

Does a Sweet Tooth A Heavy Body Make?

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On my honor as a University Student, I have neither given nor received
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Obesity and Additive Sugars

Obesity is a growing epidemic around the world; it is predicted that there will be an additional 65 million obese adults, in the USA alone, by 2030 (Wang et al, 2011). Distribution of food is not a problem in well-developed countries such as USA, France, Germany, Canada, and many more. Companies that sell unhealthy foods are still growing to this day. The main reason why companies are still growing is because their customer base is growing, and customers are still buying their products. Many unhealthy foods contain additive sugars. Additive sugars are sugars added to foods in addition to sugar content the foods had to begin with. So how are people still consuming those products? There are multiple factors involved, part of Actor-Network Theory, such as: socioeconomic factors, sugar's addictive properties, bad habits, cultural/religious reasons, and more. Additive sugars are also used as political technologies. When humans were hunter-gatherers, humans evolved to look out for foods with sugar, as those are the foods with great taste and nutrition. This is part of a reward system that humans used to seek out good food back when humans lived in a more dangerous environment, especially when good foods were scarce. But such food is not scarce nowadays, it is easily available in most countries around the world. Sugar companies use the addictive properties of sugar to make sure that customers continue to buy their products. Also, the sugar industry tampered and/or bribed around with scientific experiments and data around the 1950s-1970s about sugar (Kearns et al 2015, Kearns et al 2016).

Research of several kinds have been done, such as: online research, interviews of different individuals, research into sugar as part of culture (Gulati et al. 2014), research into contents of different foods, etc. The research question is: how much does additive sugar factor as a political technology and how much influence does it have in Actor Network Theory?

Research Question and Methods

The research question is how addictive are additive sugars, how much do additive sugars factor as a political technology and how much influence do additive sugars have in an Actor Network Theory (ANT)? The methods to answer this research question involve five steps, each with their own purposes and objectives. The first step is to research articles and textbooks to find out what are the effects sugar has on the body and brain, and whether those effects cause addiction. The second step is to research the sugar industry and what role they play in the development of companies that sell foods with additive sugars. The third step is to look more deeply into how companies advertise their products. The fourth step is to collect more research on socioeconomics and cultural effects of foods with additive sugars and on which groups of people are most affected or even rely on foods like fast-food. The fifth and final step involves interviewing consumers, current or former, of products with additive sugars to understand how they feel about the products, whether these products play a critical role in their lives, and to determine what factors affect these people that kept them eating foods with additive sugars. This step was to determine if socioeconomics, bad habits, cultural background, or other factors are causing these effects. Questions from the interview are in the Appendix. One example question is “How did you feel when consuming those high-sugar foods? Did you feel happy, depressed, etc.?” (R. Serbulea, personal interview, February 10th, 2020). This question would show if foods with additive sugars can convey some emotional response from the user, like a political technology.

Background Information on Additive Sugars

Additive sugars are sugars that are added to foods, even if said foods already had sugar to begin with. Foods with additive sugars are usually unhealthy; such foods that go into the

category include sodas, candy, fast-foods, corn-syrup, and many more. A documentary called *Super-Size Me*, by Morgan Spurlock, in 2004 showed people what happens when Spurlock himself ate nothing but McDonalds meals for 30 days in a row. This topic about additive sugars was inspired by the *Super-Size Me* documentary. Spurlock mentioned in his documentary of how most of the McDonald menu items contained added sugars, even their salads. After the 30-day diet, Spurlock gained over 25 pounds and his body fat levels went from 11% to 18%. Also, Spurlock said, “I ate over 30 pounds of sugar in total, that’s about a pound a day.” (Spurlock, *Super-Size Me*, 2004). Another example includes a story of a man who dealt with weight gain, but it was not exactly caused by eating unhealthy foods. One person was interviewed, his identity will be kept anonymous, who will be referred to as David (R. Serbulea, personal interview, February 20th, 2020). David grew up in Romania during the late 60s and early 70s, a time when Romania was under communism. Romania during that time was under the rule of a dictator and many of the country’s people had to wait hours just to get basic items like eggs and milk, but many people still starved. David started a family and moved to the United States of America. He and his wife were both financially successful to support their family. David said, “There were times we ate fast-food for the convenience, but we did eat plenty of healthy home cooked meals too.” However, overtime, David gained weight, almost reaching 300 pounds. He claims, “It was not really unhealthy food, even though I ate a bunch, but my bad habits. Whenever my family ate meals my wife cooked and the children had leftovers, I would eat the rest of it. Just dumping it into me like a trashcan, because I felt like it would be a waste of money, even if some of that food could have been saved in the fridge and microwaved another day” (R. Serbulea, personal interview, February 20th, 2020). His story was another major influencer into the research of additive sugars.

Actor Network Theory and Political Technologies with Additive Sugars

Science, Technology and Society (STS) theories involved in additive sugars are Actor-Network Theory (ANT) and political technologies. ANT is important to these arguments because ANT is involved is because there are multiple factors as to why so many people still purchase and eat sugar. Companies and customers are factors in the complex network of ANT theory that the article by Cressman details; advertisements represent the “intermediaries” that link the potential customers to the products of fast-food (Cressman, 2009).

Another STS framework that involves itself with additive sugars is political technologies. Humans evolved a reward system where if a human ate a type of food with sugar, it would trigger an increase in neurotransmitters, such as dopamine, in the brain. This biological feature was used by early mankind to survive and knowing which foods are good to eat and which are not or even poisonous. The sugar industry is a major contributor, as shown from both articles by Kearns et al, in how companies have taken advantage of that evolutionary feature. The sugar industry has been shown to have tampered with research and the data collected about sugar, and even bribed scientists to make sugar look not as bad and turn the blame to another ingredient in unhealthy foods, like fats and oils. Perhaps the sugar industry knew how addicting sugar is and tried to not lose their customers, especially if they can keep said customers addicted to their products (Kearns et al 2015, Kearns et al 2016).

Advertisements are also a part of political technologies as they are made to be alluring and to make sure the viewer(s) know the product and keep it in the back of their head (Winner, 1980). The correlation of advertisement viewing, and childhood weight gain was shown in an article by Chou (Chou et al, 2008). Even Spurlock stated in his documentary, “The average American child sees about 10,000 food advertisements per year, 95% of those are for sugared

cereals, soft drinks, fast-food or candy”. This is showing how children are prime targets for companies that sell additive sugars. Another statement made by Spurlock was, “In 2001, on direct media advertising, McDonald’s spent \$1.4 billion worldwide while the 5-a-day fruit and vegetable campaign’s advertising budget was a lowly \$2 million a hundred times lower than the advertising of a candy company” (Spurlock, *Super-Size Me*, 2004).

These statements and articles all show the alluring and seductive power that advertisements have on people and how much money companies are willing to spend. Socioeconomics are also big factor in ANT theory and even political technologies, but socioeconomics may not be the final factor. Bad habits could be another factor contributing to the popularity of these additive sugar foods and the continuation of companies to sell unhealthy foods. David gained weight and unhealthy conditions due to his bad habits of eating his family’s leftovers, even if he was already done eating his meal. All these factors show how ANT theory and political technologies are the main STS frameworks for this topic concerning the power and influence of additive sugars and the companies using said sugars.

Results

After some research, results for each step on additive sugars has been found or determined. The results of research from technical documents showed that sugar is addictive; sugar can cause a chain reaction in the brain releasing neurotransmitters, such as dopamine. In an experiment, where rats had sugar and/or fat diets, it was shown that the rats which had the high sugar diet developed withdrawal similar to opiate drugs. (Avena 2007, Avena et al. 2007, Avena et al. 2009). The results of research related to the sugar industry show that the sugar industry, in the 1950s-1970s, did use several tactics to change the results of experiments involving sugars and to sway the opinions the public had about how sugars are important to people and that fats

are what lead to obesity (Kearns et al. 2015, Kearns et al. 2016). The results of research on company advertisement show that companies spend large amounts of money in advertisements as means to keep their customers interested, especially children. These results show how advertisements are another actor in ANT for additive sugars as well as a prime example of a political technology (Spurlock, *Super-Size Me*, 2004). The results of research on socioeconomics and cultural effects of foods with additive sugars show that socioeconomics does affect what kinds of diets people have. Research has shown low-income families and young people (children and adolescents) are most likely to have diets with high amounts of sugar (Bowman et al 2004). The results of research on culture, background, and bad habits show that cultural backgrounds, bad habits, and other niche factors can lead to a consumption of additive sugars that can then lead to obesity and obesity-related problems. These results are based on an interview done with a former consumer of foods with additive sugars and research of the cultural and social implications sugar has in India. (Gulati et al 2014, R. Serbulea, personal interview, February 10th, 2020)

Discussion

The results from research from technical documents show that sugar is addicting. Several experiments, by Avena, used rats as animal models to determine the effects diets of high sugar have on the body or the brain and what behaviors are a result. Brains of animals, especially mammals, have evolved pathways in the brain to release neurotransmitters, such as dopamine and/or acetylcholine. This evolutionary feat was done to make a reward system as a means for the animals to know what foods are good to eat, what to seek, and which ones are not poisonous. Sugar also provides energy to be used for exercise and similar activities or to be stored for hibernation or for times of famine. In these experiments the rats that were given high-sugar diets

had high levels of energy and activity. But when rats that previously had high-sugar diets stopped getting the high-sugar food, withdrawal symptoms developed. These symptoms included teeth chattering, head shakes, manifestations of anxiety and many more. The rats going through a period of abstinence of the high-sugar food were seen to increase the number of times they request food, about 20% more than rats on high-fat diets. These symptoms are like symptoms animals and people experience from opiate-like materials. As shown in Figure 1, the rats that had abstained from high-sugar foods had a larger percent of “lever pressing”, meaning activity of requesting food, than the rats with low-sugar diets (Avena et al 2007). When the rats that were forced to not eat high-sugar foods, for a period of time, another symptom was shown where the alcohol intake was increased by about 9%. The researchers in this experiment concluded that irregular patterns of sugar consumption can be a gateway to alcohol use. The results from these experiments show how addicting sugar can be and how companies can exploit the biological properties of sugar on their customers, like selling and consumption of opiate drugs. (Avena 2007, Avena et al 2007, Avena et al 2009)

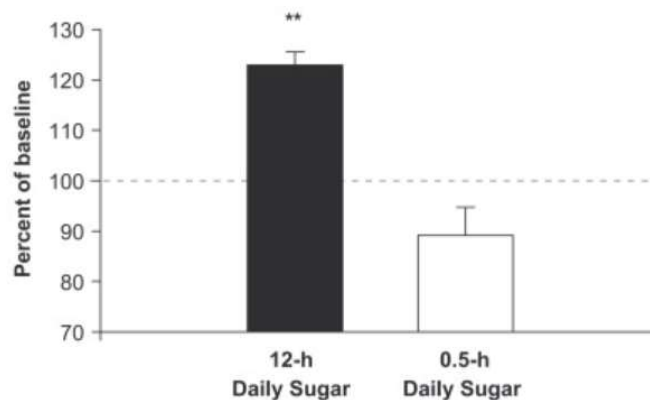


Figure 1: The figure from an article showing the increased activity of rats with high-sugar diets in the form of lever-pressing (Avena et al 2007)

The results from research related to the sugar industry show that the sugar industry has a history of tampering with scientific experiments involving sugar and spreading misinformation to the public around the 50s-70s. The sugar industry tampered with scientific experiments

involving sugar and tried to make the public think that sugars are good, and fats are not. One experiment was done to determine the effects sugar has on teeth. Around 1965, the sugar industry sponsored a research project as a means to devalue the severity that sugar has as a factor and risk associated with Coronary Heart Disease. Around 1966, the National Institute of Dental Research (NIDR) conducted several experiments to determine and publish the effects that sucrose and other sugar-based foods have on the teeth. Most of the results showed a correlation between sugar consumption and tooth decay. The sugar industry could not hide the effects their products have on teeth, but they developed several tactics to make sure none of the sales of their products decreased overtime. The sugar industry funded research, with other food industries, on enzymes and vaccines that could counter dental plaque and tooth decay. These tactics were done as a means for the sugar industry to appear helpful and trying to keep the public healthy, but the industry still wants to increase sales and keep consumers buying their products (Kearns et al 2015, Kearns et al 2016). Companies, in capitalistic societies, were built to make profit on whatever products they sell, but sometimes there should come a point when enough is enough and how far a company can go, how their reputation will be seen by others. The actions performed by the sugar industry at these times show how this industry is an actor in ANT and used several tools as political technologies in order to keep and/or grow the number of products they make and sell.

The results from research on company advertisement show that companies, specifically companies selling products that are high in sugar, spend enormous amounts of money for advertisements (Kearns et al 2015, Kearns et al 2016). Advertisements are made to be alluring and to guarantee that the viewer remembers the advertisement or at least to keep it in the subconscious mind; this further enforces how ads are another form of political technologies used

on customers (Winner, 1980). In the documentary *Super-Size Me*, directed by Morgan Spurlock, Spurlock stated “The average American child sees about 10,000 food advertisements per year, 95% of those are for sugared cereals, soft drinks, fast-food or candy”. Spurlock also said: “In 2001, on direct media advertising, McDonald’s spent \$1.4 billion worldwide, Hershey’s spent about \$200 million for ads for their candy, while the 5-a-day fruit and vegetable campaign’s advertising budget was a lowly \$2 million; a hundred times lower than the advertising of a candy company” (Spurlock, *Super-Size Me*, 2004). These quotes are significant as it shows that companies are deliberately targeting children because children cannot go or buy products on their own; they need their parents or some form of adult supervision. Bringing in adults also increases the probability of more sales as, more than likely, the adults will purchase and consume similar foods along with the kids. These quotes also show how much more money these food companies have versus a campaign to encourage more healthy eating. In an article by Chou et al, it was shown that there is a correlation between advertisement viewing and childhood weight gain. “In the 1963–70 period, 4 percent of children ages 6–11 years and 5 percent of adolescents age 12–19 were defined as being overweight. The percentage of children who are overweight more than tripled by 1999, reaching 13 percent. For adolescents, the incidence of overweight has nearly tripled in the same period, reaching 14 percent.” (Chou et al, 2008). This quote is important as it shows how the rate of children becoming overweight has been increasing for the past few decades and is still increasing to this day. All these quotes show that advertisements are yet another “intermediary” in the ANT, being used as a political technology to further increase the production and consumption of foods with additive sugars by making people remember the products (Cressman, 2009).

The results of research on socioeconomics and cultural effects of foods with additive sugars show that socioeconomics is a significant factor in affecting peoples' diets. In an article by Bowman et al, about 6,212 USA children and adolescents, ages ranging from 4-19 years, were taken into account for this article and it was found that about 30.3% of them reported consuming fast-food. Males were more likely to consume fast foods than females, and non-Hispanic blacks were shown to more likely to consume fast-foods than other ethnicities. It was also shown that children in higher age groups were more likely consume fast-foods, most likely due to busy family lives or an increase in the sense of independence (Bowman et al, 2004). Another that was determined was that children in the South of the USA are more likely to consume fast-foods than kids in other parts of the USA.

Characteristics (Percent of Total Sample)	Percent Having Fast Food	
	Weighted Mean	95% CI
Age groups		
4–8 years old (32.0%)	24.6	22.6–26.6
9–13 years old (32.2%)	26.4	23.9–28.9
14–19 years old (35.8%)	39.0	35.3–42.7
Gender		
Males (51.0%)	32.3	29.5–35.1
Females (49.0%)	28.3	26.0–30.6
Household income as % poverty		
0%–130% (26.2%)	24.9	20.8–29.0
131%–350% (43.9%)	30.4	27.5–33.3
>350% (29.9%)	35.1	31.2–39.0
Race		
Non-Hispanic whites (65.8%)	31.4	28.9–33.9
Non-Hispanic blacks (15.8%)	33.3	28.9–37.7
Non-Hispanic other races (4.7%)	27.1	18.5–35.7
All Hispanics (13.7%)	23.2	19.2–27.2
Urbanization		
MSA, central city (29.0%)	29.2	26.1–32.3
MSA, suburban areas (49.2%)	32.6	29.8–35.4
Non-MSA, rural (21.8%)	26.7	21.5–31.9
Region		
Northwest (18.6%)	27.3	23.2–31.5
Midwest (24.1%)	32.5	28.0–37.0
South (34.8%)	33.6	30.7–36.5
West (22.5%)	25.6	23.0–28.2

Figure 2: A Table from Bowman et al showing the data and correlations of fast-food consumptions with different groups from youths of USA (Bowman et al, 2004)

All of this data is shown in Figure 2. The article did state that while there might be some correlations between income and fast-food consumption, it is not as clear as some of the other correlations because more income could mean more food availability. But since fast-foods are cheap, perhaps it could be used more by low-income families (Bowman et al, 2004). All in all,

these results have shown correlations of fast-foods with American youths and how children are another part of the ANT. More research will need to be conducted into this step as to collect more data and find more possible correlations and evidence into ANT.

The results from research on culture, background, and bad habits show that cultural background and/or bad habits can be factors into a high-sugar diet. One article, by Gulati et al, shows the results of research conducted in India. India has a population about 4 times more numerous than the USA, in 2020, and India is currently dealing with obesity and obesity related problems, especially diabetes. India is the largest consumer of sugar in the world. As seen from Figure 3, India's number of patients with diabetes has been increasing from 2000-2013. Gulati reported two main factors into the high sugar consumption in India: tradition and Sugar-Sweetened Beverages (SSBs). Traditionally in India, it is customary to "sweeten the mouth" after meals, during festivals, gatherings, family events and more. India does have a history with sugar, especially since sugar was unknown to the Western world until Alexander the Great's conquest of India around 327 BC.

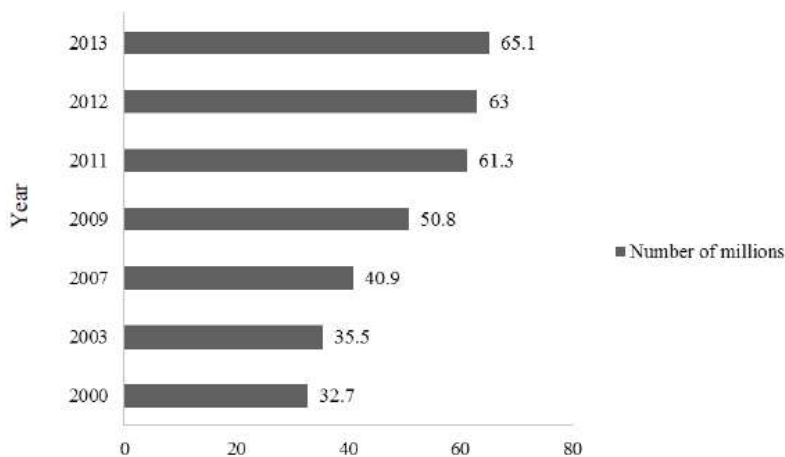


Figure 3: A bar chart, from Gulati et al, showing the rising numbers of people with diabetes in India (Gulati et al 2014)

Another substantial contributor are SSBs. SSBs are not only sodas but also milkshakes and sweetened buttermilk. SSBs are easily available in many parts of India, whether it be rural or

urban. SSBs are also easily available in schools in India, also showing how companies of these SSBs are targeting children. Figure 4 is from Gulati's article and it shows the exponential increase in consumption of SSBs by capita. This article by Gulati has shown how the USA is not the only country with a serious obesity epidemic and how culture could be used, and possibly exploited, to increase sales and consumption of sugar-based products. (Gulati et al 2014)

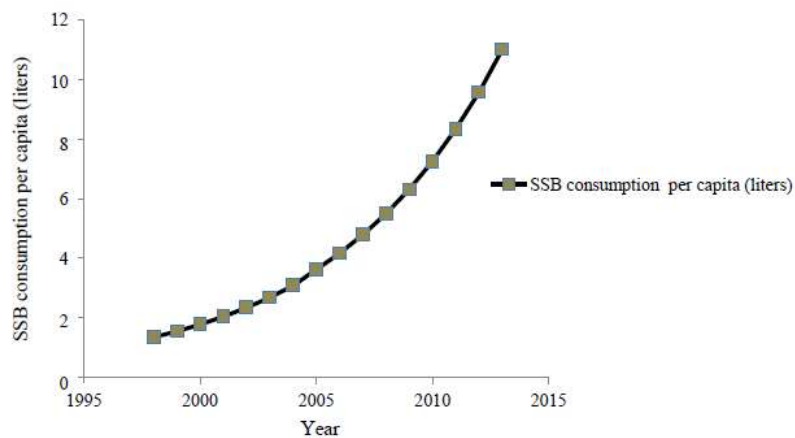


Figure 4: A graph, from Gulati et al, showing the rising levels, in what seems to be exponential, of consumers of SSBs in India (Gulati et al 2014).

One interview subject was interviewed three times to gain greater insight on personal usage of additive sugars. This person's identity will be kept anonymous and will be referred to as David. David is a middle-aged white male. David was born and raised in the Eastern European country of Romania in 1967. Romania was under a communist regime during David's time and those times were hard for the people. Getting basic food, such as eggs and milk, can take hours. David stated, "I stood in a line from 4am to 8am just to get eggs and milk." Eventually, David went to college, received a degree in engineering, got married, started a family and managed to move to the USA in the early 1990s, after the Romanian Revolution. David and his wife were able to get well-paid jobs in the USA and were financially stable. However, David used his financial success to try many types of foods. Burgers, fries, cakes, fruit juice, sodas and more. "I drank fruit juice and soda like water. There were some Pepsi and fruit juices available in

Romania. But in the USA, there are so many types of brands and flavors. My favorites were cherry-flavored sodas and apple juice.” While David did consume plenty of these high-sugar foods, he still tried to keep a balance between sweets and homemade foods. However, there was another factor that he believes led to his obesity. “Whenever my family and I ate anywhere, whether home or restaurant, when my family finished their meals and there were leftovers, I ate those leftovers, even if I was full. I was a literal garbage bin for leftovers. I couldn’t help it, it seemed like a waste of money to just leave it there. I kept forgetting how plentiful and available food is in the USA vs communist Romania.” All these quotes and information show how background, culture, and habits are additional actors or “intermediaries” in ANT that can overlap or tie in with additive sugars (Cressman, 2019). This was one person’s story, what other ones exist out in the world and how many? Are those stories worse or better than David’s story? These are questions that could be answered with more interviews. (R. Serbulea, personal interview, February 10th, 2020)

There were several limitations for this research project. One limitation was the low number of interviews conducted. More interviews would have brought more data, quotes, and statements. Some people were asked if interviews could be conducted but there was not much luck getting many participants. For some it was a sensitive subject and for others there was not much time in their schedule. If more time was given for research, perhaps more people would have been interviewed. Another limitation was the amount of research on socioeconomics and cultural effects of foods with additive sugars. Not as much research was done for that step due to the amount of time given for this thesis. The final limitation was the amount of time to complete this research project. Additive sugars are a big topic to perform research on as there are numerous papers, articles, experiments, documentaries and more materials discussing the many

implications, consequences and purposes of additive sugars; it can be easy to be overwhelmed with all that information. If more time was given to conduct the research, then this paper would have had more data and references.

More research should be done to determine how far additive sugars are being used as political technologies as well as how much influence additive sugars have in ANT. This research should be led by STS researchers, since the main subjects are on Political Technology and Actor Network Theory. However, the STS researchers should collaborate with dieticians and/or hospitals in order to gather more data on the biological impacts of sugar and to gain access to patients dealing with obesity and/or obesity related problems.

Conclusion

The research question was how addictive are additive sugars, how much do additive sugars factor as a political technology and how much influence do additive sugars have in ANT? The research and results show that additive sugars do play a large role in the Actor Network Theory with so many tools and strategies that the sugar industry and food companies use as extra actors and political technologies. The results also show how companies exploit the biological reward system humans possess in order to keep customers addicted. The ANT for additive sugars is like a complex spider web with many actors and intermediaries making up parts of the web and political technologies further strengthening it. When someone gets caught in this “web,” it is difficult to escape from it, and sugar companies make full use of it. The results also show a correlation with sugar consumption and obesity and/or other health-related risks. More research should be done to determine how to combat the addictive nature of sugar, whether it be through more health education amongst the youths, substitutes, laws, etc.

Appendix:

Main Questions used during interview(s) (Other questions have been used but were specific to the person being interviewed):

Q1: What is your cultural and/or societal background? Are you from the USA or did you immigrate?

Q2: If acceptable to you, what was your financial situation during your time of obesity?

Q3: What were some foods and/or beverages that you think you consumed too many of?

Q4: How did you feel when consuming those high-sugar foods? Did you feel happy, depressed, etc?

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