

Addiction: Kicking the Can (Soda, that is)

An Investigation of the Effects of Modern Soda Consumption and the Best Approach to Curbing the Habit

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Summary. Addiction is a word commonly associated with hard drugs and vices such as cocaine, heroin, alcohol, and cigarettes. Here, we attempted to broaden the scopes of modern clinical addiction to include that of carbonated beverages. In addition to becoming chemically addicted to illicit & licit drugs, we are susceptible to forming addiction to everyday activities like the consumption of food and drink. Consistent consumption of soda is known to produce behaviors both with predictable patterns and ill side effects. Regulation of public soda consumption has been unsuccessful. Nevertheless, we seek to bring awareness to the dangers of daily soft drink intake. One subject with a Pepsi ONE addiction was examined in this research. After reviewing many prior methodologies of rehabilitation, a route to quit the harmful habit based on the subject's lifestyle was provided. Similar templates may be utilized to help others needing assistance in abolishing their own vices.

Video: <http://youtu.be/4lrETnx66YI>

The modern illness. Throughout the last couple centuries, the world has made great progress in science, medicine, and many social aspects. These advances have helped people live longer, healthier, and more fulfilling lives. However, these statements are said with some reservations. While infectious diseases and other old-world predicaments have been globally remedied, other equally serious problems have risen due to modern unhealthy lifestyles. These issues include the likes of chronic disease such as obesity, heart disease, and diabetes. There are a plethora of causes that lead to these problems, whether it is smoking, overindulging, sedentary habits, or other vices. The common thread among all of these behaviors seems to be addiction, ingrained habits that lead to unhealthy consequences. One of the most commercialized and widely used products in our society that nurtures addictive behaviors is soda. They often contain high amounts of ingredients that contribute to many physiological dysfunctions. Throughout this project, we will be attempting to clarify the concept of addiction, with an emphasis on soda consumption, its causes, describe several relevant studies, and finally offer a potential solution to any soda addicts.

Addiction vs Habit. Before we look further into the serious subject of addiction, it must be differentiated from habit. An addiction is defined as “a compulsive need for and use of a habit-forming substance characterized by tolerance and by well-defined physiological symptoms upon withdrawal,” or more broadly as “persistent compulsive use of a substance known by the user to be harmful” (Merriam-Webster). There is an explicit compulsive need to do something that is known to be harmful. A habit on the other hand is defined as “a behavior pattern acquired by frequent repetition or physiologic exposure that shows itself in regularity or increased facility

of performance” (Merriam-Webster). This means that a habit may be an action that is not necessarily harmful, but has turned to a regular act through repetition. An addiction is a habit, but a habit may not necessarily be an addiction. Since this project is focused on the harmful effect of compulsive soda drinking, we will treat and refer to soda consumption primarily as an addiction. We will now proceed to further describe addiction in its rawest forms.

Addiction. Classical substance addiction is characterized by habituations of harmful behaviors, and also by rehabilitation attempts that often end in relapse episodes of complete and utter loss of self-control. Often times, the addict acknowledges the negative consequences of their actions, but could not find the motivation to quit. When a brave attempt does occur, curbing the habit would seem both psychologically and physiologically impossible. This sense of internal powerlessness is the main reason that behavioral disorders are immensely difficult to manage, so much that the first step in alcoholic recovery programs is to acknowledge this feeling of hopelessness due to the stranglehold of the addiction over the addict’s livelihood. To make effectively eliminations of harmful habits a reality, interventions, such as rehabilitation programs, must be specific developed to each patient. Careful considerations must not only terminate the drug-seeking behaviors but it must also minimize the chance of relapse.

Establishing the Addiction. Addiction develops through several subconscious, but ordinary, learning mechanisms. Of course, different genetic backgrounds and environmental influences make one less or more vulnerable to developing an addiction than another. Intrinsically, the mechanisms that take hold are similar to an operant conditioning paradigm. In operant conditioning, or instrumental conditioning, a hedonic sense is developed for behaviors through either encouraging or discouraging results. This fundamental reward system is the basis for all behaviors. However, an addiction profile develops when superficial chemicals are introduced into the brain, overloading it with euphoria. The result is a strong learnt association that drives drug-seeking behaviors regardless of the final health consequences: an addiction. The harmfulness of a particular addiction depends on the nature of the drug, as well as the patient’s physiological conditions. Alcohol and cigarettes are the few of many popular sources of socially acceptable addiction. In reality, regardless of social approval, all addictions, including that to soda, have the potential to severely disrupt one’s livelihood.

Prevalence. Soda consumption is highly prevalent within the United States. Based on the CDC, about half of the population consumes sugary drinks on a daily basis, and a quarter consumes soda every day (CDC). As mentioned, many of the soda ingredients are not especially healthy to the human body and constant intake would indicate the onset of many familiar diseases including obesity, diabetes, and hypertension. A major contribution to the soda epidemic is the early age at which the addiction begins to take root. At least a quarter of teens in high school were observed to drink soda daily. Coincidentally, the childhood obesity rate across the United States is approximately 18%, more than double of the 7% in 1980 (CDC). Unfortunately, consumer loyalty established in the younger years of a child’s life, as well as soda’s availability, leads to an addiction that will continue into adulthood. By getting the childrens hooked, soda companies are effectively ensuring future sales.

Children are not the only ones targeted by big soda. The corporations habitually use misleading advertising techniques that provide a sense of false justifications in the public’s soda intake. The products are often advertised as “healthy options”, while it is only healthy in

comparison to their other products. A medium sized soft drink can be presented as a healthier alternative to a large soft drink merely due to the fewer amount of calories, while the ill effects are obviously still present. In another example, the below Wendy's link describes a "Healthy Menu" which contains foods that still contain an extremely large amount of calories compared to actual health foods.

<http://www.wendys.com/food/nutritious-options.jsp>

Unfortunately, many people do not see the risks they are taking in their junk food consumptions. To better justify the label of addiction to soda, we will now proceed to examine a better-known example to be compared with soda: tobacco.

Comparison: Tobacco. Tobacco products, considered harmful drugs by many, are some of the most deadly and addictive substances available to the public. Tobacco usage results in approximately half a million deaths each year. Hundreds of thousands of illnesses are documented each year, including cancer, organ failure, and other chronic diseases - statistics eerily similar to that of soda. Users wanting to quit almost unanimously express its difficulty due to their addictions to the product, with full understandings of the underlying harmful effects. Soda users often have similar comments regarding their addictive behaviors. While there are not enough evidences to put soda and tobacco use on equal playing grounds, both show characteristically parallel behavioral dysfunctions. Proven treatments used against tobacco products could therefore be effectively used, with modification, against soda addiction. While solutions like this exist, many people still refuse to see soda as a legitimate addiction that requires treatment. This is primarily due to the controversy of whether or not the main ingredient, sugar, in soda is addicting. Tobacco products contain nicotine, hard drugs are intrinsically highly rewarding substance, and alcohol has ethanol. Research has shown, however, that there are evidences supporting the addictiveness of sugar (Avena et al. 2008). Sugar, along with the artificial chemicals found in soda, causes many different problems within the human body. On average, one 12 ounce soda soft drink contains 39 grams of sugar. While this may seem like a lot, half of the product on the market contains even more. Milk has been considered a healthy and necessary product to consume for decades. However, tending to the children, largely influenced by social media, schools tend to serve flavored milk as a choice alongside regular milk. Flavored milk has been observed to be "the most popular milk choice among school children". Each carton has a total of about 30 grams for every 8 ounces, which is almost 4 grams per ounce. For comparison, a regular 12 ounce can of Coca-Cola™ contains 39 grams of sugar, which equates to about 3.25 grams of sugar per ounce. Children in school are ingesting more sugar from milk, an iconically nutritious product, than ever before. They are consuming three times the recommended value of sugar per day just through milk; the healthy drink is now unhealthy due the effectiveness of high sugar content in selling products.

Two more commonly consumed products are energy drinks and juice. In order to compare, two common ones were picked out in order to compare sugar content. Red Bull™ Energy Drink contains about 3.19 grams of sugar per ounce and Monster™ Energy Drink contains approximately 3.38 grams of sugar per ounce. While these products also contain caffeine, an addictive substance as well, the sugar contributes much to the level of addictiveness. Furthermore, between grape, apple, and orange juice, the average sugar content is equal to around 3.92 grams of sugar per ounce. The amount of sugar in these products is all hover around

3-4 grams per ounce. Meaning we are consuming, on average, 42 grams of sugar per every 12 ounce drink we consume, while the suggested daily value of sugar intake is about 36 grams PER DAY for men, and about 25 grams PER DAY for women. We are consuming an exponentially more amount of sugar every day and this is contributing to a huge sugar addiction rampant throughout our society. Despite the differences in sugar content, all of these products are extremely harmful to the human body. We will, however, be focusing on soda for the remainder of this paper.

Other sources of unexpected addictions:

Addiction	Description
Gambling	Also known as ludomania. Continuous urge to gamble causing harm to the gambler or others. Could potentially be develop into pathological gambling, a serious clinical condition.
Work	Over 10% of the workforce suffers from work addiction. It is characterized by excessive and compulsive working.
Sex	Hypersexuality defined as a dysfunctional preoccupation with sexual fantasy, often in combination with bursts of obsessive pursuits of non-intimate sex.
Internet Addiction Disorder	A wide range of excessive and compulsive behaviors having to do with computer usage. A variety of categories exist such as cybersex addiction, cyber-relationship addiction, net compulsion of online gaming and shopping, information overload of the need to surf the internet excessively, and computer addiction of off-line games.
Shopping	Also known as oniomania. An obsessive-compulsive urge to shop excessively. Could potentially develop into a clinical disorder.
Exercise	The patient develops the obsessive-compulsive urge to exercise which may become harmful without sufficient rest. Exercise addiction shows high comorbidity with eating disorders.

Effects. Due to the largely artificial cocktail of chemicals in modern day soft drinks, there are both long-term and immediate consequences of soda consumption. High fructose corn syrup (HFCS) is the main caloric sweetener in soft drinks. It is a mixture of fructose and glucose,

both easily absorbed simple sugars. Our body is not designed to handle rapid intakes of refined sugars. As a result, the blood glucose level increases dramatically, signaling an over-release of insulin, which mediates the sugar's absorption into the cells. This mechanism, in the short-term, is a sugar rush followed by the crash. Over long period, the body habituates to the fluctuation in insulin level and diabetes takes hold. Studies have found that the soft-drink population is more vulnerable to deteriorating dental health, most likely due to the constant influx of sugary fluid (Forshee et al 2004). Furthermore, research done at the Salk Institute located in California discovered that these high levels of sugar harm more than just the balance of insulin, ultimately leading to diabetes. These levels of glucose damage cells located in the brain. The excess sugar evokes a response from the brain similar to that of an immune response to bacteria or viruses. The resulting response may be detrimental to mental health and cause deficiencies similar to those associated with Alzheimer's disease. In addition to high levels of insulin, cortisol is secreted in higher amount as well due to the mental stress caused by the levels of refined sugars. This hormone has also been found to affect memory (Aubele and Reynolds, 2011).

The excess amount of sugars affects more than just brain chemistry within the body. Osteoporosis is a disease of the bones that increases their frailty and leads to an increased risk of fracture. Due to the acidic nature of soda, constant consumption increases the acidity of the contents in the stomach of a consumer. In order to protect the lining of the stomach, the body needs to balance out the acid and neutralize it. Sources of a basic substance capable of quickly negative the acidity are the calcium deposits within the bones. By constantly ingesting soda, the user is depleting the calcium stores within their body and making their bones more susceptible to breakage (Schwalfenberg 2012, Supplee et al. 2011). This is closely linked with recorded enamel decay due to consistent soda consumption. By drinking soda, the initial action of pouring it into your mouth affects the teeth directly the same way it affected the stomach. Enamel, the hard part of the tooth protecting the inner part of the tooth responsible for providing the enamel with nutrients, is made of a calcium containing compound. The acidity of the soda draws the calcium, however little, out from the tooth and makes it weaker. The sugar doesn't help the cause by rotting the teeth on its own.

Another issue worth talking about is the possibility of organ damage. Among other things, soda abuse has been linked with a "2-fold increased odds for kidney function decline in women" (Lin and Curhan 2010) as well as the development of a fatty liver (Nseir et al. 2010). Having damaged organs does not allow the body to function normally and facilitates other future problems. For example, in 2011 a research center petitioned the FDA to ban the caramel used to make different soda's brown due to the carcinogenic effect of two ingredients the were found to cause cancer in animals: 2-methylimidazole and 4-methylimidazole. Based on California's legislature, Proposition 65, a daily 16 microgram dose of 4-methylimidazole, the caramel coloring, is sufficient to pose a cancer threat. Both regular and diet cola's have been found to contain 200 micrograms in every 20 oz serving (CSPI 2012)

If this weren't enough to convince someone to quit drinking soda, which I hope you as the reader aren't doing, there is a more visible effect of consistent soda use: accelerated aging. The main cause of this is phosphoric acid. This substance has been found to trigger a plethora of problems, including many of the ones mentioned above. A research team conducted an experiment on laboratory rats in which they injected high levels of phosphoric acid into the rats. With an average life span of 3 years, the test rats died five weeks earlier than the control rats that

had normal levels of phosphoric acid (Ohnishi and Razzque 2010). If we assume the same effect in humans with an average lifespan of 80 years, all other variables held constant, a human with excess phosphoric acid would die approximately 133 weeks earlier than one with normal levels, or 2.5 years.

Misconceptions. Unfortunately, these problems are highly disregarded. People find use in soda for more than just a sugar high; drinking soda is a social behavior and was thought to be a great way to refresh oneself. Unfortunately, Soda is a readily available source of excessive calories. All present studies indicate a close positive correlation between soft drink consumption and increased energy intake (Vartanian et al 2007). Soda offers little nutritional value aside from short bursts of energy from the simple sugars, lacking macronutrient diversity as well as any significant micronutrients. Between 1970 and 1997, per capita soft drink consumption increased by 86% (Putnam and Allshouse 1999). In the same time period, prevalence of obesity more than doubled (Flegal et al 2002). The proportion of sugar's contribution to the daily energy intake has been ever increasing (Popkin and Nielsen 2003).

Due to the rising caloric scare, diet versions of soda have been heavily promoted as a solution without alteration to the addiction. Artificial sweeteners replace HFCS and reduce the caloric value of many diet options to near zero. However, artificial sweeteners carry many risks of their own. Aspartame, one popular ingredient, was found to be safe in many sponsored studies (Lean and Hankey 2004). However, unaffiliated studies have found many adverse effects of aspartame. It has been labeled as a carcinogen relating to lymphomas and leukemia (Soffritti et al 2005). In a double-blind study, it was also reported that aspartame triggers negative affects to vulnerable populations (Walton et al 1993).

Legislations. Due to this growing problem of soda usage, there have been several legal movements in an attempt to decrease soda use. While an explicit ban on soda is not plausible, policies banning certain aspects of it have potential. Due to the ever-rising rates dietary diseases in America, such as obesity and diabetes, many proposals on soda tax has been made on a state level. While some have not been successful, 30 current states levy an average of 5% tax on soda sales. A brave attempt of penny-per-ounce of tax was proposed for the city of Richmond City, California. The ballot was shot down drastically due to major company funded campaigns. Mayor Michael Nutter of Philadelphia attempted to bring about two-cents per ounce levy tax on sugary drinks, targeting obesity as the goal and filtering the revenue to public schools, but his plans also failed to bring about change, twice. The American Beverages Association spent upwards of \$70 millions in fighting against soda taxes across the country. Despite being unsuccessful, many towns took notice of the concerns and followed suit with their own plans on discouraging potentially harmful soft-drink consumption. 30 states have given their own shot at similar attempts to reduce soda consumption.

One of the most promising legislations regarding soft-drinks is the infamous New York soda ban. In September of 2012, Mayor Bloomberg signed into law a ban on the sales of soda containers larger than 16-oz. starting March 12th, the law will go into effect in New York City, making consumption of large volumes of soda more costly. This has been a controversial issue for the past year. Main concerns were on the topics of violating trade laws, potentially increasing plastic waste, and increase the cost of daily habits. The business groups indicated that this legislature will cost them \$600,000 in labeling and other expenses as well as cut into significant

portion of sales. At the least, the effective validity of this large-sized soda ban is being called into question. Less than one week prior to the bill's going into effect, state judge Milton Tingling ruled the legislation as unconstitutional, effectively vanquishing any further soda modulation attempts in New York.

College studies. As part of the undergraduate population, statistics of soda consumption in college students is highly relevant. It is usually known that about one-fourth of the students consume soft-drinks daily according to the Center of Disease Control, as the rest are spread around coffee and alcohol. In a study done by Block et al, college students were investigated for their soda addiction (Block et al., 2013). It was found that the primary reason for choosing a certain sugary drink is taste. Price was revealed to be important, but a second factor to taste. The ones who drank diet versions of the soda do so primarily because of the taste as well. A price tag of slightly below one dollar was shown to triggers strong motivation for specific drinks. On the other hand, health and nutritional content were of limited interest. Several students indicated that shock imageries designed to evoke aversive feelings regarding the drinks are effective ways to deter continued brand loyalty. Another important suggestion revealed the power involved in relating soda in terms of other dietary extremities, such as displaying the undissolved forms of sugars. Behavioral economics studies have shown that providing free water bottles is also a good way to reduce soda consumption due to a students' preference for free things (Ariely 2008). The understandings from these surveys showed that, in the busy life of students, beverage choices are often not results of deep consideration. Intrinsic guidelines exist to select drinks out of habit for the sake of convenience. As most students are without a steady source of income, it is understandable that key factors such as being free of charge, overwhelms all previous preferences.

Research in Addiction. Throughout the years, many researchers have studied the usage and addiction of sugar. There are a plethora of articles that describe the physical as well as physiological aspects of sugar addiction. However, none were found with plans that are determined to end soda usage. As mentioned above, while there are policies that exist to curtail soda usage, no publications have been made with a concrete plan in place. The only relevant articles mention the importance of various aspects when a quit attempt is made.

Several previous studies have demonstrated the pertinence of environmental context in the developments of addiction and its extinction (Basam and Tomie, 1985; Bouton and Swartzentruber, 1991). In one of Rutgers professor Arthur Tomie's studies, contextual cue plays an important role in the development of habits. The brain is draws connects with the environmental factors that appears to appear simultaneously as the drug, and the association maintains the behavior (Tomie, 1995). Environmental cues are also known as contextual cues, in which certain addiction habits persists solely in certain contexts, as we can see in the following look at the role of these environmental factors in relapse.

It has been long understood that in order addictive behaviors are strongest in the presence of certain contexts. It was then realized that in rehabilitation, the same contextual cues must be present for the addictive behavior to be curbed successfully. In *Renewal of drug seeking by contextual cues after prolonged extinctions in rats*, Crombag and Shaham investigated the effects applies to relapse, the renewal of drug-seeking behaviors (Crombag and Shaham, 2002). Long-Evans rats were trained to self-administer speedball, a strong behavior reinforcer in the form of a

mixture of cocaine and heroin. Different groups of subjects were trained in different contexts of lighting, sound, and odors. After ten days of conditioning, a prolonged, twenty days of extinction procedure took place in a variable of settings without speedball infusion. It was revealed that the most successfully rehabilitated subjects were those whose addictive behaviors extinguished in the same contextual cues as the addiction's development. Those whose distinguishing protocols were held in a different context were reliable to renew their drug-seeking behaviors when returned to the original environments, relapse. The key knowledge to take away from this study is the importance of contextual cues presence in the rehabilitation settings. The settings must resemble the environment in which addictions occur, if not at those places, to achieve maximum alterations to the undesired behaviors.

Aversion therapy. Aversion therapy is one of the possible approaches to disengage addiction behaviors, and possibly the most ruthless. The concept is to further associate the substance of addiction, its effects, smell, or even sight to unpleasant events. In clinical settings, selected chemicals are mixed into the substance of abuse to produce an aversive reaction from simple bitter sensations to feelings of regurgitation. In part of a multi-sensory chemical aversion therapy program, twenty cocaine addicts were found to have various levels of success rates due to their complexity of addiction (Frawley and Smith, 1990). The treatment program followed closely to the Schick alcoholism treatment program in which, after three days of detoxification, the patients received alternating treatments of aversive therapy and sodium thiopental. The anesthesia interviews are critical in fighting withdrawal symptoms such as anxiety, restlessness, and general instability. In the aversion pairing, each patient is first injected with a cocktail of emetine, pilocarpine, and ephedrine. At the onset of nausea, the patients were asked to snort a line of cocaine substitute, and then remained focused on images of cocaine for the duration of nauseating effects. Overall, 56% of the patients were able to remain abstinent in the 18 months tracking period. Within the group patients successfully rehabilitated, significantly more were also alcohol drinkers. From the differences unveiled in this study, we can see that aversion therapy, while harsh, is a very effect option for the worst addicts. Variations in addictive behavior also lessen the strength of one habit, making it more manageable in forming association with aversive sensations.

Due to our position as undergraduate students and not medical practitioners, standard clinic aversion therapy procedures will be avoided. Instead, our knowledge regarding the process of conditioning extinction will be utilized to design subsequent modifications in the subject's lifestyle. Using prevalent methods in prevalent behavioral extinction procedures, the goal is to weaken the physiological habituated behaviors of drinking soda. Methods such as altering contextual cues to the addiction would prove instrumental in our purposes. By taking miniscule steps in the rehabilitation process, less strain and resistance will be expected and only moderate motivation could prove successful.

Survey. After reviewing the underlying mechanisms of addiction, this project has reached its crux in developing a generalized treatment plan. Though the onset of addiction varies from one person from another, it is often recognized by severe disruption in one's lifestyle. In order to formulate a plan best designed to our subject(s), a questionnaire was given to obtain important understandings of the depth, and effects, of the dependency. The survey is attached at the end of this paper. The format and the style of each question has been modified to follow closely with practiced addiction identifying exams, including the CAGE test, AUDIT test, and

JHU 20 questions. Each question is delegated to investigate a certain aspect of addiction as well as the domains of life under effect. Several questions were also dedicated to observe brand loyalty and sight-recognition based on the associations developed in the long-term behavioral conditioning, as per the current academic understandings of addiction. The main lifestyle alterations were simplicity in their goals to reduce the associations between the soda-drinking behaviors and pleasant sensations. The declarative statement at the end of the survey is also a measure of confidence in the perspectives of our subject, setting the patient in good perspective of the challenges being undertaken. Overall, this questionnaire gives us an insight as to the speed we must progress for a successful rehabilitation.

Addiction surveys give a quick estimation of disruption caused in one's life. It is difficult to only use the amount of drinks as an indicator for addiction as each person varies on their body type. However, the below resources are demonstrative quantifications of lifestyle disruptions one could experience. A "heavy" user would score high in these surveys. Please see the exemplary addiction surveys below if you, or any associates, is known to habitually drink, smoke, or take narcotics.

For the CAGE and AUDIT test for alcohol, please see <http://www.addictionsandrecovery.org/addiction-self-test.htm>

For JHU 20 questions of alcohol addiction please see <http://www.the-alcoholism-guide.org/test-for-alcoholism.html>

Clear the smoke tobacco survey

<http://www.clearthesmoke.org/learn/tobacco-addiction-test>

For a general addiction questionnaire, please see Narcotics Anonymous

<http://www.na.org/?ID=ips-an-an-IP7>

Treatment plans. Our survey revealed several potential targets to anchor our attempt at rehabilitation. It was mentioned that the main environment of the addictive behavior occurs in morning commute. The commute inside the car provides the essential environment of addiction, and therefore the environment for extinction. The first steps in our rehabilitation process will involve alteration of the contextual cue that indicates soda drinking. After the associations are weakened, the next necessary step will be the reduction of specific soda intake, eventually reducing the soda consumption to non-habitual. In this design, the soda weaning process will take model after the commonly known four-week plan. However, if the desired results are not reached, it will be further modified and extended. The first week of our plan consists of a reduction in sign tracking, breaking the association between Pepsi containers and the drink itself. The following will be composed of replacement of Pepsi in smoothing the transitional period of reduction in intake. Finally, the last step would be the process to become completely independent from Pepsi ONE. Because the car is the environmental context, most alterations will occur there.

Following is a sample of our time table; the proposed changes are noted with justifications and the time duration as well as the expectations for best-case scenario:

Time	Alterations	Justifications	Expected Results
13 March ~ 20 March	Pepsi ONE consumption must be using alternate containers than cans and anything with a Pepsi Logo	Spring Recess is a good time to start with the first and easiest modifications. Pepsi consumption is not decreased but the association between the sight and feel of Pepsi can is reduced.	Subject should no longer exhibit automated drinking behavior at the sight and touch of Pepsi ONE cans.
21 March ~ 27 March	Three days of the week, Snapple consumption will replace Pepsi consumption using the same container.	Effectively reduces Pepsi consumption without reducing the fluid intake. The double association of the container to different substances reduces Pepsi association.	Subject successfully reduces Pepsi consumption.
28 March ~ 3 April	Pepsi consumption is partially replaced with carbonated water.	The bubbling sensation of carbonated water, which does not contain any harmful ingredients, can simulate the sensation of Pepsi while reducing consumption.	Subject successfully reduces Pepsi consumption.
4 April ~ 17 April	Pepsi consumption completely replaced by water or other beverages.	This is the important step in completely weaning the subject off Pepsi ONE	Subject successfully curbs Pepsi consumption for two weeks.
18 April ~ 24 April	Drink everything that is not Pepsi out of a Pepsi ONE can or a mug covered in its designs.	Show mastery over addiction. Disassociate Pepsi ONE can with the substance.	Subject shows complete rehabilitation. Further reinforcement disassociates Pepsi can from the drink itself.

Detours. Every challenge comes with additional bumps needed to be overcome. Our treatment plan could not be followed closely due to the plethora of other existing academic

responsibilities and the nature of class scheduling. However, this allowed us to modify the treatments to more closely fit the lifestyle and responsibilities of our patient. It was found that the majority of soda intake occurs before noon, during the morning commute. It was thought that a distraction can be provided in the form of Radiolab podcasts and it is currently under testing. The beginning of this project also coincided with the patient obtaining a new vehicle, which is benefiting our purposes due to the loss of the original addiction environment. It was also expressed that peanut-eating behavior will also be subjected to removal along with the Pepsi ONE addiction.

Results Throughout the last several weeks, Dr. Julie Fagan has been following the proposed plan in an attempt to cut down her soda consumption. As mentioned above, there are always detours that have to be taken into consideration when a quit plan is being implemented, mainly due to the varying nature of everybody's physiology. Dr. Fagan initially started with an addiction that compelled her to consume approximately 4-6 cans of Pepsi ONE daily. She made it clear that the bulk of her drinking occurred during the first half of the day and in her car. Based on this information, we were able to modify the plan to fit her needs. By filling the cup holders in her car with items such as earring, keys, change, and yogurt containers, she was effectively able to replace the soda can with other objects. It was brought up that Dr. Fagan only drink Pepsi ONE out of 12 oz can containers. Thus, by occupying the cup holders, she was unable to place the cans in the car. This, alongside podcasts that were provided to keep her mind off of soda, was able to dramatically decrease her soda consumption. As of now, Dr. Julie Fagan was able to cut her daily soda consumption in half. This means an impressive decrease of the chemical additives her body has been needed to metabolize.

She has expressed on multiple occasions that she has had health problems resulting from her daily soda consumption. These problems include feeling anxious and upset, being easily annoyed and bothered, and feeling guilty about drinking soda while aware of the problems it causes. "I know drinking Pepsi ONE is not a good thing - has health consequences. That has obviously not been enough motivation to stop this habit. Need some other motivations to stop..." This is the biggest problem regarding addiction. This type of mindset impedes addicts from making healthier choices for themselves. There need to amendable quit plans that are able to fit anyone's personality if we plan on combating soda addiction - and addiction to all harmful substances for that matter. Hopefully by continuing with our plan, Dr. Fagan will ultimately cut down her consumption to zero and finally be able to rid herself of this soda addiction.

Conclusion. Substance addiction is a complex behavioral phenomenon that has been under the scrutiny of research for decades. Slowly, our knowledge of the area expanded along with the available options for treatment. To combat addictive behavioral disorders, our understandings allow us to use similar mechanisms to either extinguish the behavior or associate it with aversive effects. Null trials can be used to allow the brain to forget the associations it built with the drug and lose dependency. Selected nauseating drug injections can be used to form powerful aversive memories of the drug. Important factors such as environmental contexts are also keys for successful rehabilitation. Furthermore, different patients are known to exhibit varying rates of recovery. With all these available information at hand, custom designed plans can be created to best combat the addictive behaviors of each patient. Soda drinking must be regarded as any other addiction and treated as such. Addiction to harmful substances is a high prominent theme within the United States. Currently one half of the population consumes sugar

drinks daily, and a quarter consumes soda. Regulatory or societal changes must take place. Diet related chronic diseases and their complications are currently costing the United States \$150 billion dollars a year, and that number is set to double within the next 10 years (CDC). As part of the society heavily influenced by soft-drinks, we must each do our part in providing the solutions to this problem.

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12. Have you had any physical ailments in the past year that may have been caused by the soda consumption, such as stomach aches, toothaches, or headaches?

Yes, _____ No

13. Is there a change in appetite since you started drinking soda habitually?

Yes No Did not notice

14. Under what conditions does your soda consumption decrease?

___ Sickness ___ Prior or post exercise ___ Under stress
___ Relaxed ___ Hunger ___ Anxious
___ Others, _____

15. Has a relative, friend, co-worker, or associates shows concern about your soda consumption, or suggested that you cut down?

Yes No

16. Have you ever been upset or anxious because of a **lack of** soda?

Yes No

17. Are there specific people, or places, that you associate with drinking Pepsi ONE?

Yes, _____ No

18. Do you crave a drink at a definite time daily?

Yes, _____ No

19. Is there a specific activity that you associate with drinking Pepsi ONE?

Yes, _____ No

20. Please use the space below to write a declarative statement regarding what you expect to get out of this project personally and what you wish to change regarding your soda drinking habit:

_____.

**Letter to Editor. Yang Yeh to NYDailyNews response to
<http://www.nydailynews.com/life-style/health/people-consume-soda-drink-sizes-restricted-study-article-1.1313092>**

Dear Editor:

This letter is in response to the April 10th article by Ms. Tracy Miller with the title of *People may consume MORE soda when drink sizes are restricted, at least in some scenarios: study*. The article described several studies that critically questioned the design of Mayor Bloomberg's large size soda ban. While the evidence provided by the research indicates that the legislation needs reworking, the message of the attempt should not be so hastily dismissed.

The obesity epidemic has escalated to the point that several governors across the country have attempted variations of the soda regulation. Unfortunately, these legislatures simply do not stand a chance against beverage companies' heavy lobbying. Nevertheless, I hope that these struggles, including that of Mayor Bloomberg's, draw public attention to the health complications often involved in the overconsumption of soda.

We often only associate the word "addiction" with hard drugs such as cocaine and heroin. The truth is that soda drinkers are also vulnerable to developing an addiction with health complications such as diabetes and heart diseases. The ingredients list for soft-drinks often contain several potentially harmful chemicals, none of which anyone would sprinkle on top of their evening steak dinner. The consumer market is only thriving due to the fact that soda is a heavily advertised designer drug. The companies want us to be addicted to their products, to buy more, to drink more, and to not have any afterthoughts of the possible physiological effects from their chemical cocktails.

As a current undergraduate at Rutgers University, the ill effect of a soda addiction is an unquestionable reality. All around me, fellow students and professors are often seen with a can in their hands. One professor of mine was developing osteoporosis due to her soda consumption, but the thought of quitting never crossed her mind. Only recently was she able to summon up enough motivation to attempt kicking her habit. She is making steady improvements, but it is nevertheless an excruciating process. From her experience, I have witnessed the disruptiveness that a soda addiction could bring upon a person's life, and I urge other readers to keep the consequences in mind before sipping that next drink. While the policies attempting to be implemented may be ineffective, as evidenced by the article, such attempts are the first steps in making people realize that the current state of public health is in need of a hearty nudge towards the right direction.

Yang Yeh
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Letter to the Editor to United Press International - Rich Shalmiyev

I am sending this letter regarding a serious issue in hopes that it gets published.

To the Editor:

My partner and I have been doing research on the soda addiction spreading throughout the world. We are centered in New Brunswick, NJ, USA, where we were able to guide a Rutgers Professor, Dr. Julie Fagan, in ending her soda dependence. She has consumed soda on a daily basis for years, albeit aware of the dangers. Soda and sugar are contributing to the obesity epidemic throughout the nation. The CDC shows that the obesity rate has tripled in the last thirty years. About half the population consumes sugar filled drinks on a daily basis. This is a destructive compulsion. Medical journals have, on numerous occasions, written articles citing the effects of excess sugar consumption. It is a huge risk factor to illnesses ranging from osteoporosis to cancer. We believe an effective quit plan can help people everywhere kick the can and create a healthier society.

Richard Shalmiyev