1-1-2013

Cup Size Effects On Soda Consumption

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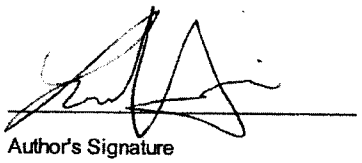

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Cup Size Effects on Soda Consumption

(TITLE)

BY

Lisa Heiser

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

Masters of Science in Dietetics

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

2013

YEAR

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Cup Size Effects on Soda Consumption

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Cup size effects on soda consumption

Obesity is defined as having a body mass index of 30 or above. Obesity has become a global epidemic. According to the World Health Organization global obesity has doubled since 1980. Approximately 35% of adults, age 20 years or more, were overweight in 2008 and 20% were obese. Almost 65% of the world's populations live in countries were overweight and obesity kills more people than underweight disparities ("Obesity and overweight," 2013). "Between 1999–2000 and 2009–2010, the prevalence of obesity increased among men but not among women. In1999–2000, 27.5% of men were obese, and by 2009–2010 the prevalence had increased to 35.5%. Among women, 33.4% were obese in 1999–2000 with no significant change in 2009–2010 (35.8%). In 1999–2000, the prevalence of obesity was higher in women than in men. Between 1999–2000 and 2009–2010, the difference in the prevalence of obesity between men and women decreased so that in 2009–2010, the prevalence of obesity in men was virtually equal to that in women (Ogden, 2012)." Ford, Li, Zhao and Tsai also found these same results, using 1999-2008 NHANES data revealing that" both obesity and abdominal obesity increased in men, and abdominal obesity increased in women"(Ford, Li, Zhao & Tsai, 2011)."The obesity crisis in the United States has reached epidemic proportions. Not only does this epidemic affect the health of the nation, but it also has economic and financial ramifications. An obese and overweight population impacts medical costs, the cost of health insurance that businesses provide for their employees and the productivity of firms. However, this epidemic is not only having an impact on adults, but also on children and young adults which will affect the United States in the future in terms of its competitiveness in the global markets. Obesity has caused cases of diabetes, heart problems, hypertension and cancer to increase at a higher rate" (Guarino, 2013).Chang,

Pollack and Colditz using the data from the National Health Interview Survey found that obesity-attributable comorbidities are associated with a decrease in life years and increase in mortality rates" (Chang, Pollack &Colditz, 2013). Obesity is also a barrier to physical activity. "Arthritis is a common comorbidity of adults with obesity, and arthritis-related joint pain and functional limitation might contribute substantially to low rates of physical activity among adults with obesity" (Hootman, Murphy &Helmick, 2011). "Soft drink consumption is significantly linked to overweight, obesity, and diabetes worldwide, including low and middle income countries" (Basu, McKee, Galea&Stuckler, 2013, p. e1).

Purpose of the Study

The purpose of this research study is to assess whether using smaller cup size influences consumption of soda in a restaurant style setting.

Objectives and Hypothesis

Research Objectives

The research objectives of this study include:

To determine if 16 oz cups verses 32 oz cups influence soda consumption in a restaurant style setting when served with a salty snack.

Hypothesis

The hypothesis of this study include:

Participants with 16 oz cup size will drink significantly less soda compared participants with 32 oz cup size when salty snacks are being consumed.

Limitations

Generalizability: Since this study is a convenience sample of participants, this research may not be generalizable to the overall population.

Timing: The time of the group meetings may influence soda and pretzel consumption such as being held immediately after lunch.

Weather: The temperature outside may have influences how hydrated the participants were before starting the meetings.

Meeting Length: The variation in length of time of the meetings may have influenced the amount of soda and pretzels consumed.

Taste Preference: Some participants do not drink soda.

Participant Discussion: Participants discussed the difference in cup sizes between the two conditions.

Operational Definitions

Overweight and Obesity: ranges of weight that are greater than what is generally considered healthy for a given height ("Defining overweight and," 2012).

Review of Literature

Obesity Epidemic Overview

"In the 1970's, diets began a great shift towards processed foods, fast foods eaten away from home and increased use of edible oils and sugar-sweetened beverages. Negative effects from this dramatic diet change began to be recognized in the early 1990's in middle/ low income populations. Now obesity is being recognized from urban to rural areas in the poorest countries of sub-Saharan Africa and South Asia to populations in countries with higher income levels, such as the United States" (Popkin,

Adair & Ng, 2011, p.3). Ford et al. analyzed NHANES data from 1999-2008 and found that abdominal obesity among US adults increased in both men and women (Ford, Li, Zhao & Tsai, 2011),although the increasing rate of obesity seems to be diminishing (Flegal, Carroll, Ogden & Curtin, 2010). According to the CDC more than 1/3 (35.7%) of US adults were obese in 2011 ("Adult obesity facts," 2012) and more than 1/3 of children and adolescents are overweight or obese in 2010 ("Childhood obesity facts," 2013).Child obesity is not only a large problem in the United States, but is also increasing in Mexico where research has shown nearly half of elementary school children are overweight (Block, Gillman, Linakis& Goldman, 2013). Non-Hispanic blacks have the highest rate of obesity (49.5%) followed by Mexican Americans (40.4%), Hispanics (39.1%) and non-Hispanic whites (34.3%). Higher income non-Hispanic blacks and Mexican Americans were more likely to be overweight/obese than lower income, and higher income women were more likely to be overweight except if they have a college education, then incidence is lower ("Adult obesity facts," 2012). "The obesity prevalence for the US population aged 18 and over more than tripled from 1976 to 2008", effecting both US born and immigrants (Singh, Siahpush, Hiatt &Timsina, 2011, p. 94). First generation born Mexican American immigrants have a greater chance of being overweight or obese compared to their first-generation counterparts (Florez, Dubowitz, Saito, Borges & Breslau, 2012).The national obesity epidemic can be recognized in many populations, including the military. From 1990 to 2006, 18-year-old civilian applicants into the military obesity rate increased from 22.8% to 27.1%. The US military is recruiting from and increasingly overweight population (Hsu, Nevin, Tobler&Rubertone, 2007). Not only are the new military applicants overweight, but veterans prevalence of

overweight/obesity is increasingly high as well (Almond, Kahwati, Kinsinger& Porterfield, 2008). Other populations that are alarmingly obese include women of childbearing age, 29-44 years, where nearly one in two is either overweight or obese (Vahratian, 2009). A large problem with so many Americans' being overweight is that people have lost the accurate perception of what a healthy weight is. "A large proportion of overweight individuals perceive themselves as having the right weight"; with the majority that have never been told that they are overweight by a health care practitioner (Yaemsiri, Slining&Agarwal, 201, p.1063). The rise of obesity has contributed to the rising health care costs in America. Overweight/Obese elderly men spend 6-13% more on their lifetime health care costs while overweight/obese women spend 11-17% more (Yang & Hall, 2008). "The direct medical cost of overweight/obesity is approximately 5-10% of US healthcare spending" (Tsai, Williamson & Glick, 2011, p.50). This is comparable with US's neighbor where "between 2.2%-12.0% of Canada's total healthcare expenditures are attributable to obesity. High costs associated with overweight/obesity and modest costs for obesity prevention programs" have also been observed in Canada (Tran et al., 2013, p. 1). Obesity prevention programs in the United States have also been associated with reduced risk of obesity in 2005 (Chen, Roy & Crawford, 2013), but have thus far not been able to completely "cure" the epidemic.

Obesity Legislation

Legislation is also important when making any major national health changes. Schools are taking action by banning the selling of sugar sweetened beverages to children. Mello, Pomeranz& Moran (2008) provide that "evidence from experimental and longitudinal studies show that increases in the consumption of sugar sweetened beverages

are followed by excess weight gain. Efforts by state policymakers to adopt legislation or regulations that restrict the availability of sugar-sweetened beverages in schools have encountered resistance from consumer and parent groups as well as the beverage industry, who argue that children's food choices are a matter of personal responsibilities and parental choice" (p.595). "In 2003, Arkansas became the first state to ban student-assessable vending machines in elementary schools. Florida, Hawaii and Maine have also been leaders in this area of law"(Mello, Pomeranz& Moran, 2008, p.596). Whether policy change is actually effective has not been shown in the attempt to reduce overall BMI (Taber et al., 2011). Another avenue to reduce soda consumption in schools has been to tax this type of beverage. Strum, et al. found that at-risk children, children who are already overweight or come from low-income homes or African American homes, decrease consumption when soda is taxed (Sturm, Powell, Chriqui&Chaloupka, 2010). Other studies have found that soda taxes provide minimal impacts on weight changes (Powell, Chriqui, Khan, Wada &Chaloupka, 2013). As many countries are experiencing an obesity epidemic similar to the Unites States, the UK has gone to the length of banning advertising practices that target children, completely banning certain food categories. Their attempt seems to have backfired and caused more damage than good, argues industry representatives (Darwin, 2009). Another health policy that is aimed at reducing the obesity epidemic is the Federal Health-Care Reform Act. This act became effective on March 23, 2010. "This Act was poised to improve the obese patient' access to health care, the quality of the health care they receive, and the mix of health-care providers that treat them. Children, under several provisions in the Act, such as the Children's Health Insurance Program, will have greater access to health care. Medicare

beneficiaries, more than half of whom are overweight or obese, can gain access to comprehensive risk assessment and personalized prevention plans. The Act delineated the formation of a National Prevention Health Promotion and Public Health Council. The Council will develop national strategies and deploy enactment funds to disseminate evidenced based recommendations for wellness, health prevention and public health. Funds will be made available to support evidence-based community-centered prevention initiatives and chronic disease prevention strategies, which will directly impact obesity and its associated comorbidities; Small employers will receive funds for establishing wellness programs inevitably including nutrition, physical activity, and weight management measures" (Levine &Koepp, 2011, p. 897-898). The last policy is New York City's ban on large soda pop sold in stores and restaurants. This act was to become effective on March 12, 2013 to limit the size of soda sold to 16 oz. maximum. This action is now in federal appellate court. Following this judicial decision the case will go to the court of appeal, where a briefing and oral argument date will be set, with a final decision anticipated by January, 2014. Further research is needed in order to evaluate the effectiveness of this policy.

Factors Effecting Obesity

There are many factors to consider when examining the causes of obesity. These areas include cultural, economic, food, genetics, lifestyle, media, location and the social environment.

Cultural

It is important to analyze cultural differences in obesity so that health professionals are aware of the populations they will be educating. The CDC found that

non-Hispanic blacks have the highest incidence of obesity followed by Hispanics and non-Hispanic whites, respectively ("Morbidity and mortality," 2012). Research shows that non-Hispanic Black children are growing up drinking more sugar-sweetened beverages and less milk at home compared to non-Hispanic white children(Dodd, Briefel, Cabili, Wilson & Crepinsek, 2013). Other research indicates that "advancing age is the single largest predictor" of obesity in children followed by ethnicity (Long, Mareno, Shabo& Wilson, 2012, p.41). The prevalence of obesity among adults in different cultures is dependent on the culture the individual lives in (Befort, Nazir&Perri, 2012). Ethnic differences may not be observed as much in children, but by adulthood there are definite variances', indicating interventions are needed among various ethnicities.

Economic

Economic parameters among US populations must also be taken into account when analyzing the obesity trends across the Unites States. Among female children research has shown that "low parental income and education are both significant risk factors for the gradual onset of overweight after beginning kindergarten" (Balistreri& Van Hook, 2011, p. 610). As children progress through the lifecycle research has shown that as adolescents, "on the family level, parent's education, but not poverty status, is associated with being overweight" (Martin, Frisco, Nau& Burnett, 2012, p. 597). When analyzing multiple studies, Eisenmann, et al. found that "even though there may not be statistically significant differences in overweight between food-insecure and food-secure children, the prevalence of overweight remains relatively high in food-insecure children" (Eisenmann, Gundersen , Lohman, Garasky& Stewart, 2011, p. e73). A study using participants enrolled in the Women's Infants and Children's (WIC) program suggests that

"household food insecurity, without hunger, is associated with 22% greater odds of child obesity" (Metallinos-Katsaras, Must & Gorman, 2012, p.1949).

Food

When accounting for food insecurity the perspective of food choices must be considered. According to the United States Department of Agriculture (USDA),"eating a diet rich in vegetables and fruits as part of an overall healthy diet may reduce risk of multiple health disparities" ("Vegetables,"para. 1). Research has shown that overweight / obese children's intake of vegetables was "consistently related to parent intake" (Raynor et al., 2011, p. 425). Adults may concentrate on other aspects of the diet when considering healthy eating. Research has shown that obese adults have a negative attitude towards high-fat foods although they prefer and consume high fat foods (Roefs& Jansen, 2002). When looking at the overall diet, food decisions are often dictated by food culture and time restraints (Sealy, 2010).

Genes

It is suggested that genes may play a role in the development of obesity ("Obesity & genetics," 2010). It has been shown that "parental BMI impacts the severity of obesity in children and this is strengthened as the child grows into adolescence"(Svensson et al., 2011, p. 46). Other research "indicates a preconceptional impact of paternal obesity on the reprogramming of imprint marks during spermatogenesis" (Soubry et al., 2013, p. 1). In populations such as European, Asian and Mexican the gene PCSK1 variants have been shown to be associated with obesity, although data analysis by Choquet et al. showed no significant association for obesity risk(choquet, Kasberger, Hamidovic& Jorgenson,

2013). Further research is needed to verify genetic associations before any firm conclusions can be made.

Location

So if results are inconsistent when looking at genetic factors effecting obesity the next factor to consider is location of obese individuals. A study using NHANES data from 2005-2008 found that "obesity is markedly higher among adults from rural versus urban areas across the United States"(Befort, Nazir&Perri, 2012, p. 392),contrary to studies with data conducted before 2005(Gibson, 2011). Since it is well known that rural communities lack fast food resources we wonder what types of foods are being purchased and where they are being purchased from. Americans' are getting the majority of their energy, or food, from stores followed by quick service and full service restaurants (Drewnowski&Rehm, 2013).

Lifestyle

Location research is valuable when considering educational opportunities in educating families on healthy choices, such as 100% juice instead of sugary drinks. "Encouraging caregivers to promote healthy dietary behaviors and provide healthy choices, limiting children's television and computer use, and reducing fast food consumption can contribute to reductions in sugary beverage consumption among children"(Lopez et al., 2012, p. 541). Andaya et al. found that "interventions are needed that are geared at increasing the frequency of eating breakfast as a family and decreasing the amount of TV watched during family meal time , especially among Latino families" (Anadaya, Arredondo, Alcaraz, Lindsay & Elder, 2011, p.308). Other lifestyle factors that are thought to have an impact on obesity are sleep and television. There are

inconsistent results concerning sleep's effect on obesity. Studies have shown that there is no association between sleep and body mass index (BMI) (Lytle et al., 2012), while others have found that "higher BMI is associated with shorter sleep duration, later sleep timing, caloric consumption after 8pm, and fast food meals" (Baron, Reid, Kern & Zee, 2011, p.1374). "Bedroom television sets, which results in greater time spent watching tv and shorter sleep durations, both of which increase a child's odds of becoming overweight; taking out the bedroom television is proposed to help reduce overweight and obese adults and decrease viewing time" (Jones, Johnson & Harvey-Berino, 2010, p. 290-291). Television viewing also effects children's overall diet quality decreasing intake of fruits and vegetables (Miller, Taveras, Rifas-Shiman& Gillman, 2008).

Media

Over half of television commercials promote foods and 72% are aimed at candy, snacks and fast food (Darwin, 2009). Televisions and other "technologies can affect family relationships and are becoming progressively more embedded in everyday practices; mealtime rituals can become altered and change when mediated by the television"(Chitakunye& Maclaran,2012, p. 1). Koordeman et al. found that adults that are exposed to more soda commercials tend to drink more soda (Koordeman, Anschutz, Van Baaren& Engels, 2010).Exposure to food advertisements also increases children's preference for branded food items (Halford et al., 2008). Hare-Bruun et al. found that long exposure to television viewing is also associated with generally having unhealthy food preferences and food habits among children (Hare-Bruun et al., 2011). Outdoor advertisements can also impact food decisions. "Higher percentage of outdoor advertisements promoting food or non-alcoholic beverages within a census tract has

shown to increase the odds of obesity among residents"(Lesser, Zimmerman & Cohen, 2013, p. 1).

Beverage consumption

Drink preference, dictated primarily by taste, is a major contributor of why certain populations', such as college students, choose to drink certain beverages (Block, Gillman, Linakis& Goldman, 2013). Nationally, according to a study by Park et al. using the Youth Risk Behavior Survey, "29.2% of students report drinking sugar-sweetened soda at least one time per day"(Park, Sherry, Foti&Blanck, 2012, p. 125). "Soft drink consumption has increased by 300% in the past 20 years. Soft drinks constitute the leading source of added sugars in the diet and exceed the USDA's recommended sugar consumption for adolescents"(Harrington, 2008, p. 3). Since 1965 individuals consume approximately 222 calories more per day from beverages (Duffey&Popkin, 2007). While caloric beverage consumption has risen, nutritious milk consumption decreased since the 1970's (Bowman, 2002) indicating beverage calories are coming from other sources, such as soda. Beverage consumption patterns have been shown to be influenced by race/ethnicity (Dodd, Briefel, Cabili, Wilson &Crepinsek, 2013) as well as age and income. "Low income children have higher odds of heavy sugar sweetened beverage consumption than high income children"(Han & Powell, 2013, p. 43)."Sugar sweetened beverages provide, on average, about 21% of energy consumed by children, significantly explaining Body Mass Index (BMI)"(Gaskin et al., 2012, p. 1). Research has shown that prevalence of overweight in young children is significantly associated with current soda consumption(Warner, Harley, Bradman, Vargas &Eskenazi, 2006), (James & Kerr, 2005). Other research has shown no correlation between children's beverage

consumption and changes in weight or BMI (Newby et al., 2004). "Diet soda intake has been shown to be positively and significantly associated with BMI among females"(Laska, Murray, Lytle &Harnack, 2012, p. 118), while other studies suggest that "obesity risk may be lower when artificial sweetened beverages replace sugar sweetened beverages in the diet"(Pereira, 2013, p. 433). Even though results are mixed, there does seem to be a positive correlation between consumption of sugar and BMI and abdominal circumference (Penatti, Lira, Katashima, Rosa & Pimentel, 2012). "Soft drink consumption is significantly linked to overweight, obesity and diabetes worldwide, including in low and middle income countries"(Basu, McKee, Galea&Stuckler, 2013, p. e1). "Consumption of sugar sweetened beverages has been associated with an increased risk of developing diabetes in adult women"(James & Kerr, 2005, p. S54) and unhealthy behaviors (Ranjit, Evans, Byrd-Williams, Evans &Hoelscher, 2010). Research has also shown "daily consumption of diet soda associated with a 36% greater relative risk of incident metabolic syndrome and 67% greater relative risk for type 2 diabetes compared with non-consumption"(Nettleton et al., 2009, p. 688). Research has also shown that soda consumption may be associated with kidney damage (Shoham et al., 2008). Due to the detrimental effects soda has on health disparities health professionals are searching for ways to reduce the consumption of these products. One such tactic is reducing the availability of these products to children at school. Unfortunately limiting availability of these beverages has not shown a decrease in sugar sweetened beverage consumption (Blum et al., 2008). Other studies have shown that when 16oz containers are bundled together to decrease the amount of soda per container, the amount sugar sweetened beverages sold can actually increase (Wilson, Stolarz-Fantino, &Fantino, 2013).

Sodium

Salt intake does seem to affect people's emotions and how they perceive thirst (Stevenson, Case & Oaten, 2010). Kim and Lee, 2009, found that individuals that eat salty foods have an increased preference and intake of saltier foods (Kim & Lee, 2009). Children seem to prefer saltier foods and will pick out foods with a higher salt content (Bouhlal, Chabanet, Issanchou& Nicklaus, 2013). "Thirst is highly sensitive to increases in plasma sodium concentration and osmolality, requiring only a 2%–3% increase to induce feelings of thirst" (Stachenfeld, 2008).

Dining Environment

Visual Cues

Knowing how much one is eating is very important when combating obesity. It can be hard to estimate how much food you are eating. Children have a hard time estimating different types of foods that amorphous to different shapes, such as mashed potatoes (Friedman, Bennett, Barbarich, Keaschuk& Ball, 2012). Visual cues help us to know when to stop eating. Wansink, Painter and North (2005) found that when individuals ate from self-refilling bowls that provided no visual cue participants ate 73% more soup(Wansink, Painter & North, 2005). Other research has shown that the visual cue of simply labeling gives people the cue to know how much is in a certain product, such as a drink, and provides that people will make a healthier decision, such as picking the smaller cup (Vermeer et al., 2010). Another way to decrease intake is to eat slower and take time while consuming food (Andrade, Greene &Melanson, 2008).

Food Portioning

Young and Nestle looked at portions from manufacturers both past and present in 2002 and found that "marketplace food portions have increased in size and now exceed federal standards" (Young & Nestle, 2002, p. 246). When people are focused and realize how much they are consuming, they will eat or drink less (Bolhuis, Lakemond, Wijk, Luning&Craaf, 2013). When offered small portions at worksite cafeterias Vermeer et al. found that "when offering a small meal in addition to the existing size, a percentage of consumers that is considered reasonable were inclined to replace the large meal with the small meal" (Vermeer, Steenhuis, Leeuwis, Heymans &Seidell, 2011). Serving bowl size during super bowl parties have been shown to effect the amount of food participants consume. Participants that serve themselves from larger bowls verse smaller bowls, each containing the same amount of snack, took 53% more and consumed 56% more(Wansink& Cheney, 2005).Large bowl size has been shown to increase consumption in ice cream(Hortsmann et al., 2011) and yogurt (Merritt et al., 2011).Yet another tactic to combat overeating, which the food industry realized years ago, is offering food in smaller prepackaged portions, such as 100 calorie packs (Wansink, Payne & Shimizu, 2011). People can do this naturally by using smaller plates, spoons, bowls, etc. When comparing groups using small bowl verse large bowl it was found that participants that ate from a small bowl ate significantly less, ice cream (Wansink, Van Ittersum& Painter, 2006).This is seen not only when serving humans, but our animals as well. When using a large bowl and large scoop pet owners feed their dogs significantly more food than when a small scoop/bowl is used (Murphy, Lusby, Bartges& Kirk, 2012).The shape of glasses can influence how much we pour and consume as well

(Wansink& Van Ittersum, 2005). Wansink and Van Ittersum (2011) found that color contrast can effect consumption and that reduced color contrast significantly reduces overeating even on large plates (Van Ittersum&Wansink, 2011). Studies that have tested the effect of plate size have revealed mixed results. Shah et al. (2011) found that plate size had no effect on consumption when participants served from an individual self-serve bowl of spaghetti (Shah, Schroeder, Winn & Adams-Huett, 2011). When participants eat from a buffet, Rolls et al. (2007) found that plate size had no effect on consumption, although those with smaller plates make significantly more trips to the food line(Rolls, Roe, Halverson &Meengs, 2007). Rolls, Roe and Meengs found that when offering the same group of participant's larger portions verse smaller portions on separate occasions "the 50% increase in portion sizes resulted in a mean increase in daily energy intake of 423±27 kcals, which did not differ significantly between men and women" (Rolls, Roe &Meengs, 2007, p. 1535). Previous studies have also shown the same results, that larger portions increase energy intake (Rolls, Morris & Roe, 2002).Following studies have confirmed these results (Rolls, Roe &Meengs, 2006), (Kelly et al., 2009). The size of a beverage container has also been studied. Researchers served lunch in a laboratory once a week for 6 weeks and varied the type of beverage consumed between cola, diet cola and water using 12oz verse 18oz. Flood, Roe and Rolls (2006) found that "increasing beverage portion size significantly increased the weight of beverage consumed, regardless of the beverage type" (Flood, Roe and Rolls, 2006, p. 1984). There are no studies to date that look at the effect of cups size with a salty snack offered in a restraint style environment on consumption. Therefore, this research study will be testing the

effect of soda consumption when using 16 oz versus 32 oz cups and offered with a salty snack.

Method

The following section describes the methodology used to assess if using smaller cup size influences consumption of soda in a restaurant style setting when a salty snack is present.

Design

The design of this study was quasi-experimental.

Sample

Participants were a convenience sample of University staff, faculty and students who were members of NCS subcommittee groups. Three groups participated in this study. Participants that were excluded from this study were members that did not wish to participate.

Data Collection Instruments

Cups: Participants were given a 16oz clear plastic cup during one meeting and 32oz clear plastic cup during another meeting.

Soda: Participants were given a choice of Pepsi, Diet Coke or Sprite.

Measuring cups: Each participant's leftover soda was measured at the completion of the study.

Procedure for Data Collection

Participants were asked if they wished to participate in this study when entering the subcommittee meetings. If participants chose to participate in the study, then they were given a consent form. Pre-numbered bags of pretzels, containing 17 pretzels, or 1

serving, were set on the table for each participant. Upon completion of the bag, each participant was given a subsequent bag with the same participant number. Upon completion of the study remaining pretzels were measured and subtracted from the original amount given. The amount consumed was recorded. The table placements were also set with either a 16oz cup or a 32oz cup with participant number. Participants were asked by the researcher which choice of beverage they would prefer. The researcher recorded the participant number with their choice of beverage. The researcher then filled the 16oz glass with 12oz soda or 32oz glass with 24oz soda. As participants finished their beverage the researcher brought the participant a refill with their initial choice of beverage. Upon completion of the meeting the researcher measured how much beverage remained in the cup, and pretzels remained in the premeasured bags, and subtracted this amount from the total amount given per participant.

Data Analysis

A T-test using Microsoft Excel was used to compute and analyze data to see if there were significant differences between groups.

Results

Table 1
Soda consumption per participant

	Soda	
Participant	16 oz Group	32oz Group
1	7	0
2	18	9
3	18	13
4	3.5	4
5	16	11
6	10	15
7	0	24
8	12	24
9	15	24
10	6.5	7
Total	106	124
Average	10.6	12.4
Significance	0.23	

Table 2
Pretzel consumption per participant

	Pretzels	
Participant	16oz Group	32oz Group
1	13	0
2	17	15
3	9	12
4	0	not taken
5	8	not taken
6	15	29
7	0	0
8	2	0
9	11	17
10	5	12
Total	80	85
Average	8	8.5
Significance	0.25	

Discussion

Results indicate that cup size did not significantly ($p>.05$) ($p=.23$) effect the amount of soda consumed, as seen in Table 1. These finding differ from a study by Horstmann et al., 2011 which indicate that using a larger bowl and larger spoon increases intake of ice cream (Hortsmann et al., 2011). This was also seen in a study by Merritt et al., 2011, where using a larger bowl significantly increased consumption of yogurt. It would be logical to assume that using a larger cup size would increase intake of soda consumed. Flood, Roe and Rolls (2006) found that "increasing beverage portion size significantly increased the weight of beverage consumed, regardless of the beverage type" (Flood, Roe and Rolls, 2006, p. 1984). This research study contradicts these findings. Even though the results of this study differ from past studies, there was a non-significant ($p>.05$) trend of increased soda consumption when using a larger cup. There was approximately a 17% increase of soda consumed by the groups using a 32oz cup.

There are multiple reasons to explain why the results indicated that there is no significant difference in cup size and soda consumption contrary to previous studies. The small sample size as a result of the pared subject design may be one reason that the results indicate that there were no differences. Participant data was only used if they participated in both the meetings. Many participants did not come to the second meeting. Other factors that influenced the finding of this study are meeting timing, weather and meeting duration. One of the factors may have been the timing of the meetings. There were meetings held directly after lunch when participants were not hungry and so did not eat as many pretzels or drink as much soda because they were already satiated. Other meetings were held in the morning when participants were more inclined to drink

caffeinated beverages. Another uncontrolled variable that may have affected the amount of soda consumed was the weather. During some meetings the outside temperate was warmer than other meetings, causing participants to have increased thirst. Finally, there were meetings that were a shorter duration decreasing the amount of time participants had to drink their soda and eat their pretzels to show a significant ($p<.05$) difference.

Salt intake does seem to affect people's emotions and how they perceive thirst (Stevenson, Case & Oaten, 2010). Kim and Lee, 2009, found that individuals that eat salty foods have an increased preference and intake of saltier foods (Kim & Lee, 2009). Participants in this study only consumed approximately half a serving, indicating that there was not a salty taste preference among participants. Children seem to prefer saltier foods and will pick out foods with a higher salt content (Bouhlal, Chabanet, Issanchou& Nicklaus, 2013). Participants in this research study were a group of staff, faculty and students with ages above adolescence. The age population of subjects did not seem to prefer the saltier snack. Further research is needed to find if taste preferences for a salty snack differ between children and adults. It is logical to assume that the more salty snack an individual consumes the more fluid that person would consume. "Thirst is highly sensitive to increases in plasma sodium concentration and osmolality, requiring only a 2%–3% increase to induce feelings of thirst (Stachenfeld, 2008)." Participants on average only consumed ½ serving, not the normal intake for an average individual and thus probably didn't consume enough of the salty snacks to increase thirst.

Future studies should use a larger sample size. There should be a better control of location, time and environment. The conditions should be alternated as to which one is

collected first so the effect of outside weather is approximately the same in both conditions.

Conclusion

Past studies indicate that using larger dinnerware increases consumption (Hortsmann et al., 2011), (Merritt et al., 2011),(Flood, Roe and Rolls, 2006, p. 1984). Results of this study contradict these findings, although the trend in soda consumption increased 17% when using a large cup. A reason that the results revealed a non-significant difference may be because of the small sample size. I believe with a larger sample of subjects the results would indicate a positive correlation between large cup size and amount of soda consumed. The salty snack did not make a difference in consumption between cup sizes. Further research is needed to determine if a salty snack increases soda consumption. More research is needed with a larger sample size in order to draw definite conclusions.

References

Almond, N., Kahwati, L., Kinsinger, L., & Porterfield, D. (2008).The prevalence of overweight and obesity among us military veterans.*Military Medicine*, *173*(6), 544.

Andaya, A., Arredondo, E., Alcaraz, J., Lindsay, S. & Elder, J. (2011). The association between family meals, tv viewing during meals, and fruit, vegetables, soda and chips intake among latino children. *Journal of Nutrition Education and Behavior, 43* (5), 308-315

Andrade, A., Greene, G. &Melanson, K. (2008). Eating slowly led to decreases in energy intake within meals in healthy women. *Journal of the American Dietetic Association, 108,* 1186- 1191

Balistreri, K., & Van Hook, J. (2011). Trajectories of overweight among us school children: A focus on social and economic characteristics. *Maternal Child Health Journal ,15*, 610-619.

Baron, K., Reid, K., Kern, A. & Zee, P. (2011).Role of sleep timing in caloric intake and BMI.*Obesity, 19* (7), 1374-1381

Basu, S., McKee, M., Galea, G., &Stuckler, D. (2013). Relationship of soft drink consumption to global overweight, obesity and diabetes: A cross-national analysis of 75 countries. *American Journal of Public Health*, e1-e7.doi: 10.2105/AJPH.2012.300974

Befort, C., Nazir, N. &Perri, M. (2012). Prevalence of obesity among adults from rural and urban areas of the united states: Findings from NHANES (2005-2008). *The Journal of Rural Health, 28,* 392-397

Block, J., Gillman, M., Linakis, S. & Goldman, R. (2013). "If it tastes good, I'm eating it": qualitative study of beverage consumption among college students. *Journal of Adolescent Health, 52,* 702-706

Blum, J., Davee, A., Beaudoin, C., Jenkins, P., Kaley, L. & Wigand, D. (2008) Reduced availability of sugar-sweetened beverages and diet soda has a limited impact on beverage consumption patterns in maine high school youth. *Journal of Nutrition Education and Behavior, 40*, (341-347)

Bolhuis, D., Lakemond, C., Wijk,R., Luning, P. &Craaf, C. (2013). Consumption with large sip sizes increases food intake and leads to underestimation of the amount consumed. *PLoSONE, 8* (1), e53288

Bouhlal, S., Chabanet, C., Issanchou, S., & Nicklaus, S. (2013). Salt content impacts food preferences and intake among children. *PloS ONE*, *8*(1), e53971.

Bowman, S. (2002). Beverage choices of young females: Changes and impact on nutrient intake. *Journal of the American Dietetic Association, 102* (9), 1234-1239

Center for Disease Control, (2010).Obesity & genetics. Retrieved from website: http://www.cdc.gov/Features/Obesity/

Center for Disease Control, (2012).Adult obesity facts. Retrieved from website: http://www.cdc.gov/obesity/data/adult.html

Center for Disease Control, (2012).Morbidity and mortality weekly report. Retrieved from website: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6107a5.htm

Center for Disease Control, (2013).Childhood obesity facts. Retrieved from website: http://www.cdc.gov/healthyyouth/obesity/facts.htm

Chang, S., Pollack, L., &Colditz, G. (2013). Life years lost associated with obesity related diseases for u.s. non-smoking adults. PloS ONE, 8(6), e66550.

Chen, Z., Roy, K., Crawford, C.A.G. (2013) Obesity prevention: the impact of local health departments. *Health Services Research, 48,* 603-627

Chitakunye, P. &Maclaran, P. (2012). Materiality and family consumption: the role of the television in changing mealtime rituals. *Consumption Markets & Culture,* 1-21

Choquet, H., Kasberger, J., Hamidovic, A., & Jorgenson, E. (2013). Contribution of common pcsk1 variants to obesity in 8,359 sujects from multi-ethic american population. *PLoSONE, 8*(2), e57857.

Darwin, D. (2009). Advertising obesity: Can the us follow the lead of the uk in limiting television marketing of unhealthy foods in children?.*VANDERBILT JOURNAL OF TRANSNATIONAL LAW*, *42*, 317-350.

Defining overweight and obesity. (2012, April 27). Retrieved from http://www.cdc.gov/obesity/adult/defining.html

Dodd, A., Briefel, R., Cabili, C., Wilson, A., &Crepinsek, M. (2013). Disparities in consumption of sugar-sweetened and other beverages by race/ethnicity and obesity status among united states schoolchildren. *Journal of Nutrition and Behavior*, *45*(3), 240-249.

Drewnowski, A. &Rehm, C. (2013).Energy intakes of us children and adults by food purchase location and by specific food source.*Nutrition Journal, 12,* 59

Duffey, K. &Popkin, B. (2007).Shifts in patterns and consumption of beverages between 1965 and 2002.*Obesity, 15* (11), 2739

Eisenmann, J., Gundersen , C., Lohman, B., Garasky, S., & Stewart, S. (2011). Is food insecurity related to overweight and obesity in children and adolescents? a summary of studies, 1995-2009. *Obesity reviews*, *12*, e73-e83.

Flegal, K. M., Carroll, M. D., Ogden, C. L., & Curtin, L. R. (2010).Prevalence and trends in obesity among us adults, 1999-2008.*Journal of the american medical association*, *303*(3), 235-241.

Flood, J., Roe, L. & Rolls, B. (2006).The effect of increased beverage portion size on energy intake at a meal.*Journal of the American Dietetic Association, 106,* 1984-1990

Florez, K., Dubowitz, T., Saito, N., Borges, G., & Breslau, J. (2012). Mexico-united states migration and the prevalence of obesity: a transnational perspective. *American Medical Association, 172*(22), 1760-1762.

Ford, E., Li, C., Zhao, G., & Tsai, J. (2011).Trends in obesity and abdominal obesity among adults in the united states from 1999-2008.*International Journal of Obesity, 35*, 736-743.

Friedman, A., Bennett, T., Barbarich, B., Keaschuk, R. & Ball, G. (2012). Food portion estimation by children with obesity: The effects of estimation method and food type. *Journal of the Academy of Nutrition and Dietetics, 112,* 302-307

Gaskin, P., Lai, P., Guy, D., Knight, J., Jackson, M. & Nielsen, A. (2012) Diet, physical activity, weight status, and culture in a sample of children from the developing world. *Journal of Nutrition and Metabolism, 2012,*1-8

Gibson, D. (2011). The neighborhood food environment and adult weight status: Estimates from longitudinal data. *American Journal of Public Health, 101*(1), 71-78

Guarino, A. (2013). An american dilemma: The financial costs and economic impact of obesity in the united states. Advances in Management, 6(7), 3-7.

Halford, J., Boyland, E., Cooper, G., Dovey, T., Smith, C., Williams, N., Lawton, C. & Blundell, J. (2008). Children's food preferences: Effects of weight status, food type, branding and television food advertisements (commercials). *International Journal of Pediatric Obesity, 3,* 31-38

Han, D., Murphy, R., Morgan, A., Lam, W., Thompson, J., Wall, C., Waldie, K., Mitchell, E. & Ferguson, L. (2013). Reduced genetic influence on childhood obesity in small for gestational age children. *BMC Medical Genetics, 14,*10

Han, E. & Powell, L. (2013). Consumption patterns of sugar-sweetened beverages in the united states. *Journal of the Academy of Nutrition and Dietetics, 113*, 43-53

Hare-Bruun, H., Nielson, B., Kristensen, P., Moller, N., Togo, P. &Heitmann, B. (2011). Television viewing, food preferences, and food habits among children: A prospective epidemiological study. *BMC Public Health, 11,* 311

Harrington, S. (2008). The role of sugar-sweetened beverage consumption in adolescent obesity: A review of the literature. *The Journal of School Nursing, 24* (1), 3

Hootman, J., Murphy, L., &Helmick, C. (2011). Arthritis as a potential barrier to physical activity among adults with obesity — united states, 2007 and 2009. Morbidity and Mortality Weekly Report, 60(19), 614-618.

Horstmann, M. J., Merritt, J. M., Barnes, J. L., Newell, S. B., Rhodes, K., Painter, J. E. (2011). The effect of dinnerware size on ice cream consumption. *The Journal of the American Dietetic Association, 111*(9 Suppl. 2), A-51.

Hsu, L., Nevin, R., Tobler, S., &Rubertone, M. (2007). Trends in overweight and obesity among 18-year-old applicants to the united states military, 1993-2006. *Journal of Adolescent Health, 41*, 610-612.

James, J. & Kerr, D. (2005).Prevention of childhood obesity by reducing soft drinks. *International Journal of Obesity, 29,* S54-S57

Jones, K., Otten, J., Johnson, R. & Harvey-Berino, J. (2010).Removing the bedroom television set: A possible method for decreasing television viewing time in overweight and obese adults.*Behavior Modification, 34* (4), 290-298

Kelly, M., Wallace, J., Robson, P., Rennie, K., Welch, R., Hannon-Fletcher, M., Brennan, S., Fletcher, A. & Livingstone, M. (2009)Increased portion size leads to a sustained increase in energy intake over 4 d in normal-weight and overweight men and women. *British Journal of Nutrition, 102,* 470-477

Kim, G., & Lee, H. (2009). Frequent consumption of certain fast foods may be associated with an enhanced preference for salt taste. *Journal of Human Nutrition and Dietetics, 22*, 475-480.

Koordeman, R., Anschutz, D., Van Baaren, R. & Engels, R. (2010). Exposure to soda commercials affects sugar-sweetened soda consumption in young women. An observational experimental study.*Appetite, 54,* 619-622

Laska, M., Murray, D., Lytle, L. &Harnack, L. (2012). Longitudinal assocaitions between key dietary behaviors and weight gain over time: Transitions through the adolescent years. *Obesity, 20,* 118-125

Lesser, L., Zimmerman, F. & Cohen, D. (2013).Outdoor advertising, obesity, and soda consumption: a cross-sectional study. *BMC Public Health, 13* (20), 1-7

Levine, J., &Koepp, G. (2011). Federal health-care reform: Opportunities for obesity prevention. *Obesity*, *19*(5), 897-899.

Long, J., Mareno, N., Shabo, R., & Wilson, A. (2012). Overweight and obesity among white, black and mexicanamerican children: Implications for when to intervene. *Journal for Specialits in Pediatric Nursing*, *17*, 41-50.

Lopez, N., Ayala, G., Corder, K., Eisenberg, C., Zive, M., Wood, C. & Elder, J. (2012). Parent support and parent-mediated behaviors are associated with children's sugary beverage consumption. *Journal of the Academy of Nutrition and Dietetics, 112,* 541-547

Lytle, L., Murray, D., Laska, M., Pasch, K., Anderson, S. &Farbakhsh, K. (2012).Examining the longitudinal relationship between change in sleep and obesity risk in adolescents. *Health and Education Behavior*,*40*(3), 362-370

Mello, M., Pomeranz, J., & Moran, P. (2008). The interplay of public health law and industry self-regulation: The case of sugar-sweetened beverage sales in schools. *American Journal of Public Health, 98*(4), 595-596.

Merritt, J. M., Horstmann, J. M., Barnes, J. L., Painter, J. E. (2011). The effect of dinnerware size on the consumption of yogurt. *The Journal of the American Dietetic Association,* 111(9 Suppl. 2), A-91.

Metallinos-Katsaras, E., Must, A., & Gorman, K. (2012). A longitudinal study of food insecurity on obesity in preschool children.*Journal of the Academy of Nutrition and Dietetics, 112*, 1949-1958.

Miller, S., Taveras, E., Rifas-Shiman, S. & Gillman, M. (2008).Association between television and poor diet quality in young children.*International Journal of Pediatric obesity, 3,* 168-176

Murphy, M., Lusby, A., Bartges, J. & Kirk, C. (2012). Size of food bowl and scoop affects amount of dog food owners feed their dogs. *Journal of Animal Psychology and Animal Nutrition, 96,* 237-241

Newby, P., Peterson, K., Berkey, C., Leppert, J., Willett, W. &Colditz, G. (2004). Beverage consumption is not associated with changes in weight and body mass index among low-income preschool children in north dakota. *Journal of the American Dietetic Association, 104,*1086-1094

Obesity and overweight. (2013, March). Retrieved from http://www.who.int/mediacentre/factsheets/fs311/en/index.html

Ogden, C. (2012). Prevalence of obesity in the united states, 2009–2010. Medical Benefits, Retrieved from www.cdc.gov/nchs/ data/databriefs/db82.pdf

Park, S., Sherry, B., Foti, K. &Blanck, H. (2012).Self-reported academic grades and other correlates of sugar-sweetened soda intake among us adolescents.*Journal of the Academy of Nutrition and Dietetics, 112,* 125-131

Penatti, M., Lira, F., Katashima, C., Rosa, J. & Pimentel, G. (2012). Sugar intake is correlated with adiposity and obesity indicators and sedentary lifestyle in brazilian individuals with morbid obesity. *NutricionHospitalaria, 27* (5), 1547-1553

Pereira, M. (2013). Diet beverages and the risk of obesity, diabetes, and cardiovascular disease: A review of the evidence. *Nutrition reviews, 71* (7), 433-440

Popkin, B. M., Adair, L. S., & Ng, S. W. (2011).Global nutrition transition and the pandemic of obesity in developing countries.*Nutrition reviews* ,*70*(1), 3-21.

Powell, L., Chriqui, J., Khan, T., Wada, R., &Chaloupka, F. (2013). Assessing the potential effectiveness of food and beverage taxes and subsidies for improving public health: A systematic review of prices, demand and body weight outcomes. *Obesity reviews*, *14*, 110-128.

Nettleton, J., Lutsey, P., Wang, Y., Lima, J., Michos, E. & Jacobs, D. (2009) Diet soda intake and risk of incident metabolic syndrome and type 2 diabetes in the multi-ethnic study of atherosclerosis (MESA). *Diabetes Care, 32* (4), 688-694

Ranjit, N., Evans, M., Byrd-Williams, C., Evans, A. &Hoelscher, D. (2010). Dietary and activity correlated od sugar-sweetened beverage consumption among adolescents. *Pediatrics, 126*, e754-e761

Raynor, H., Van Walleghen, E., Osterholt, K., Hart, C., Jelalian, E., Wing, R., & Goldfield, G. (2011). The relationship between child and parent food hedonics and parent and child food group intake in children with overweight/obesity. *Journal of the American Dietetic Association, 111*, 425-430.

Roefs, A., & Jansen, A. (2002).Implicit and explicit attitudes toward high-fat foods in obesity.*Journal of Abnormal Psychology, 111*(3), 517-521.

Rolls, B., Morris, E. & Roe, L. (2002). Portion size of food affects energy intake in normal-weight and overweight men and women. *American Journal of Clinical Nutrition, 76,* 1207-1213

Rolls, B., Roe, L., Halverson, K. &Meengs, J. (2007). Using smaller plate did not reduce energy intake at meals. *Appetite, 49,* 652-660

Rolls, B., Roe, L. &Meengs, J. (2006). Larger portion sizes lead to a sustained increase in energy intake over 2 days. *Journal of the American Dietetic Association, 106,*

543-549

Rolls, B., Roe, L. &Meengs, J. (2007). The effect of large portion sizes on energy intake is sustained for 11 days. *Obesity, 15* (6), 1535-1543

Sealy, Y. (2010). Parents' food choices: Obesity among minority parents and children. *Journal of Community Health Nursing, 27*, 1-11.

Singh, G., Siahpush, M., Hiatt, R., &Timsina, L. (2011). Dramatic increases in obesity and overweight prevalence and body mass index amonth ethnic-immigrant and social class groups in the united states, 1976-2008. *Journal of community health, 36*, 94-110.

Shah, M., Schroeder, R., Winn, W. & Adams-Huett, B. (2011).A pilot study to investigate the effect of plate size on meal energy intake in normal weight and overweight/obese women.*Journal of Human Nutrition and Dietetics, 24,* 612-615

Shoham, D., Durazo-Arvizu, R., Kramer, H., Luke, A., Vupputuri, S., Kshirsager, A. & Cooper, R. (2008) Sugary soda consumption and albuminuria: Results from the national health and nutrition examination survey, 1999-2004.*PLoS ONE, 3* (10), e3431

Soubry, A., Schildkraut, J., Murtha, A., Wang, F., Huang, Z., Bernal, A., Kurtzberg, J., Jirtle, R., Murphy, S., &Hoyo, C. (2013). Parental obesity is associated with IGF2 hypomethylation in newborns: results from a newborn epigenetics study (NEST) cohort. *BMC Medicine, 11* (29), 1-10

Stachenfeld, N. (2008). Acute effects of sodium ingestion on thirst and cardiovascular function. *Curr Sports Med Rep*, *4*(4 Suppl), S7-13.

Stevenson, R., Case, T., & Oaten, M. (2010). Salt-in duced thirst results in increased finickiness in humans. *The Psychological Record*, *60*, 385-398.

Sturm, R., Powell, L., Chriqui, J., &Chaloupka, F. (2010). Soda taxes, soft drink consumption, and children's body mass index. *Health Affairs*, *29*(5), 1052-1058.

Svensson, V., Jacobsson, J., Fredriksson, R., Danielsson, P., Sobko, T., Schioth, H., & Marcus, C. (2011). Associations between severity of obesity in childhood and adolescence, obesity onset and parental bmi: a longitudinal cohort study. *International Journal of Obesity*, *35*, 46-52.

Taber, D., Stevens, J., Evenson, K., Ward, D., Poole, C., Maciejewski, M., Murray, D., & Brownson, R. (2011). State policies targeting junk food in schools: Racial/ethnic differences in the effect of policy change on soda consumption. *American Journal of Public Health*, *101*(9), 1769-1775.

Tran, X. T., Nair A.V., Kuhle S., Ohinmaa, A., Veugelers, P.J. (2013) Cost analysis of obesity in Canada: scope, quality, and implications. *Cost effectiveness and resource allocation, 11*(3), 1-9.

Tsai, A.G., Williamson D.F., Glick, H.A. (2011). Direct medical costs of overweight and obesity in the usa: a quantitiative systematic review. *Obesity Reviews, 12,* 50-61

US Department of Agriculture, (n.d.).Vegetables. Retrieved from website: http://www.choosemyplate.gov/food-groups/vegetables-why.html

Vahratian, A. (2009). Prevalence of overweight and obesity among women of childbearing age: results from the 2002 national survey of family growth. *Maternal Child Health Journal ,13*, 268-273.

Van Ittersum, K. &Wansink, B. (2011). Plate size and color suggestibility: The delboeuf illusion's bias on serving and eating behavior. *Journal of Consumer Research, 39,* 215-228

Vermeer, W., Steenhuis, I., Leeuwis, F., Bos, A., Boer, M. &Seidell, J. (2010). Portion size labeling and intended soft drink consumption: The impact of labeling format and size portfolio. *Journal of Nutrition Education and Behavior, 42* (6), 422-426

Vermeer, W., Steenhuis, I., Leeuwis, F., Heymans, M. &Seidell, J. (2011). Small portion sizes in worksite cafeterias: do they help consumers to reduce their food intake?.*International Journal of Obesity, 35,* 1200-1207

Warner, M., Harley, K., Bradman, A., Vargas, G. &Eskenazi, B. (2006) Soda consumption and overweight status of 2-year-old mexican-american children in california. *Obesity, 14* (11), 1966-1974

Wansink, B. & Cheney, M. (2005). Super bowls: serving bowl size and food consumption. *Journal of the American Medical Association, 293* (14), 1723-1728

Wansink, B., Painter, J. & North, J. (2005). Bottomless bowls: Why visual cues of portion size may influence intake. *Obesity Research, 13* (1), 93-100

Wansink, B., Payne, C. & Shimizu, M. (2011). The 100-calorie semi-solution: sub-packaging most reduces intake among the heaviest. *Obesity, 19,* 1098-1100

Wansink, B. & Van Ittersum, K. (2005). Shape of glass and amount of alcohol poured: comparative study of effect of practice and concentration. *BMJ, 331,* 1512-1514

Wansink, B., Van Ittersum, K. & Painter, J. (2006). Ice cream illusions bowls, spoons, and self-served portion sizes. *American Journal of Preventive Medicine, 31* (3), 240-243

Wilson, B., Stolarz-Fantino, S. &Fantino, E. (2013).Regulating the way to obesity: unintended consequences of limiting sugary drink sizes.*PLoS One 8* (4), e61081

Yaemsiri, S., Slining, M., &Agarwal, S. (2011).Percieved weight status, overweight diagnosis, and weight control among us adults: the nhanes 2003-2008 study. *International Journal of Obesity, 35*, 1063-1070.

Yang, Z., Hall, A. (2008). The financial burden of overweight and obesity among elderly americans: the dynamics of weight, longevity, and health care costs. *Health Services Research, 43,* 849-868

Young, L. & Nestle, M. (2002). The contribution of expanding portion sizes to the us obesity epidemic. *American Journal of Public Health, 92,* 246-249