Thesis Prospectus

The Design of Bitter Utensils for Weight Loss
(Technical Topic)

Analysis of the Vulnerability of the Biggest Loser Network
(STS Topic)

A Thesis Prospectus

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

Adult obesity occurs when an individual has a body mass index (BMI) of 30.0 or greater for a given height and weight (Centers for Disease Control and Prevention [CDC], 2021). The prevalence of obesity has increased progressively into the 21st century. Of the 21 states with data concerning the percentage of obesity in 1985, only 8 had 10-14% obesity. By 2010, 11 states had 30% or more obesity, and the minimum obesity percentage for any given state was 20% (Kizirian, n.d.). Obesity results in several effects that collectively decrease life expectancy. These effects include physical problems such as co-morbidities like type 2 diabetes, arthritis, and various cardiovascular diseases. Mental health problems like low self-esteem, impaired interpersonal communication, and poor body image are also concerns (Djalalinia et al., 2015).

The increase in obesity may be related to increases in portion sizes beginning in the 1970s. Large portion sizes inadvertently increase energy intake by encouraging individuals to consume more than their bodies need. A net gain in energy leads to weight gain, which further results in obesity (Young & Nestle, 2002). Confounded with the large portion sizes available, dieting does not always translate to permanent weight loss due to the inability to adhere to the diet during weight loss (Thomas et al., 2008). Thus, I will propose a technical design that allows individuals to follow a diet as they see fit with less restriction in food choice and stringent meal planning to help prevent consuming portion sizes that promote excessive food intake.

The social and psychological causes and effects of eating also present challenges for individuals attempting to lose weight that supersede dieting. Therefore, the technical design cannot wholly solve the high prevalence of obesity. I will use a science, technology, and society (STS) approach and the technical design because effective weight loss occurs within a heterogeneous network. The technical design will alleviate the practice of food restriction in

dieting that discourages long-term weight loss. The STS approach will consider the human and non-human actors that have resulted in the poor outcomes of the contestants in the Biggest Loser network. This analysis will delineate the social and psychological factors that precede and follow obese individuals, broadly, while dieting. Failure to consider both the technical and social aspects of obesity reduction will result in ineffective weight loss. Reduced weight loss will then slow the process of decreasing the proportion of obesity in the United States.

Technical Project

Several treatments exist to combat obesity, such as exercise, dietary medications, bariatric surgery, and dieting (Brazier, 2018). While these treatments are effective, people appear to use dieting the most. There are a variety of diets that result in significant weight loss. These include the Keto diet, the Vegetarian diet, the Mediterranean diet, and the Biggest Loser diet based on the hit television show by the same name (U.S. News & World Report, n.d.). Despite the effectiveness of dieting, there is no one-size-fits-all diet for all individuals because of the conflicting views on which diets should be used (Thomas et al., 2008). This ambiguity can make it hard to determine which diet is suitable for an individual's unique lifestyle. If an individual does decide upon a diet, then the diet may prove difficult to adhere to (Thomas et al., 2008). Poor adherence can result in weight regain, which means that the negative symptoms of the disease remain. Because individuals will need to lose weight again, dieting can become stressful and demotivating.

Dieting often encourages eating specific food groups or proportions of macronutrients (carbs, fats, and proteins), but it does not address the role of taste sensation in food choices. There is a physiological basis for why many individuals desire certain foods, such that people typically prefer sweet and salty-tasting foods to bitter-tasting foods. Sweet taste signifies that

food is rich in energy while salty taste indicates that the sodium ions required for bodily electrolyte balance are present. Moreover, there is an association between bitter taste and a long-standing evolutionary practice meant to ward off toxin consumption (Wang et al., 2020). Because individuals generally prefer sweet and salty foods, many obese individuals likely prefer sweet and salty foods to bitter foods as well. Thus, the development of bitter-tasting utensils may promote weight loss by increasing daily caloric deficit via decreased appetite and food consumption without dietary adherence. I propose a technical design for a set of bitter-tasting utensils to be used with a diet or as a stand-alone treatment. This design places importance on portion control to curb both the large portion sizes in the United States and, in time, minimize the need to restrict conscious consumption of certain foods.

I will employ two stages for this design: development and testing. An already used bitter material or novel material will provide the bitter taste. The shape and size will be physically similar to modern American utensils for ease of transition. Animal specimens will orally ingest various concentrations of novel material or a current bitter material without swallowing to assess toxicity. I will then perform a comparative analysis that complies with Food and Drug Administration (FDA) regulations for equipment and utensils using both the bitter-tasting and standard utensils. Qualitative data will incorporate a questionnaire on meal satisfaction, hunger dissipation, and consciousness of bitter taste. Additional quantitative data will include the time to complete the provided meals and mean portion consumption for individuals before and after meals for the standard and bitter-tasting utensil groups. These data, collectively, will help determine the efficacy of the technical design in meeting the goal of decreasing caloric intake in a habitual, unconscious manner to promote a sustainable method for weight loss.

STS Project

The Biggest Loser is a hit television series that aired its first episode in 2004 on the National Broadcasting Company (NBC). When the show began, twelve contestants competed for a cash prize of $250,000 and the title of "the biggest loser" (Dehnart, 2020). To lose the required body weight to become the biggest loser, contestants engaged in vigorous exercise and strict diets—similar to other individuals' weight loss regimens outside the show. They also participated in challenges that were atypical of regular weight loss plans. For example, the temptation challenge consisted of contestants consuming a copious amount of calories in exchange for some—often unknown—benefit (Hines, 2013). Still, many of the biggest losers regained their weight despite winning cash prizes and the biggest loser title (Brodwin, 2017).

A study conducted by the National Institute of Health (NIH) surmised that fourteen of the sixteen total contestants tracked over six years had regained much of their weight back (Fothergill et al., 2016). As well, their resting metabolic rates (RMR), or the number of calories burned when an individual's body is at rest, were well below the baseline taken at the start of the study. The conclusions of the study revealed that the process of metabolic adaptation had occurred. Individuals in the study, and by extension individuals who undergo substantial weight loss, had metabolisms that slowed down after some time after appearing on the show. A slower metabolism makes it hard to lose and keep the weight off since these individuals need to consume fewer calories to lose the same amount of weight they had previously done on *The Biggest Loser*. As a result, some have proposed that exercising consistently alongside weight loss ensures that the number of calories burned exceeds those consumed to promote weight loss. Contestants who had kept some of their prior weight off also underwent metabolic adaptation. They maintained their weight loss by incorporating more exercise than those who had not (Wein,

2017). The problem, however, is that this does not consider why a former contestant had not only developed an eating disorder but expressed that the proposed regimens on the show were not followed (Poretsky, 2010). By omitting discussion of the social terrain within the network, the nuances associated with the social and mental health aspects of weight loss are obscure.

Actor-network theory (ANT) states that entities called actors form a network to achieve some common goal or solve a particular problem (Laugelli, 2021). Using ANT, I argue that there were several social and psychological factors within and surrounding the actors of the Biggest Loser network. Former contestants were then unable to sustain weight loss after the show, indicating that the network had become vulnerable. The Biggest Loser network can eventually discourage weight regain, promote sustainable weight loss, and ultimately reduce obesity in the United States by examining these factors. Analysis of the Biggest Loser network will consist of viewing episodes from former seasons of *The Biggest Loser*, listening to interviews from former contestants and staff members, and skimming social media pages and blogs from former contestants in an STS research paper. I will compare the lifestyles of former contestants during their season's episodes with their lifestyles after leaving the show to see what actors in the Biggest Loser network could not be understood purely by watching the television show. These comparisons may indicate why the highly-rated show kept the promise of weight loss with little long-term evidence from former contestants. I will use interviews from former contestants to get a sense of their psychological profiles and experiences appearing on the show. Interviews from former staff members will also reveal aspects of the Biggest Loser network that were unapparent by only watching the show. Likewise, social media pages and blogs of former contestants will provide a means to see how former contestants are affected by social and psychological factors dominating the Biggest Loser network.

Conclusion

The technical report will evaluate a proposed technical design for a set of utensils that will limit food consumption. This report will focus on treating obesity by producing a treatment with portion control in mind instead of food choices. Dieting will also be a viable supplement to the technical design should an individual desire to do so. The STS research paper will discuss the vulnerability of current dieting practices. This paper will use the show *The Biggest Loser* and other actors in the Biggest Loser network to determine social and psychological factors affiliated with past contestants that affected their abilities to lose weight. The results of the technical report will contribute to resolving the broader socio-technical problem of the high proportion of obesity in the United States. These results will ensure that the technical design is safe, effective, and sustainable. Likewise, they will indicate that the technical design reduces strict diet adherence while still promoting weight loss. The results of the STS research paper will further resolve this problem by clearly articulating the supplementary role that the social and psychological factors play in treating obesity via the various connections between actors in the Biggest Loser network.

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