THE EFFECTS OF MESSAGE FRAMING ON SODA CONSUMPTION IN YOUNG ADULTS

Debra A. Hoffmann

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Committee:

Robert Carels, Advisor

Mary-Jon Ludy
Graduate Faculty Representative

Dara Musher-Eizenman

William O’Brien
ABSTRACT

Robert A. Carels, Advisor

Overconsumption of added sugars is a serious public health concern in the United States and accounts for about 16.3% of total daily energy intake (369.2 kilocalories) among young adults. One of the major contributors to added sugar consumption is sugar-sweetened beverages, of which soda represents the largest source (a third of all added sugars consumed). This is problematic because soda is empty calories and puts young adults at risk for a lifelong battle with preventable health conditions. Regulatory fit, which takes into consideration the motivational orientation of the individual, provides a framework for designing persuasive health messages. The current study sought to investigate how framing health- or appearance-focused messages based on one’s regulatory orientation influenced attitudes, intentions, and behaviors related to soda consumption.

One hundred forty-seven young adults, aged 18 to 25, participated in the main survey. After completing questionnaires that assessed their regulatory orientation and dietary intake over the prior week, participants were randomly assigned to a 2 (message framing: gain or loss) x 2 (message focus: health or appearance) condition, where they were presented with one of four video messages pertaining to reducing soda intake. Following this, they answered questions about their attitudes and intentions towards reducing their soda intake and if they were interested in a one-week follow-up survey. Fifty-two participants completed the follow-up.

No significant differences were found in outcomes when framing messages based on one’s regulatory orientation or, when experiencing fit, on the focus of the messages. However, the video messages, overall, were effective in reducing soda consumption by 33% and sugar-sweetened beverage and overall added sugar intake by 20%.
While the current study was unable to demonstrate the effectiveness of message framing using regulatory fit, the broader success of this study still offers a promising avenue for further research. A key issue facing traditional interventions are their feasibility, as most tend to be costly, time consuming, and resource-intensive. The current study, therefore, offers a simple, cost-effective approach that is not only engaging and approachable, but could be easily disseminated and, most importantly, provide a foundation towards enacting real change.

*Keywords:* young adults, added sugar, regulatory focus, regulatory fit, message framing
This work is dedicated to my father, who worked tirelessly to give me the opportunities that led to where I am today and showed me the true meaning of hard work, dedication, and perseverance, and to my husband and furbabies, Darwin, Newton, Samantha, Otis, and Tucker, who have provided an unparalleled amount of love, support, and encouragement throughout my graduate school journey. Words cannot capture how much you all mean to me and how appreciative I am of all the sacrifices you made.
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Prevalence and Risk Factors of Added Sugar Consumption</td>
<td>2</td>
</tr>
<tr>
<td>Sugars and Carbohydrates: The Basics</td>
<td>5</td>
</tr>
<tr>
<td>Sources of Sugars</td>
<td>6</td>
</tr>
<tr>
<td>Sugars and Metabolic Health</td>
<td>7</td>
</tr>
<tr>
<td>Public Policies and Controversy Surrounding Added Sugars</td>
<td>11</td>
</tr>
<tr>
<td>Motivating Factors for Behavior Change in Young Adults</td>
<td>12</td>
</tr>
<tr>
<td>Regulatory Focus Theory: Background and Theoretical Basis</td>
<td>15</td>
</tr>
<tr>
<td>Regulatory Focus Theory: Promotion and Prevention Motivations in Goal Pursuit</td>
<td>19</td>
</tr>
<tr>
<td>Regulatory Focus Theory: Promotion and Prevention Motivations in Goal Pursuit</td>
<td>19</td>
</tr>
<tr>
<td>Regulatory Fit</td>
<td>20</td>
</tr>
<tr>
<td>Current Study</td>
<td>24</td>
</tr>
<tr>
<td>Hypotheses</td>
<td>24</td>
</tr>
<tr>
<td>METHODS</td>
<td>26</td>
</tr>
<tr>
<td>Participants</td>
<td>26</td>
</tr>
<tr>
<td>Procedure</td>
<td>27</td>
</tr>
<tr>
<td>Measures</td>
<td>28</td>
</tr>
<tr>
<td>Demographic Information</td>
<td>28</td>
</tr>
<tr>
<td>Regulatory Orientation</td>
<td>28</td>
</tr>
<tr>
<td>Dietary Intake</td>
<td>29</td>
</tr>
<tr>
<td>Beverage Intake</td>
<td>30</td>
</tr>
<tr>
<td>Attitudes</td>
<td>30</td>
</tr>
<tr>
<td>Intentions</td>
<td>31</td>
</tr>
<tr>
<td>Manipulation Check</td>
<td>31</td>
</tr>
<tr>
<td>Experimental Manipulation</td>
<td>31</td>
</tr>
</tbody>
</table>
INTRODUCTION

Overconsumption of added sugars, which are sugars and syrups added to foods or beverages when they are processed or prepared (U.S. Department of Agriculture, 2015a), is a serious public health concern in the United States. Across all age groups, added sugars account for about 15% of total daily energy intake (Welsh, Sharma, Grellinger, & Vos, 2011), which is 50% more than the current recommended guidelines and three times the proposed guidelines (World Health Organization, 2015). Caloric intake from added sugars and the percentage of total calories consumed from added sugars increases linearly with age, peaking during adolescence (12–19 years) and young adulthood (20–39 years), after which it declines (Ervin, Kit, Carroll, & Ogden, 2012; Ervin & Ogden, 2013). Among adolescents, 17.3% of their calories consumed come from added sugars (359.6 kilocalories [kcals]), whereas it is 16.3% for young adults (369.2 kcals; Welsh et al., 2011). While the percentage of total calories from added sugars has decreased across all age groups by approximately 19% from 1999 to 2008 (18.1% to 14.6%; Welsh et al., 2011), prior to that, it had increased by nearly 40% (13.1% in 1977 to 18.1% in 1999; Popkin & Nielsen, 2003). This change in trends is suspected to be due to a variety of contributing factors, such as the popularity of low-carbohydrate diets in the late 1990s and early 2000s, increasing public concern over the rising rates of obesity, and a growing emphasis of public policy efforts on this issue; however, the main driving force behind this shift is unclear (Welsh et al., 2011). That said, while added sugar consumption has begun to decline, overall, consumption levels are dangerously high and still remain a significant problem.

The current study sought to reduce added sugar consumption from soda among young adults. Because soft drinks are so ubiquitous in our society and are a major source of empty calories (Bleich, Wang, Wang, & Gortmaker, 2009; Welsh et al., 2011), it is an obvious target
for intervention. For the remainder of the Introduction, a brief overview of sugar consumption will first be provided. This includes the major contributors to added sugar consumption, the various types of sugars, how they are digested and regulated in the body, and their effects on metabolic health. Next, the role of public policy and government in curbing the availability and affordability of sugar and sugary products, as well as the controversy and resistance to government involvement, will be discussed. Finally, one prominent theory of motivation used to deliver persuasive health messages and enact behavior change will be examined. This includes its background and theoretical basis, the two motivational systems underlined by this theory and how they influence goal pursuit, and how messages can be framed to influence attitudes, intentions, and behaviors.

**Prevalence and Risk Factors of Added Sugar Consumption**

One of the major contributors to added sugar consumption comes from sugar-sweetened beverages (SSBs), which includes regular (non-diet) soda/pop, fruit drinks (i.e., non-100% fruit juice), sweetened coffees and teas, and sports and energy drinks (Huth, Fulgoni, Keast, Park, & Auestad, 2013; National Cancer Institute, 2014; U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2015; Welsh et al., 2011). While recent trends in SSB consumption have mirrored that of added sugars (i.e., a decline; Han & Powell, 2013; Welsh et al., 2011), calories from SSBs have increased by 63% over the past 40 years (Popkin & Nielsen, 2003; Welsh et al., 2011). Currently, more than two-thirds of Americans aged 2 to 34 and half of adults aged 35 or older consume SSBs on any given day, with between 5 to 20% consuming at least 500 kcals of SSBs on a daily basis (Han & Powell, 2013). Daily SSB consumption has become so prevalent that two-thirds of the recommended guidelines for added sugar consumption come from SSBs alone (Welsh et al., 2011).
Of all the calories consumed from SSBs, soda represents the largest source, comprising about 60% of total SSB calories (Bleich et al., 2009) and a third of all added sugars consumed (Huth et al., 2013). Soda is the top source of added sugars in American’s diets, except for in very young children (two to five year olds; Welsh et al., 2011), with young adults being one of the highest consumers (Han & Powell, 2013; Kumar et al., 2014; Ogden, Kit, Carroll, & Park, 2011; Welsh et al., 2011; West et al., 2006). In fact, young adults consume 6.5 times as much sugar from soda than from coffee and tea and almost 100 times more than from energy drinks (Welsh et al., 2011). In a nationally representative sample of U.S. adults, about a fourth of 18 to 34 year olds reported consuming regular soda at least once per day (Kumar et al., 2014). Young adults consume on average 146 kcals from soda on a daily basis (9.5% of total energy intake from SSBs; Welsh et al., 2011), with almost a fifth consuming at least 500 kcals of soda daily (equivalent to almost four, 12 oz cans of Coca-Cola; Han & Powell, 2013).

Added sugar consumption is especially problematic because it is considered empty calories (i.e., it offers little to no nutritional benefit; Huth et al., 2013; U.S. Department of Agriculture, 2015b), is less satiating in liquid form and, as a result, may promote positive energy balance (Akhavan, Luhovyy, & Anderson, 2011; DellaValle, Roe, & Rolls, 2005; DiMeglio & Mattes, 2000; Mattes, 1996; Mattes & Campbell, 2009), exhibits similar addictive characteristics, such as cravings and signs of withdrawal, as drugs and other substances (Avena, Rada, & Hoebel, 2008; Colantuoni et al., 2001), and often displaces more healthy, nutrient-dense foods and beverages (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2015). Further, individuals who consume higher amounts of added sugars not only have lower micronutrient intakes (Frary, Johnson, & Wang, 2004; Gibson, 2007; Johnson et al., 2009; Marriott, Olsho, Hadden, & Connor, 2010; Vartanian, Schwartz, & Brownell, 2007),
but poorer dietary patterns overall (e.g., they consume more energy-dense foods, such as fast food, salty snacks, and desserts, and fewer servings of fruits and vegetables; Frary et al., 2004; Fung et al., 2009; Piernas, Mendez, Ng, Gordon-Larsen, & Popkin, 2014; Vartanian et al., 2007). This is particularly concerning during early adulthood because it is a critical period during which lifelong behavior patterns are established (Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008). Thus, not only are young adults engaging in an unhealthy behavior that may persist throughout adulthood, but this puts them at greater risk for a number of adverse health conditions and diseases, including type 2 diabetes, overweight/obesity, metabolic syndrome, and cardiovascular disease (CVD; e.g., Aeberli et al., 2011; Basu, Yoffe, Hills, & Lustig, 2013; Duffey, Gordon-Larsen, Steffèn, Jacobs, & Popkin, 2010; Fung et al., 2009; Hu & Malik, 2010; Imamura et al., 2015; Malik et al., 2010; Menotti et al., 1999; Schulze et al., 2004; Welsh et al., 2010; Yang et al., 2014). There is also some evidence that consuming added sugars and SSBs increase the risk of pancreatic cancer due to higher sugar in the bloodstream (Larsson, Bergkvist, & Wolk, 2006; Michaud et al., 2002). It also negatively impacts bone health due to the decreasing intake of calcium-rich beverages (Kristensen, Jensen, Kudsk, Henriksen, & Mølgaard, 2005; Tucker et al., 2006).

A recent meta-analysis found that adults who consumed one to two servings of SSBs per day had a 26% greater risk of developing type 2 diabetes and a 20% greater risk of metabolic syndrome than those who less frequently consumed them (i.e., fewer than one serving per month; Malik et al., 2010). The Nurses’ Health Study, which is one of the largest and longest running investigations into factors that influence the incidence of chronic disease (Channing Laboratory at Brigham and Women’s Hospital, n.d.; Colditz & Hankinson, 2005), followed 88,520 women over a 24 year period and found that regular consumption of SSBs (≥ two servings per day)
increased the risk for developing coronary heart disease by 21%, even after adjusting for health and lifestyle factors (e.g., age, health status, diet, body mass index [BMI], and total energy intake; Fung et al., 2009).

Dietary recall data collected between 1988 and 2006 from the National Health and Nutrition Examination Survey (NHANES), which is a program conducted by the National Center for Health Statistics/Centers for Disease Control and Prevention and is designed to assess the health and nutritional status of a representative sample of U.S. children and adults (Centers for Disease Control and Prevention/National Center for Health Statistics, 2014), was used to examine the association between added sugar consumption and CVD mortality risk (Yang et al., 2014). After adjusting for various covariates, such as race/ethnicity, educational attainment, smoking status, physical activity level, and BMI, an increase in the percentage of energy intake consumed from added sugars was found to increase the risk for CVD mortality exponentially. Specifically, participants who consumed 11%, 15%, 19%, and 25% of their total energy from added sugars had a 7%, 18%, 38%, and 103% increased risk for CVD mortality, respectively, compared to those who consumed 7% of their total energy from added sugars.

**Sugars and Carbohydrates: The Basics**

Sugars are a carbohydrate – one of the three basic macronutrients essential for human functioning – that comes in many forms and contains approximately four calories of energy per gram (Blake, 2011; International Food Information Council Foundation, n.d.). The most basic form of sugars are monosaccharides (glucose, fructose, and galactose), with glucose being the most abundant and primary energy source for the body (Blake, 2011; DeBruyne, Pinna, & Whitney, 2015). In addition to monosaccharides, there are disaccharides (sucrose, maltose, and lactose), which are composed of a glucose molecule and another monosaccharide, and
polysaccharides (starch, fiber, and glycogen), which are long chains of monosaccharides (Blake, 2011; DeBruyne et al., 2015; Whitney & Rolfes, 2010).

During digestion, most carbohydrates are broken down into monosaccharides, at which point they are mostly converted into glucose by the liver (Blake, 2011). Glucose is then either stored in the liver or distributed throughout the body, with any excess amount stored as fat (Blake, 2011; Whitney & Rolfes, 2010). The body regulates the amount of glucose in the blood via hormones released by the pancreas (insulin and glucagon), as too much or too little sugar in the blood can be dangerous or even fatal (American Diabetes Association, 2014; Blake, 2011). Thus, for example, when blood glucose levels rise after consuming carbohydrates, the pancreas releases insulin to facilitate the absorption of glucose by cells, either to provide immediate energy or stored for later use (Blake, 2011). When blood glucose levels drop too low, glucagon signals the liver to release glucose into the blood and, if necessary, creates glucose from noncarbohydrate sources (mostly from protein; Blake, 2011; Whitney & Rolfes, 2010). The only carbohydrate, however, that is not easily digestible or broken down is fiber, which passes through the body and contributes little energy (DeBruyne et al., 2015).

**Sources of Sugars**

Some foods and beverages, specifically those that are raw and unprocessed, naturally contain sugar (e.g., milk and dairy products contain lactose, and fruits, honey, and root vegetables contain fructose and/or glucose), while others are produced commercially or added during processing or preparation (i.e., “added sugars,” such as SSBs; International Food Information Council Foundation, n.d.; U.S. Department of Agriculture, 2015a). Added sugars, however, can be derived from naturally occurring sources or be refined and processed (e.g., high-fructose corn syrup [HFCS]), but those that are found naturally, such as in fruit, tend to be more
diluted and, therefore, are considered healthier (i.e., four apples have about the same amount of sugar as a 20 oz bottle of Coca-Cola). Sugars are added to foods and beverages to increase its sweetness, enhance its flavor, texture, or color, provide fermentation for baked goods, maintain freshness and food quality, and prevent spoilage, such as acting as a preservative in jams and jellies (International Food Information Council Foundation, n.d.; National Institutes of Health & U.S. National Library of Medicine, 2015; Whitney & Rolfes, 2010). The most common sources of added sugars in American’s diets, besides SSBs, are from candies, cakes, cookies, pies, pastries, fruit drinks, and dairy desserts (i.e., processed, nutrient-poor foods and beverages; Huth et al., 2013; United States Department of Agriculture, 2015a).

Similarly, there are sugar substitutes (also known as artificial or non-caloric sweeteners), which have a negligible amount of calories and are as sweet as or even sweeter than table sugar (i.e., sucrose; ranging anywhere from 0.8 to 80 times as sweet; Blake, 2011; Whitney & Rolfes, 2010). Some common types of artificial sweeteners include saccharin, aspartame, acesulfame K, sucralose, and rebaudioside A (Blake, 2011; Mayo Clinic, 2015; Whitney & Rolfes, 2010). These sweeteners may be derived naturally (for example, rebaudioside A is derived from the stevia plant) or chemically manufactured, and are typically used in processed foods or in cooking and baking (Mayo Clinic, 2015). They are especially favored among individuals with diabetes because of how they are metabolized (either more slowly or not absorbed at all), and thus produce less of a spike in blood glucose levels, which makes it much easier for someone who is unable to effectively manage blood glucose levels (Blake, 2011).

**Sugars and Metabolic Health**

A large body of research has examined the effects that different types of sugars have on metabolic health. For example, adults who consume sucrose, which contains 50% glucose and
50% fructose, have a significantly higher accumulation of fat mass, as well as higher concentrations of total cholesterol, triglycerides (i.e., fatty molecules in the blood), inflammatory markers (uric acid, haptoglobin, and transferrin), and blood pressure, than those who ingest similar items sweetened with artificial sweeteners (Bruun, Maersk, Belza, Astrup, & Richelsen, 2015; Maersk et al., 2012; Raben, Vasilaras, Møller, & Astrup, 2002; Sørensen, Raben, Stender, & Astrup, 2005). Similarly, daily intake of sucrose-sweetened soft drinks, compared to isocaloric semi-skimmed milk and water, over six months increased fat accumulation, lipid profiles, and uric acid levels (Bruun et al., 2015; Maersk et al., 2012).

While HFCS, the most common sweetener used in SSBs, has a similar composition as sucrose (it typically contains either 42% or 55% fructose, with the remainder as glucose; U.S. Food and Drug Administration, 2014), it has been shown to increase the risk of developing gout, as well as albuminuria (a marker for kidney damage; National Kidney Foundation, 2009) and apolipoprotein B concentrations (a protein that transplants fat and cholesterol in the blood; U.S. National Library of Medicine, 2016), both of which are associated with an increased risk of developing CVD (Choi & Curhan, 2008; Shoham et al., 2008; Stanhope et al., 2011). In fact, Choi and Curhan (2008) followed more than 45,000 men over 12 years and found that daily consumption of soft drinks (one serving per day) increased the risk of gout by 45% compared to consuming soft drinks once per month. This risk increased to 85% when two or more servings per day were consumed. No associated risk was found for diet soft drinks.

As indicated above, while both sucrose and HFCS consumption increase one’s risk for adverse health effects, fructose, as opposed to glucose, appears to be the main culprit for this. This is believed to be due to the way that these two monosaccharides are metabolized (Bray, 2007; Schaefer, Gleason, & Dansinger, 2009). While glucose passes through the bloodstream to
be broken down by the various tissues throughout the body, fructose is processed in the liver and any excess can result in increased uric acid and triglyceride levels, which can damage liver function and heighten the risk for gout and nonalcoholic fatty liver disease, as well as lead to insulin resistance (Mayes, 1993). One noteworthy study examined the serum triglyceride responses of meals containing 100 g sucrose, 50 g glucose, or 50 g fructose (Cohen & Schall, 1988). Fifty grams of glucose and fructose were used to directly compare its effects to sucrose, given sucrose’s composition (i.e., half glucose and half fructose). Significantly higher triglyceride concentrations were observed in adults that ingested either sucrose or fructose, as opposed to glucose. And, since sucrose and fructose elicited similar responses, it was concluded that this increase was due to the fructose within sucrose.

Additional support is provided by more recent studies that have found that fructose, as opposed to glucose, significantly increases apolipoprotein B, LDL, or “bad” cholesterol, and triglyceride concentrations, as well as fasting blood glucose and insulin levels, and waist-to-hip ratio (Aeberli et al., 2011; Stanhope et al., 2009, 2011; Teff et al., 2004). Moderate to high fructose consumption (≥ 74 grams or two 12-oz cans of Coca-Cola) independently and significantly increases the risk for high blood pressure by 36% (stage 1) and 87% (stage 2) in adults with no prior history of hypertension (Jalal, Smits, Johnson, & Chonchol, 2010), and has been found to increase blood glucose, insulin, and triglyceride levels by 67%, 42%, and 44% after 2 weeks and 73%, 39%, and 141% after 10 weeks, respectively, compared to a complex carbohydrate diet low in fructose (Swarbrick et al., 2008). What is especially concerning about these findings is that SSBs contain a higher amount of fructose than what is reported (Ventura, Davis, & Goran, 2011; Walker, Dumke, & Goran, 2014). For example, an analysis of the fructose content in popular soft drinks revealed that they contained above 58% fructose, with
name brands, such as Coca-Cola, Pepsi, and Sprite, containing 64 to 65% fructose (Ventura et al., 2011).

Unlike caloric sweeteners (i.e., sugars that provide calories, such as fructose and sucrose), there is less consistent, and often conflicting, evidence on the impact of artificial sweeteners on metabolic health (Brown, Banate, & Rother, 2010; Reid et al., 2016; Sylvetsky, Blau, & Rother, 2016). In fact, the dietary community is split on whether artificial sweeteners are a healthier alternative to caloric sweeteners. On one side, studies have found that consuming artificial sweeteners, when compared to sucrose or a placebo, is associated with lower blood pressure, glucose, and insulin levels, and reduced markers of inflammation (Anton et al., 2010; Fitch & Keim, 2012; Raben et al., 2002; Sørensen et al., 2005). Artificial sweeteners have been promoted as a healthier alternative for weight loss and weight management due to their negligible calories (Bellisle & Drewnowski, 2007; Fitch & Keim, 2012).

However, there is still some evidence that suggests artificial sweeteners increase the risk for some of the same chronic diseases as its caloric counterparts and, in some cases, may be even higher (Gardener et al., 2012; Suez et al., 2014; Swithers, 2013). This may be because total caloric intake, particularly from discretionary foods (i.e., foods high in sugar, sodium, fat, and cholesterol), is higher among those that consume diet beverages compared with SSBs (An, 2016; Bleich, Wolfson, Vine, & Wang, 2014). A recent meta-analysis of randomized clinical trials found no support for artificial sweeteners being beneficial for weight management and found it instead to be associated with increased BMI and cardiometabolic risk (Azad et al., 2017). Despite this conflicting evidence, several prominent organizations, including the U.S. Food and Drug Administration (FDA) and the Academy of Nutrition and Dietetics, have deemed them to
be safe (Butchko et al., 2002; Fitch & Keim, 2012; Gallus et al., 2007; Kroger, Meister, & Kava, 2006; National Cancer Institute, 2009; Weihrauch & Diehl, 2004).

**Public Policies and Controversy Surrounding Added Sugars**

With the growing interest and concern in added sugar consumption, there has been a large push within the last half-decade towards public policy campaigns and health initiatives to increase public awareness of added sugars in foods and beverages. For example, in July 2015, the FDA proposed changes to update the Nutrition Facts label to include information about added sugars in packaged products (U.S. Food and Drug Administration, 2015). The FDA had also mandated that, by December 2016, all chain restaurants and vending machines disclose calorie and nutrition information to consumers “in a direct and accessible manner” (U.S. Food and Drug Administration, 2016).

While more than two-thirds of states and Washington, D.C. have applied a small sales tax to regular SSBs sold in retail stores and through vending machines (Chriqui, Eidson, & Chaloupka, 2014), several states, such as California, Connecticut, Hawaii, and Vermont, have attempted to pass bills that impose a much more significant tax to sugared products, with Berkeley, California being the first U.S. city to successfully implement one ($0.01 per fluid ounce or about 68 cents for a 2 liter bottle; Sugar-Sweetened Beverage Product Distribution Tax, Berkeley Municipal Code, Chapter 7.72; California Center for Public Health Advocacy, 2016b). Additionally, there have been attempts by various states to curb added sugar consumption by prohibiting the sale or serving of SSBs in public schools or childcare settings, putting warning labels on SSBs, and restricting the sale of oversize (greater than 16 fluid ounces) SSBs to minors (California Center for Public Health Advocacy, 2016b). In addition, many states, cities, and counties have contributed to this effort through educational campaigns, such as Pouring on the

However, despite these efforts, there has been a significant amount of resistance and controversy around imposing restrictions on foods and beverages. For example, state courts in New York, California, Hawaii, and Vermont recently struck down bills that sought to reduce SSB consumption (California Center for Public Health Advocacy, 2016b). Much of this controversy is centered around the belief that the government should not be allowed to dictate what people can or cannot eat or drink, as this imposes on personal freedom (Public Broadcasting Service NewsHour, 2012). Others view this as a “slippery slope,” similar to trans fat, which was first required to be disclosed on nutrition labels before eventually being banned (Los Angeles Times, 2015). Still others do not see how beneficial taxes would actually be, as they believe that it would not actually change purchasing behavior and would instead hurt low-income individuals most, or even go so far as to create a black market demand for it (The Wall Street Journal, 2015). Some even view sugar as being targeted as the “new fat,” and argue that as a society we are constantly seeking to demonize or place blame on something (British Broadcasting Corporation News, 2014). Nevertheless, many prominent researchers are united in their view on sugar being toxic to our health and see government regulation as essential to combatting this issue (e.g., Brownell & Frieden, 2009; Lustig, Schmidt, & Brindis, 2012).

**Motivating Factors for Behavior Change in Young Adults**

Overall, there is a tremendous amount of resistance from big business and powerful lobbyists, making it difficult to create systematic changes due to conflicts of interest and political power that those opposed to such changes have (e.g., The Atlantic, 2011; The Guardian, 2016; Time, 2016). Moreover, despite efforts to raise awareness about the health implications of
excess sugar consumption, young adults still do not appear to have much knowledge of nutrition or nutritional guidelines, especially when it comes to beverages (e.g., Block, Gillman, Linakis, & Goldman, 2013; Hattersley, Irwin, King, & Allman-Farinelli, 2009; Park, Onufrak, Sherry, & Blanck, 2014). For example, in one focus group study, a young adult noted that they “don’t even know what the numbers mean. Six hundred? Now, is that good or bad?” (Block et al., 2013). Another commented that calories are “the last thing on my mind when…drinking something” (Block et al., 2013). Young adults consistently indicated in another focus group study that they do not think about the nutritional content of beverages (for example, “if it’s a liquid it doesn’t really count;” Hattersley et al., 2009). A cross-sectional national survey found that only about a fifth of 18 to 24 year olds had accurate knowledge of the energy content in SSBs, with almost 15% unaware that consuming SSBs can contribute to weight gain (Park et al., 2014).

Young adults have also noted how they do not perceive the negative health consequences of consuming soft drinks as being applicable to them, as, for example, they are “still invincible” and it only becomes an issue when “you’re old” and “weaker” (Block et al., 2013). In Hattersley et al., (2009), young adults commented how soft drinks are ubiquitous in their culture and that it is not as socially acceptable to drink water or diet soda instead. While these are just a few examples, it clearly demonstrates the importance of finding effective means to persuade young adults to curtail their excess sugar consumption. These messages not only have to appeal to this age group, but also have to be persuasive enough to promote change.

Therefore, an important factor to consider when it comes to health behavior change is what motivates young adults. While little is known about what motivates their dietary habits, previous research has shown that appearance is a stronger motivating factor than health when it comes to weight loss and physical activity (LaRose, Leahey, Hill, & Wing, 2013; Poobalan,
MESSAGES TO COMBAT SODA CONSUMPTION

Aucott, Clarke, & Smith, 2012). This is likely due to the culture this age group places on body shape and appearance, as well as the fact that most young adults have not experienced many, if any, of the long-term consequences of unhealthy lifestyle choices (i.e., chronic diseases; Chen & Brown, 2005; Latner, Stunkard, & Wilson, 2005; Malinauskas, Raedeke, Aeby, Smith, & Dallas, 2006; Neighbors & Sobal, 2007; Wharton, Adams, & Hampl, 2008). In fact, when it comes to romantic relationships, obese individuals are rated by university students as the least desirable sexual partner, even compared to individuals with various disabilities (e.g., being in a wheelchair, missing an arm, or having a mental illness; Chen & Brown, 2005; Latner, Stunkard, & Wilson, 2005).

Given this, it may be that messages that emphasize appearance would be more effective in modifying health behaviors among young adults. One area that has utilized this approach is with reducing UV sun exposure (Hillhouse & Turrisi, 2002; Jones & Leary, 1994). Jones and Leary (1994) compared the effectiveness of health- and appearance-based messages on university students’ intentions to reduce sun exposure. Participants were provided with 500 word essays that outlined either health- or appearance-based reasons against tanning. The authors found that the appearance essay, compared to its health counterpart, was more effective in increasing intentions to engage in safe UV exposure behaviors. In another study, an appearance-based intervention was developed to reduce indoor tanning behavior in college females (Hillhouse & Turrisi, 2002). Those in the intervention group received an 11-page workbook that highlighted appearance-based reasons against indoor tanning, whereas the control group received general information about skin cancer and sun protection. After a two-week follow-up, those in the intervention group reported more negative attitudes towards indoor tanning and fewer intentions to engage in it. This effect persisted two months following the
intervention, with the intervention group engaging in indoor tanning half as much as the control group.

Given the success of using appearance-based messages in modifying UV exposure, it may also be a more effective method in reducing young adults’ soda consumption than a traditional message that emphasizes improved health. Although there is limited research on the appearance effects of added sugar consumption, diets higher on the glycemic index (i.e., foods and beverages that cause a higher spike in blood glucose levels) have been found to indirectly affect the prevalence, severity, and duration of acne due to hormonal factors that mediate this (for a review: Spencer, Ferdowsian, & Barnard, 2009).

**Regulatory Focus Theory: Background and Theoretical Basis**

Message framing is one way to effectively deliver persuasive health messages (Gallagher & Updegraff, 2012; Smith & Petty, 1996). This is done by manipulating the structure, content, and delivery of information in a manner that influences people’s attitudes, intentions, and behaviors. One prominent theory that provides a framework for this is regulatory focus theory (RFT). Regulatory focus theory is based on the hedonic principle, a foundational principle underlying most major theories of motivation and personality in psychology (Elliot & Covington, 2001; Graham & Weiner, 1996). The hedonic principle asserts that individuals approach pleasure (i.e., desired end-states) and avoid pain (i.e., undesired end-states). Its roots are traced back to ancient Greek philosophers, who viewed it as a central guiding principle for human behavior (Elliot & Covington, 2001). Within psychology, its influence has been vast and extensive, with many renowned psychologists implementing these basic principles of approach and avoidance into their work, such as William James (1890), Edward Thorndike (Law of Effect, 1911), Sigmund Freud (Pleasure Principle, 1915), Carl Jung (Psychological Types, 1921),
Edward Tolman (Purposive Behaviorism, 1925), Ivan Pavlov (Classical Conditioning, 1927), Kurt Lewin (Field Theory, 1935), B. F. Skinner (Operant Conditioning, 1938), and Clark Hull (Drive Theory, 1943; Elliot & Covington, 2001; Graham & Weiner, 1996).

E. Tory Higgins, the founder of RFT, believes that the hedonic principle’s basis of approach and avoidance motivation is too simplistic as a motivational principle (Higgins, 1997, 1998). For example, it does not differentiate between different end-states and instead treats all desired or undesired end-states as equivalent. An undesired end-state may be to avoid the pain accompanied by hunger or thirst. The hedonic principle treats these two end-states as the same; avoidance of an undesired end-state. However, it ignores any differences between hunger and thirst and the motivations for avoiding them (Higgins, 1998). Similarly, it does not explain how or why an individual approaches or avoids an end-state; only that they do so. For instance, two students might have the same goal of obtaining an A in class (i.e., the desired end-state). However, each student may view this goal in different ways. It may be that one student views it as a means to obtain valedictorian status, whereas for another it is to not lose one’s class standing. Thus, while both students have similar approach motivations (to obtain an A in class), their motivations for doing so are different (Molden, Lee, & Higgins, 2008). Regulatory focus theory addresses these shortcomings and expands upon the hedonic principle by further delineating approach and avoidance motivational processes in order to provide an explanation of how people approach pleasure and avoid pain, as well as the strategies that they use in doing so (Higgins, 1997, 1998).

According to RFT, there are two fundamental needs central to survival: nurturance and security (Higgins, 1997, 1998). Nurturance needs are concerned with obtaining advancement, growth, and accomplishment, whereas security is concerned with protection, safety, and
MESSAGES TO COMBAT SODA CONSUMPTION

responsibility (Higgins, 1997; Molden et al., 2008). These needs were conceptualized based upon the theories of Bowlby (1969), Maslow (1955), Mead (1934), and Sullivan (1953). Higgins believes that, growing up, children learn how to fulfill these needs by interacting with their caretakers (Higgins, 1997, 1998). Caretakers, in turn, respond to children in different ways that could be pleasurable or painful to the child, which teaches them how to respond and manage their relationships with their caretakers in order to fulfill those core needs (Higgins, 1997, 1998). Accordingly, what children learn about regulating their own behavior (i.e., self-regulation) differs for nurturance and security needs, as those needs are met differently by their caretakers (a core concept of RFT; Higgins, 1997, 1998).

The interactions between the caretaker and child can be classified into two broad categories: those that involve a promotion-focus and those that involve a prevention-focus (Higgins, 1997, 1998, 2012). These two motivational systems are concerned with acquiring either nurturance (promotion-focus) or security (prevention-focus) needs (Higgins, 1998). Each system involves pleasure (a desired end-state) and pain (an undesired end-state), but they are experienced in different ways. For example, caretaker-child interactions that involve a promotion-focus teaches the child that in order to obtain nurturance in the world, one must attain accomplishments and fulfill hopes and aspirations (Higgins, 1997, 1998, 2012). With promotion-focus, the child develops a sensitivity to positive outcomes; that is, the presence of positive outcomes is experienced as pleasure and its absence as pain (Higgins, 1997). The modes of interaction that fall into promotion-focus are bolstering (the presence of positive outcomes; a desired end-state) or love withdrawal (the absence of positive outcomes; an undesired end-state). Bolstering interactions are when the caretaker gives affection to the child when they succeed, encourages them to overcome challenges, or provides opportunities to
succeed (Higgins, 1997, 1998, 2012). Conversely, love withdrawal is when the caretaker takes away something pleasurable to the child when they engage in an unwanted behavior, such as ending mealtime when the child is disruptive or taking a toy away when the child refuses to share it (Higgins, 1997, 1998, 2012).

On the other hand, prevention-focus interactions teach the child that in order to obtain security, one must ensure safety, be responsible, and meet their obligations (Higgins, 1997, 1998, 2012). As a result, the child develops a sensitivity to negative outcomes, with their absence experienced as pleasure and presence as pain (Higgins, 1997). There are two types of prevention-focus interactions: prudence and punitive/critical. Prudent modes of interaction are when the caretaker creates an environment to protect the child (e.g., childproofing the house) or teaches them how to stay safe and be alert to danger (Higgins, 1997, 1998, 2012). These interactions focus on the absence of negative outcomes; the desired end-state. Conversely, in punitive/critical interactions, the caretaker may punish, scold, or yell at the child for an unwanted behavior, such as making a mistake or being irresponsible (e.g., running into the street in front of a vehicle; Higgins, 1997, 1998, 2012). In this case, the result is the presence of negative outcomes; an undesired end-state.

These two motivational systems (promotion- and prevention-focus) are predominately learned through early childhood socialization, but can be activated at any moment, such as through interactions with coworkers or significant others, or at different times within an interaction (Higgins, 1997, 1998, 2012). They can also be temporarily induced or primed by emphasizing one of these needs or presenting information in terms of gains or losses, self-construals, or positive and negative stereotypes (e.g., Higgins, Roney, Crowe, & Hymes, 1994; Lee, Aaker, & Gardner, 2000; Molden et al., 2008; Seibt & Förster, 2004; Shah & Higgins,
2001; Shah, Higgins, & Friedman, 1998; Zhao & Pechmann, 2007). However, while individuals learn to self-regulate with each of these systems, prolonged exposure to one system can create a chronic focus on that need (Molden et al., 2008).

Previous research supports the influence of caretaker interactions in the development of these motivational systems (Keller, 2008; Manian, Papadakis, Strauman, & Essex, 2006; Manian, Strauman, & Denney, 1998). For example, university students were asked in one study to provide retrospective ratings on their parents’ behavior (Keller, 2008). Recollections of a critical/punitive mode of parenting correlated with the student having a prevention-focus orientation, while bolstering mode of parenting correlated with a promotion-focus. Similarly, another study found that student recollections of parental warmth was associated with the student having a promotion-focus orientation, whereas parental rejection was associated with prevention-focus (Manian et al., 1998).

**Regulatory Focus Theory: Promotion and Prevention Motivations in Goal Pursuit**

These two motivational systems differ based on their strategic preferences for goal pursuit. Namely, promotion-focused individuals use eager and enthusiastic strategies (i.e., approach strategies) to pursue opportunities for advancement and achievement, whereas prevention-focused individuals use vigilant and careful strategies (i.e., avoidance strategies) to avoid mistakes and assure safety (Higgins, 1998). These strategic inclinations also vary depending on how desirable or undesirable the outcome is. For promotion-focused individuals, more eager goal pursuit strategies are used when approaching a desired outcome (i.e., a gain) than when avoiding an undesired outcome (i.e., a nongain; Higgins, 2000). In contrast, higher vigilant means are used among prevention-focused individuals when avoiding an undesired outcome (i.e., a loss) than approaching a desired outcome (i.e., a nonloss; Higgins, 2000). The
reason for this is because approaching a gain is much more motivating than avoiding a nongain, whereas avoiding a loss is much more motivating than approaching a nonloss. These differences in strategic inclinations influence individuals’ choices and decision making during goal pursuit (e.g., Crowe & Higgins, 1997; Higgins et al., 1994; Liberman, Molden, Idson, & Higgins, 2001).

For example, Higgins et al. (1994) examined differences in strategic inclinations between regulatory orientations by asking participants about strategies they would use when it comes to friendship. Specifically, in the promotion-focused condition, participants were asked what they would do to be a good friend, whereas prevention-focused participants were asked what they would do to try not to be a poor friend. The strategies that were formulated included either strengthening friendships through approach strategies (e.g., being supportive, generous, and loving) or preventing a loss of friendship through avoidance strategies (e.g., staying in touch, not neglecting them, and not gossiping about them). In a follow-up study, a separate group of participants were asked which three strategies, from a list of those generated in the initial study, they would use for friendship. Promotion-focused individuals were nearly 40% more likely to choose approach strategies than prevention-focused individuals. This relationship was even stronger for avoidance strategies, which were more than twice as likely to be selected by prevention- than promotion-focused individuals. This is because, in each case, those strategies best aligned with their regulatory focus orientations.

**Regulatory Fit**

When individuals pursue a goal using means that align with their regulatory focus orientation, they experience regulatory fit (i.e., promotion/eager and prevention/vigilant; Higgins, 2000, 2005). This is in contrast to non-fit, which is when the strategic means do not align with one’s orientation (i.e., promotion/vigilant and prevention/eager). Promotion-focused
individuals experience stronger fit when they approach gains (e.g., getting a discount; high eagerness) as opposed to when they avoid nongains (e.g., not getting a discount; low eagerness), whereas, for prevention-focused individuals, it is when they avoid losses (e.g., paying a penalty; high vigilance) rather than approach nonlosses (e.g., not paying a penalty; low vigilance; Higgins, 2000). This is due to the different emphases of these two regulatory orientations (i.e., promotion-focus with gains and prevention-focus with losses).

When individuals experience fit, it affects their judgment, attitudes and decision making. Examples of this include the perceived value of an outcome, persuasiveness of a message, intention to perform a behavior, perceived success at and willingness to repeat a task, and prospective and retrospective feelings toward engaging in a behavior (Cesario, Grant, & Higgins, 2004; Freitas & Higgins, 2002; Higgins, Idson, Freitas, Spiegel, & Molden, 2003; Hong & Lee, 2008; Latimer, Rivers, et al., 2008; Pfeffer, 2013; Zhao & Pechmann, 2007). In one study, young adults were asked whether they would prefer to receive either a coffee mug or a disposable pen (Higgins et al., 2003). Half were given instructions framed in an eager manner (i.e., the gains from picking either object) and the other half in a vigilant manner (i.e., the losses by not receiving either object). Those that selected the mug were asked how much they thought it was worth, if the price of the pen was three dollars. Participants in the fit group assigned an approximately 50% higher price to the mug ($8.78 and $8.07 for promotion- and prevention-focused, respectively) than those in the non-fit group ($5.00 and $6.32). Similar results were found in a follow-up study, where participants were given the opportunity to purchase the mug with their own money. Those in the fit group offered roughly 70% more than those in the non-fit group ($4.76 and $4.68 vs. $2.49 and $3.11). These findings suggest that individuals assign a higher value to desirable outcomes when they experience fit.
Another study presented undergraduate students with messages using either eager or vigilant means to increase daily consumption of fruits and vegetables (Cesario et al., 2004). After reading the message, participants indicated their attitudes and intentions towards increasing their fruit and vegetable consumption. Results showed that those who were promotion-focused had greater attitude and intention ratings with the eager rather than the vigilant framing, whereas the opposite was found for prevention-focused individuals. Similar findings, with regards to regulatory fit and intention ratings, were reported in another study that attempted to create persuasive messages aimed at deterring smoking behavior (Zhao & Pechmann, 2007). In this study, predominantly promotion-focused participants who viewed an ad framed using promotion-focused language (i.e., gains) reported stronger intentions not to smoke than when they viewed a prevention-focused ad (i.e., emphasizing losses; 4.52 vs. 3.88). The opposite was found for those with predominant prevention-focused orientations, in that higher intentions were reported when viewing an ad that fit with their orientation (4.61 vs. 4.20). Together, these findings, when applied to the expectancy-value model of motivation, suggest that individuals who experience fit are more likely to engage in goal pursuit because they assign a higher value to the outcome. This assumption could also explain why messages that fit with one’s regulatory orientation are considered more persuasive (Cesario et al., 2004; Hong & Lee, 2008; Zhao & Pechmann, 2007).

Regulatory fit also affects performance and elicits behavior change (e.g., performing better on a task, consuming more fruits and vegetables, and increasing physical activity; Förster, Higgins, & Idson, 1998; Latimer, Rivers, et al., 2008; Latimer, Williams-Piehota, et al., 2008; Shah et al., 1998; Spiegel, Grant-Pillow, & Higgins, 2004). Spiegel and colleagues (2004) presented young adults with one of two messages that emphasized either the benefits of eating
MESSAGES TO COMBAT SODA CONSUMPTION

(promotion-focus) or costs of not eating (prevention-focus) fruits and vegetables. They were then asked to record how many servings of fruits and vegetables they consumed over the following week. There was a 21% increase in consumption of fruits and vegetables among those in the fit (8.25 and 8.06 servings for promotion and prevention, respectively) compared to the non-fit conditions (7.05 and 6.46 servings). Another study also presented promotion- and prevention-focused messages aimed at increasing fruit and vegetable intake and exposed participants to those messages several times over a three month period (Latimer, Williams-Piehota, et al., 2008). The authors found a medium effect size ($r = .3$) for fit predicting higher fruit and vegetable intake at four months. Similar findings with regards to fit have been found in other areas, such as physical activity, in which tailored messages that fit with one’s regulatory focus predicted greater engagement in physical activity than non-fit messages (Latimer, Rivers, et al., 2008). Together, these findings highlight how taking into account one’s regulatory orientation and manner of goal pursuit can increase the effectiveness of messages.

What drives these effects is that regulatory fit causes individuals to “feel right” about and engage more strongly in their goal pursuit (Higgins, 2000, 2005; Lee & Higgins, 2008). This, in turn, intensifies one’s reaction to a message or target, in that positive reactions are more positive and negative reactions are more negative, thus strengthening their engagement in the message and making it easier to process (Cesario & Higgins, 2008; Higgins, 2000; Lee & Higgins, 2008). It should be noted that regulatory fit does not create a reaction; it only enhances the individual’s experience (their evaluative reaction). However, when individuals are alerted to this feeling right effect, it eliminates the influence of fit on attitudes and message persuasiveness (whether positive or negative; Cesario et al., 2004). It is believed that this occurs because it alerts
individuals to potential biases in their judgment and causes them to overcompensate for it (Cesario et al., 2004).

**Current Study**

Regulatory focus and regulatory fit have had a broad influence across a variety of domains, from marketing to organizational behavior and education to ethics. Within health, they have been applied towards promoting healthier dietary habits, particularly in the area of fruit and vegetable intake (Cesario et al., 2004; Hong & Lee, 2008; Latimer, Williams-Piehota, et al., 2008; Spiegel et al., 2004; Tam, Bagozzi, & Spanjol, 2010). These theories have advanced health communications by offering a way to further individualize a message by taking into account one’s regulatory orientation in order to maximize the effectiveness of that message. However, to date, no study has applied this theoretical framework to reducing added sugar consumption. And, with the problematic trends observed in soda consumption among young adults, it is crucial that effective, persuasive messages are developed that can reverse this trend, as this age group is at risk for a lifelong battle with serious, preventable chronic diseases. Thus, the current study sought to investigate how framing health- or appearance-focused messages based on one’s regulatory orientation influenced attitudes, intentions, and behaviors related to soda consumption. The goal was to ultimately modify or reduce this unhealthy behavior and, hopefully, contribute towards future endeavors to combat this dangerous trend.

**Hypotheses.** Hypothesis 1a: It was hypothesized that a message that emphasized the benefits of reducing soda consumption would be more effective in enhancing attitudes, increasing intentions, and modifying behavior for promotion- than prevention-focused individuals.
Hypothesis 1b: Conversely, it was hypothesized that when the costs of consuming soda were emphasized, it would be more effective in enhancing attitudes, increasing intentions, and modifying behavior for prevention-focused individuals than promotion-focused individuals.

This is because approaching a gain is more motivating than avoiding a nongain for promotion-focused individuals, whereas, for prevention-focused individuals, avoiding a loss is more motivating than approaching a nonloss (see Higgins, 2000).

Hypothesis 2: When individuals experience regulatory fit (i.e., promotion/gain and prevention/cost), a message that highlights appearance-based reasons was hypothesized to be more effective in enhancing attitudes, increasing intentions, and modifying behavior than a health-focused message. This is based on previous research that has shown that appearance is a stronger motivating factor than health in young adults (LaRose, Leahey, Hill, & Wing, 2013; Poobalan, Aucott, Clarke, & Smith, 2012). Further, the culture of this age group places a large emphasis on body shape and appearance and young adults are unlikely to have experienced many of the long-term consequences of consuming soda (i.e., chronic diseases, such as diabetes and CVD; Chen & Brown, 2005; Latner et al., 2005; Malinauskas, Raedeke, Aeby, Smith, & Dallas, 2006; Neighbors & Sobal, 2007; Wharton, Adams, & Hampl, 2008).

Finally, post hoc exploratory analyses examined whether attitudes or intentions mediated the relationship between regulatory fit and consumption behaviors. However, because there is limited research in this area, no specific hypotheses were proposed.
METHODS

Participants

Nine hundred twenty-nine participants between the ages of 18 and 25\(^1\) were recruited through Amazon's Mechanical Turk, an online workforce community. Participants provided informed consent and completed the eligibility screener. To be eligible, participants had to be within the specified age range, live in the U.S., speak English as their primary language, and consume the equivalent of at least four, 12 ounce cans of regular, non-diet soda per week\(^2\). Participants who were eligible were able to complete the main survey and were compensated for their time ($0.50). After completing the main survey, they were offered the opportunity to participate in the follow-up survey, which took place one week later. Additional compensation ($0.25) was provided for completing the follow-up. Quality control questions, such as “Please select disagree,” were included throughout both surveys to ensure that participants were attentive and providing quality responses.

Two hundred and five were eligible and completed the main survey. Of those who were ineligible, 49% did not meet the soda consumption requirements, 40% were outside the targeted age range, 5% attempted the survey multiple times, 4% failed the quality control check, 2% did not complete the survey, 0.4% did not speak English as their primary language, 0.3% did not live

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\(^1\) Young adulthood is defined in a number of different ways in the literature (e.g., Ebbeling et al., 2005; Han & Powell, 2013; Larson, Neumark-Sztainer, Laska, & Story, 2011; Ludwig et al., 1999; McMillan-Price et al., 2006). This range typically varies anywhere from 18 to 39 years of age. The following age range, which is referred to as emerging adulthood, was selected because it is considered a distinct and separate period from young adulthood (Arnett, 2000).

\(^2\) This amount of soda was selected based on the ratio of added sugars from soda to all added sugars consumed by young adults (40% of added sugars come from soda; Welsh et al., 2011). Then, based on an average diet of 2,000 kcals, the maximum amount of added sugars in calories that should be consumed was calculated using the dietary guidelines of no more than 10%. Lastly, the 40% ratio previously calculated was multiplied by the maximum amount of added sugars that should be consumed to determine a weekly limit (it was found to be 3.6, 12 ounce cans of soda). The number of cans was rounded and set as the minimum inclusion criteria.
in the U.S., and 0.1% had technical issues that resulted in the video message not playing for them.

Among those who were eligible, nearly three-quarters correctly answered all four manipulation checks (see Measures below). Of interest, almost 90% of those who received a gain- or loss-framed message correctly identified it as such, while 89% and 99% correctly identified the appearance- and health-focused messages. After excluding those who failed the manipulation check, there were roughly an equal number of participants in each of the conditions (gain vs. loss: 77 and 70; health vs. appearance: 73 and 74).

Half (50.3%) of eligible participants were female and almost two-thirds (65%) were Caucasian. Mean age was 22.8 (SD = 1.9) and mean BMI was 28.2 kg/m² (SD = 7.9), with 41% classified as normal weight. About half (49%) were single and never married, 46% were employed full-time, and most (85%) had at least some college education. For additional demographic information see Table 1.

Nearly all (93%) participants who completed the main survey expressed interest in the follow-up survey. More than a third (38%) of those who expressed interest successfully completed the follow-up, with 1% failing the quality control check and 1% completing it after the submission deadline.

**Procedure**

Participants first completed the informed consent, which stated that they would be participating in a study examining the nutritional habits of young adults and would be asked to evaluate a message in order to develop more effective messages. The framing of the purpose of the study is based on Cesario et al. (2004). Following this, participants were asked to complete several questionnaires (i.e., Regulatory Focus Questionnaire [RFQ], Dietary Screener
MESSAGES TO COMBAT SODA CONSUMPTION

Questionnaire [DSQ], and Brief Questionnaire to Assess Habitual Beverage Intake [BEVQ-15]). They were then randomly assigned to a 2 (message framing: gain or loss) x 2 (message focus: health or appearance) condition, where they were presented with one of four messages pertaining to reducing soda intake. Participants were informed that they would be viewing a video message and would be asked questions about it afterward, so they should pay careful attention to it. Following the video message, they were asked questions about the message and completed additional questionnaires asking about their attitudes and intentions towards reducing their soda intake. Participants provided demographic information and then were given the option to participate in the second part of the study, which occurred one week later. This second part involved completing certain questionnaires (i.e., DSQ, BEVQ-15, attitudes, and intentions) that they previously completed in part one.

Measures

**Demographic Information.** Basic demographic information, such as age, gender, race, income, education, employment status, height and weight, was collected. Participants were asked to provide this information at the end of the main survey. See Appendix A.

**Regulatory Orientation.** Regulatory orientation was measured using the RFQ (Higgins et al., 2001). The RFQ contains 11 items that were generated based on RFT and asks about one’s history of past decisions (success or failure) in goal pursuit. There are two subscales (promotion and prevention) and higher scores in a subscale indicate a stronger preference for using strategies (i.e., eagerness or vigilance) consistent with that orientation. This measure has demonstrated good internal reliability ($\alpha = .73$ and .80 for promotion and prevention subscales, respectively) and two month test-retest reliability ($r = .79$ and .81 for promotion and prevention subscales, respectively; Higgins et al., 2001). It has also shown evidence for convergent and
discriminant validity using the cognitive structure and impulsivity subscales from Jackson’s (1974) Personality Research Form and the reward responsiveness and fun seeking subscales from Carver and White’s (1994) Behavioral Approach System (Higgins et al., 2001). This measure was administered prior to the experimental manipulation. The Cronbach’s alpha for each subscale in the current study was .84 (promotion) and .93 (prevention). See Appendix B.

Dietary Intake. The National Cancer Institute’s DSQ is a 26-item measure that assesses the frequency of consumption of various food and beverage items to determine current dietary intakes of fruits and vegetables, dairy/calcium, added sugars, whole grains/fiber, red meat, and processed meat. Due to the length of follow-up, the time of recall for the DSQ was modified, such that response options were restricted to weekly and daily consumption.

The DSQ has been validated in a number of large, nationally representative, cross-sectional surveys, including the National Health and Nutritional Examination Survey (NHANES) 2009-2010 and the National Health Interview Survey Cancer Control Supplement (NHIS CCS) 2010, and calibrated against 24-hour dietary recalls. Dietary screeners have been shown to provide similar mean dietary intakes as full length dietary questionnaires (Thompson et al., 2004; Thompson et al., 2005).

This measure was administered prior to the experimental manipulation and after a one week follow-up. Its purpose was to understand the general dietary habits of the sample, as little would have been known beyond their regular consumption of soda. Also, as previously discussed in the Introduction, individuals who consume added sugars tend to have poorer dietary patterns overall (e.g., Frary, Johnson, & Wang, 2004; Fung et al., 2009; Piernas, Mendez, Ng, Gordon-Larsen, & Popkin, 2014; Vartanian, Schwartz, & Brownell, 2007). Thus, it is especially important to know sample characteristics, such as whether this sample had healthy eating habits.
This measure was administered again upon follow-up for exploratory purposes to examine the changes in added sugar consumption following the experimental manipulation. Cronbach’s alphas were .74 for the main survey and .81 for the follow-up. See Appendix C.

**Beverage Intake.** The BEVQ-15 (Hedrick et al., 2012) was used to assess the frequency and amount of sugar-sweetened beverages consumed. It estimates the mean daily intake (kcals and daily grams) of 15 types of beverages, including regular soda. Test-retest reliability using Pearson bivariate correlations between the BEVQ-15 and its full length version, BEVQ-19, ranged from 0.96 to 0.99, absolute differences in outcomes between those two measures (BEVQ-15 and BEVQ-19) were minimal, and internal consistency using Cronbach’s alpha was ≥ 0.7 (Hedrick et al., 2012). Further, it has been validated against three, 24-hour food intake recalls (Spearman correlation coefficients ranged from 0.27 to 0.76; Hedrick et al., 2012). The BEVQ-15 differs from the BEVQ-19 in the removal of three beverage categories (vegetable juice, mixed alcoholic drinks, and meal replacement drinks) that were found to be low in prevalence of consumption and the combination of beer and light beer into one category. This measure was given prior to the experimental manipulation and after a one week follow-up. Cronbach’s alphas were .83 and .72 for the main and follow-up surveys, respectively. See Appendix D.

**Attitudes.** Participants rated their attitudes toward reducing their soda consumption using three bipolar adjective pairs (*negative/positive, unfavorable/favorable*, and *bad/good*) on a 7-point scale. These items formed a general attitude index. This measure was based on a previous study that examined modifying eating and exercise habits to maintain a healthy body weight (Kees, Burton, & Tangari, 2010). In their study, they reported a Cronbach’s alpha of 0.94. This measure proceeded the experimental manipulation and was given after a one week
MESSAGES TO COMBAT SODA CONSUMPTION

follow-up. The Cronbach’s alphas for this measure were .94 for the main survey and .89 for the follow-up.

Intentions. Participants were asked to rate their intentions to reduce their soda consumption using a 7-point scale, from not likely at all to very likely. Specifically, they were asked about their likelihood of reducing their soda consumption over the following week. This question was modified from the one used in Kees (2011), who examined ads that promoted healthy eating habits. It is also based on other similar, single-item questions used by dietary and physical activity studies that measure intentions (e.g., Cesario et al., 2004; Latimer, Rivers, et al., 2008; Tam, Bagozzi, & Spanjol, 2010). This measure was administered subsequent to the experimental manipulation and after a one week follow-up.

Manipulation Check. Participants were asked four questions about the video message they viewed. The purpose of these questions were to ensure that participants paid attention to and comprehended the video message. Two of the questions were used to verify that the manipulation was performed properly (e.g., a gain-framed message was perceived as such by participants). See Appendix E.

Experimental Manipulation

Participants were randomly assigned to receive one of four messages of approximately 180 words in length. Each message contained either gain- or loss-framed information that emphasized health or appearance. The gain-framed messages stressed the benefits of reducing soda consumption, while loss-framed messages focused on the costs. It should be noted that the information contained in each set of messages had the same structure and dose (i.e., the same number of references to health or appearance). Further, all messages contained the same goal of
reducing soda consumption. The content of these messages were based on the extant literature that has examined the consequences of added sugar or soda consumption.

**Health-focused Loss [Gain]-framed Message.** Research has shown that there are a number of consequences [benefits] to consuming [reducing] soda. In fact, did you know that consuming one 20 ounce bottle of soda contains about twice as much sugar as you should consume in an entire day? But, why does that matter? First, the more [less] sugar you consume, the more [less] fat there will be in your blood. This, in turn, will result in there being more [less] fat stored within your organs. Over time, this can lead to [help prevent] serious health problems, such as liver disease and pancreatitis. Secondly, sugar is very high in calories. This means that consuming [eliminating] that innocent 20 ounce bottle of soda each day can lead to about 25 pounds gained [lost] in just one year! This is important because having more [less] body fat can lead to many health problems [benefits]. For example, it can raise [lower] your blood pressure and cholesterol levels and increase [reduce] your risk for heart disease, diabetes, and stroke. So, the next time you reach for that soda, think about it; is it really worth it when it comes to your health?

**Appearance-focused Loss [Gain]-framed Message.** Research has shown that there are a number of consequences [benefits] to consuming [reducing] soda. In fact, did you know that consuming one 20 ounce bottle of soda contains about twice as much sugar as you should consume in an entire day? But, why does that matter? First, consuming [reducing] sugar can lead to [prevent] embarrassing breakouts of blackheads and pimples. And who wants to go out with a huge pimple right on your forehead? Secondly, sugar is very high in calories. This means that consuming [eliminating] that innocent, 20 ounce bottle of soda can lead to about 25 pounds gained [lost] in just one year! You’ll look heavier [leaner] and your clothes will feel tighter
[looser]. Also, having more [less] fat means that it will be harder [easier] to see your muscles. Altogether, this will bring you further away from [closer to] being beach body ready. And, the reality is heavier [thinner] individuals are considered less [more] attractive and sexually desirable than thinner [heavier] individuals. So, the next time you reach for that soda, think about it; is it really worth it when it comes to your appearance?
RESULTS

While participants were randomly assigned to each condition, chi-square and one-way ANOVAs were performed to ensure that there were no differences in demographics or baseline added sugar consumption. Chi-square and independent samples t-tests were also run to examine whether there were any differences between those who took the follow-up survey or not. Similarly, bivariate correlations, independent samples t-tests and one-way ANOVAs were conducted between the demographic variables and the variables of interest (i.e., attitudes, intentions, and added sugar consumption behaviors) to identify potential covariates. Bivariate correlations and two-way univariate ANOVAs were performed for the main analyses and simple linear regressions for the exploratory analyses. Because many of the outcome variables were skewed, bias-corrected and accelerated bootstrapping was used with 1,000 samples to estimate probability values and 95% confidence intervals.

Mean dietary intakes from the DSQ and BEVQ-15 were calculated using scoring algorithms provided by the developers of each measure (Hedrick et al., 2012; National Cancer Institute, 2016). The scoring algorithms converted participants’ responses to mean daily estimates of intake for fruits and vegetables (cups), dairy (cups), added sugars (teaspoons [tsp]), added sugar from SSBs (teaspoons, grams [g], and kcals), whole grains (ounces), fiber (grams), and calcium (milligrams). Additionally, daily kilocalories and grams for various beverages were calculated. Change scores were calculated by subtracting participant’s initial intakes of total added sugar, added sugar from SSBs, and kilocalories of soda from their follow-up intakes. Change scores were also calculated for participant’s attitudes and intentions towards reducing soda consumption to examine whether these variables changed at the one week follow-up. These
scores would indicate whether the experimental manipulation maintained effectiveness over this period.

Participants reported an initial mean daily added sugar intake of 397.5 kcals ($SD = 169.5$), added sugar intake from SSBs of 275.6 kcals ($SD = 194.2$), and 219.2 kcals from soft drinks ($SD = 207.3$). Additionally, participants consumed 2.4 cups of fruits, vegetables, and legumes ($SD = 1.0$) and 1.0 ounce of whole grains daily ($SD = 1.5$). Subsequent to the experimental manipulation, participants reported slightly above average composite attitudes ($M = 5.1, SD = 1.8$) and intentions ($M = 4.5, SD = 2.0$) on a seven point scale towards drinking less soda. After the one week follow-up, mean daily added sugar intake was 318.3 kcals ($SD = 173.8$), added sugar intake from SSBs was 203.5 kcals ($SD = 176.1$), and 167.7 kcals came from soft drinks ($SD = 207.7$). Moreover, participants consumed 2.3 cups of fruits, vegetables, and legumes ($SD = 1.0$) and 1.0 ounce of whole grains daily ($SD = 1.3$). Mean average attitudes were 4.8 ($SD = 1.8$) and intentions were 3.9 ($SD = 2.1$).

Participants’ regulatory focus was calculated using the scoring procedures outlined by the study’s author (Higgins et al., 2001). The calculated scores were kept on a continuous scale, when possible, to maximize power due to the small sample size in the follow-up survey. Positive values indicated predominant promotion orientation and negative values prevention. Although the extant literature tends to use a median split procedure, it was not used in the present study due to regulatory orientation being negatively skewed ($M = .34, SD = 1.0$). Two-thirds of participants were promotion-focused, while a third were prevention. Despite the predominantly promotion-focused sample, bivariate correlations and independent samples t-tests revealed no significant differences between the orientations and the main variables of interest. As a note, one participant obtained a zero score for their regulatory focus, indicating that they were equally
promotion- and prevention-focused, and thus were not classified as having any predominant orientation in the categorical analyses.

All participants who were eligible and correctly answered quality control and manipulation check questions were included in the statistical analyses. There were no missing values in the dataset. The Benjamini-Hochberg correction was used to control for multiple testing (Benjamini & Hochberg, 1995).

Preliminary analyses were conducted to ensure that randomization was performed properly, as well as to examine whether there were differences in those who took the follow-up survey or not. As a note, participants who expressed interest in taking the follow-up, but never actually completed it, were included with those who declined participation in the survey. Results showed no differences in demographics or baseline added sugar consumption variables in each of the four conditions, nor in the demographics or main variables of interest, including participants’ regulatory focus or whether they experienced fit, between those who took the follow-up survey and those who did not. Similarly, there were no differences between any of the demographic variables and variables of interest. Therefore, no covariates were controlled for in the main analyses.

Hypothesis 1 predicted that a gain-framed message would be more effective in enhancing attitudes, increasing intentions, and reducing added sugars consumed from soda in participants who scored higher in promotion-focus, whereas a loss-framed message would be more effective for those higher in prevention-focus. Bivariate correlations and 2 (regulatory focus) x 2 (gain vs. loss) univariate ANOVAs were conducted to test this hypothesis. There were no significant differences between groups when a gain- or loss-framed message was viewed. See Tables 2 and 3.
In the second hypothesis, participants who experienced regulatory fit were expected to respond more favorably (i.e., have higher attitudes and intentions and a greater reduction in added sugars from soda) to an appearance-based message than a health one. To test this hypothesis, 2 (regulatory fit vs. non-fit) x 2 (health vs. appearance) univariate ANOVAs were performed. No significant differences were found between health- and appearance-based messages and regulatory fit. See Table 4.

Finally, simple linear regressions were performed to examine whether attitudes or intentions mediated the relationship between regulatory fit and consumption behaviors. However, because regulatory fit did not predict the behavioral outcomes, no further analyses were necessary. See Table 5.

Given the null findings for the main hypotheses, post hoc paired-sample t-tests on the overall effectiveness of the experiment, ignoring participant’s condition and their regulatory focus and fit, were conducted. Significant differences were found for changes in added sugar (baseline: $M = 396.9$ kcals, $SD = 200.6$; follow-up: $M = 318.3$, $SD = 173.8$; $t(51) = 2.91$, $p < .01$), SSB (baseline: $M = 284.4$ kcals, $SD = 220.5$; follow-up: $M = 203.5$, $SD = 176.1$; $t(51) = 2.74$, $p < .01$), and soda (baseline: $M = 241.4$ kcals, $SD = 226.2$; follow-up: $M = 167.7$, $SD = 207.7$; $t(51) = 2.68$, $p < .01$) consumption. No differences were found for the change in attitudes or intentions.
DISCUSSION

Framing health messages that fit with one’s regulatory focus has been used to promote healthier dietary habits (Cesario et al., 2004; Hong & Lee, 2008; Latimer, Williams-Piehota, et al., 2008; Spiegel et al., 2004; Tam et al., 2010). However, no research has examined this in the context of promoting a reduction in added sugar consumption. The present study applied the theoretical framework from RFT to video messages and followed up with participants one week later to see if this seemingly simple experimental manipulation could reduce soda consumption among young adults. Soda was selected as the intervention target because it is the top source of added sugars in American’s diets, with young adults being one of the highest consumers of it (Han & Powell, 2013; Kumar et al., 2014; Ogden et al., 2011; Welsh et al., 2011). Thus, modifying this unhealthy behavior could potentially curtail lasting adverse health conditions, such as type 2 diabetes, CVD, and metabolic syndrome, to name a few (e.g., Basu, Yoffe, Hills, & Lustig, 2013; Imamura et al., 2015; Yang et al., 2014).

There were two main hypotheses proposed. The first examined whether experiencing regulatory fit based on one’s regulatory focus (i.e., promotion or prevention) and the particular video message viewed (i.e., gain or loss-framed) influenced attitudes, intentions, and behaviors. The second hypothesis explored whether modifying the focus of the message (i.e., appearance instead of health) would more strongly influence outcomes among those who experienced regulatory fit. It was believed that an appearance-focused message would resonate more with young adults because it is a stronger motivating factor when it comes to their engagement in health behaviors (LaRose et al., 2013; Poobalan et al., 2012). However, neither hypothesis was supported.
A number of reasons could explain the null findings. First, it is likely that there was not enough power to detect differences. In both the main and follow-up studies, the sample sizes were relatively small (147 and 57, respectively), especially when the number of comparison groups (i.e., four; gain/health, gain/appearance, loss/health, and loss/appearance) are taken into account. Ludolph and Schulz (2015), in their systematic review of the effectiveness of regulatory fit in health communication, found that while the literature generally does not report effect sizes, those that did (five out of twenty-seven studies) were small to moderate, with one being large. However, only two of those studies were relevant to the present study and each reported medium effect sizes ($r_s = 0.3$; Latimer, Williams-Piehota, et al., 2008; Tam, Bagozzi, & Spanjol, 2010). This was generally consistent in the current study, as effect sizes were in the small to medium range, with behavioral outcomes on the latter end. Power analyses calculated using G*Power determined that the current study would have needed a total sample size of 138 (for correlation analyses) and 210 (t-test) to detect differences with a medium effect size.

Unfortunately, recruitment through Amazon’s MTurk proved quite difficult, with only about a fourth of the initial pool of 929 participants passing the eligibility screener. While MTurk has been shown to be a reputable and reliable source for data collection and safeguards were put in place to ensure quality responses (e.g., questions that gauged attention were scattered throughout the main and follow-up surveys), it is possible that it may have not been the best outlet for recruitment in this study (Buhrmester, Kwang, & Gosling, 2011; Goodman, Cryder, & Cheema, 2013; Peer, Vosgerau, & Acquisti, 2014). For example, there may have been too many restrictions placed, as more than two-thirds of participants were screened out based on the amount of soda they consumed and for being outside the targeted age range. While this was not expected, as the inclusion criteria for soda consumption was below the average consumption for
this age range, it suggests that MTurk may have a limited and unrepresentative sample of young adults. Thus, it may have been more beneficial to broaden recruitment efforts to other outlets, such as universities that may have a higher density of young adults.

Another possible explanation is that, regardless of one’s regulatory orientation or experience of fit, the video messages themselves were not effective in reducing soda consumption. However, this was not supported by the post hoc analyses (see Results). In fact, the results provided strong support for the experiment’s overall effectiveness, as soda consumption declined by about a third and SSB and overall added sugar intake by about 20%. These findings are in line with other interventions conducted with young adult samples, which reported changes in SSB consumption that ranged between 10 and 40% (Hebden et al., 2014; Kerr et al., 2016).

For example, Hebden and colleagues (2014) delivered a 12 week mobile intervention that consisted of weekly SMS text messages and emails that provided motivational advice. Participants used an application (app) to track their targeted health behaviors and were encouraged to post on online forums, in which the study’s interventionist answered questions or provided recommendations. Sugar-sweetened beverage consumption was assessed via a self-report measure. The authors found that, following the intervention, SSB intake declined by about 26% from baseline. Kerr and colleagues (2016) delivered a similar intervention that involved providing either tailored dietary feedback accompanied with weekly text messages of nutritional tips, dietary feedback only, or no feedback. The intervention was conducted over a six month period and participants used a mobile food app to record their foods and beverages at baseline and at the end of the study. A dietitian used the baseline food records in order to tailor recommendations on dietary habits for the groups that received feedback. Servings of SSB
declined by about 20% in the feedback and text messaging group, 40% in the feedback only group, and 25% in the control.

What makes the present study particularly noteworthy, however, is that not only did it find similar effects, but it was over a shorter period of time (one week) and through a simple, brief message. This makes it a much more cost-effective and efficient approach for promoting behavioral changes compared to traditional and even mobile interventions, which are conducted on a much larger scale and typically incorporate multiple components, such as personalized feedback, weekly lectures, meetings with a health professional, etc.

Additionally, there was no decline observed in attitudes or intentions towards reducing soda consumption following the manipulation to the one week follow-up. This finding is in fact quite interesting because it suggests that the manipulation maintained effectiveness over the one-week period, as opposed to a decline, for example, which would indicate instead that participants’ attitudes and intentions weakened over time. However, future research is necessary to determine how long these changes could be sustained for and, if they were to decline, how best to deliver some form of a booster session to re-strengthen the effects. With that said, it is not surprising that the video messages were effective, as this study shares similarities with the mobile interventions described above that attempt to improve dietary habits. While this study used a different medium (video as opposed to text messages), they each provide educational material in a manner that is easily accessible to young adults, which is particularly important given that young adults lack nutritional knowledge and awareness with SSBs (Block et al., 2013; Hattersley et al., 2009; Park et al., 2014). While the other two interventions provided direct motivation via text, it is also possible that the video messages in the current study implicitly provided motivation for change as well. While this latter point was not measured, it could be a
fruitful area to investigate, as motivation is an important factor in making dietary changes (Satia, Kristal, Curry, & Trudeau, 2001; Teixeira, Silva, Mata, Palmeira, & Markland, 2012).

However, while the experiment was effective in promoting behavioral changes, it raises the question of why regulatory focus and fit theories did not seem to influence the outcomes in this study. While it was expected that the messages would be effective in inducing fit, as they were designed using terminology consistent with RFT and were believed to be more engaging than the messages typical in this literature (i.e., a single paragraph of text), it is still possible that there was something inherent in the delivery or message itself that did not appeal to the targeted orientation and therefore induce a strong enough fit effect. This would especially make sense, as the general direction of the findings in the first hypothesis were often in the wrong direction (e.g., higher attitudes reported by promotion-focused individuals in the loss-framed conditions; see Tables 2 and 3).

One possible explanation for this could be that the background music, which was upbeat, could have been too positive and somehow confused the emphasis of the message (i.e., on losses) that was conveyed in the loss-framed conditions. However, this still would not explain why the results were not in the expected direction for the gain-framed conditions. Another possibility is that there were inherent differences in the effectiveness of the messages between each of the four conditions, which could have affected the findings. To examine this, 2 (health vs. appearance) x 2 (gain vs. loss) univariate ANOVAs were conducted, ignoring regulatory focus and fit (see Table 6). While there was no interaction between the framing and emphasis of the message, two main effects emerged, in that those who received health, as opposed to appearance, messages reported higher attitudes ($M = 5.4$, $SD = 1.7$ vs. $M = 4.7$, $SD = 1.8$; $p < .01$) and intentions ($M = 5.0$, $SD = 1.9$ vs. $M = 4.0$, $SD = 1.9$; $p < .001$). While this suggests that the health messages may
MESSAGES TO COMBAT SODA CONSUMPTION

have had a slightly stronger impact initially, this clearly did not have a lasting effect, as no differences were found in participants’ consumption behaviors following the manipulation. It is possible that participants found the health evidence stronger (e.g., more persuasive or motivating) or that including appearance-focused messages somehow weakened the fit effect. This could be possible because the dietary messages in the RFT literature are predominately health-focused and do not place much, if any, emphasis on appearance. Nevertheless, it is unusual that only two variables were significant and thus it is difficult to draw much further meaning from this.

Unfortunately, beyond this, it is not clear what else could explain the lack of fit. That said, given the unexpected findings, as well as there being no clear guidelines in this literature on how best to create effective and persuasive messages, the most likely explanation is that the messages were not designed to effectively induce fit. What may have been more fruitful was to pilot various iterations of each dietary message to identify those that created the strongest fit effect. This could be done by piloting various rationales for or against the targeted behavior, themes and music, and selecting the ones that either create the strongest reactions, are the most believable, are perceived as more persuasive, etc.

Further support for a lack of fit is that one would expect there to be a difference in attitudes or intentions between the fit and non-fit conditions. This is because when fit is induced, individuals have a stronger reaction to the message than those that do not experience fit (Cesario & Higgins, 2008; Higgins, 2000; Lee & Higgins, 2008). However, this was not found. In fact, for the loss conditions, there was a positive relationship between regulatory focus and attitudes ($r = .28, p = .02$), such that individuals higher in promotion-focus had more positive attitudes towards reducing soda consumption (Table 2). While this finding was no longer significant after
a correction was applied, what is particularly interesting is that the directionality is opposite of what regulatory fit proposes. This suggests that there may have been either methodological problems with the attitudes measure or, as mentioned earlier, that the messages did not induce fit.

The measure used for attitudes in this study was based on another study (Kees et al., 2010); however, the authors did not perform any psychometric testing and therefore it may not have been a valid instrument or properly captured the construct. To further investigate this, post hoc correlations were performed between attitudes and intentions with baseline added sugar consumption variables and changes in behavioral outcomes (i.e., added sugars, SSBs, and soda consumption), and no significant relationships were found (see Table 7). The lack of relationships again suggest that there may be methodological issues with the measure because, when taken in the context of the Theory of Planned Behavior (TPB), a prominent theory in social psychology that has been used to predict and change health behaviors, it is expected that there would be a relationship between attitudes, intentions, and behaviors (Ajzen, 1985; Godin & Kok, 1996). According to the TPB, one’s behavior is influenced by their intention to perform the behavior, which is affected by their attitudes (positive and negative evaluations) toward it (Ajzen, 1985). In fact, one review article found, among 56 studies that applied the TPB to health-related behaviors, medium effect sizes ($r_s = .46$) in the relationships between attitudes and intentions, and intentions and behaviors (Godin & Kok, 1996). While on one hand it seems unlikely that the issue lie within the attitudes measure used in the current study, as it was derived from another study that had found effects with it, on the other hand, given how respected the TPB is and the lack of relationships observed between attitudes, intentions, and behaviors, it seems more likely than not that there are in fact methodological problems with the measure. It is quite possible that a more established measure of attitudes would have found different results.
However, as a note, many of the attitudes and intentions measures used in the RFT literature follow a similar format, so it is unclear why this study did not find results with it.

Finally, one other plausible explanation for why regulatory focus and fit did not have an impact on the outcomes is that the medium (i.e., video format) and delivery of the messages (i.e., the text was broken up into small segments) are not consistent with the literature. For example, in the present study, the text of the messages were broken up into small segments and were displayed in a video. Participants were also never able to view the message in its entirety. This is in contrast to the extant literature, which typically displays messages as a single block of text. Only one study that this author is aware of has used a video format (Zhao & Pechmann, 2007). While this study did find the format effective, it was an antismoking advertisement and the message was depicted through a visual scene with no words or text. Thus, it is quite possible that the format used in the current study may have weakened or washed out any effect.

Similarly, it is also possible that some participants could not read the text fast enough, as the scenes changed after a set delay. While the manipulation checks should have caught this, only a couple questions were asked, so participants still could have known the answers to the questions without reading the full messages.

That said, there are several limitations in this study that are worth noting. First, it is quite possible that demand characteristics may have influenced the study’s overall findings. While the prompts that participants were presented with were identical, the messages were about reducing sugar and many of the assessment questions asked about their sugar consumption. Thus, it is quite possible that these cues inadvertently encouraged participants to modify their reported behavior. Similarly, self-report data was used to assess dietary outcomes for participants, which has been shown to be subject to bias and underreporting (Schaefer et al., 2000; Westerterp &
Goris, 2002). Further, the sample was predominately Caucasian and college-educated. In addition, the study targeted a specific, narrow age range of high consumers of soda (in this sample, consumption rates were surprisingly 50% higher than the average for this age group) and participants generally had unhealthy eating habits. For example, they consumed less than half the recommended servings for fruits, vegetables, and whole grains (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2015). Because of this, the results from this study may not be generalizable to other, more diverse groups, or to individuals who are less frequent consumers of soda. Additionally, the study had a fairly small sample size, particularly for the follow-up, which made it difficult to draw meaningful conclusions for each of the conditions. This study also only examined short-term effects of the experimental manipulation, as participants were followed up with one week later. Therefore, while there were significant changes in dietary outcomes, a longer-term follow-up would be necessary to demonstrate how lasting these effects are. This was also a self-selected sample and thus may have been more motivated for change compared to individuals in the broader population. Finally, as discussed earlier, the attitudes and intentions measures were not psychometrically validated instruments and, as such, the reliability and validity of these measures are unknown and possibly even questionable. This is in contrast to the measures used for added sugar consumption (DSQ and BEVQ-15), which have undergone rigorous psychometric testing and demonstrated good reliability and validity.

Despite these limitations, the present study demonstrated that delivering dietary messages via a video format can be an effective tool to combat excess soda consumption in young adults over the short term. Identifying effective means to tackle this issue is critical, as SSBs are ubiquitous in American society, with more than two-thirds of young adults consuming SSBs on
any given day and 20% consuming at least 500 kcals on a daily basis (Han & Powell, 2013). While SSBs include a variety of beverages, soda represents the largest source by far, which is especially problematic because it offers effectively no nutritional benefit and often displaces healthier foods and beverages (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2015). This is compounded by the fact that early adulthood is an important period in establishing lasting dietary habits, so engaging in this unhealthy behavior can lead to lifelong battles with serious, but preventable, chronic diseases (Nelson et al., 2008).

Therefore, while the current study was unable to demonstrate the effectiveness of RFT and message framing, the broader success of implementing this approach still offers a promising avenue for further research. One of the key issues facing traditional interventions are their feasibility, as most tend to be very costly, time consuming, and resource-intensive. Thus, what is particularly interesting about this study is how it addresses these shortcomings and offers a simple, cost-effective approach that is not only engaging and approachable, but could be easily disseminated and, most importantly, provide a foundation towards enacting real change.
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### APPENDIX A. TABLES

Table 1

**Participant Characteristics**

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<td>Normal Weight (18.5 – 24.9)</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Overweight (25 – 29.9)</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Obese (≥ 30.0)</td>
<td>31</td>
<td></td>
</tr>
</tbody>
</table>
Table 2

Correlations between Regulatory Focus and Attitudes, Intentions and Consumption Behaviors in the Gain- and Loss-Framed Conditions

<table>
<thead>
<tr>
<th></th>
<th>Gain</th>
<th></th>
<th></th>
<th>Loss</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RF</td>
<td>n</td>
<td>r</td>
<td>95% CI</td>
<td>p</td>
<td>n</td>
</tr>
<tr>
<td>Attitudes</td>
<td>RF</td>
<td>77</td>
<td>-.07</td>
<td>[-.30, .15]</td>
<td>.55</td>
<td>70</td>
</tr>
<tr>
<td>Intentions</td>
<td>RF</td>
<td>77</td>
<td>-.04</td>
<td>[-.28, .20]</td>
<td>.72</td>
<td>70</td>
</tr>
<tr>
<td>Δ Attitudes</td>
<td>RF</td>
<td>24</td>
<td>-.12</td>
<td>[-.41, .26]</td>
<td>.58</td>
<td>28</td>
</tr>
<tr>
<td>Δ Intentions</td>
<td>RF</td>
<td>24</td>
<td>-.13</td>
<td>[-.44, .19]</td>
<td>.56</td>
<td>28</td>
</tr>
<tr>
<td>Δ Added Sugars</td>
<td>RF</td>
<td>24</td>
<td>-.03</td>
<td>[-.52, .37]</td>
<td>.90</td>
<td>28</td>
</tr>
<tr>
<td>Δ SSBs</td>
<td>RF</td>
<td>24</td>
<td>-.11</td>
<td>[-.53, .33]</td>
<td>.62</td>
<td>28</td>
</tr>
<tr>
<td>Δ Soda</td>
<td>RF</td>
<td>24</td>
<td>.04</td>
<td>[-.44, .45]</td>
<td>.86</td>
<td>28</td>
</tr>
</tbody>
</table>

Note. Attitudes = Initial attitudes towards reducing soda consumption; Intentions = Initial intentions to reduce soda consumption; Δ Attitudes = Change in attitudes between the main and follow-up surveys; Δ Intentions = Change in intentions between main and follow-up; Δ Added Sugars = Change in added sugars between main and follow-up, Dietary Screener Questionnaire; Δ SSBs = Change in added sugars from sugar-sweetened beverages between main and follow-up, Dietary Screener Questionnaire; Δ Soda = Change in soda consumption between main and follow-up, Beverage Intake Questionnaire.

*a* Confidence intervals for estimated range of r values using the bootstrap method.

*b* This finding was not significant after the Benjamini-Hochberg correction was applied.
### Table 3

**Univariate Analysis of Variances Examining the Effects of Regulatory Focus and Message Framing on Attitudes, Intentions and Consumption Behaviors**

<table>
<thead>
<tr>
<th>Regulatory Focus</th>
<th>Message Framing</th>
<th>Gain $M (SD)$</th>
<th>Loss $M (SD)$</th>
<th>df</th>
<th>$F$</th>
<th>$p$</th>
<th>$\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Promotion</td>
<td>5.07 (1.80)</td>
<td>5.26 (1.57)</td>
<td>1, 142</td>
<td>3.99</td>
<td>.05</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td>Prevention</td>
<td>5.40 (1.69)</td>
<td>4.36 (1.97)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitudes</td>
<td>Promotion</td>
<td>4.57 (1.89)</td>
<td>4.67 (1.84)</td>
<td>1, 142</td>
<td>2.73</td>
<td>.10</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>Prevention</td>
<td>4.85 (1.98)</td>
<td>3.82 (2.22)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intentions</td>
<td>Promotion</td>
<td>0.25 (2.03)</td>
<td>-0.82 (1.77)</td>
<td>1, 48</td>
<td>2.05</td>
<td>.16</td>
<td>.04</td>
</tr>
<tr>
<td></td>
<td>Prevention</td>
<td>0.21 (1.34)</td>
<td>0.62 (1.75)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta$ Attitudes</td>
<td>Promotion</td>
<td>-0.44 (1.46)</td>
<td>-0.40 (2.53)</td>
<td>1, 48</td>
<td>0.06</td>
<td>.82</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Prevention</td>
<td>0.00 (1.51)</td>
<td>-0.23 (2.09)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta$ Intentions</td>
<td>Promotion</td>
<td>-93.37 (193.41)</td>
<td>-76.44 (187.65)</td>
<td>1, 48</td>
<td>1.11</td>
<td>.30</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>Prevention</td>
<td>-152.99 (290.50)</td>
<td>-17.36 (128.12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta$ Added Sugars</td>
<td>Promotion</td>
<td>-112.84 (234.54)</td>
<td>-62.76 (210.00)</td>
<td>1, 48</td>
<td>0.47</td>
<td>.50</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>Prevention</td>
<td>-153.02 (260.83)</td>
<td>-18.30 (151.33)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta$ SSBs</td>
<td>Promotion</td>
<td>-68.15 (189.48)</td>
<td>-62.32 (216.77)</td>
<td>1, 48</td>
<td>1.92</td>
<td>.17</td>
<td>.04</td>
</tr>
<tr>
<td></td>
<td>Prevention</td>
<td>-187.14 (263.24)</td>
<td>-23.97 (123.83)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Attitudes = Initial attitudes towards reducing soda consumption; Intentions = Initial intentions to reduce soda consumption; $\Delta$ Attitudes = Change in attitudes between the main and follow-up surveys; $\Delta$ Intentions = Change in intentions between main and follow-up; $\Delta$ Added Sugars = Change in added sugars between main and follow-up, Dietary Screener Questionnaire; $\Delta$ SSBs = Change in added sugars from sugar-sweetened beverages between main and follow-up, Dietary Screener Questionnaire; $\Delta$ Soda = Change in soda consumption between main and follow-up, Beverage Intake Questionnaire.
Table 4

*Univariate Analysis of Variances Examining the Effects of Regulatory Fit and Message Focus on Attitudes, Intentions and Consumption Behaviors*

<table>
<thead>
<tr>
<th>Regulatory Focus</th>
<th>Message Focus</th>
<th>Health $M (SD)$</th>
<th>Appearance $M (SD)$</th>
<th>df</th>
<th>$F$</th>
<th>$p$</th>
<th>$\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fit</td>
<td>Health</td>
<td>5.20 (1.88)</td>
<td>4.64 (1.86)</td>
<td>1, 142</td>
<td>0.07</td>
<td>.79</td>
<td>.00</td>
</tr>
<tr>
<td>Non-Fit</td>
<td></td>
<td>5.59 (1.58)</td>
<td>4.87 (1.58)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fit</td>
<td>Appearance</td>
<td>5.07 (1.86)</td>
<td>3.89 (1.99)</td>
<td>1, 142</td>
<td>0.47</td>
<td>.50</td>
<td>.00</td>
</tr>
<tr>
<td>Non-Fit</td>
<td></td>
<td>5.02 (1.89)</td>
<td>5.28 (1.79)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Δ Attitudes</td>
<td>Fit</td>
<td>0.82 (2.42)</td>
<td>0.17 (1.49)</td>
<td>1, 48</td>
<td>0.35</td>
<td>.56</td>
<td>.01</td>
</tr>
<tr>
<td>Non-Fit</td>
<td></td>
<td>-0.46 (2.01)</td>
<td>-0.48 (0.50)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Δ Intentions</td>
<td>Fit</td>
<td>-0.18 (0.75)</td>
<td>-0.44 (2.15)</td>
<td>1, 48</td>
<td>0.13</td>
<td>.72</td>
<td>.00</td>
</tr>
<tr>
<td>Non-Fit</td>
<td></td>
<td>-0.31 (2.52)</td>
<td>-0.14 (1.35)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Δ Added Sugars</td>
<td>Fit</td>
<td>9.35 (131.20)</td>
<td>-101.25 (178.86)</td>
<td>1, 48</td>
<td>3.77</td>
<td>.06</td>
<td>.07</td>
</tr>
<tr>
<td>Non-Fit</td>
<td></td>
<td>-136.59 (238.99)</td>
<td>-26.20 (181.69)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Δ SSBs</td>
<td>Fit</td>
<td>-3.24 (171.93)</td>
<td>-111.54 (215.35)</td>
<td>1, 48</td>
<td>2.55</td>
<td>.12</td>
<td>.05</td>
</tr>
<tr>
<td>Non-Fit</td>
<td></td>
<td>-122.55 (236.86)</td>
<td>-29.26 (205.05)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Δ Soda</td>
<td>Fit</td>
<td>-12.09 (172.61)</td>
<td>-70.50 (156.30)</td>
<td>1, 48</td>
<td>4.69</td>
<td>.04</td>
<td>.09</td>
</tr>
<tr>
<td>Non-Fit</td>
<td></td>
<td>-162.93 (232.78)</td>
<td>24.99 (199.79)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. Attitudes = Initial attitudes towards reducing soda consumption; Intentions = Initial intentions to reduce soda consumption; Δ Attitudes = Change in attitudes between the main and follow-up surveys; Δ Intentions = Change in intentions between main and follow-up; Δ Added Sugars = Change in added sugars between main and follow-up, Dietary Screener Questionnaire; Δ SSBs = Change in added sugars from sugar-sweetened beverages between main and follow-up, Dietary Screener Questionnaire; Δ Soda = Change in soda consumption between main and follow-up, Beverage Intake Questionnaire.*

*This finding was not significant after the Benjamini-Hochberg correction was applied.*
Table 5

*Simple Linear Regression Analyses for Regulatory Fit Predicting Consumption Behaviors*

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>R</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δ Added Sugars</td>
<td>43.76</td>
<td>54.63</td>
<td>.11</td>
<td>0.80</td>
<td>.11</td>
<td>0.64</td>
<td>.43</td>
</tr>
<tr>
<td>Δ SSBs</td>
<td>23.70</td>
<td>59.89</td>
<td>.06</td>
<td>0.40</td>
<td>.06</td>
<td>0.16</td>
<td>.69</td>
</tr>
<tr>
<td>Δ Soda</td>
<td>57.39</td>
<td>55.29</td>
<td>.15</td>
<td>1.04</td>
<td>.15</td>
<td>1.08</td>
<td>.30</td>
</tr>
</tbody>
</table>

*Note.* Each row represents a separate linear regression; *n* = 52 for all analyses. Δ Added Sugars = Change in added sugars between the main and follow-up surveys, Dietary Screener Questionnaire; Δ SSBs = Change in added sugars from sugar-sweetened beverages between main and follow-up, Dietary Screener Questionnaire; Δ Soda = Change in soda consumption between main and follow-up, Beverage Intake Questionnaire.
Table 6

Univariate Analysis of Variances Examining the Effects of Message Framing and Focus on Attitudes, Intentions and Consumption Behaviors

<table>
<thead>
<tr>
<th>Message Framing</th>
<th>Health</th>
<th>Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>df</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td>p</td>
</tr>
<tr>
<td>( \eta^2 )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitudes</td>
<td>5.56 (1.79)</td>
<td>4.83 (1.79)</td>
</tr>
<tr>
<td></td>
<td>5.35 (1.63)</td>
<td>4.46 (1.80)</td>
</tr>
<tr>
<td>Intentions</td>
<td>5.03 (1.89)</td>
<td>4.33 (1.97)</td>
</tr>
<tr>
<td></td>
<td>5.05 (1.88)</td>
<td>3.48 (1.79)</td>
</tr>
<tr>
<td>( \Delta ) Attitudes</td>
<td>0.78 (2.38)</td>
<td>-0.09 (1.34)</td>
</tr>
<tr>
<td></td>
<td>-0.30 (2.14)</td>
<td>0.10 (1.34)</td>
</tr>
<tr>
<td>( \Delta ) Intentions</td>
<td>-0.33 (1.41)</td>
<td>-0.27 (1.53)</td>
</tr>
<tr>
<td></td>
<td>-0.22 (2.24)</td>
<td>-0.50 (2.51)</td>
</tr>
<tr>
<td>( \Delta ) Added Sugars</td>
<td>-97.43 (286.63)</td>
<td>-122.73 (190.85)</td>
</tr>
<tr>
<td></td>
<td>-67.08 (172.38)</td>
<td>-16.48 (146.30)</td>
</tr>
<tr>
<td>( \Delta ) SSBs</td>
<td>-98.90 (263.82)</td>
<td>-142.64 (230.28)</td>
</tr>
<tr>
<td></td>
<td>-61.46 (197.73)</td>
<td>-7.30 (157.21)</td>
</tr>
<tr>
<td>( \Delta ) Soda</td>
<td>-97.94 (300.94)</td>
<td>-113.74 (163.27)</td>
</tr>
<tr>
<td></td>
<td>-103.25 (177.29)</td>
<td>61.20 (126.47)</td>
</tr>
</tbody>
</table>

*Note. Attitudes = Initial attitudes towards reducing soda consumption; Intentions = Initial intentions to reduce soda consumption; \( \Delta \) Attitudes = Change in attitudes between the main and follow-up surveys; \( \Delta \) Intentions = Change in intentions between main and follow-up; \( \Delta \) Added Sugars = Change in added sugars between main and follow-up, Dietary Screener Questionnaire; \( \Delta \) SSBs = Change in added sugars from sugar-sweetened beverages between main and follow-up, Dietary Screener Questionnaire; \( \Delta \) Soda = Change in soda consumption between main and follow-up, Beverage Intake Questionnaire*
Table 7

*Bivariate Correlations between Attitudes, Intentions and Consumption Behaviors*

<table>
<thead>
<tr>
<th></th>
<th>Added Sugar</th>
<th>SSBs</th>
<th>Soda</th>
<th>Δ Added Sugars</th>
<th>Δ SSBs</th>
<th>Δ Soda</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attitudes</strong></td>
<td>-.13</td>
<td>[-.34, .11]</td>
<td>-.12</td>
<td>[-.33, .11]</td>
<td>.02</td>
<td>[.00, .04]</td>
</tr>
<tr>
<td>** Intentions**</td>
<td>-.08</td>
<td>[-.25, .12]</td>
<td>-.10</td>
<td>[-.27, .08]</td>
<td>-.24</td>
<td>[-.53, .04]</td>
</tr>
</tbody>
</table>

*Note.* For baseline analyses, *n* = 147, and for change variables, *n* = 52. All *ps* > .05. Attitudes = Initial attitudes towards reducing soda consumption; Intentions = Initial intentions to reduce soda consumption; Added Sugar = Baseline added sugar intake, Dietary Screener Questionnaire; SSBs = Baseline sugar-sweetened beverage intake, Dietary Screener Questionnaire; Soda = Baseline soda consumption, Beverage Intake Questionnaire; Δ Added Sugars = Change in added sugars between the main and follow-up surveys, Dietary Screener Questionnaire; Δ SSBs = Change in added sugars from sugar-sweetened beverages between main and follow-up, Dietary Screener Questionnaire; Δ Soda = Change in soda consumption between main and follow-up, Beverage Intake Questionnaire.

*a* Confidence intervals for estimated range of *r* values using the bootstrap method.
APPENDIX B. DEMOGRAPHIC QUESTIONS

1. How old are you? Please enter your date of birth.

2. What gender do you identify as?
   _____ Male  _____Female  _____Other (please specify)

3. Which of the following best describes your race/ethnicity? You may choose more than one.
   a. _____ American Indian or Pacific Islander
   b. _____ Asian
   c. _____ Black or African American
   d. _____ White
   e. _____ Hispanic/Latino/a
   f. _____ Other (please specify)

4. What is your relationship status?
   a. _____ Single and Never Married
   b. _____ In a Relationship
   c. _____ Married/Domestic Partnership
   d. _____ Divorced
   e. _____ Widowed/Widower
   f. _____ Other (please specify)

5. What is your current employment status?
   a. _____ Employed Full-Time
   b. _____ Employed Part-Time
   c. _____ Self-Employed
   d. _____ Student
   e. _____ Homemaker
   f. _____ Unemployed
   g. _____ Other (please specify)

6. What is the highest level of education you have completed?
   a. Some Grade or High School
   b. High School Graduate or GED
   c. Trade School
d. Some College Credit, No Degree  
e. Associate’s (Two Year) Degree  
f. Bachelor’s (Four Year) Degree  
g. Graduate Degree  
h. Other (please specify)  

7. What is your height? _____ feet _____ inches  
8. What is your current weight? _____ pounds
APPENDIX C. REGULATORY FOCUS QUESTIONNAIRE

This set of questions asks you **HOW FREQUENTLY** specific events actually occur or have occurred in your life. Please indicate your answer to each question by circling the appropriate number below it.

1. Compared to most people, are you typically unable to get what you want out of life?
   
   1  2  3  4  5
   never  sometimes  very or seldom  often

2. Growing up, would you ever “cross the line” by doing things that your parents would not tolerate?

   1  2  3  4  5
   never  sometimes  very or seldom  often

3. How often have you accomplished things that got you "psyched" to work even harder?

   1  2  3  4  5
   never  a few times  many times
   or seldom

4. Did you get on your parents’ nerves often when you were growing up?

   1  2  3  4  5
   never  sometimes  very or seldom  often

5. How often did you obey rules and regulations that were established by your parents?

   1  2  3  4  5
   never  sometimes  always or seldom

7. Do you often do well at different things that you try?

   1  2  3  4  5
   never  sometimes  very or seldom  often

8. Not being careful enough has gotten me into trouble at times.

   1  2  3  4  5
   never  sometimes  very or seldom  often

9. When it comes to achieving things that are important to me, I find that I don't perform as well as I ideally would like to do.

   1  2  3  4  5
   never  sometimes  very true  often  true

10. I feel like I have made progress toward being successful in my life.

    1  2  3  4  5
    certainly  false  certainly  true

11. I have found very few hobbies or activities in my life that capture my interest or motivate me to put effort into them.

    1  2  3  4  5
    certainly  false  certainly  true
6. Growing up, did you ever act in ways that your parents thought were objectionable?

   1  2  3  4  5
   never  sometimes  very
or seldom       often
MESSAGES TO COMBAT SODA CONSUMPTION

APPENDIX D. DIETARY SCREENER QUESTIONNAIRE

These questions are about foods you ate or drank during the past month, that is, the past 30 days. When answering, please include meals and snacks at home, at work or school, in restaurants, and anywhere else.

1. How old are you (in years)?
   - [ ] years

2. Are you male or female?
   - [ ] Male
   - [ ] Female

3. During the past month, how often did you eat hot or cold cereals? Mark one [x]:
   - [ ] Never Go to question 4.
   - [ ] 1 time last month
   - [ ] 2-3 times last month
   - [ ] 1 time per week
   - [ ] 2 times per week
   - [ ] 3-4 times per week
   - [ ] 5-6 times per week
   - [ ] 1 time per day
   - [ ] 2 or more times per day

4. During the past month, what kind of cereal did you usually eat? _Print cereal._
   - [ ]

5. If there was another kind of cereal that you usually ate during the past month, what kind was it? _Print cereal, if none leave blank._
   - [ ]

6. During the past month, how often did you have any milk (either to drink or on cereal)? Include regular milks, chocolate or other flavored milks, lactose free milk, buttermilk. Please do not include soy milk or small amounts of milk in coffee or tea. Mark one [x]:
   - [ ] Never Go to question 8.
   - [ ] 1 time last month
   - [ ] 2-3 times last month
   - [ ] 1 time per week
   - [ ] 2 times per week
   - [ ] 3-4 times per week
   - [ ] 5-6 times per week
   - [ ] 1 time per day
   - [ ] 2-3 times per day
   - [ ] 4-5 times per day
   - [ ] 6 or more times per day

7. During the past month, what kind of milk did you usually drink? Mark one [x]:
   - [ ] Whole or regular milk
   - [ ] 2% fat or reduced fat milk
   - [ ] 1%, ½%, or low-fat milk
   - [ ] Fat-free, skim or nonfat milk
   - [ ] Soy milk
   - [ ] Other kind of milk _Print milk._
   - [ ]

8. During the past month, how often did you drink regular soda or pop that contains sugar? Do not include diet soda. Mark one [x]:
   - [ ] Never
   - [ ] 1 time last month
   - [ ] 2-3 times last month
   - [ ] 1 time per week
   - [ ] 2 times per week
   - [ ] 3-4 times per week
   - [ ] 5-6 times per week
   - [ ] 1 time per day
   - [ ] 2-3 times per day
   - [ ] 4-5 times per day
   - [ ] 6 or more times per day
MESSAGES TO COMBAT SODA CONSUMPTION

9. During the past month, how often did you drink 100% pure fruit juices such as orange, mango, apple, grape and pineapple juices? Do not include fruit-flavored drinks with added sugar or fruit juice you made at home and added sugar to. Mark one [X].

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2-3 times per day
- 4-5 times per day
- 6 or more times per day

10. During the past month, how often did you drink coffee or tea that had sugar or honey added to it? Include coffee and tea you sweetened yourself and presweetened tea and coffee drinks such as Arizona Iced Tea and Frappuccino. Do not include artificially sweetened coffee or diet tea.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2-3 times per day
- 4-5 times per day
- 6 or more times per day

11. During the past month, how often did you drink sweetened fruit drinks, sports or energy drinks, such as Kool-Aid, lemonade, Hi-C, cranberry drink, Gatorade, Red Bull or Vitamin Water? Include fruit juices you made at home and added sugar to. Do not include diet drinks or artificially sweetened drinks.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2-3 times per day
- 4-5 times per day
- 6 or more times per day

12. During the past month, how often did you eat fruit? Include fresh, frozen or canned fruit. Do not include juices.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day

13. During the past month, how often did you eat a green leafy or lettuce salad, with or without other vegetables?

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day
<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>During the past month, how often did you eat any kind of <strong>fried potatoes</strong>, including french fries, home fries, or hash brown potatoes?</td>
<td>Never, 1 time last month, 2-3 times last month, 1 time per week, 2 times per week, 3-4 times per week, 5-6 times per week, 1 time per day, 2 or more times per day</td>
</tr>
<tr>
<td>During the past month, how often did you eat any <strong>other kind of potatoes</strong>, such as baked, boiled, mashed potatoes, sweet potatoes, or potato salad?</td>
<td>Never, 1 time last month, 2-3 times last month, 1 time per week, 2 times per week, 3-4 times per week, 5-6 times per week, 1 time per day, 2 or more times per day</td>
</tr>
<tr>
<td>During the past month, how often did you eat <strong>refried beans</strong>, <strong>baked beans</strong>, beans in soup, pork and beans or any other type of cooked dried beans? Do <strong>not</strong> include <strong>green beans</strong>.</td>
<td>Never, 1 time last month, 2-3 times last month, 1 time per week, 2 times per week, 3-4 times per week, 5-6 times per week, 1 time per day, 2 or more times per day</td>
</tr>
<tr>
<td>During the past month, how often did you eat <strong>brown rice</strong> or other cooked whole grains, such as bulgur, cracked wheat, or millet? Do <strong>not</strong> include <strong>white rice</strong>.</td>
<td>Never, 1 time last month, 2-3 times last month, 1 time per week, 2 times per week, 3-4 times per week, 5-6 times per week, 1 time per day, 2 or more times per day</td>
</tr>
<tr>
<td>During the past month, not including what you just told me about (green salads, potatoes, cooked dried beans), how often did you eat <strong>other vegetables</strong>?</td>
<td>Never, 1 time last month, 2-3 times last month, 1 time per week, 2 times per week, 3-4 times per week, 5-6 times per week, 1 time per day, 2 or more times per day</td>
</tr>
<tr>
<td>During the past month, how often did you have <strong>Mexican-type salsa</strong> made with tomato?</td>
<td>Never, 1 time last month, 2-3 times last month, 1 time per week, 2 times per week, 3-4 times per week, 5-6 times per week, 1 time per day, 2 or more times per day</td>
</tr>
</tbody>
</table>
MESSAGES TO COMBAT SODA CONSUMPTION

20  During the past month, how often did you eat pizza? Include frozen pizza, fast food pizza, and homemade pizza.

   □ Never
   □ 1 time last month
   □ 2-3 times last month
   □ 1 time per week
   □ 2 times per week
   □ 3-4 times per week
   □ 5-6 times per week
   □ 1 time per day
   □ 2 or more times per day

21  During the past month, how often did you have tomato sauces such as with spagetti or noodles or mixed into foods such as lasagna? Do not include tomato sauce on pizza.

   □ Never
   □ 1 time last month
   □ 2-3 times last month
   □ 1 time per week
   □ 2 times per week
   □ 3-4 times per week
   □ 5-6 times per week
   □ 1 time per day
   □ 2 or more times per day

22  During the past month, how often did you eat any kind of cheese? Include cheese as a snack, cheese on burgers, sandwiches, and cheese in foods such as lasagna, quesadillas, or casseroles. Do not include cheese on pizza.

   □ Never
   □ 1 time last month
   □ 2-3 times last month
   □ 1 time per week
   □ 2 times per week
   □ 3-4 times per week
   □ 5-6 times per week
   □ 1 time per day
   □ 2 or more times per day

23  During the past month, how often did you eat red meat, such as beef, pork, ham, or sausage? Do not include chicken, turkey or seafood. Include red meat you had in sandwiches, lasagna, stew, and other mixtures. Red meats may also include veal, lamb, and any lunch meats made with these meats.

   □ Never
   □ 1 time last month
   □ 2-3 times last month
   □ 1 time per week
   □ 2 times per week
   □ 3-4 times per week
   □ 5-6 times per week
   □ 1 time per day
   □ 2 or more times per day

24  During the past month, how often did you eat any processed meat, such as bacon, lunch meats, or hot dogs? Include processed meats you had in sandwiches, soups, pizza, casseroles, and other mixtures. Processed meats are those preserved by smoking, curing, or salting, or by the addition of preservatives. Examples are: ham, bacon, pastrami, salami, sausages, bratwursts, frankfurters, hot dogs, and spam.

   □ Never
   □ 1 time last month
   □ 2-3 times last month
   □ 1 time per week
   □ 2 times per week
   □ 3-4 times per week
   □ 5-6 times per week
   □ 1 time per day
   □ 2 or more times per day
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<tbody>
<tr>
<td><strong>25</strong> During the past month, how often did you eat whole grain bread including toast, rolls and in sandwiches? Whole grain breads include whole wheat, rye, oatmeal and pumpernickel. Do <strong>not</strong> include white bread.</td>
<td><strong>28</strong> During the past month, how often did you eat cookies, cake, pie or brownies? Do <strong>not</strong> include sugar-free kinds.</td>
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<tr>
<td>Never</td>
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<td>1 time last month</td>
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<tr>
<td><strong>26</strong> During the past month, how often did you eat chocolate or any other types of candy? Do <strong>not</strong> include sugar-free candy.</td>
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<td></td>
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<tr>
<td>Never</td>
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<td>1 time last month</td>
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<tr>
<td><strong>27</strong> During the past month, how often did you eat doughnuts, sweet rolls, Danish, muffins, pan dulce, or pop-tarts? Do <strong>not</strong> include sugar-free items.</td>
<td><strong>29</strong> During the past month, how often did you eat ice cream or other frozen desserts? Do <strong>not</strong> include sugar-free kinds.</td>
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<td>Never</td>
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<tr>
<td><strong>30</strong> During the past month, how often did you eat popcorn?</td>
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<tr>
<td>Never</td>
<td>Never</td>
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<td>1 time last month</td>
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<td>2 or more times per day</td>
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</table>
APPENDIX E. BEVERAGE INTAKE QUESTIONNAIRE

Beverage Questionnaire (BEVQ-15)

Instructions:
In the past month, please indicate your response for each beverage type by marking an “X” in the bubble for “how often” and “how much each time”.

1. Indicate how often you drank the following beverages, for example, if you drank 5 glasses of water per week, mark 4-6 times per week.
2. Indicate the approximate amount of beverage you drank each time, for example, if you drank 1 cup of water each time, mark 1 cup under “how much each time”.
3. Do not count beverages used in cooking or other preparations, such as milk in cereal.
4. Count milk added to tea and coffee in the tea/coffee with cream beverage category NOT in the milk categories.

<table>
<thead>
<tr>
<th>Type of Beverage</th>
<th>Never or less than 1 time per week (go to next beverage)</th>
<th>1 time per week</th>
<th>2-3 times per week</th>
<th>4-6 times per week</th>
<th>1 time per day</th>
<th>2+ times per day</th>
<th>3+ times per day</th>
<th>Less than 6 fl oz (3/4 cup)</th>
<th>8 fl oz (1 cup)</th>
<th>12 fl oz (1 1/2 cups)</th>
<th>16 fl oz (2 cups)</th>
<th>More than 20 fl oz (2 1/2 cups)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>o</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
</tr>
<tr>
<td>100% Fruit Juice</td>
<td>o</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
</tr>
<tr>
<td>Sweetened Juice Beverage/Drink (fruit ades, lemonade, punch, Sunny Delight)</td>
<td>o</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
</tr>
<tr>
<td>Whole Milk</td>
<td>o</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
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<tr>
<td>Reduced Fat Milk (2%)</td>
<td>o</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
</tr>
<tr>
<td>Low Fat/Fat Free Milk (Skim, 1%, Buttermilk, Soymilk)</td>
<td>o</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
</tr>
<tr>
<td>Soft Drinks, Regular</td>
<td>o</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
</tr>
<tr>
<td>Diet Soft Drinks/Artificially Sweetened Drinks (Crystal Light)</td>
<td>o</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
</tr>
<tr>
<td>Sweetened Tea</td>
<td>o</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
</tr>
<tr>
<td>Tea or Coffee, with cream and/or sugar (includes non-dairy creamer)</td>
<td>o</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
</tr>
<tr>
<td>Tea or Coffee, black, with/without artificial sweetener (no cream or sugar)</td>
<td>o</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
<td>0</td>
<td>o</td>
</tr>
<tr>
<td>Beer, Ales, Wine Coolers, Non-alcoholic or Light Beer</td>
<td>o</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>o</td>
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<td>o</td>
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<td>o</td>
</tr>
<tr>
<td>Hard Liquor (shots, rum, tequila, etc.)</td>
<td>o</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>o</td>
<td>0</td>
<td>o</td>
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<tr>
<td>Wine (red or white)</td>
<td>o</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>o</td>
<td>0</td>
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<tr>
<td>Energy &amp; Sports Drinks (Red Bull, Rockstar, Gatorade, Powerade, etc.)</td>
<td>o</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>o</td>
<td>0</td>
<td>o</td>
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<td>o</td>
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<tr>
<td>Other (list):</td>
<td>o</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</table>

Virginia Polytechnic Institute and State University, 2016.
APPENDIX F. MANIPULATION CHECK

1. The main message in the video was about the:
   a. benefits of reducing soda
   b. risks of drinking soda
   c. benefits of exercise
   d. risks of not flossing

2. The reasons that were provided in the video were mostly focused on:
   a. mood (how the individual feels or the emotions they have)
   b. health (medical problems that occur inside the body)
   c. appearance (outer, physical looks that others can see)
   d. financial (how much money one has)

3. Drinking soda can lead to how much of a change in weight in one year?
   a. 2 lbs
   b. 10 lbs
   c. 25 lbs
   d. 50 lbs

4. Regular, non-diet, soda contains twice as much sugar as you should consume in an entire day.
   a. True
   b. False
   c. There is no limit to the amount of sugar you should consume
   d. The message did not provide this information
APPENDIX G. IRB APPROVAL LETTER

DATE: June 6, 2017
TO: Debra Hoffmann, MA
FROM: Bowling Green State University Institutional Review Board
PROJECT TITLE: [1043959-2] Framing Messages to Young Adults
SUBMISSION TYPE: Amendment/Modification
ACTION: DETERMINATION OF EXEMPT STATUS
DECISION DATE: June 6, 2017
REVIEW CATEGORY: Exemption category # 2

Thank you for your submission of Amendment/Modification materials for this project. The Bowling Green State University Institutional Review Board has determined this project is still exempt from IRB review according to federal regulations AND that the proposed research has met the principles outlined in the Belmont Report. You may now begin the research activities.

Note that changes cannot be made to exempt research because of the possibility that proposed changes may change the research in such a way that it no longer meets the criteria for exemption. If you want to make changes to this project, contact the Office of Research Compliance for guidance.

We will retain a copy of this correspondence within our records.

If you have any questions, please contact the Office of Research Compliance at 419-372-7716 or orc@bgsu.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Bowling Green State University Institutional Review Board’s records.