food advertising on eating behavior. *Health Psychology, 28*(4), 404.
- Harris, J. L., Pomeranz, J. L., Lobstein, T., & Brownell, K. D. (2009). A crisis in the marketplace: how food marketing contributes to childhood obesity and what can be done. *Annual Review of Public Health, 30*, 211-225.
- Harris, J. L., Schwartz, M. B., & Brownell, K. D. (2010). Marketing foods to children and adolescents: licensed characters and other promotions on packaged foods in the supermarket. *Public Health Nutrition, 13*(3), 409-417.
- Harris, J. L., Schwartz, M., Shehan, C., Hyary, M., Appel, J., Haraghey, K., & Li, X. (2015). *Snack FACTS 2015: Evaluating snack food nutrition and marketing to youth*. Rudd Center for Food Policy & Obesity.
- Harris, J., Romo-Palafox, M., Choi, Y., & Kibwana, A. (2019). Children's Drink FACTS 2019: Sales, Nutrition, and Marketing of Children's Drinks. *UConn Rudd Center for food policy & obesity*.
- Hawkes, C. (2006). Uneven dietary development: linking the policies and processes of globalization with the nutrition transition, obesity and diet-related chronic diseases. *Globalization and Health, 2*(1), 4.
- Herrera, A. L., & Pasch, K. E. (2018). Targeting Hispanic adolescents with outdoor food & beverage advertising around schools. *Ethnicity & Health, 23*(6), 691-702.
- Heaney, C. A., & Israel, B. A. (2008). *Social networks and social support. Health behavior and health education: Theory, research, and practice, 4*, 189-210.
- Heshmat, S. (2011). *Eating behavior and obesity: Behavioral economics strategies for health professionals*. springer publishing company.
- Huang, H. C., Chang, Y. T., Yeh, C. Y., & Liao, C. W. (2014). Promote the price promotion. *International Journal of Contemporary Hospitality Management*.
- Hillier, A., Cole, B. L., Smith, T. E., Yancey, A. K., Williams, J. D., Grier, S. A., & McCarthy, W. J. (2009). Clustering of unhealthy outdoor advertisements around child-serving institutions: a comparison of three cities. *Health & Place, 15*(4), 935-945.
- Hoad, V., Somerford, P., & Katzenellenbogen, J. (2010). High body mass index overtakes tobacco as the leading independent risk factor contributing to disease burden in

- Western Australia. *Australian and New Zealand Journal of Public Health*, 34(2), 214-215.
- Home - UConn Rudd Center for Food Policy and Obesity. (n.d.). Retrieved August 10, 2020, from <http://www.uconnruddcenter.org/>
- Hruby, A., & Hu, F. B. (2015). The epidemiology of obesity: a big picture. *Pharmacoeconomics*, 33(7), 673-689.
- Institute of Medicine (US). Committee on Food Marketing and the Diets of Children and Youth. (2006). *Food marketing to children and youth: Threat or opportunity?* National Academies Press.
- Inman, J. J., & McAlister, L. (1993). A retailer promotion policy model considering promotion signal sensitivity. *Marketing Science*, 12(4), 339-356.
- Inman, J. J., McAlister, L., & Hoyer, W. D. (1990). Promotion signal: proxy for a price cut? *Journal of Consumer Research*, 17(1), 74-81.
- Isgor, Z., Powell, L., Rimkus, L., & Chaloupka, F. (2016). Associations between retail food store exterior advertisements and community demographic and socioeconomic composition. *Health & Place*, 39, 43-50.
- Jaacks, L. M., Vandevijvere, S., Pan, A., McGowan, C. J., Wallace, C., Imamura, F., ... & Ezzati, M. (2019). The obesity transition: stages of the global epidemic. *The lancet Diabetes & endocrinology*, 7(3), 231-240.
- Jayawardena, R., Byrne, N. M., Soares, M. J., Katulanda, P., & Hills, A. P. (2013). Prevalence, trends and associated socio-economic factors of obesity in South Asia. *Obesity Facts*, 6(5), 405-414.
- Jeffery, R. W., & Utter, J. (2003). The changing environment and population obesity in the United States. *Obesity Research*, 11(S10), 12S-22S.
- Jenkin, G., Madhvani, N., Signal, L., & Bowers, S. (2014). A systematic review of persuasive marketing techniques to promote food to children on television. *Obesity Reviews*, 15(4), 281-293.
- John, D. R. (1999). Consumer socialization of children: A retrospective look at twenty-five years of research. *Journal of Consumer Research*, 26(3), 183-213.
- Johnston, L. D., Delva, J., & O'Malley, P. M. (2007). Soft drink availability, contracts, and revenues in American secondary schools. *American journal of preventive medicine*, 33(4), S209-S225.
- Kelly, B., King, L., Jamiyan, B., Chimedtseren, N., Bold, B., Medina, V. M., ... & Go, J. J. (2015). Density of outdoor food and beverage advertising around schools in Ulaanbaatar (Mongolia) and Manila (The Philippines) and implications for policy. *Critical Public Health*, 25(3), 280-290.

- Kelly, B., Cretikos, M., Rogers, K., & King, L. (2008). The commercial food landscape: outdoor food advertising around primary schools in Australia. *Australian and New Zealand Journal of Public Health, 32*(6), 522-528.
- Kunkel, D., Wilcox, B. L., Cantor, J., Palmer, E., Linn, S., & Dowrick, P. (2004). Report of the APA task force on advertising and children. *Washington, DC: American Psychological Association, 30*, 60.
- Larson, N., Davey, C. S., Coombes, B., Caspi, C., Kubik, M. Y., & Nanney, M. S. (2014). Food and beverage promotions in Minnesota secondary schools: secular changes, correlates, and associations with adolescents' dietary behaviors. *Journal of School Health, 84*(12), 777-785.
- Latimer, L. A. (2013). *Direct observations of in-school food and beverage promotion: advances in measures and prevalence differences at the school-level* (Doctoral dissertation).
- Lee, J. M. (2008). Why young adults hold the key to assessing the obesity epidemic in children. *Archives of Pediatrics & Adolescent Medicine, 162*(7), 682-687.
- Leibowitz, J., Rosch, J. T., Ramirez, E., Brill, J., & Ohlhausen, M. (2012). A review of food marketing to children and adolescents: follow-up report. *Federal Trade Commission*.
- Lesser, L. I., Zimmerman, F. J., & Cohen, D. A. (2013). Outdoor advertising, obesity, and soda consumption: a cross-sectional study. *BMC Public Health, 13*(1), 20.
- Lissner, L., Wijnhoven, T. M. A., Mehlig, K., Sjöberg, A., Kunesova, M., Yngve, A., ... & Breda, J. (2016). Socioeconomic inequalities in childhood overweight: heterogeneity across five countries in the WHO European Childhood Obesity Surveillance Initiative (COSI-2008). *International Journal of Obesity, 40*(5), 796-802.
- Livingstone, S., & Helsper, E. (2004). Advertising foods to children: understanding promotion in the context of children's daily lives. *London, UK: Department of Media and Communications, London School of Economics and Political Science*.
- Lopez, A. D., Mathers, C. D., Ezzati, M., Jamison, D. T., & Murray, C. J. (Eds.). (2006). Global burden of disease and risk factors. The World Bank.
- Ludvigsen, A., & Scott, S. (2009). Real kids don't eat quiche: what food means to children. *Food, Culture & Society, 12*(4), 417-436.
- Luke, D., Esmundo, E., & Bloom, Y. (2000). Smoke signs: patterns of tobacco billboard advertising in a metropolitan region. *Tobacco Control, 9*(1), 16-23.

- Maher, A., Wilson, N., & Signal, L. (2005). Advertising and availability of obesogenic foods around New Zealand secondary schools: a pilot study. *The New Zealand Medical Journal (Online)*, 118(1218).
- Maier, S. U., Makwana, A. B. & Hare, T. A. (2015) Acute stress impairs self-control in goal-directed choice by altering multiple functional connections within the brain's decision circuits. *Neuron*, 87, 621–631.
- Mazur, A., Telega, G., Kotowicz, A., Malek, H., Jarochowicz, S., Gierczak, B., ... & Mazur, D. (2008). Impact of food advertising on food primary and secondary schools in purchases by students in south-eastern Poland. *Public Health Nutrition*, 11(9), 978-981.
- McCall, K. L. (2003). What's the big dif? Differences between marketing and advertising. Retrieved October 3, 2005.
- McGinnis, J. M., Gootman, J. A., & Kraak, V. I. (2006). Committee on food marketing and the diets of children and youth; Institute of Medicine. Food marketing to children and youth: Threat or opportunity.
- McNeal, J. U., & McNeal, J. U. (1999). *The kids market: Myths and realities*. Paramount Market Publishing
- McNeal, J. U., & Yeh, C. H. (1993). Born to shop. *American Demographics*. June, 15(6), 34-39.
- Mehta, K., Phillips, C., Ward, P., Coveney, J., Handsley, E., & Carter, P. (2012). Marketing foods to children through product packaging: prolific, unhealthy and misleading. *Public Health Nutrition*, 15(9), 1763-1770.
- Moodie, R., Stuckler, D., Monteiro, C., Sheron, N., Neal, B., Thamarangsi, T., ... & Lancet NCD Action Group. (2013). Profits and pandemics: prevention of harmful effects of tobacco, alcohol, and ultra-processed food and drink industries. *The Lancet*, 381(9867), 670-679.
- Must, A., & Strauss, R. S. (1999). Risks and consequences of childhood and adolescent obesity. *International Journal of Obesity*, 23(2), S2-S11.
- Nanney, M. S., Davey, C. S., & Kubik, M. Y. (2013). Rural disparities in the distribution of policies that support healthy eating in US secondary schools. *Journal of the Academy of Nutrition and Dietetics*, 113(8), 1062-1068.
- Nicole Randall OAAA Communications Senior Director. (2019, January 17). 2018 OAAA Communications Report. Retrieved August 10, 2020, from <https://specialreports.oaaa.org/2018oaaacomunicationsreport/>
- Nishida, C., Uauy, R., Kumanyika, S., & Shetty, P. (2004). The joint WHO/FAO expert consultation on diet, nutrition and the prevention of chronic diseases: process, product and policy implications. *Public Health Nutrition*, 7(1a), 245-250.

- Ogden, C. L., Carroll, M. D., Lawman, H. G., Fryar, C. D., Kruszon-Moran, D., Kit, B. K., & Flegal, K. M. (2016). Trends in obesity prevalence among children and adolescents in the United States, 1988-1994 through 2013-2014. *Jama*, 315(21), 2292-2299.
- Ogden, C. L., Carroll, M. D., Fryar, C. D., & Flegal, K. M. (2015). Prevalence of obesity among adults and youth: United States, 2011–2014.
- Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2014). Prevalence of childhood and adult obesity in the United States, 2011-2012. *Jama*, 311(8), 806-814.
- Oliver, M., Badland, H., Mavoa, S., Witten, K., Kearns, R., Ellaway, A., ... & Schluter, P. J. (2014). Environmental and socio-demographic associates of children's active transport to school: a cross-sectional investigation from the URBAN Study. *International Journal of Behavioral Nutrition and Physical Activity*, 11(1), 70.
- Pasch, K. E., & Poulos, N. S. (2013). Outdoor food and beverage advertising: a saturated environment. In *Advances in Communication Research to Reduce Childhood Obesity* (pp. 303-315). Springer, New York, NY.
- Parker, L., Burns, A. C., & Nyberg, K. (Eds.). (2010). *Childhood obesity prevention in Texas: Workshop summary*. National Academies Press.
- Pasch, K. E., Komro, K. A., Perry, C. L., Hearst, M. O., & Farbakhsh, K. (2007). Outdoor alcohol advertising near schools: what does it advertise and how is it related to intentions and use of alcohol among young adolescents? *Journal of Studies on Alcohol and Drugs*, 68(4), 587-596.
- Peterlin, B. L., Rosso, A. L., Rapoport, A. M., & Scher, A. I. (2010). Obesity and migraine: the effect of age, gender and adipose tissue distribution. *Headache: The Journal of Head and Face Pain*, 50(1), 52-62.
- Pearce, J., Hiscock, R., Blakely, T., & Witten, K. (2009). A national study of the association between neighbourhood access to fast-food outlets and the diet and weight of local residents. *Health & Place*, 15(1), 193-197.
- Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In *Communication and persuasion* (pp. 1-24). Springer, New York, NY.
- Pi-Sunyer, X. (2009). The medical risks of obesity. *Postgraduate medicine*, 121(6), 21-33.
- PricewaterhouseCoopers. (n.d.). The 19th Annual Global Entertainment & Media Outlook 2018-2022. Retrieved August 01, 2020, from <https://www.pwccn.com/en/industries/telecommunications-media-and-technology/entertainment-and-media/global-entertainment-and-media-outlook-2018-2022.html>
- Poulos, N. S., & Pasch, K. E. (2015). The Outdoor MEDIA DOT: The development and inter-rater reliability of a tool designed to measure food and beverage outlets and outdoor advertising. *Health & Place*, 34, 135-142.

- Poulos, N. S., & Pasch, K. E. (2015). Energy drink consumption is associated with unhealthy dietary behaviours among college youth. *Perspectives in Public Health*, 135(6), 316-321.
- Powell, L. M., Schermbeck, R. M., & Chaloupka, F. J. (2013). Nutritional content of food and beverage products in television advertisements seen on children's programming. *Childhood Obesity*, 9(6), 524-531.
- Powell, L. M., Szczypka, G., & Chaloupka, F. J. (2010). Trends in exposure to television food advertisements among children and adolescents in the United States. *Archives of Pediatrics & Adolescent Medicine*, 164(9), 794-802.
- Powell, L. M., Szczypka, G., Chaloupka, F. J., & Braunschweig, C. L. (2007). Nutritional content of television food advertisements seen by children and adolescents in the United States. *Pediatrics*, 120(3), 576-583.
- Power, E. M. (2005). Determinants of healthy eating among low-income Canadians. *Canadian journal of public health/revue canadienne de sante'e publique*, S37-S42.
- Pulgaron, E. R. (2013). Childhood obesity: a review of increased risk for physical and psychological comorbidities. *Clinical Therapeutics*, 35(1), A18-A32.
- Reilly, J. J., & Kelly, J. (2011). Long-term impact of overweight and obesity in childhood and adolescence on morbidity and premature mortality in adulthood: systematic review. *International Journal of Obesity*, 35(7), 891-898.
- Reilly, J. J., Armstrong, J., Dorosty, A. R., Emmett, P. M., Ness, A., Rogers, I., ... & Sherriff, A. (2005). Early life risk factors for obesity in childhood: cohort study. *Bmj*, 330(7504), 1357.
- Raghuveer, G., Hartz, J., Lubans, D. R., Takken, T., Wiltz, J. L., Mietus-Snyder, M., Baker-Smith, C., Pietris, N., & Edwards, N.M. (2020). Cardiorespiratory fitness in youth: An important marker of health – A scientific statement from the American Heart Association. *Circulation*. Retrieved from <https://doi.org.ezproxy.lib.utexas.edu/10.1161/CIR.0000000000000866> on August 3, 2020.
- Robinson, T. N., Borzekowski, D. L., Matheson, D. M., & Kraemer, H. C. (2007). Effects of fast food branding on young children's taste preferences. *Archives of Pediatrics & Adolescent Medicine*, 161(8), 792-797.
- Ross, H., & Chaloupka, F. J. (2003). The effect of cigarette prices on youth smoking. *Health Economics*, 12(3), 217-230.
- Rozendaal, E., Buijzen, M., & Valkenburg, P. (2010). Comparing children's and adults' cognitive advertising competences in the Netherlands. *Journal of Children and Media*, 4(1), 77-89.
- Roedder, D. L. (1981). Age differences in children's responses to television advertising: An information-processing approach. *Journal of Consumer Research*, 8(2), 144-153.

- Rideout, K., Levy-Milne, R., Martin, C., & Ostry, A. S. (2007). Food sales outlets, food availability, and the extent of nutrition policy implementation in schools in British Columbia. *Canadian Journal of Public Health, 98*(4), 246-250.
- Scaglioni, S., De Cosmi, V., Ciappolino, V., Parazzini, F., Brambilla, P., & Agostoni, C. (2018). Factors influencing children's eating behaviours. *Nutrients, 10*(6), 706.
- Schwimmer, J. B., Burwinkle, T. M., & Varni, J. W. (2003). Health-related quality of life of severely obese children and adolescents. *Jama, 289*(14), 1813-1819.
- Singh, A. S., Mulder, C., Twisk, J. W., Van Mechelen, W., & Chinapaw, M. J. (2008). Tracking of childhood overweight into adulthood: a systematic review of the literature. *Obesity Reviews, 9*(5), 474-488.
- State Obesity Data. (n.d.). Retrieved August 09, 2020, from <https://stateofchildhoodobesity.org/states/tx/>
- Staples, T., Lakey, D., & Williams, M. A Report to the Texas Legislature from the Interagency Obesity Council.
- Story, M., Nannery, M. S., & Schwartz, M. B. (2009). Schools and obesity prevention: creating school environments and policies to promote healthy eating and physical activity. *The Milbank Quarterly, 87*(1), 71-100.
- Story, M., Kaphingst, K. M., Robinson-O'Brien, R., & Glanz, K. (2008). Creating healthy food and eating environments: policy and environmental approaches. *Annu. Rev. Public Health, 29*, 253-272.
- Story, M., & French, S. (2004). Food advertising and marketing directed at children and adolescents in the US. *International Journal of Behavioral Nutrition and Physical Activity, 1*(1), 3.
- Story, M., Kaphingst, K. M., & French, S. (2006). The role of schools in obesity prevention. *The Future of Children, 109*-142.
- Strasburger, V. C. (2001). Children and TV advertising: Nowhere to run, nowhere to hide. *Journal of Developmental & Behavioral Pediatrics, 22*(3), 185-187.
- Svensson, V., Lundborg, L., Cao, Y., Nowicka, P., Marcus, C., & Sobko, T. (2011). Obesity related eating behaviour patterns in Swedish preschool children and association with age, gender, relative weight and parental weight-factorial validation of the Children's Eating Behaviour Questionnaire. *International Journal of Behavioral Nutrition and Physical Activity, 8*(1), 134.
- Swinburn, B. A., Sacks, G., Hall, K. D., McPherson, K., Finegood, D. T., Moodie, M. L., & Gortmaker, S. L. (2011). The global obesity pandemic: shaped by global drivers and local environments. *The Lancet, 378*(9793), 804-814.
- Strauss, R. S. (2000). Childhood obesity and self-esteem. *Pediatrics, 105*(1), e15-e15.

- Tariq, S., Tariq, S., & Tariq, S. (2019). Association of perceived stress with healthy and unhealthy food consumption among teenagers. *JPMA. The Journal of the Pakistan Medical Association*, 69(12), 1817-1821.
- Terry-McElrath, Y. M., Turner, L., Sandoval, A., Johnston, L. D., & Chaloupka, F. J. (2014). Commercialism in US elementary and secondary school nutrition environments: trends from 2007 to 2012. *JAMA pediatrics*, 168(3), 234-242.
- Tremblay, M. S., Katzmarzyk, P. T., Bryan, S. N., Perez, C. E., & Ardern, C. I. (2005). Obesity, overweight and ethnicity. *Health Reports*, 16(4), 23.
- United States. Public Health Service. Office of the Surgeon General, United States. Office of Disease Prevention, Health Promotion, Centers for Disease Control, & Prevention (US). (2001). *The Surgeon General's call to action to prevent and decrease overweight and obesity*. US Government Printing Office.
- Velazquez, C. E., Black, J. L., & Ahmadi, N. (2015). Food and beverage promotions in Vancouver schools: A study of the prevalence and characteristics of in-school advertising, messaging, and signage. *Preventive Medicine Reports*, 2, 757-764.
- Valkenburg, P. M. (2000). Media and youth consumerism. *Journal of Adolescent Health*, 27(2), 52-56.
- Van Der Horst, K., Oenema, A., Ferreira, I., Wendel-Vos, W., Giskes, K., van Lenthe, F., & Brug, J. (2007). A systematic review of environmental correlates of obesity-related dietary behaviors in youth. *Health Education Research*, 22(2), 203-226.
- Vilija, M., & Romualdas, M. (2014). Unhealthy food in relation to posttraumatic stress symptoms among adolescents. *Appetite*, 74, 86-91.
- Walton, M., Pearce, J., & Day, P. (2009). Examining the interaction between food outlets and outdoor food advertisements with primary school food environments. *Health & Place*, 15(3), 841-848.
- Wang, G., & Dietz, W. H. (2002). Economic burden of obesity in youths aged 6 to 17 years: 1979–1999. *Pediatrics*, 109(5), e81-e81.
- Wang, Y. (2001). Cross-national comparison of childhood obesity: the epidemic and the relationship between obesity and socioeconomic status. *International Journal of Epidemiology*, 30(5), 1129-1136.
- Wang, Y., & Lim, H. (2012). The global childhood obesity epidemic and the association between socio-economic status and childhood obesity.
- Wilkie, W. L. (1997). Developing research on public policy and marketing. *Journal of Public Policy & Marketing*, 16(1), 132-136.
- Willms, J. D., Tremblay, M. S., & Katzmarzyk, P. T. (2003). Geographic and demographic variation in the prevalence of overweight Canadian children. *Obesity Research*, 11(5), 668-673.

- Why does childhood overweight and obesity matter? (2014, October 06). Retrieved August 09, 2020, from [https://www.who.int/dietphysicalactivity/childhood\\_consequences/en/](https://www.who.int/dietphysicalactivity/childhood_consequences/en/)
- World Health Organization. (2007). Prevention and control of noncommunicable diseases: implementation of the global strategy: Report by the Secretariat. In *Prevention and control of noncommunicable diseases: implementation of the global strategy: report by the Secretariat*.
- World Health Organization. (2014). Commission on Ending Childhood Obesity. Facts and figures on childhood obesity. *World Health Organization: Geneva, Switzerland*.
- World Health Organization. (2016). *Report of the commission on ending childhood obesity*. World Health Organization.
- World Health Organization. (2010). *World health statistics 2010*. World Health Organization.
- Zenk, S. N., & Powell, L. M. (2008). US secondary schools and food outlets. *Health & Place, 14*(2), 336-346.
- Zhang, Q., & Wang, Y. (2004). Socioeconomic inequality of obesity in the United States: do gender, age, and ethnicity matter? *Social Science & Medicine, 58*(6), 1171-1180.
- Zimmerman, F. J., & Bell, J. F. (2010). Associations of television content type and obesity in children. *American Journal of Public Health, 100*(2), 334-340.