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Are Primetime Diets Congruent With Dietary Recommendations? Content Analyses of Food Advertisements in the United States, China, and Singapore

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Despite public programs to promote healthy eating among populations in developed and developing countries, the increase in obesity as a result of poor dietary patterns continues to persist. As food advertising has been implicated for contributing to this global health challenge, this study aims to provide empirical evidence on food advertising in a broader global context, across economically and culturally different nations. We conducted a large scale content analysis of the types of food advertised on primetime television in the United States, China, and Singapore, which resulted in the collection of 1,008 television hours. Using the dietary blue2376s proposed by the health authorities as the applied framework, the study compared the types of food advertised against the dietary parameters. Findings showed that despite differences in economic development and cultures, food advertised on primetime television across three countries are incongruent with dietary recommendations. The study offers insights on how misaligned and out of sync food advertising and commercial interests are from government health policies. Implications of findings to encourage healthy eating among populations worldwide are discussed.

Background

The prevalence of obesity is increasing at an alarming rate worldwide. In 2014, the World Health Organization (WHO) reported that obesity across the globe has doubled since 1980. In the United States, 70.7% of adults are overweight and 37.9% are obese (Centers for Disease Control and Prevention [CDC], 2016). By 2030, the number of obese Americans is forecast to balloon to 86.3% (Wang, Beydoun, Liang, Caballero, & Kumanyika, 2008). In Singapore, a modern multiethnic city-state in Southeast Asia, the rate of obesity increased from 6.8% in 2004 to 10.8% in 2010 (National Health Survey, 2010). A health problem once confined to high-income countries, obesity is also on the rise in low- and middle-income countries (WHO, 2014). As of 2013, China is ranked second in this category followed by India, Russia, and Brazil (Ng et al., 2014).

Obesity is a chronic disease that leads to a number of potentially life-threatening conditions. A high risk factor that gives rise to serious health consequences, the disease is capable of worsening existing illnesses or triggering other health problems, inflicting significant disadvantages and immeasurable costs on the individual and the society (WHO, 2014). Concerned health authorities in many countries have therefore adopted measures to reverse the escalating trend by reviewing health policies and implementing preventive measures. One such measure is establishing nutritional requirements to encourage healthy eating.

In the United States, health authorities have been proactively taking measures to educate their citizens on how to eat healthily. The CDC, for example, funds 25 states to run campaigns and programs to address the problem of obesity and chronic diseases. State-wide efforts are coordinated to ensure that nutrition and physical activity strategies are adopted to improve the health of Americans (CDC, 2016). As far back as 1992, the U.S. Department of Agriculture (2014a) created the Food Guide Pyramid to provide advice on the components of a healthy diet. This blue2376 for healthy eating was subsequently revised and replaced by MyPyramid in 2005 and MyPlate in 2011 which advocated a diet rich in fruits and vegetables.

Although culturally different from the United States, China is likewise waging a war against obesity. The world's most

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populous country now has more than 90 million obese citizens and another 200 million overweight (Chen, 2008). In 2002, 22.8% of Chinese were overweight and 7.1% obese—an increase of 40.7% and 97.2% from 1992 respectively. China's rapid economic rise and growth of chronic diseases among its population propelled the Chinese government to educate its people to consume a well-balanced diet and to implement community-based interventions to reduce overweight and obesity (Bell, Ge, & Popkin, 2002; Wu, 2006). Many of these programs were, however, sporadically implemented in different parts of the country and independently from one another which resulted in inconclusive outcomes as to whether the efforts succeeded in creating awareness of the ills of obesity (Gao, Griffiths, & Chan, 2008). In 1989, recognizing that fast-developing China faces a nutrition paradox when it comes to feeding its population, the Chinese government launched its first set of nutritional guidelines nationwide, called the Food Guide Pagoda, in the hope to encourage its citizens to eat healthily (Ge, 2011).

In Singapore, health authorities had embarked on nationwide campaigns to curb the rising rate of obesity by implementing major health promoting policies from 1992 to 2004. The Health Promotion Board developed dietary guidelines and formulated comprehensive health promotion programs to encourage the adoption of healthy lifestyles in schools, workplaces, and communities. The limited success was however thwarted by many other environmental, social, and cultural challenges, and Singapore continues to face a rising trend in obesity with its associated diseases (Soon, Koh, Wong, & Lam, 2008). New recommendations were subsequently offered in 2003, which underwent further revision in 2014 (Cheong, 2014). Called My Healthy Plate, it followed closely to the United States' blue2376 for a healthy diet. However, despite unrelenting communication efforts and public programs to promote healthy eating in the United States, China, and Singapore, poor dietary patterns continue to persist (Capacci et al., 2012).

As food consumption is a major contributing factor to unhealthy eating behaviors, food advertising on television has been implicated for contributing to the obesity epidemic (Harris & Graff, 2012; Kemps, Tiggermann, & Hollitt, 2014). Research has consistently found high percentages of unhealthy foods advertised on television (Cairns, Angus, Hastings, & Caraher, 2013; Chapman, Nicholas, & Supramaniam, 2006) with many studies showing positive associations between continued consumption of food high in calories and the cumulative exposure to unhealthy food advertising on television (Boyce, 2007). Scholars (e.g., Viswanath, Ramanadhan, & Kontos, 2007) have argued that advertising affects individuals' health by influencing what people consume through the promotion of food and beverage (F&B) products as food marketers' use of psychological techniques through implicit messages are capable of eliciting powerful responses in viewers, which may mislead them into thinking that consuming the advertised food is good for them (Livingstone & Helsper, 2006).

Researchers whose studies utilized social-cognitive theories further contended that food advertised on television trigger subtle but pervasive effects on eating behaviors that are likely to occur outside of viewers' intention or consciousness (Bargh & Morsella, 2008). Priming effects, in particular, which guided Harris, Bargh, and Brownell's (2009) study on the effect of television food advertising on eating behavior, demonstrated the "power of food advertising to prime automatic eating behaviors" (p. 404). Specifically, the study found that participants who were exposed to food ads consumed more snacks after watching food ads on television compared with those in other conditions. The effects were also not related to hunger or other conscious influences, leading the scholars to caution health authorities of potential health consequences of priming effects of televised food ads on public's diet.

Given that obesity is a worldwide concern, how prevalent then are unhealthy food ads on television across nations in different parts of the world? Do viewers in emerging countries in Asia watch the same number of unhealthy food ads as their Western counterparts? Are obesogenic environments in Asian countries equally influenced by the aggressive global marketing practices of the F&B industry? To establish an evidence-based relation between the amount of unhealthy food advertising promoted on television across different countries and viewers' indulgence in such foods, more research is needed to better understand the global food advertising landscape beyond the Western nations.

The objective of this study therefore aims to examine and compare the types of F&B promoted on television in the United States, China, and Singapore using content analysis and comparing the results against the dietary parameters provided by the respective health authorities. We selected the United States, China, and Singapore for several reasons. First, the three countries face similar challenges of having to tackle health problems arising from the prevalence of obesity among their respective populations (WHO, 2016). Second, food advertising in these countries is largely unregulated, with the exception of general guidelines offered by self-regulatory bodies to reduce junk food exposure on children's television (Lee, 2014). Hence, it is useful to explore and compare the amount and types of food advertised on prime-time television where no airtime constraints are imposed on food products. Third, the three countries are economically and culturally diverse (Aaker & Lee, 2001), making it an interesting study to better understand the relationship between food advertising and worldwide obesity. Specifically, the United States is a Western country with a highly developed economy and a culture that nurtures an independent self-view; whereas China is an Asian society that is still developing economically with a culture that nurtures interdependent self-views (Aaker & Lee, 2001). Singapore, a modern and a multiracial cosmopolitan city-state in Southeast Asia, exhibits cultural hybridization and has a culture that balances a mix of both independent and interdependent self-views (Chua, 1998).

Television was chosen as the medium for examination because it is still, by far, the most effective platform for advertisers (Lynch, 2015). For viewers, although the Internet and other digital media are increasingly gaining popularity, television remains the dominant medium in many parts of the world. In the United States, there are 116.4 million television homes, which reach out to 296 million Americans (Nielsen, 2014) and advertisers continue to allocate their largest chunks of budget for television (Bercovici, 2013). In China, television reaches almost 400 million households representing 97% of the total population (CMM Intelligence, 2009). It is also the most popular advertising vehicle in China, capturing the second largest slice of the global advertising expenditure after the United States (China Weekly News, 2015). Similarly, in Singapore, the growing popularity of online media use has not occurred at the expense of television which continues to attract eight out of 10 adult viewers weekly (Channel NewsAsia, 2014). More important, television provides images, knowledge and avenues for understanding about almost everything including food consumption and health (Giles, 2003). The way television contributes to an increase in unhealthy lifestyles (e.g., unbalanced diets or obesity) include:

commercial marketing and advertising of high-calorie foods and beverages, portrayals of eating, drinking, and body image in both advertising and program or story content, consumption of excess calories during television viewing, and reduced levels of calorie expenditure during periods of inactivity associated with media use. (Samuel et al., 2007, p. 209)

Given the prevalence of obesity the United States, China, and Singapore, and television a favorite medium for viewers and advertisers in these three countries, how prevalent then are unhealthy food ads on television? Are foods promoted on primetime television across the three countries consistent with dietary recommendations advocated by the countries' dietary guidelines? We pose the following research questions to address the aforementioned issues:

Research Question 1 (RQ1): What is the prevalence of F&B ads in absolute numbers and in terms of proportion of total ads across the United States, China, and Singapore?

RQ2: Are the F&B promoted on primetime television congruent with the dietary guidelines proposed by the countries' dietary recommendations?

RQ3: What proportions of F&B television advertising in the United States, China, and Singapore are unhealthy?

Method

Data Collection Procedures

We conducted a content analysis of F&B advertising on prime-time television in the United States, China, and Singapore. We picked three popular television channels in each country which totals nine channels (United States: ABC, NBC, and CBS; China: BTv1, BTv6, and CCTv6; Singapore: 8, 5, and U). The

channels were selected based on their high viewership ratings during the primetime belt which tends to attract large numbers of advertisers (Murphy, Wilkin, Cody, & Huang, 2009). Data were collected in 2010. Recordings in the United States were carried out in Austin, Texas, from February 1 through 28. Recordings in Beijing, China, were conducted from March 1 through 28, whereas recordings in Singapore were carried out from February 19 through March 18. Four hours of primetime television per channel (United States from 6pm to 10pm; China and Singapore from 7 pm to 11 pm) were recorded daily over 4 weeks (28 days), including weekends and holidays to capture the different television viewing patterns consistently over 4 weeks. The extensive exercise and rigorous procedure resulted in the collection of 1,008 television hours and yielded a total of 31,837 television ads across the three countries.

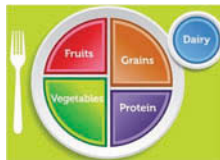


Coding Scheme Development

Because our aim is to provide an evidenced-based reality check for assessing the effectiveness of health policy formulation and implementation, dietary recommendations of the three countries were used as the framework to guide this study. The three countries' food illustrations serve as reminders to encourage individuals to choose food types which make up the ideal healthy diet. As shown in Table 1, the U.S. icon for healthy eating, MyPlate, encourages Americans' diet to comprise 50% fruits and vegetables, and another 50% food rich in grains and proteins with measured amounts of low-fats or fat-free dairy. These five healthy food groups recommended are fruits, vegetables, grains, protein foods, and dairy. Together, they make up the building blocks for a healthy diet (U.S. Department of Agriculture, 2014a). Food and drinks to avoid, on the other hand, are those which contain empty calories, i.e., calories from solid fats and added sugars which have little nutrients and are found mostly in processed foods such as cakes, cookies, soda, pizzas (U.S. Department of Agriculture, 2014b).

In China, the Food Guide Pagoda encourages Chinese to consume more cereals and grains; vegetables, fruits and tubers, milk; beans/dairy products; and food rich in proteins such as fish, poultry, eggs, and lean meat (see Table 1). Regarding food to avoid, it advises against the consumption of fatty meat and those with animal fat; food high in salt content; alcoholic drinks (to be consumed in limited amounts); as well as the consumption of unclean and spoiled food (Ge, 2011). In Singapore, nutritional guidelines adopted by the Health Promotion Board follow closely to the United States' icon for a healthy diet. Singapore calls it My Healthy Plate (see Table 1). It advocates a diet also comprising 50% fruits and vegetables, 25% of whole grains, and another 25% protein food such as poultry, bean products, and seafood. It further recommends exercise, use of healthier oils and the consumption of water instead of sugar-sweetened drinks (Health Promotion Board, 2014).

A close examination of all three countries' nutritional guidelines and food icons shown indicate that the categorization of food by health authorities in the United States, China, and Singapore are mostly similar. All three health authorities

Table 1. Dietary guidelines recommended by health authorities in United States, China, and Singapore

Country	Nutritional food icon	Recommended food groups	Food groups to avoid
United States	MyPlate (2011) ^a 	<ul style="list-style-type: none"> • Fruits • Vegetables • Grains (e.g., oats) • Protein foods (e.g., beans, seafood) • Milk (fat-free, low-fat) 	<p>Empty calories</p> <ul style="list-style-type: none"> • Cakes, cookies, pastries, and donuts • Sodas, energy drinks, sports drinks, and fruit drinks • Cheese • Pizza • Ice cream • Sausages, hot dogs, bacon, and ribs <p>Some empty calories</p> <ul style="list-style-type: none"> • Sweetened applesauce • Regular ground beef • Fried chicken • Whole milk
China	Food Guide Pagoda (2007) ^b 	<ul style="list-style-type: none"> • Cereals and grains • Vegetables, fruits, and tubers • Milk, beans/dairy products • Fish, poultry, eggs, lean meat 	<ul style="list-style-type: none"> • Fatty meat and animal fat • Food high in salt • Alcoholic drinks (to be consumed in limited amounts) • Unsanitary and spoiled food
Singapore	My Healthy Plate (2014) 	<ul style="list-style-type: none"> • Fruits and vegetables • Whole grains (e.g., brown rice) • Lean meats, seafood, bean products • Soybean, low-fat, nonfat dairy products 	<ul style="list-style-type: none"> • Food that has saturated fat • Food that contains salt and sauces (e.g., those with salt preserved and preservatives) • Food that contains sugar (empty calories) • Sugared and sweetened beverages • Alcoholic beverages (to be consumed in moderation)

^aUnited States Department of Agriculture (2014a).

^bGe (2011).

essentially recommend the following foods (considered healthy) for consumption:

- Fruits and vegetables,
- Grains and cereals,
- Food rich in proteins such as lean meat, seafood, poultry, fish, and soya products, and
- Low-fat, nonfat milk and water.

In contrast, foods and beverages to be avoided or consumed only in very small portions (considered unhealthy) are identified as follows:

- Food high in saturated fats,
- Regular meats (nonlean such as ground beef),
- Fried food,
- Food high in salt contents,
- Sweet food,
- Preserved food,
- Sugared and sweetened beverages,
- Whole milk, and
- Alcoholic drinks.

Using the collective list of food classifications across three countries as a guide, we proceeded to develop a common coding scheme. The units of examination were prime-time ads which were primarily grouped into two dominant categories: F&B ads, and non-F&B ads. Because this was an extensive exercise involving ads in three countries, a grounded method was adopted to create units of measurements. To address our three research questions and to establish whether food promoted on television are congruent with those advocated by dietary guidelines, we further created coding units by classifying the F&B ads into healthy food, unhealthy food, and other food after conducting two coding trials where coders watched random samples of television ads which were not used for the official coding exercise.

We created a total of 27 units (9 for the three countries' channels and 18 for F&B). Healthy food were fruits, vegetables, proteins (such as seafood and lean meats), grains, dairy (such as low-fat milk), and mineral water. In contrast, unhealthy food were cakes and pastries; sugary cereals, biscuits, and bars; desserts and snacks; chocolate and candies;

sweetened beverages and sodas; processed meats; processed/canned food; spreads, sauces, and gravy; fast food and pizzas; and dine-in restaurants. Other types of food were herbal and health supplements and medication and drugs. The total numbers and percentages of healthy, unhealthy, and other food across the three countries were subsequently coded and calculated. Regarding non-F&B advertisements, only frequency was recorded as the data were needed only for comparison against the total number of ads.

Coding Process and Intercoder Reliability

To facilitate the coding process and to achieve consistency among the coders, a codebook and coding rules that was based on the literature were developed. Three coders, effectively bilingual in English and Chinese, were trained according to the coding guidelines. Two trial sessions were first conducted for the coders who watched samples of televised ads on digital video discs containing several hours of primetime television recorded outside of the designated 28 days selected for the study. The trials allowed the coders to practice, identify, and resolve ambiguity in the coding scheme and to improve intercoder reliability.

The three coders rotated among themselves and took turns to code three channels from each country, resulting in all three coders eventually coding all nine channels. Using Perreault and Leigh's (1989) measure of reliability indicated by intercoder reliability was tested three times, once for each country. Of the full sample per country, 10% was subjected to the intercoder reliability tests (i.e., 36 television hours out of 336 television hours per country). To ensure convergence and reliability among the three coders, when one coder disagreed with an observation, that judgment was considered as noncompliant and eliminated from the calculation of agreement percentages among the coders. In short, only observations involving 100% from all three coders were included in the agreement percentage used for the intercoder reliability. All variables in the study met the acceptable reliability levels stipulated in Perreault and Leigh (1989), at $>.90$.

Results

RQ1 asks how many ads are aired during primetime television in the United States, China, and Singapore watch and how many of them are F&B ads. As shown in Figure 1, our data collected over a period of 28 days in each country revealed that a total of 13,927 ads were aired, of which 2,832 (20.4%) were F&B. In China, 8,975 ads appeared, of which 2,920 (32.5%) were F&B. In Singapore, television audiences were targeted by 8,935 ads of which 2,220 (24.8%) were F&B. On the whole, Figure 1 shows that viewers across the three countries possibly viewed between 20% and 30% of F&B ads on primetime television.

While coding the ads, we further discovered interesting patterns pertaining to F&B unique (nonduplicated) ads versus the total number of F&B advertisements. As presented in Figure 2, the United States has the highest number of unique F&B ads with 570 (2,832 total ads), followed by Singapore with 171 (2,220 total ads) and China 77 (2,920 total ads). However, China has the highest number of F&B ads on television with 2,920 in total, followed by the United States with 2,832, and Singapore, 2,220. This pattern shows that although China has the least number of unique ads, the repeat exposure is greater than the other two countries, while the reverse is true for the United States.

We also asked whether and to what extent the F&B advertised on primetime television in the three countries are congruent with the dietary guidelines proposed by the countries' dietary recommendations (*RQ2*); and how much of unhealthy F&B advertising viewers in the United States, China, and Singapore may possibly have viewed on primetime television (*RQ3*). Our findings for the breakdown of healthy and unhealthy F&B ads established that larger portions of unhealthy F&B ads than healthy F&B ads were prevalent on primetime television in all three countries (see Table 2).

As shown in Table 2, in the United States, the figures were 80 (2.8%) healthy, 2,104 (74.3%) unhealthy, and 648 (22.9%) others. In China, there were 443 (15.2%) healthy, 1,828

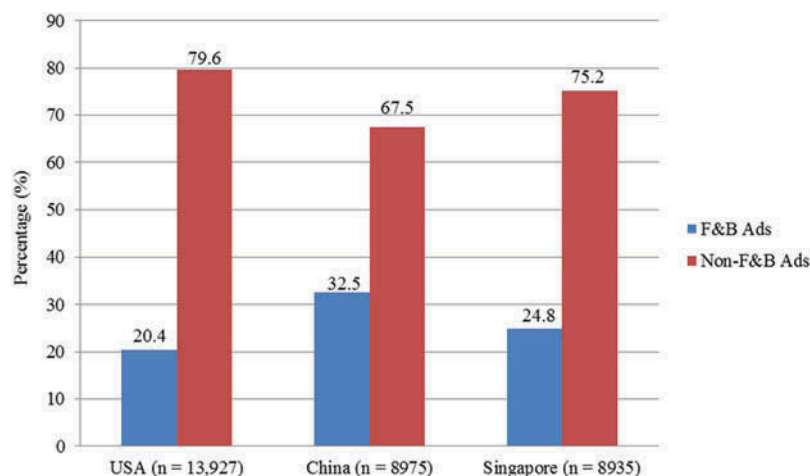


Figure 1. Comparison of F&B and non-F&B ads in the United States, China, and Singapore. F&B = food and beverage

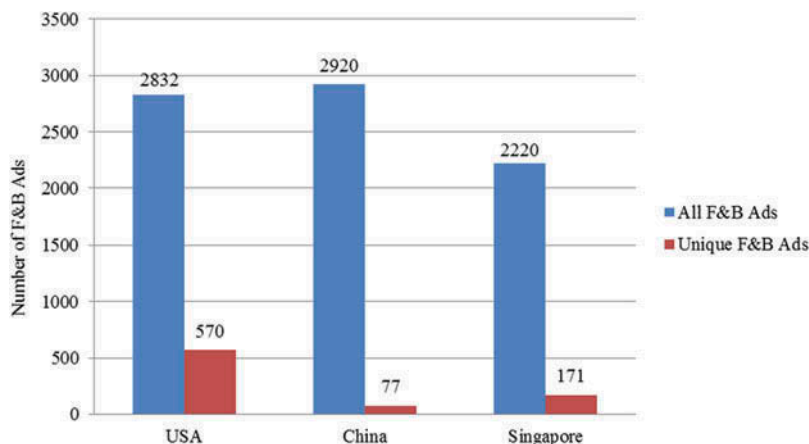


Figure 2. Comparison of unique and all F&B ads in the United States, China, and Singapore. F&B = food and beverage.

(62.6%) unhealthy, and 649 (22.2%) others. In Singapore, there were 253 (11.4%) healthy, 1,803 (81.2%) unhealthy, and 164 (7.4%) others. Overall, it is clear that there is a discrepancy between what each country’s nutrient blue2376 recommends and what is shown on primetime television, thus answering RQ2. As for viewers’ exposure to unhealthy food ads during primetime, they are prevalent across the United States, China and Singapore television, taking up 60% to 80% of all F&B ads, hence answering RQ3. Chi-square statistics for the healthy F&B ads ($\chi^2 = 233.95, p < .01$) further indicate that the three countries are significantly

different in terms of the frequency of healthy and unhealthy F&B ads shown on primetime television. China television recorded the highest percentage of healthy F&B ads, followed by Singapore, and the United States. As for unhealthy F&B ads, country difference was also significant ($\chi^2 = 64.10, p < .01$). Singapore recorded the highest percentage of such ads, followed by the United States, and China.

To investigate the types of healthy and unhealthy F&B advertised on television, our study further provided the breakdown in percentages of healthy and unhealthy food (see Table 2). For healthy F&B, in the United States, the highest

Table 2. Comparison of healthy, unhealthy F&B and other food on primetime television in the United States, China, and Singapore

Food categories	United States		China		Singapore		Total		χ^2	
	n	%	n	%	n	%	n	%		
Healthy food	80	2.8	443	15.2	253	11.4	776	9.7	233.95**	
Fruits	8	0.3	2	0.1	0	0.0	10	0.1		
Vegetables	3	0.1	82	2.8	0	0.0	85	1.1		
Proteins	11	0.4	4	0.1	30	1.4	45	0.6		
Grains	36	1.3	0	0.0	46	2.1	82	1.0		
Dairy	22	0.8	351	12.0	177	8.0	550	6.9		
Mineral water	0	1.4	4	0.1	0	0.0	4	0.1		
Unhealthy food	2,104	74.3	1,828	62.6	1,803	81.2	5,735	71.9		64.10**
Cakes and pastries	46	1.6	55	1.9	94	4.2	195	2.4		
Sugary cereals, biscuits, and bars	110	3.9	0	0.0	77	3.5	187	2.3		
Desserts and snacks	88	3.1	242	8.3	96	4.3	426	5.3		
Chocolate and candies	209	7.4	565	19.3	495	22.3	1,269	15.9		
Sweetened beverages and sodas	442	15.6	434	14.9	574	25.9	1,450	18.2		
Processed meats	17	0.6	0	0.0	0	0.0	17	0.2		
Processed/canned food	224	7.9	157	5.4	73	3.3	454	5.7		
Spreads, sauces, and gravy	104	3.7	17	0.6	8	0.4	129	1.6		
Fast food and pizzas	624	22.0	195	6.7	363	16.4	1,182	14.8		
Dine-in restaurants	240	8.5	163	5.6	23	1.0	426	5.3		
Other food	648	22.9	649	22.2	164	7.4	1,461	18.4	201.31**	
Herbal and health supplements	86	3.0	169	5.8	72	3.2	327	4.1		
Medication and drugs	562	19.8	480	16.4	92	4.1	1,134	14.2		

** $p < .01$.

number recorded was “Grains” (1.3%). The highest in China and Singapore was dairy with 12.0% and 8.0%, respectively. Fruits and vegetables, highly advocated by health authorities to comprise as much as 50% of our diets, were dismal. The percentages for these groups across the three countries ranged from none in Singapore, 0.4% in the United States (0.3% for fruits and 0.1% for vegetables) to merely two fruit ads (0.1%) and 82 (2.8%) vegetables ads in China.

For unhealthy F&B, the top three most advertised in the United States were fast food and pizzas (22.0%), followed by sweetened beverages and sodas (15.6%) and dine-in restaurants (8.5%). In China, they were chocolates and candies (19.3%), followed by sweetened beverages and sodas (14.9%) and desserts and snacks (8.3%). In Singapore, the most advertised were sweetened beverages and sodas (25.9%), followed by chocolates and candies (22.3%) and fast food and pizzas (16.4%).

Discussion

Given that food advertising on television has been implicated for the global obesity epidemic, this study investigated the prevalence and types of F&B promoted on primetime television in the United States, China, and Singapore and the extent to which those ads were consistent with dietary recommendations advocated by the countries’ dietary guidelines.

Findings from our content analyses concur with past studies conducted in the United States that found high levels of food advertised on television to be poor in nutrition (e.g., Harrison & Marske, 2005; Mink, Evans, Moore, Calderon, & Deger, 2010). Our study, which includes Asia, found more than two-thirds or between 60% and 80% of all F&B ads on primetime television in the United States, China, and Singapore were for unhealthy food. On this note, we reiterate the call for global health authorities to recognize the negative influence of televised food ads on eating behaviors to slow the rate of rising obesity. Studies on priming effects (e.g., Harris, Bargh, & Brownell’s, 2009) have shown that food ads on television, which act as “real-world primes” (p. 405) are capable of conveying powerful cues which trigger unhealthy food consumption such as unnecessary snacking. Self-regulatory resources in fairly unregulated countries such as the United States, China, and Singapore are thus likely to be limited in their motivation as well as ability to defend against the priming effects of food advertising on television particularly during evening “prime-time” hours where most viewing occurs. Future research may also wish to corroborate our findings by conducting studies investigating whether the inconsistency between the F&B ads and dietary recommendation in each country is associated with the rate of obesity.

It is interesting to note that our results showed that industrialization and economic development negatively parallel the public exposure to healthy F&B ads. China, a developing country for example, has highest percentages of healthy F&B ads, with Singapore close behind and the United States in final position. In terms of the frequency of unhealthy food

exposure in Asia, amongst the two Asian nations, the more economically advanced (and Westernized) Singapore demonstrated greater presence of unhealthy food ads over China. Our findings appear to suggest that the prevalence of unhealthy food advertising relates to population obesity levels, and that obesity is a civilization disease—an unintended social consequence of modernity (Cordain et al., 2005). At a macro-level, authorities may wish to monitor the relationship between their population’s exposures to unhealthy food advertising in relation to the country’s economic progress.

Our data also revealed that while China had the least number of unique F&B ads, the ads appeared to be duplicated to a large extent. This suggests a great deal of repetition and bulk media space purchase on television in China, which would ensure wide reach of similar ads to the population. The United States showed an opposite pattern, suggesting that the U.S. ads would presumably be more tailored to certain target segments and/or occasions which suggest a more sophisticated targeted communication strategy.

Our research findings further established that there was a wide disparity between recommended dietary intake for populations and the media exposure levels with television as the indicator. For instance, while the guidelines proposed by the three countries strongly advocate diets rich in fruits, vegetables, proteins, and grains consumption (e.g., both MyPlate (United States) and My Healthy Plate (Singapore) advocate a diet comprising 50% fruits and vegetables and 50% grains and proteins), ads promoting such food categories were dismal in all three countries (0.0%—0.3% for fruits, 0.0%—2.8% for vegetables, 0.1%—1.4% for proteins, 0.0%—2.1% for grains). Given the increasing rates of obesity in the United States, China, and Singapore, and the fairly relaxed food advertising regulations in these countries, authorities may wish to review their health policies to more clearly guide food advertising, perhaps with some kind of quota range for food categories such that the public get to view a balanced array of foods. To curb the watching of recurring unhealthy food ads, governments in some parts of the world for example have adopted restrictions and guidelines to regulate food advertising. The most common form of restriction is banning unhealthy food advertising on children’s television, which countries such as Sweden, Norway, the United Kingdom, Belgium, and Australia have already implemented (Associated Press, 2007; Veerman, Van Beeck, Barendregt, & Mackenbach, 2009). However, no country has so far implemented restrictions to balance food exposures on primetime advertising targeted at the general population except for France.

Instead of an outright ban on unhealthy food advertising on children’s television, the French government passed a mandatory law in 2007 requiring all unhealthy food advertisers wishing to broadcast on television to allocate 7% of the televised advertisement space to health messages (determined by the health authorities) on promoting exercise and the consumption of fruits and vegetables (Mercer, 2007). Food advertisers

who wish to opt out are allowed to drop the health message on the condition that they donate 1.5% of their advertising budget to a fund for government health campaigns. This approach was seen as trying to balance the interests of commercial groups and health advocates (Hall, 2007).

Nevertheless, for countries such as the United States, China and Singapore which rely on the food and advertising industries to self-regulate, health authorities may wish to consider adopting integrated campaigns that take into consideration effective messages and prior attitudes towards unhealthy food consumption (Yeo, 2013). It is vital that the campaigns are not intermittently implemented or targeted only at one particular segment in society. They should be cohesively executed and sustained on a large scale, and simultaneously aim to influence by educating related groups of stakeholders across ages in the family and individuals from schools, businesses, healthcare, and the media. In so doing, public communication efforts may achieve a higher success rate in changing the public's health behaviors, hence better balancing the interests of commercial advertisers and at the same time, safeguard the health of the public.

Similar to all content analysis studies, our study is not without limitations. First, while this study provides useful insights into the prevalence of F&B ads and the extent to which those ads are consistent with dietary recommendations advocated by each country, it does not address the question of what effects these ads have on viewers' eating behaviors and pertinent health issues. Second, it does not measure the nature of ads (e.g., visual dimensions, creative appeals, and storylines). Just counting the number of times a healthy or unhealthy product appears does not incorporate creative appeals, although such a factor can critically interact with viewers to generate higher or lower appeal, and hence potentially cause a certain percentage of healthy ads in one country to have the same effect as a higher or lower percentage in another country. We encourage future research to examine the presentation of these healthy and unhealthy food ads, focusing on visual and audio representation and message appeals.

In terms of targeting, we are aware that sophisticated target marketing of a certain percentage of ads that are unhealthy in one country can have a significantly different effect on viewers, compared with another country where such targeting techniques may not be employed. For example, in the United States, there is a growing and real concern over the extent to which advertising for unhealthy products is reaching children and minorities through targeted efforts, despite regulatory efforts to reduce child-directed advertising of unhealthy F&B products (Powell, Schermbeck, Szczypka, & Chaloupka, 2013; Williams, Crockett, Harrison, & Thomas, 2012). Future research may also wish to investigate the effect of food advertising exposure on different demographic groups and its accompanying effects.

Our study nevertheless provides empirical evidence on food advertising in a broader global context. It reveals critical knowledge on food advertising across countries, and shows that despite differences in economic development stages and

cultures, the types of F&B advertised and promoted on television are more or less similar. More important, our study shows that primetime diets on television across cultures are incongruent with dietary recommendations advocated by health authorities. It offers interesting insights on how misaligned and out of sync food advertising and commercial interests are from government health policies, hence posing challenges to global health promotion with dire implications for public health. It is also significant because although numerous studies have analyzed F&B promoted on Western television, few have investigated adults' exposure to unhealthy food. Given the dearth of data relating to food advertising in Asia, our study further contributes by providing empirical evidence and closing a much needed knowledge gap on China (an East Asian country) and Singapore (a Southeast Asian city-state).

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