

THE PENNSYLVANIA STATE UNIVERSITY
SCHREYER HONORS COLLEGE

DEPARTMENT OF BIOBEHAVIORAL HEALTH

LINGUISTIC PREDICTORS OF WEIGHT-RELATED EXPERIENCES IN A SAMPLE OF
OVERWEIGHT AND OBESE INDIVIDUALS

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SPRING 2019

A thesis
submitted in partial fulfillment
of the requirements
for a baccalaureate degree
in Biobehavioral Health
with honors in Biobehavioral Health

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ABSTRACT

Weight discrimination is a commonly reported experience in virtually every social environment, including educational institutions, workplace settings, healthcare environments, the media, and within interpersonal relationships (Puhl & Heuer, 2010). It is estimated to be the fourth most prevalent cause of perceived discrimination among Americans (Puhl, Andreyeva & Brownell, 2008). A number of psychological and physical health effects are associated with frequent reports of weight stigma and discrimination, including, but not limited to, body image distress (Annis et al., 2004), lower levels of self-acceptance (Carr & Friedman, 2005), increased risk of engaging in binge-eating behaviors, increased risk of anxiety and mood disorders (Puhl & Suh, 2015; Hatzenbuehler, Keyes & Hasin, 2009), and increased risk of weight gain (Puhl & Heuer, 2010). Therefore, specific populations vulnerable to weight discrimination, such as overweight and obese individuals, need to be studied further, particularly using innovative methods. Language and linguistic analysis has the potential to reveal a considerable amount of information about individuals, including their thoughts, feelings, behaviors, personalities, social relationships, and may even be telling of their health status (Tausczik & Pennebaker, 2010). Computerized text analysis tools, such as Linguistic Inquiry and Word Count (LIWC), serve as unique methods to examine word use, and may be useful in examining narratives of weight-related experiences. The present study examined how overweight and obese individuals write about themselves in response to a prompt about meaningful weight-related experiences during a larger study. LIWC was used to analyze participant's writing responses with an emphasis on relevant word categories (i.e., body-related words, negative emotion words, anxiety words and social processes words). Primary analyses examined if BMI predicted body-related language and

social processes words and if sex was a moderator of these relationships. Further analyses examined if weight vigilance predicted anxiety words and if weight stigma predicted negative emotion words. Findings indicated that BMI was largely unrelated to linguistic indicators, as was internalized stigma and weight vigilance. However, participant sex moderated the association between BMI and the proportion of social process words. Additional exploratory analyses conducted to supplement the original hypotheses found that weight stigma was a positive predictor of social process words, weight vigilance was a positive predictor of perceptual process words, and body appreciation was a negative predictor of sad words in participant's writing. The present study addresses the need to study weight-related experiences, particularly weight discrimination, in overweight and obese individuals through language, in an attempt to better understand and contribute to reducing obesity stigma and its associated health effects.

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ACKNOWLEDGEMENTS

I would like to thank the entire Stress, Health, and Daily Experiences laboratory for their guidance and support throughout the thesis process. Lindsey, thank you for giving me the opportunity to work with you and learn from you. Dr. Smyth, thank you for your endless support and for giving me the opportunity to work in the SHADE Lab. Health and writing have always been my two passions. Your extensive knowledge on expressive writing and eagerness to mentor opened my eyes to an entire new field of health research. Thank you for encouraging me and challenging me to pursue a thesis that combined my two burning passions. I would also like to thank Dr. Kamens for reviewing and editing my thesis. Lastly, thank you to my friends and family for their invaluable support along the way, and continue to support me in my pursuits. Without you, this thesis would not be possible.

Chapter 1

Introduction

The Prevalence of Obesity

In the United States, the prevalence of obesity has been increasing at an alarming rate since the 1970s. Between 1976-1980 and 1988-1994, obesity increased by 8% among adults ages 20-74 years old and between 1988-1994 and 1999-2000, the prevalence of obesity increased again by 7% for men and 8% for women (Flegal, Carroll, Ogden & Curtin, 2010). The Centers for Disease Control and Prevention reported that, in 2015-2016, 39.8% of American adults 20 years and older were obese and 71.6% of American adults were either overweight or obese (CDC, 2016).

These weight categories used to define weight status are typically calculated using Body Mass Index (BMI), which considers an individual's weight in kilograms divided by an individual's height in meters. For adults 20 years old and older, the Center for Disease Control and Prevention defines underweight as a BMI of less than 18.5 and normal weight as a BMI between 18.5 - 24.9. Overweight is defined as a BMI of 25.0 - 29.9, while obese is defined as a BMI of 30.0 or greater. Additionally, there are subdivisions of obese categories, including Obese Class I (BMI of 30.0 to less than 35.0), Obese Class II (BMI of 35.0 to less than 40.0), and Obese Class III (BMI of 40.0 or greater) (CDC, 2017).

The staggering number of Americans that are obese or overweight is reaching epidemic proportions and is a critical health issue that the United States currently faces. Being overweight

and obese is a health risk, as obesity has been shown to be a risk factor for a number of chronic medical conditions and complications including type 2 diabetes, hypertension, heart disease, cerebrovascular disease, and respiratory disease (Malnick & Knobler, 2006). However, one of the overlooked, yet critical health concerns overweight and obese individuals face that may translate to poorer health is a social issue: the experience of weight stigma and discrimination.

Defining Weight Stigma and Weight Discrimination

Weight stigma is defined as a process of social devaluation against individuals who are perceived to carry excess weight (Tomiya, 2014; Puhl & Brownell, 2003). These individuals (e.g. overweight/obese) are often excluded and marginalized by society, and may be the victim of weight discriminatory behaviors such as teasing, bullying, avoidance by others, discriminatory hiring practices, and inappropriate humor due to one's weight (MacLean et al., 2009).

Additionally, individuals who experience weight stigma are often subject to an array of negative stereotypes, including the perceptions that they are lazy, unattractive, noncompliant with medical treatments, have a lack of willpower and control, and are personally responsible for their physical condition (Lawrence, 2004; Puhl & Heuer, 2010; Lee, 2009; Brownell, Puhl, Schwartz, Rudd, 2005; Huizinga, Bleich, Beach, Clark & Cooper, 2010). Weight stigma and discrimination is frequently reported in a variety of different environments, including educational institutions, workplace environments, healthcare settings, the media, and among interpersonal relationships with friends and family members (Puhl & Heuer, 2010). Differences in gender have also been observed with regards to experiences of weight discrimination, with obese women three times more likely to report experiencing weight discrimination than obese men (Puhl, Andreyeva &

Brownell, 2008). Additionally, frequent experiences of weight stigma and discrimination may result in particular individuals being weight vigilant. Weight vigilance, or frequently being aware of and looking out for stressors related to one's weight status that may be present in one's social environment, has the potential to affect health, as research has well-documented the adverse health effects of vigilance (Potter, 2018; Hicken, Lee, Ailshire, Burgard, & Williams, 2013). Among American adults, weight discrimination ranks as the fourth most prevalent cause of perceived discrimination and is reportedly similar in prevalence to racial discrimination (Puhl, Andreyeva & Brownell, 2008). The reported prevalence of weight discrimination is alarming, as research indicates there are a number of health consequences associated with frequent experiences of weight stigma and discrimination.

The Health Effects of Weight Stigma and Discrimination

Experiences of weight stigma and discrimination have been associated with a number of negative psychological and physical health outcomes (Puhl & Heuer, 2010). These psychological and physical health consequences are inextricably linked, as changes in psychological health often impact the biology and behavior of those affected by weight stigma and discrimination. Moreover, weight stigma can lead to poorer psychological health.

Psychological Health Consequences

Body Image Dissatisfaction and Distress

Individual's perceptions of body image and appearance may be impacted by reported experiences of weight stigma and discrimination (Annis, Cash & Hrabosky, 2004). Weight-based teasing history reflects one form of weight stigma and has been found to be significantly associated with greater weight concerns, shape concerns, and body dissatisfaction in obese bariatric surgery patients, even after childhood onset of obesity was controlled (Rosenberger, Henderson, Bell & Grilo, 2007). Additionally, among currently overweight women, greater weight stigma experiences were found to be significantly associated with a number of psychological health indicators including greater body image dissatisfaction and body image distress, preoccupation with weight, and convoluted beliefs about appearance when compared to women who were never overweight (Annis et al., 2004). Body image dissatisfaction and distress may manifest itself in other behaviors, including the desire to lose weight. Among obese individuals, the difference between current weight and desired weight was greater among individuals who reported experiencing weight discrimination, internalized weight stigma, and concerns about body image (Jung, Spahlholz, Hilbert, Riedel-Heller & Luck-Sikorski, 2017). Overall, experiences of weight discrimination may prove to be psychologically damaging to an individual's perceptions of their body image.

Self-acceptance and Self-esteem

Experiences of weight stigma and discrimination have also been associated with detriments to self-acceptance and self-esteem (Carr & Friedman, 2005). Weight-based teasing history has been shown to be significantly associated with lower levels of self-esteem (Rosenberger et al., 2007; Annis et al., 2004). Additionally, within-group differences may be present with regards to levels of self-acceptance in populations of overweight and obese individuals. Individuals in the obese II/III category (BMI of 35 or greater), reported significantly lower levels of self-acceptance of their personality, life satisfaction, and life achievements compared to normal weight individuals; moreover, this difference was mediated by reports of weight discrimination. Furthermore, individuals in the obese I category (BMI of 30-34.9) were not found to have significant differences in self-acceptance levels compared to normal weight individuals (Carr & Friedman, 2005). Those who are extremely obese and frequently experience weight stigmatization may thus be at the highest risk for lower levels of self-acceptance and self-esteem.

Anxiety, Mood Disorders, and Depression

The effects of weight discrimination may manifest in various forms of psychopathology, including, but not limited to, anxiety, mood disorders, and depression (Puhl & Heuer, 2010). Greater frequencies of weight discrimination experiences are associated with greater depression and anxiety (Friedman, Ashmore & Applegate, 2008; Chen *et al.*, 2007; Hatzenbuehler, Keyes & Hasin, 2009). An alarming amount of overweight and obese individuals who report experiencing weight discrimination may be at risk for a psychological diagnosis, with one study reporting that

56% of individuals who frequently experienced weight discrimination met criteria for at least one psychological diagnosis (Hatzenbuehler, Keyes & Hasin, 2009). Overweight and obese individuals who frequently experience weight discrimination in various environments may be at risk for poor psychological health, as they may be 2.4 times more likely to be diagnosed with more than three psychiatric conditions (Hatzenbuehler et al., 2009).

Proposed Mechanisms

A number of reasons have been proposed to explain why psychological health consequences are associated with reports of weight discrimination including body image dissatisfaction, self-acceptance, self-esteem, anxiety, and depression. The most common reason is rooted in societal misperceptions about overweight and obese people. Obese individuals are subject to a number of negative stereotypes, including that they are unattractive, ugly, weak, awkward, and lazy (Brownell et al., 2005). Despite the multitude of research detailing the many causes of obesity including genetic, biological, social, and economic factors, obese individuals are often seen as personally responsible for their condition, health, and excess weight due to factors within their control, such as overeating or a lack of exercise (Lee, 2009; Finkelstein, Ruhm & Kosa, 2005). This misconception leads others to view obese individuals as lazy and having a lack of willpower (Lawrence, 2004; Puhl & Heuer, 2010). The cumulative effects of weight discrimination may cause individuals to internalize a range of negative beliefs about themselves, including that they are worthless and inadequate and perpetuate a feeling of overall shame (Rosenberger et al., 2007). These negative beliefs and feelings may be partially responsible for the increased levels of body dissatisfaction and distress, lower levels of self-

esteem, and higher risk of anxiety, mood disorders, and depression that are reported with frequent weight discrimination. It is important to note that frequent experiences of weight discrimination are associated with changes in health behaviors, including lower motivations to diet, exercise, and lose weight, and these associations were mediated by low positive affect (Vartanian, Pinkus, & Smyth, 2018). These changes in behavior may also contribute to poorer psychological and emotional health that individuals report following weight stigma.

Physical Health Consequences

Binge-eating Behaviors

Frequent experiences of weight discrimination may place individuals at an increased risk for binge eating disorders and behaviors (Puhl & Suh, 2015). It has been found that adults who report more frequent experiences of weight stigmatization reported greater binge-eating behaviors (Ashmore, Friedman, Reichmann & Musante, 2008). However, external experiences of weight discrimination have not been consistently predictive of binge-eating behaviors. The internalization of weight biases may also be important in an individual's risk of engaging in binge-eating behaviors, as individuals who hold weight bias stereotypes have been found to be more likely to report binge-eating behaviors (Puhl, Moss-Racusin & Schwartz, 2007).

Binge-eating behaviors have been hypothesized to serve as a coping mechanism frequently used by overweight and obese individuals in an attempt to manage stressful experiences of weight stigmatization or reduce negative mood states brought about by weight discrimination (Puhl & Brownell, 2006; Ashmore et al., 2008). Binge-eating behaviors may thereby act as a distraction from negative mood states like anger, anxiety or depression

(Ashmore et al., 2008). In addition, existing research has identified weight stigma and discrimination as a potential biological chronic stressor (Jackson, Kirschbaum, & Steptoe, 2016). Chronic stressors have been shown to result in the prolonged activation of the Hypothalamic-pituitary-adrenal (HPA) axis and the release of excess cortisol, which may stimulate an increase in food intake and lead to binge-eating behaviors (Adam & Epel, 2007; Epel, Lapidus, McEwen & Brownell, 2001). These binge-eating behaviors appear to be prevalent, and as many as 80% of overweight and obese individuals may cope with weight stigma experiences by consuming food (Puhl & Brownell, 2006). Binge-eating behaviors may be indicative of psychological distress, as psychological distress has appeared to explain the relationship between weight stigmatization and binge-eating behaviors (Ashmore et al., 2008). Thus, these unhealthy behaviors may originate and/or be sustained as victims of weight discrimination attempt to cope with these negative experiences.

Weight Gain

An individual's physical health may be impacted by experiences of weight stigma and discrimination through future weight gain and difficulties losing weight (Puhl & Heuer, 2010). Experiences of weight discrimination may promote future weight gain, as weight discrimination has been associated with increases in weight and an increased risk of becoming obese over time (Jackson, Beeken & Wardle, 2014; Sutin & Terracciano, 2013). Furthermore, perceived weight discrimination was associated with increased odds of becoming obese four years later, even among individuals who were not initially obese (Jackson et al., 2014). Weight discrimination may serve as an added pressure among individuals attempting to lose weight. Among individuals

initially obese, weight discrimination was associated with remaining obese four years later, with those who reported weight discrimination three times more likely to remain obese compared to those who did not report weight discrimination (Sutin & Terracciano, 2013).

A number of hypotheses exist that attempt to explain the mechanisms between weight discrimination and weight gain. These hypotheses include a behavioral basis, as weight discrimination has been shown to be associated with increases in food intake, particularly increases in convenience food consumption, and decreases in physical activity (Sutin & Terracciano, 2013; Sutin, Robinson, Daly & Terracciano, 2016). The development of these unhealthy behaviors may occur as a result of coping with the perceived stress of weight discrimination. A physiological mechanism may also be at work, in which excess cortisol and glucocorticoids are released in response to chronic stress and these hormones may stimulate an increase in food intake, particularly calorie-dense, high-fat foods that promote weight gain (Adam & Epel, 2007; Tataranni *et al.*, 1996; Epel *et al.*, 2001). In fact, this explanation is supported by research that categorizes frequent weight discrimination as a chronic, social stressor that activates the HPA axis, and thus stimulates the release of cortisol (Jackson *et al.*, 2016). Another proposed explanation for the observed increase in weight associated with weight discrimination is through decreased exercise motivation and exercise behavior. Weight stigmatization may discourage individuals from being motivated to exercise through both embarrassment and shame, as individuals who report greater weight stigmatization have been found to be more likely to be motivated to not exercise (Vartanian & Shaprow, 2008).

Reception of Healthcare

Weight stigma and discrimination may also indirectly influence the health of overweight and obese individuals through the reception of healthcare (Puhl & Heuer, 2010). Individuals who report experiencing more frequent weight discrimination are less likely to adhere to medical treatments (Richardson *et al.*, 2014) and are less likely to receive recommended medical screening tests (Amy, Aalborg, Lyons & Keranen, 2006). Overweight and obese patients' perceptions of weight discrimination in healthcare settings and perceptions of healthcare providers' weight biases toward them may deter these individuals from seeking and receiving adequate healthcare (Bertakis & Azari, 2005; Amy *et al.*, 2006). Weight stigma may interfere with the care that patients receive from healthcare providers due to weight biases held by providers. These negative attitudes may impede the intimate patient-provider relationship, and in turn, cause individuals to delay seeking preventative care (Vartanian & Smyth, 2013; Puhl & Heuer, 2009). Therefore, experiences of weight stigma and discrimination have the potential to directly affect individual's health through physical and psychological consequences and indirectly affect health via an individual's motivations to seek healthcare and treatment, further exacerbating health effects and placing certain individuals (e.g. overweight/obese) at increased risk for poorer health outcomes. However, most approaches in research to understand weight stigma and its health consequences rely on individuals' self-reports on standardized scales or structured clinical interviews. These approaches, despite their benefits, may miss some of the richness of experiences in everyday life. As such, research would be enhanced with the use of additional tools to better understand the experiential aspects of weight stigma derived from reflections on lived experiences. One method to accomplish this is via the study of language use and linguistic indicators.

What Language Can Reveal About Individuals

The primary function of language is a means of communication from one individual to another. However, the words people use can also illuminate their personalities, thoughts, beliefs, feelings, behaviors, and social relationships, which may be telling of their health status. This makes language a potential tool for examining individual's experiences of weight discrimination and weight-related events. The idea of examining individual's word use for psychological components came about as a result of conducting numerous expressive writing studies (Tausczik & Pennebaker, 2010). Expressive writing, or the written emotional expression of language about traumatic or stressful events consecutively over a period of time, has been shown to provide physical and psychological health benefits (Pennebaker & Beall, 1986; Pennebaker, 1997; Robinson, Jarrett, Vedhara & Broadbent, 2017; Smyth, Stone & Hurewitz, 1999; Pennebaker & Smyth, 2016). However, not only has actively writing about emotional traumas been shown to lead to improvements in health, but the words that people use in their writing may also be predictive of their health and other indicators related to health including behaviors, psychological states, and personality (Tausczik & Pennebaker, 2010).

Language as Predictive of Health and Psychological States

Following the first expressive writing study by Pennebaker & Beall (1986), subsequent studies have explored linguistic components that may be predictive of health. Emotion words and cognitive words, such as causal and insightful words (because, effect, cause and think, know, realize), may be of particular importance. Individuals who wrote about emotional traumas over three consecutive days were more likely to report reductions in subsequent physician visits if

their writing contained a greater amount of positive emotion words, a moderate amount of negative emotion words, and an increased amount of cognitive words from their first day to their final day of writing (Pennebaker & Francis, 1996). Additionally, these findings have been replicated, in that increases in causal and insightful words (over repeated writing sessions) and positive emotion words are associated with better health (Pennebaker, Mayne & Francis, 1997).

Therefore, changes in thinking patterns over time, evidenced by the increase in the amount of cognitive words from the first day to the last day of expressive writing, may be important psychological processes that occur as an individual attempts to reconstruct, reappraise or cope with a traumatic experience and these processes may be beneficial for health (Pennebaker et al., 1997; Tausczik & Pennebaker, 2010). Therefore, language has a unique ability to reveal how an individual may be processing or understanding an event, and may predict health. Positive and negative emotion words have been shown to be important linguistic predictors of health. Positive emotion words have been associated with health in a linear association, in that the use of more positive emotion words are associated with better health outcomes. However, negative emotion words have been associated with health in a curvilinear association, in that the use of fewer negative emotion words and greater negative emotion words have been associated with poorer health outcomes, whereas a moderate amount of negative emotion words have been shown to provide the best health outcomes (Pennebaker, 2003). Researchers have attempted to explain these results by the well-documented positive effects of optimism on health, and the harmful effects of pessimism (Scheier & Carver, 1985; Danner, Snowdon & Friesen, 2001; Peterson, Seligman & Vaillant, 1988). Additionally, researchers have attempted to explain the curvilinear association between negative emotion words and health in that failing to use enough negative emotion words in language may be indicative of repressive

styles of coping that have been shown to have harmful effects on health (Jamner, Schwartz & Leigh, 1988), and that the use of a moderate amount of negative emotion words may instead be beneficial to health. Additionally, too much negative engagement may reflect rumination and worry, and may otherwise impede coping efforts (Kross, Ayduk & Mischel, 2005).

Word use can also reveal information about an individual's psychology and what they are focused on, including their priorities and intentions. Content words (e.g. nouns, verbs and adjectives that communicate the content of the text) are indicative of an individual's attention, but function words (e.g. personal pronouns) have also been shown to provide information about an individual's attentional focus (Tausczik & Pennebaker, 2010). Clinical samples have been common study samples used to examine how language may be associated with psychological states and cognitive processes. Research has shown that psychiatric patients used fewer positive emotion words, such as optimism or energy words, exclusion words, bodily function words, and fewer future references (Junghänel, Smyth, & Santner, 2008). Word use has also been found to be predictive of depression and individuals particularly vulnerable to depression. Depressed individuals used significantly more first-person singular pronouns, indicating an attentional focus directed toward themselves, and more negatively valenced words compared to non-depressed individuals. Individuals who reported being formerly depressed were found to use increasingly more first-person pronouns from the first to the last essay (Rude, Gortner & Pennebaker, 2004). Researchers have hypothesized that this heightened self-focused attention observed in depressed individuals may be reflective of a loss of self-worth, in which individuals attempt to regain this worth, but instead end up more focused on themselves, which is believed to increase negative emotions and blame (Pyszczynski & Greenberg, 1987; Carver & Scheier, 1981). These persistent negative thoughts and emotions representative of clinical depression have been shown to have

physiological health effects, as depression is associated with a number of poorer health outcomes, including fibromyalgia, higher rates of smoking, higher rates of cardiovascular events, and increased risk of inflammatory diseases (Gotlib & Hammen, 2008).

Additionally, word use has also been found to be predictive of Post-Traumatic Stress Disorder (PTSD) psychopathology including the disease's symptoms and severity, in which individuals with PTSD used significantly more singular pronouns and death-related words in trauma narratives, with the usage of linguistic variables differing by disease severity (Papini, Yoon, Rubin, Lopez-Castro & Hien, 2015). These linguistic patterns observed in individual's narratives were consistent with the disease's recognized symptoms of a sense of detachment from others, persistent and intrusive thoughts, and general psychological distress (Papini et al., 2015). Although language has largely been examined in clinical samples suffering from psychopathological diseases, examination of linguistic features may serve as a valuable method researchers can implement to examine individual's psychological states and understand what they are thinking, feeling, and their attentional focus, which in turn can reveal a great deal of information about an individual's health.

Language as Predictive of Personality and Individual Differences

Language has the unique ability to uncover individual differences such as personality styles and sex. Higher word count and use of fewer large words have been associated with extraversion in males and females (Mehl, Gosling & Pennebaker, 2006). Extroverted individuals use more social words and positive emotion words (Pennebaker & King, 1999). Personality differences have been observed in how individuals tell narratives. Individuals who scored high in

conscientiousness told narratives that were short and factual, individuals who scored high in neuroticism told narratives that were self-focused, and individuals who scored high in extraversion told narratives for social reasons (Baddeley & Singer, 2008). Additionally, individuals who possess a “failure mindset,” a common trait identified in pessimism, helplessness, and fatalism, who consistently think their efforts will not produce positive results, may be at risk of adverse health outcomes. Individuals who used failure-related words more often were found to have shorter life spans (Penzel, Persich, Boyd & Robinson, 2016). The ability of language to predict personality traits has important health implications, as various personality traits have been associated with health outcomes, behaviors, and longevity. For example, pessimistic explanatory styles have been associated with decreased cancer survival, more frequent illness, decreased likelihood to take action in the face of illness, and increased risk of depression (Schultz, Bookwala, Knapp, Scheier & Williamson, 1996; Lin & Peterson, 1990; Nolen-Hoeksema, Girgus & Seligman, 1986). In contrast, optimistic explanatory styles have been associated with reduced risk of coronary heart disease, increased immune functioning, better physical health and longevity (Kubzansky, Sparrow, Vokonas & Kawachi, 2001; Segerstrom, Taylor, Kemeny & Fahey, 1998; Rasmussen, Scheier & Greenhouse, 2010). Therefore, language can reveal information about individual’s personality and individual differences that have been tied to various health outcomes, behaviors, and psychological processes. Further, language can serve as a means through which researchers attempt to understand health risks in certain populations.

Word use may also help reveal information about sex differences. Women use more social words and references in their writing compared to men. Men were observed to use more words related to object properties, impersonal topics, and complex language (Newman, Groom,

Handelman & Pennebaker, 2008). However, sex differences with regards to word use offer conflicting findings, especially concerning emotionality. Some research has indicated that women use more emotion words than men, but other studies have failed to support this finding (Newman et al., 2008). Social words may have health implications as it has been found that word use indicative of greater social integration is predictive of longer life spans (Pressman & Cohen, 2007). Therefore, language serves as a unique tool for predicting information about health, psychological states, behaviors, and individual differences and thus, has the potential to reveal a great deal of information about the health consequences associated with weight stigma. One of the most well-known tools for deciphering language to better understand these processes is Linguistic Inquiry and Word Count (LIWC).

Understanding Language Through LIWC

Linguistic Inquiry and Word Count (LIWC) is a digital text analysis software that helps uncover individual's psychological processes by identifying emotional, cognitive, and structural components of people's language by analyzing written text files. Containing a dictionary of nearly 6,400 words, LIWC classifies words into various categories including, but not limited to, summary language variables, linguistic dimensions, and psychological processes (Tausczik & Pennebaker, 2010). LIWC was developed by Pennebaker and colleagues in an attempt to understand why research participants reported physical health improvements after consecutively writing about emotional traumas (Pennebaker & Beall, 1986). Subsequent studies have frequently used LIWC to analyze participant's written text in expressive writing studies, where participants are randomized to write consecutively about a stressful and traumatic experience or

a factual experience and health outcomes are measured. Despite LIWC's ability to count and classify words into psychological categories and provide a considerable amount of information about individual's personalities, thoughts, health status, emotions, and social relationships, computerized text analysis tools such as LIWC are still in their beginning stages and have notably limitations in their capacity to quantify language use (Tausczik & Pennebaker, 2010).

One of the most significant factors that computerized text analysis tools such as LIWC fail to capture is the context of the text. This can lead to inaccurate assumptions about the meaning of the text or narrative, which is why researchers stress the importance of analyzing the context of the text files in the analysis (Tausczik & Pennebaker, 2010). Furthermore, the application of computerized text analysis tools, such as LIWC, to understand people's psychological processes, emotional states, and health status is still relatively new, and gaps in the literature exist in attempting to understand emotional expression in writing, particularly in specific populations. The literature has well-documented the adverse health effects of experiences of weight stigma and discrimination and the widely prevalent nature of these occurrences in various environments (Puhl & Heuer, 2010). Therefore, specific populations, such as overweight and obese individuals who may be particularly vulnerable to experiencing weight-related discrimination, need to be studied further. Language and computerized text analysis tools serve as unique tools to analyze weight-related experiences in overweight and obese samples, as they have been shown to reveal information about individual's psychological processes, personality, cognitive styles, social relationships, and health status (Tausczik & Pennebaker, 2010). This thesis hopes to expand upon the current knowledge by examining the association between different subgroups of individuals and the contents of emotional expression written in

response to a prompt about weight-related experiences, specifically in a sample of overweight and obese individuals.

The Present Study

The aim of this thesis was to examine how individuals who are overweight or obese write about themselves in response to a prompt about meaningful weight-related experiences during a larger 7-day study examining experiences relevant to weight stigma in everyday life. Within the study sample of 48 overweight and obese individuals it was examined if language use systematically varied with person-level characteristics, including variables such as BMI, sex at birth, weight vigilance, and lifetime experiences of weight stigma and discrimination. Linguistic Inquiry and Word Count (LIWC) was used to analyze the participant's responses, with an emphasis on particular word categories including body-related words, negative emotion words, anxiety words, and social processes words. This thesis consisted of the following hypotheses:

Hypothesis 1. Individuals with a higher BMI will use significantly more body-related language in their writing compared to individuals with lower BMIs.

Hypothesis 2. Sex will moderate the relationship between BMI and use of body-related language. Women with higher BMIs will use significantly more body-related language in their writing than men with higher BMIs.

Hypothesis 3. Individuals with a higher BMI will use significantly less social processes words in their writing compared to individuals with lower BMIs.

Hypothesis 4: Sex will moderate the relationship between BMI and use of social processes words. Women with higher BMIs will use significantly more social processes words in their writing compared to men with higher BMIs.

Hypothesis 5. Individuals who report greater weight vigilance at baseline will use significantly more words indicative of anxiety in their writing compared to individuals who report lower weight vigilance.

Hypothesis 6. Individuals who report experiencing more frequent lifetime weight stigma at baseline will use significantly more negative emotion words in their writing compared to individuals who report less frequent lifetime weight stigma.

Chapter 2

Methods

Overview

This thesis used data that was collected for a larger study, the Weight Status and Health in Daily Life study (see Potter, 2018). The Weight Status and Health in Daily Life study was conducted in the Biobehavioral Health Department at Penn State University by the principal investigator, Dr. Lindsey Potter. The study consisted of a baseline laboratory visit, a 7-day study period, and a follow-up laboratory assessment. During the baseline laboratory visit, demographic and personality surveys were completed, height and weight measurements were taken to confirm participants' BMI, and participants were trained to use a study-provided smartphone and heart rate monitor. Following the baseline laboratory assessment, participants completed a 7-day study in which they were prompted to answer ecological momentary assessment surveys multiple times each day on the provided smartphone about daily experiences of weight stigma and discrimination and wore the provided heart rate monitor during waking hours. Lastly, a follow-up laboratory assessment was conducted, where participants returned the smartphone and heart rate monitor, a small blood sample was taken to assess glycated hemoglobin (HbA1c), and participants completed a 15-minute writing exercise where they were instructed to write about the most salient or meaningful experience related to their weight during the study.

Participants

Participants were recruited from the Penn State University and the surrounding State College area. Study fliers were displayed in buildings across the Penn State University campus and in various buildings around State College. Additionally, announcements were made in classrooms on the Penn State University campus and Study Finder was used to recruit participants.

In order to participate in the study, participants needed to meet certain study criteria. This inclusion criteria included being between the ages of 18 to 55 years old, fluent in English, and being overweight or obese. The Centers for Disease Control and Prevention's clinical cutoffs for overweight and obesity were used to classify participants' body mass index (CDC, 2017). Overweight is defined as a body mass index between 25 and 29.99 and obesity is defined as a body mass index of 30 or greater. Therefore, participants with a BMI of 25 or greater were eligible to participate. Participants' BMI was verified during the baseline laboratory assessment.

Participants who met certain criteria were also excluded from the study. This included participants who were pregnant or nursing or had been diagnosed with an eating disorder. Participants who had been diagnosed with a psychiatric disorder and hospitalized for it within the prior 3 months were excluded as well as participants with visual impairments that would interfere with their ability to complete survey questions on a phone or computer. Lastly, participants who had been diagnosed with a developmental disorder or cognitive impairment were excluded.

A total of 48 individuals completed the study. Participants ranged in age from 18 to 54 years old, with a mean age of 27.69 years old ($SD = 9.61$). Of the 48 total study participants,

43.8% were male ($n = 21$) and 56.3% were female ($n = 27$). Participants ranged in body mass index from 25.00 to 59.20, with a mean body mass index of 31.91 ($SD = 6.21$).

Procedure

At the baseline laboratory visit, participants completed questionnaires, consisting of information about demographics and personality. The baseline questionnaires were completed on a desktop computer through Qualtrics in a quiet, laboratory setting.

Following the 7-day study period, participants returned to the laboratory to complete the follow-up laboratory assessment. At the follow-up assessment, participants completed a 15-minute writing exercise in which they were instructed to write about the most salient or meaningful experience related to their weight during the study. Participants were encouraged to be as descriptive as possible about their experiences, including both the facts and memories of the experience. Participants were instructed to describe how the experience made them feel, focusing on their thoughts and emotions, and were instructed to reflect on the meaning of the experience, and how it tied into other aspects of their life. A writing utensil and a standard blue exam book were provided to participants to record their response. Participants were left alone in the laboratory and given 15 minutes to write continuously. Warnings were given with five minutes and one minute remaining. At the completion of the writing exercise, participants placed their standard blue exam book in a manila envelope to ensure confidentiality.

Measures

Weight Stigma and Weight Discrimination

Experiences of weight stigma throughout participants' lifetime were assessed at the baseline laboratory visit using the Stigmatizing Situations Inventory (SSI) (Myers & Rosen, 1999). The SSI consists of 50 situations that one may experience due to their weight. Participants indicated the frequency that they experienced such situations on a Likert scale from 0 (never) to 9 (daily). Scores for each situation were averaged to generate a total score for each participant, where higher total scores suggested more frequent experiences of weight stigma.

Weight Vigilance

Vigilance was assessed at the baseline laboratory visit with a modified measure consisting of 10 statements to assess how frequently participants monitored their social environment (feel aware of and looked out for) for negative events (Ruiz et al., 2017). Statements were modified to emphasize weight with regards to vigilance. Each of the 10 statements were rated on a Likert scale from 1 (almost never) to 5 (almost always). Scores for each statement were averaged to generate a total score for each participant, where higher total scores indicated more vigilance about their weight.

Body Appreciation

Body appreciation was assessed at the baseline laboratory visit with the use of the Body Appreciation Scale (Tylka & Wood-Baraclow, 2015). The Body Appreciation Scale consists of 10 items that assess an individual's body acceptance and appreciation. Each of the 10 statements were rated on a Likert scale from 1 (never) to 5 (always). Scores for each statement were averaged to generate a total score for each participant, where higher total scores indicated greater body appreciation.

Body Mass Index (BMI)

BMI was first assessed through a self-report of participant's height and weight upon initial screening for the study. At the baseline laboratory assessment, body mass index was calculated again by measuring participant's height and weight on a scale to confirm participant's eligibility.

Data Preparation

Data Cleaning

Each participants' written response from the 15-minute writing exercise was transferred from their standard blue exam book and was typed into individual Microsoft Word documents in preparation for analysis. The majority of participant's responses from the writing exercise contained terms that required manual cleaning before being input into the data analysis software,

Linguistic Inquiry and Word Count (LIWC). Data was manually corrected for instances such as spelling and grammatical errors, abbreviations (lbs, etc., e.g.), acronyms (BMI, EMA, AKA), and symbols (+, @, &). Particular emphasis was placed on words that related to the present study's hypotheses. These included words that reflected body-related language, negative emotion, anxiety, and social processes. This was necessary due to the structure of LIWC's internal dictionaries, which only account for common words, and are unable to categorize misspellings of words, rarely-used words, or abbreviations. Therefore, participant's individual files were cleaned for these instances in order for LIWC to accurately analyze the data.

LIWC Analysis

Following data cleaning, each participant's writing response was analyzed using LIWC software version 2015. LIWC is a digital text analysis tool that analyzes text files and groups words into categories that reflect: individual thoughts; emotional states; personality; and psychological concepts (Pennebaker et al., 2015). The software's output indicates the percentage of words in uploaded text files that fall into each category. The LIWC software contains a total of 91 output variables, including word count, four summary language variables (analytical thinking; clarity; authenticity; emotional tone), three general descriptor categories (words per sentence; percent of target words; percent of words in the text that are longer than six letters), twenty-one standard language dimensions, forty-one word categories that assess psychological variables (e.g., affect, cognition, drives), six personal concern variables (e.g., work, home, leisure), five informal language markers, and twelve punctuation categories (as presented in Pennebaker et al., 2015). Given the goals of this thesis, the LIWC categorical output was

specifically analyzed for words that reflected body-related language, social processes, negative emotion, and anxiety (a subcategory of negative emotion). Additional LIWC categories were analyzed in exploratory analyses including social process words (friend, family, male references, female references), perceptual processes (and its subcategories: feel, see, hear), and anger and sad words.

Data Analysis

Statistical Analysis

Descriptive statistics were used to analyze the frequency of sex at birth and to calculate the means and standard deviations for word count, BMI, age, lifetime experiences of weight stigma, weight vigilance, and the LIWC word categorical outputs including body-related language, negative emotion, anxiety, and social processes. Linear regressions were used to analyze each of the present hypotheses (and in subsequent exploratory analyses described below). The threshold for significance was a p-value of less than 0.05. Additional exploratory analyses were conducted to analyze variables and constructs related to (but not predicted *a priori*) to the present study's hypotheses.

Qualitative Analysis

A qualitative analysis was also conducted in which the participant's writing prompts were read and examined for common themes in relation to the study's hypotheses and analyses. This

process considered the context of participant's narratives as a whole to supplement the LIWC data analysis.

Chapter 3

Results

Restating of the Present Study's Hypotheses

The present study tested the following hypotheses.

Hypothesis 1. BMI would effect an individual's use of body-related language, in which individuals with a higher BMI will use significantly more body-related language in their writing compared to individuals with lower BMIs.

Hypothesis 2. Sex will moderate the relationship between BMI and use of body-related language. Women with higher BMIs will use significantly more body-related language in their writing than men with higher BMIs.

Hypothesis 3. BMI would effect an individual's use of social processes words, in which individuals with a higher BMI will use significantly less social processes words in their writing compared to individuals with lower BMIs.

Hypothesis 4: Sex will moderate the relationship between BMI and use of social processes words. Women with higher BMIs will use significantly more social processes words in their writing compared to men with higher BMIs.

Hypothesis 5. Individuals who report greater weight vigilance at baseline will use significantly more words indicative of anxiety in their writing compared to individuals who report lower weight vigilance.

Hypothesis 6. Individuals who report experiencing more frequent lifetime weight stigma at baseline will use significantly more negative emotion words in their writing compared to individuals who report less frequent lifetime weight stigma.

SPSS Statistics software by IBM was used to conduct the present study's statistical analysis. Linear regressions were used to analyze each of the study's hypotheses.

Descriptive Statistics

Descriptive statistics were calculated for all of the variables included in the present study, including the means, standard deviations, and ranges. The descriptive statistics are presented below in Table 1; linguistic variables derived from LIWC are a measure of the percentage of the total words reflected by each category observed in participant's written responses.

Table 1. Descriptive Statistics by Variable

Variable	Minimum	Maximum	Mean	Std. Deviation
Lifetime Experiences of Weight Stigma	0.00	2.36	0.69	0.59
Weight Vigilance	1.00	4.40	1.73	0.89
Body Appreciation	1.30	5.00	3.55	0.89
Word Count	67	463	296.79	93.90
Body-related Words*	0.00	4.35	1.44	1.14
Social Processes Words *	0.67	13.58	5.19	2.96
Friend Words *	0.00	1.52	0.31	0.40
Family Words*	0.00	1.52	0.29	0.38
Male Reference Words *	0.00	2.26	0.30	0.60

Female Reference Words*	0.00	3.30	0.21	0.56
Perceptual Processes Words*	0.00	8.70	4.56	1.79
Feel Words*	0.00	6.52	2.71	1.33
See Words*	0.00	3.57	1.21	0.87
Hear Words*	0.00	2.91	0.33	0.52
Negative Emotion Words*	0.00	5.12	1.89	1.22
Anger Words*	0.00	1.62	0.30	0.38
Anxiety Words*	0.00	2.99	0.76	0.65
Sad Words*	0.00	1.85	0.45	0.55

* Measured as a percentage of the total words

Results of the Present Study

Hypothesis 1 Results: Higher BMI was not significantly associated with a greater proportion of body-related words ($b = 0.019$, $p = 0.482$).

Hypothesis 2 Results: The association between BMI and body-related words was not significantly moderated by participant's sex (BMI*sex interaction; $b = -0.090$, $p = 0.157$).

Hypothesis 3 Results: Higher BMI was not significantly associated with a lower proportion of social process words; in fact, a statistical trend was observed such that higher BMI was associated with a *higher* proportion of social process words ($b = 0.130$, $p = 0.061$).

Hypothesis 4 Results: The association between BMI and social process words was significantly moderated by participant's sex (BMI*sex interaction; $b = 0.328$, $p = 0.037$). To understand the interaction term, simple effects by sex were examined. Among males, BMI was

unrelated to the proportion of social process words ($b = -0.122, p = 0.332$). In contrast, for females, BMI was a significant *positive* predictor of social process words ($b = 0.206, p = 0.017$; i.e., greater BMI in females was related to higher rates of social process words in essays, but this association was not observed in males).

Hypothesis 5 Results: Higher scores of weight vigilance were not significantly associated with a higher proportion of anxiety words ($b = 0.084, p = 0.438$).

Hypothesis 6 Results: Higher scores of lifetime weight stigma were not significantly associated with a higher proportion of negative emotion words ($b = 0.307, p = 0.312$).

Results of the Exploratory Analysis

Exploratory Analysis 1. In addition to the original hypothesis that an association would exist between BMI and an individual's use of social process words, each of the sub-categories of social process words in LIWC were analyzed. The sub-categories of social process words included 'friends,' 'family,' 'male references,' and 'female references' words.

Results. BMI was unrelated to the proportion of friend words ($b = -0.005, p = 0.635$), proportion of family words ($b = 0.002, p = 0.800$), proportion of male reference words ($b = 0.000, p = 0.985$), or the proportion of female reference words ($b = -0.017, p = 0.196$).

Exploratory Analysis 2. The association between scores of lifetime weight stigma and the proportion of social process words was analyzed, and also analyzed with sex at birth as a moderator. In addition, the association between lifetime weight stigma and each of the sub-categories of social process words was analyzed.

Results. The association between scores of weight stigma and the proportion of social process words was statistically significant ($b = 1.616, p = 0.025$), with higher scores of weight stigma associated with greater proportions of social process words, but sex was not a moderator of this relationship ($b = 1.243, p = 0.431$). With regard to the sub-categories of social process words, weight stigma was unrelated to the proportion of friend words ($b = 0.034, p = 0.742$), proportion of family words ($b = 0.041, p = 0.664$), proportion of male reference words ($b = 0.221, p = 0.140$), or the proportion of female reference words ($b = 0.135, p = 0.337$).

Exploratory Analysis 3. The association between scores of weight vigilance and the proportion of perceptual process words was analyzed, in addition to each of the sub-categories of perceptual process words which include ‘feel,’ ‘see,’ and ‘hear’ words.

Results. The association between weight vigilance and the proportion of perceptual process words was statistically significant ($b = 0.583, p = 0.044$). The association between scores of weight vigilance and the proportion of feel words was marginally significant ($b = 0.423, p = 0.051$), with higher scores of weight vigilance associated with a greater proportion of feel words. However, weight vigilance was unrelated to the proportion of see words ($b = 0.178, p = 0.216$) and the proportion of hear words ($b = -0.011, p = 0.900$).

Exploratory Analysis 4. The association between scores of body appreciation and the proportion of negative emotion words was analyzed, in addition to each of the sub-categories of negative emotion words which include ‘anxiety,’ ‘anger,’ and ‘sad’ words.

Results. The association between scores of body appreciation and the proportion of negative emotion words exhibited a statistical trend ($b = -0.363, p = 0.069$), such that lower scores of body appreciation were marginally associated with a greater proportion of negative emotion words. Body appreciation was unrelated to the proportion of anxiety words ($b = -0.132,$

$p = 0.221$) and the proportion of anger words ($b = -0.072, p = 0.252$). However, the association between scores of body appreciation and the proportion of sad words was statistically significant ($b = -0.198, p = 0.028$), with lower body appreciation predicting a greater proportion of sad words.

Results of Qualitative Analysis

A qualitative analysis was conducted in which the participant's writing prompts were read and analyzed for common themes to supplement the LIWC results.

Social Interactions. One of the most common themes that emerged from the narratives was the notion that there were very few reports of weight stigma and discrimination experienced by the participants over the one-week study period. The majority of participant's narratives highlighted that friends and social support systems were sources of confidence in their body image and appearance, especially when they were internally feeling dissatisfied with their weight or body. Some participants were even shocked at the idea that their weight could interfere with their social relationships: *"My weight doesn't prevent me from socializing with people,"* and *"I wondered if people really would judge others in weight problems and would come out and say to the person that they are fat. While taking this study I was surprised that some people would put someone down because of their weight."* Instead, dissatisfaction with weight and body image appeared to stem from more internalized manifestations about their appearance.

Internalization of Weight Concerns. Participants frequently detailed in their narratives that they were often aware of what they were doing and were rather conscious of choices they were making due to their weight. Some frequently mentioned examples included not taking

photos of themselves due to their weight concerns, wearing baggy clothes to hide their weight, and intentionally restricting their food because of their weight. Participants reported being rather vigilant about their weight and internalized their weight concerns and dissatisfaction about their appearance, even when they reported that their social interactions and relationships did not seem to be aware of their weight.

Environmental Weight-related Experiences. A frequently reported weight-related experience in participant's narratives was trying on clothes in a store. Participant's often reported that this experience was dissatisfying and upsetting, as it was disheartening when clothes did not fit their body because of their weight. Some participants noted that this led to increases in their body dissatisfaction. Another reported experience was that participants found themselves becoming more aware about concerns regarding their weight due to the questions that they were prompted to answer as a result of the study. Some participants noted that they didn't originally hold these weight concerns (such as taking up too much space on the bus or that people were staring at them due to their weight), but that the questions about these weight experiences made them question if they were misperceiving their social environment.

The "Secretly Obese" Mentality. Another common theme that emerged in participant's narratives was the idea of participant's being "secretly obese," in that they didn't view themselves as obese, despite having a BMI that groups them in the obese category. Participants who manifested this idea stated that they thought they hid their fat well and were lucky because of this. Interestingly, this mentality also led some participants to conclude that the study did not apply to them, as they were not truly obese.

Chapter 4

Discussion

Conclusions

The purpose of the present study was to examine how overweight and obese individuals write about themselves in response to a prompt concerning meaningful weight-related experiences during a larger, 7-day study. Individual differences within the sample of 48 individuals were examined, particularly with regard to baseline assessments of BMI, sex at birth, weight vigilance, and lifetime experiences of weight stigma and discrimination. The language of the written narratives was analyzed using LIWC for particular word categories, including body-related words, negative emotion words, anxiety words, and social processes words.

These results indicated that BMI was not associated with participant's use of body-related language in their writing, and furthermore, the relationship between BMI and the proportion of body-related words in participant's writing was not moderated by sex. This finding contradicts what the existing research suggests about overweight individuals and their psychological functioning. Overweight and obese individuals frequently report greater body dissatisfaction and distress, preoccupation with their weight, and overall poorer body image (Annis et al., 2004), at least when assessed using more typical self-report measures. Additionally, research suggests that overweight and obese individuals are frequently subject to a process of social devaluation known as weight stigma that has been shown to be associated with numerous adverse psychological indicators, including greater concerns about weight shape and greater body dissatisfaction (Puhl & Heuer, 2010; Rosenberger et al., 2007). This research suggests that overweight and obese individuals may be more preoccupied with their weight and body image due to frequently

experienced stigma, and that there may be sex differences with regards to experiences of weight stigma and perceptions of body image (Puhl et al., 2008; Feingold & Mazzella, 1998). Research has suggested that language can reveal information about an individual's attentional focus, including what they are focused on and underlying psychological and cognitive processes (Tausczik & Pennebaker, 2010). Therefore, although the research suggests that overweight and obese individuals are more preoccupied about weight and body concerns, this attentional focus on their body image was not captured in the participant's content of the narratives of the present study.

In addition, higher BMI was not found to be significantly associated with a lower proportion of social process words (e.g. talk, they), as was predicted. In fact, BMI was found to exhibit a statistical trend with regards to participant's use of social process words, in that higher BMI was actually associated with a higher proportion of social process words. Interestingly, participant's sex was found to moderate this relationship. Among males, BMI was not related to use of social process words in their writing. However, among females, BMI was found to be a positive predictor of social process words, in that greater BMI was associated with a greater use of social process words in their writing. This finding, that among women, BMI was a positive predictor of use of social process words, contradicted the predicted hypothesis and current research. Obese individuals have been labeled by others as unattractive, ugly, weak, lazy, and unattractive individuals are avoided at higher rates than those who are rated as attractive (Brownell et al., 2005; Goldman & Lewis, 1977). Therefore, one might suspect that individuals with higher BMIs may suffer in their social relationships, considering that obesity stigma is frequently reported among interpersonal relationships (Puhl & Heuer, 2010) and that this effect may be detectable in participant's language. However, the finding that women with higher BMIs

actually reported greater proportions of social process words in their writing contradicted the hypothesis and current research, as overweight women have been rated as less likable than normal weight women and as a result, may be less socially connected to others (Miller, Rothblum, Barbour, Brand & Felicio, 1990). In an attempt to disentangle this relationship and potentially determine which sub-categories were responsible for this association, additional exploratory analyses were conducted that examined the sub-categories of ‘social processes’ in LIWC. However, these additional analyses failed to reveal any clear conclusions, in that BMI was not a significant predictor of component sub-categories of social words (i.e., friend, family, male references, or female reference words). Results from the qualitative analysis supported the finding that females with greater BMIs used higher proportions of social process words, as a common theme that emerged in the narratives was that interpersonal relationships were a commonly identified source of confidence in their body image and appearance. This observation supports the present study’s findings that in this sample, social relationships were not a source of strain and stigma, but instead served as sources of body confidence and positivity.

Furthermore, the exploratory analysis revealed that lifetime scores of weight stigma were found to be associated with the proportion of social process words in participant’s writing, in which higher scores of lifetime weight stigma were associated with a greater proportion of social process words. Again, this finding contradicts evidence from the existing literature that victims of weight stigma report being the subject of negative stereotypes due to their weight, and the suggestion that these negative stereotypes may impede an overweight or obese individual’s social relationships and interactions (Brownell et al., 2005; Papadopoulos & Brennan, 2015). However, this finding is consistent with the BMI findings, in that higher BMI was associated with a greater proportion of social process words. Perhaps, overweight and obese individuals

who reported greater weight stigma were found to include more social process words in their writing because these experiences led to social discomfort in their relationships, resulting in an internalization of negative feelings such as shame or an increased focus on their dissatisfaction with social relationships (Goffman, 1963). However, despite the literature suggesting that obesity stigma may result in an increased internalization of negative emotions, such as shame, the present study did not find a significant association between reported experiences of weight stigma and proportion of negative emotion words in participant's writing. Therefore, this finding may indicate that reports of weight stigma may be associated with increased use of social process words perhaps because individuals may dwell on their dissatisfaction with their social relationships, resulting in a greater proportion of social process words in their writing (Goffman, 1963). The exploratory analysis attempted to understand these results, but lifetime report of weight stigma and proportion of social process words were not found to be moderated by sex and none of the sub-categories of social process words produced significant results. Furthermore, the qualitative analysis did not provide support for this theory, as it suggested that within this sample, social relationships were a source of body confidence.

Scores of weight vigilance were associated with the proportion of perceptual process words in participant's writing. Perceptual process words (e.g. look, heard, feeling) were further broken down into the word sub-categories of 'feel,' 'see,' and 'hear' categories in LIWC. However, scores of weight vigilance were only significantly associated with the proportion of feel words (e.g. feels, touch) in participant's writing, while the associations between weight vigilance and the proportion of see words (e.g. view, saw, seen) and hear words (e.g. listen, hearing) were not significant. This finding is interesting, and consistent with the current literature, as weight vigilance is defined as frequently being aware of and looking out for weight-

related stressors in one's environment (Potter, 2018). Vigilance consists of anticipating stressors in one's social environment, and therefore, results in individuals showing heightened awareness of their surrounding environment (Hicken et al., 2013). The perceptual process category analyzes words related to observing, hearing and feeling and word use has been shown to reveal information about individual's perceptions, specifically with regards to social interactions (Tausczik & Pennebaker, 2010; Semin & Fiedler, 1988). Therefore, the fact that individuals who reported being more vigilant about their weight actually used more words relating to perceptions of feeling is interesting and reveals that individual's differences in perceptions may be able to be accounted for in the words they use to describe weight-related experiences. This finding was concordant with one of the observations made in the qualitative analysis, where many participants reported being vigilant about their weight in public settings, and included heightened perceptions of their environment, such as worrying about their appearance in photos and clothes and intentionally restricting their food for fear of being judged by others.

Scores of weight vigilance were not associated with participant's use of anxiety words (e.g. worried, fearful) in their writing. This finding is somewhat inconsistent with the current literature on vigilance. Although weight vigilance has not been extensively studied, the adverse health effects of vigilance are well-documented, revealing that continuously being on the lookout for threats in one's environment to one's self are associated with increased stress, behavioral changes, and negative mental health effects and detriments to well-being (Hicken et al., 2013). Therefore, it is suggested that vigilance due to one's weight status may also produce similar negative physical and psychological health outcomes (Potter et al., 2018). It was reasoned that individuals who report being more weight vigilant may use more anxiety words in their language to describe weight-related experiences if they are more prone to anticipating negative outcomes

and are more fearful and worried about the occurrence of these events. However, these findings indicate that this may not be the case, suggesting that weight vigilance is not associated with increased use of anxiety words in individual's writing. Perhaps individuals who are more weight vigilant look out for these events more often, but do not experience frequent weight stigma or discrimination that it translates to increased anxiety emotions in their writing.

It is important to note the nature of the writing instructions in the present study, as this may help explain some of the study's findings. Participants were instructed to write about the most salient or meaningful experience related to their weight during the larger, 7-day study, with emphasis on description of their experiences, including both the facts and the memories. Participants were also instructed to describe how the experience made them feel and to focus on their thoughts and emotions and reflect on the meaning of the experience. The writing prompt broadly encapsulated weight-related experiences, allowing participants to write about both positive and negative experiences related to their weight. Furthermore, the writing instructions asked participants to focus on one weight-related event or experience, perhaps making it less likely to capture weight stigma and the psychological consequences of stigma, especially if participants chose to write about a positive experience. Individuals may have a range of positive and negative weight-related experiences in a variety of different environments, but these experiences, and the psychological correlates of weight stigma, may not have been adequately captured in the present study as a result of the writing prompt's emphasis on one weight-related event.

Lastly, scores of body appreciation exhibited a statistical trend with regards to participant's use of negative emotion words in their writing (e.g. hurt, ugly, nasty), in that individuals who reported lower levels of body appreciation used a greater proportion of negative

emotion words. Furthermore, the sub-categories of negative emotion words were analyzed, including ‘anxiety,’ ‘anger’ and ‘sadness’ words. There was not a significant association between body appreciation scores and anxiety or anger words. However, a significant association was found between body appreciation scores and sad words, in that individuals who scored lower on body appreciation used a greater proportion of sad words in their writing about weight-related experiences. This finding is broadly consistent with the current literature. Body appreciation is defined as being respectful, accepting, and holding positive opinions toward one’s body (Tylka & Wood-Barcalow, 2015). However, body weight dissatisfaction has been linked to negative psychological functioning, such as depression (Richard, Rohrman, Lohse & Eichholzer, 2016). In addition, weight-based stigmatization and discrimination, such as negative stereotypes, physical barriers, and social rejection, have been shown to be damaging to obese individual’s body perceptions and predictive of indicators of psychological functioning, including body image and self-esteem (Friedman et. al., 2005). Although the frequency of reported weight discrimination in the study’s sample was surprisingly low (see below for additional discussion of this point), overweight and obese individuals may continue to harbor detrimental beliefs about their body, self-esteem, and body image that are perpetuated by society, exhibiting lower levels of body appreciation than normal weight individuals (Brownell et al., 2005; Weinberger, Kersting, Riedel-Heller & Luck-Sikorski, 2016). This decrease in body appreciation may result in individuals using a greater proportion of sad words when detailing weight-related experiences due to their increased body dissatisfaction.

Limitations

The present study is not without limitations. First, this research was limited by the sample obtained in the larger, 7-day study, the Weight Status and Health in Daily Life study. The sample was predominately young, college students due to the nature of subject recruitment, with the average age of the sample being 27 years old (Mean = 27.69). Although participants were recruited from both the Penn State University, University Park campus and the surrounding State College community and included individuals between the ages of 18 and 55 years old, the majority of participants in this study were young adults. Additionally, the sample was relatively small ($n = 48$), and thus, the present study's findings may not be generalizable to overweight and obese populations. Both of these factors have the potential to limit the generalizability of the study and may have limited statistical power in the present study to detect significant findings.

This research was further limited by the relatively low reported lifetime experiences of weight stigma and discrimination in the sample, as the average total score for the SSI was 0.69. This average total score for the SSI corresponds to participants reporting, on average, that they experienced these stigmatizing situations at a frequency between 'never' (0) and 'once in your life' (1) (Myers & Rosen, 1999). Therefore, the low total score of the SSI reported in the sample may have been too small to observe an effect with regards to the present study's hypotheses.

Another limitation of the present study is the inconsistency of the LIWC results. This likely resulted from the small study sample ($n = 48$) and the relatively small amount of written text. Participants' written text consisted of one 15-minute writing session, with the average word count of the narratives being 296 words. Many of the LIWC outputs showed results that were between 0.5% - 2% of the total words in the participant's written text; as such, there may not have been sufficient text to generate stable estimates of the LIWC word categories, especially the

sub-categories. Therefore, this limited data may have prevented the present study from detecting significant results.

Lastly, the design of computerized text analysis tools, such as LIWC, likely further limited the present study. LIWC groups certain words into over 90 categories. Despite the breadth of LIWC's internal dictionary that consists of over 6,400 words, LIWC's categories only recognize specific and precise words pre-programmed into the dictionary. Therefore, not every word that embodies each category is captured in LIWC's internal dictionary. Additionally, LIWC is unable to capture the context of the text files that are loaded into the software, and only group words based on their raw meaning, failing to capture words that have multiple meanings or vary by the context of writing. Therefore, using computerized text analysis tools such as LIWC to analyze language may lead to inaccurate assumptions about the overall meaning of written narratives, leading to limitations to the present study (Tausczik & Pennebaker, 2010). In an attempt to correct this limitation, a qualitative analysis of the participant's written responses to the writing prompt was conducted. Despite this additional analysis, the present study's findings likely remained limited by the precise nature of LIWC to analyze text files.

Implications and Future Directions

Despite the limitations mentioned above, the present study demonstrated the potential of linking environmental experiences and psychological processes such as weight stigma and weight vigilance and individual characteristics such as BMI and sex to written narratives about weight-related experiences. Furthermore, it is important to note that associations were found despite the present study's use of only one 15-minute written narrative from participants about

weight-related experiences. Therefore, this study suggests that it may be feasible and potentially informative to examine experiences related to weight, particularly weight stigma and discrimination, through an individual's language in narratives to learn about psychological processes, emotional states and health status. The following future directions are suggested to expand upon the findings of the present study.

Obesity stigma and discrimination remain widely neglected areas of research, despite their reported prevalence in the population (Puhl & Heuer, 2010). Computerized text analysis tools, such as LIWC, should be used to further study obese and overweight populations who may be vulnerable to discrimination. Various types of populations need to be studied further to better understand the implications of weight stigma and discrimination. First, populations ranging in age should be studied in order to differentiate age-related differences in weight-related experiences. Second, populations who may report more frequent experiences of weight stigma and discrimination should be studied further. Extremely obese individuals are one example population that need to be studied further, as they report more frequent experiences of weight stigma and report the greatest detriments to psychological functioning (Carr & Friedman, 2005). However, research indicates that even normal weight individuals report experiencing forms of weight stigma and discrimination (Puhl, Andreyeva, & Brownell, 2008). Therefore, perhaps individuals in various weight categories should be studied further in order to understand the frequencies and differences of these weight-related experiences, and the effects these events may have on individuals. Third, larger study samples of individuals should be obtained to more reliably generalize the results. Lastly, future studies should implement changes to the writing protocol, including the implementation of longer durations of writing sessions over consecutive days in order to obtain greater amounts of written text for analysis and more reliably detect

significant results. These future directions will allow researchers to begin to understand how overweight and obese individuals experience weight-related events in an attempt to reduce the adverse health effects associated with weight stigma and discrimination.

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ACADEMIC VITA

Jillian Barton

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EDUCATION

The Pennsylvania State University, University Park, PA

May 2019

The Schreyer Honors College

Dean's List (7/7 Semesters)

Bachelor of Science in Biobehavioral Health

Minor in English

RESEARCH EXPERIENCE

Undergraduate Research Assistant

University Park, PA

Stress, Health and Daily Experiences (SHADE) Laboratory

March 2017 – Present

- Assist in the design and implementation of research protocols in a study to examine how experiences of weight stigma and discrimination may influence health
- Recruit, schedule and interact with about 50 research participants for data collection
- Perform literature searches and synthesize empirical and review articles on topics related to health

Undergraduate Research Assistant

University Park, PA

Disparities Related to Individual Variance in Executive Functioning and Stress Laboratory

June – August 2018

- Assisted in a study investigating the neurological, biological, and behavioral pathways through which emotions and cognitive abilities relate to health
- Conducted 4-hour study visits and administered a variety of neuropsychological tests to participants
- Scored neuropsychological tests & entered data in Microsoft Excel

LEADERSHIP

President

University Park, PA

Panorama – Official Student-run Online Publication

January 2016 – Present

- Oversee all organizational operations to ensure club mission is achieved
- Prepare and lead weekly organizational meetings of 20 members and communicate with all club members, editors, web and marketing team members to ensure responsibilities are met
- Delegate tasks to members and content managers to ensure publication deadlines and organizational goals are met

Member

University Park, PA

Women's Leadership Initiative

August 2017 – May 2018

- Selected to be among 35 student leaders in The College of Health and Human Development based on academic performance, leadership potential, and service to campus and community
- Developed knowledge of self and others, gained awareness of common leadership issues and practiced leadership skills through a semester-long service project
- Enhanced knowledge of leadership capacity and expanded on ability to develop leadership capacity in others

Member of the Biobehavioral Health Society & the Health and Human Development Honor Society

ADDITIONAL EXPERIENCE

Cashier

Gillian's Wonderland Pier

Ocean City, NJ

June – August 2017

Camp Counselor

Stony Creek Day Camp, Whippen Township Parks & Recreation

Blue Bell, PA

June – August 2016