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## Physiological and Psychological Effects of Being Weighed in Female Participants

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# **Physiological and Psychological Effects of Being Weighed in Female Participants**



Honors Thesis

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Advisors: Jacob Burmeister, Ph.D. and Lee Dixon, Ph.D.

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## Abstract

Stressful experiences such as constantly thinking about one's weight lead to harmful long-term physiological and psychological effects on the body. Many studies have examined the presence of weight stigma in society at large, but fewer studies have sought to determine the physical and psychological outcomes of that stigma. In the short-term, even momentary stressors could have an impact on factors such as blood pressure, for example when patients are stressed due to weighing before blood pressure is measured. This study tested whether female participants' (N = 55) attitudes about their bodies, anxiety levels, and blood pressures were affected by being weighed. The participants were 55 female undergraduate students from the University of Dayton who were enrolled in introductory psychology courses, or some other course that required research participation. It was hypothesized that being weighed would produce negative outcomes on measures of blood pressure, body satisfaction, self-esteem, and anxiety. Results of a one-way ANOVA indicated that these factors did not differ for participants who were weighed just prior to measurement compared to those who were weighed after. Thus there may be some limits to "white coat syndrome," which is the phenomenon of a patient having higher blood pressure readings when in the presence of a physician or other medical staff. Factors such as the setting and demographic of the person obtaining the measures could be relevant. Pearson two-tailed correlations revealed several significant predictors of high body mass index.

## Acknowledgements

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## Introduction

Stressful experiences such as constantly thinking about one's weight lead to harmful long-term physiological and psychological effects on the body. Many studies have examined the presence of weight stigma in society at large, but fewer studies have sought to determine the physical and psychological outcomes of that stigma (Major, Eliezer, & Rieck, 2012). While some health professionals argue that weight stigma can result in healthier outcomes, a major literature review revealed that weight stigma is consistently associated with poorer mental and physical health (Hunger, Major, Blodorn, & Miller, 2015). As is the case with all other types of stigma, few positive results come out of stigmatizing people about their weight (Pearl, Dovidio, Puhl, & Brownell, 2015). Weight stigma is oftentimes more culturally acceptable than other types of stigma, making it an aspect of stigma that is essential to study (Tomiyama, 2014). Correlations between negative psychological outcomes and weight stigma have been observed, and new research findings suggest that weight stigma could also be associated with other health outcomes (Schvey, Puhl, & Brownell, 2014) such as high blood pressure, which may soon become a problem in individuals of increasingly younger ages (Matthews & Salomon, 2005). Physical and psychological implications of weight stigma are both of great importance, especially if the experience of being weighed can induce feelings of stigmatization.

Experiencing weight stigma is physiologically stressful (Hunger, Major, Blodorn, & Miller, 2015), which could have severe consequences for patients and healthcare providers if a causal relationship exists between being weighed and physiological problems, such as higher blood pressure. Stressful experiences that might include being

weighed at a doctor's office regularly, or constantly thinking about weight can lead to harmful long-term physiological effects on the body (McEwen, 1998); therefore, it is important to ensure a safe environment for people being weighed. Weight stigma is also associated with increased risk for obesity, which could undermine weight loss attempts or positive lifestyle changes (Tomiya et al., 2014). Major, Eliezer, and Rieck (2012) conducted a study during which they had women describe why they would make a good dating partner; half of the women believed they were being videotaped, while the other half believed they were being audiotaped. The experiment found that overweight women who believed they were being videotaped had significantly higher blood pressures than women who were overweight, but believed that they were being audiotaped. In another study, Tomiyama et al. (2014) found that weight stigma was significantly related to increased levels of cortisol and oxidative stress, independent of a person's amount of abdominal fat. These results reiterate the idea that weight stigma can be stressful physiologically.

Experiencing weight stigma is psychologically stressful as well (Hunger, Major, Blodorn, & Miller, 2015). One study found that perceived weight stigma was significantly correlated with psychiatric morbidity and comorbidity, even after controlling for BMI (Hatzenbuehler, Keyes, & Hasin, 2009), suggesting that weight stigma can have a significant psychological effect regardless of actual weight. Duarte et al. (2017) suggested that weight stigmatization is associated with feelings of shame, guilt, self-criticism, and inferiority.

In the short-term, even momentary stressors could have an impact on factors such as blood pressure. This study tested whether female participants' attitudes about their

bodies, anxiety, and blood pressure were affected by being weighed. It was hypothesized that being weighed would produce negative outcomes on blood pressure and body satisfaction, self-esteem, and anxiety. Understanding the ways in which weight stigma can be psychologically stressful is essential for healthcare providers in order to neither create, nor exacerbate, psychological issues in patients. Additionally, it is crucial for researchers in the field of psychology to understand so as to continue researching how weight stigma functions in people on a psychological level.

## **Methods**

### **Participants and Procedures**

The participants in this study were 55 female undergraduate students from the University of Dayton who were enrolled in introductory psychology courses, or some other course that required research participation. Each participant was granted research credit for participating. All participants read and signed the informed consent before participating in the study. In both participant groups, the questionnaires were presented in the order of the Rosenberg Self-Esteem Scale, the State-Trait Anxiety Inventory for adults, and a series of visual analog scales measuring body satisfaction. There were 25 participants in the control group, which had the three questionnaires administered first, blood pressure/pulse taken, and height and weight recorded last. The alternative group with 30 participants had their height, weight, and blood pressures/pulses taken, and were then given the three questionnaires. Body mass index was calculated for each participant and a Pearson two-tailed correlation was used to assess correlations between BMI and each of the other variables.

## Measures

**Rosenberg Self-Esteem Scale** (Rosenberg, 1965). This ten item inventory was used to measure self-esteem. This scale is a well-known, reliable, and valid measure of self-esteem that had participants rate on a four point Likert-type scale how much they agreed or disagreed with statements about self-esteem. Answer choices ranged from ‘strongly agree’ to ‘strongly disagree.’ Higher scores indicated higher self-esteem, with some items having been reverse-scored.

**State-Trait Anxiety Inventory for adults** (Spielberger, 1997). This 40-item questionnaire asked participants to read various statements related to anxiety and indicate how they feel about each statement at that particular moment on a scale of ‘Not at all’ (1) to ‘Very much so’ (4). A cumulative score was calculated for each participant with higher scores indicating more situational anxiety.

**Visual Analog Scales** (Ogden & Sherwood, 2008). These scales consisted of nine items that asked participants to rate the degree to which they related to nine statements ‘right now’ on body attractiveness, body shape, and the desire to lose weight on a scale from ‘Not at all feeling like this right now’ (0) to ‘Very much feeling like this right now’ (100). Participants were asked to mark with a pen or pencil on a line from 0 to 100 where they were on each scale in that moment. The nine items were further subdivided into three categories: three items about attractiveness, three items about fatness, and three items about desire to change body shape/size. The responses to each of the three questions within each subscale were combined for each participant to provide three distinct scores for each subscale for each participant.

## Results

Five participants were excluded from analysis because of incomplete data, resulting in a total of 50 female participants. Table 1 displays descriptive statistics in the form of the means and standard deviations of each group.

Table 2 displays the results of a one-way analysis of variance between the two groups. The one-way ANOVA indicated that there were no significant differences between the groups on any measures; therefore, the hypothesis that being weighed would produce negative outcomes on blood pressure and body satisfaction, self-esteem, and anxiety was not supported. The largest difference between the two groups on any of the variables was the mean scores on the “desire to change body” subscale of the visual analog scale ( $F = 2.379, p = 0.130$ ).

Table 3 displays the results of a Pearson two-tailed correlation analysis of body mass index with each of the variables. Significant correlations were found between BMI and blood pressure ( $r = 0.518, p < 0.01$ ), mean attractiveness scores ( $r = -0.339, p < 0.05$ ), mean fitness scores ( $r = -0.502, p < 0.01$ ), and mean desire to change body scores ( $r = 0.612, p < 0.01$ ).

## Discussion

This project intended to explore a causal relationship between being weighed and some physical and psychological variables. The results indicated that there were no significant differences on any measures between the two groups of participants; therefore, the hypothesis that participants who were weighed first (experimental group) would have more negative outcomes on blood pressure measures/pulse readings, anxiety and self-esteem measures, and body satisfaction measures than participants who were weighed last (control group) was not supported.

These findings contradict previous research that suggests that there are negative psychological effects that result from being weighed, such as the cycle of weight stigma that one may experience, leading to stress, increased eating, and increased cortisol. These lead to more eating, and ultimately weight gain, which is where the stigma began in the first place, perpetuating a relentless cycle (Tomiya, 2014). More research into the main triggers of this cycle and how to break it is needed. One study also found that coping mechanisms in response to weight stigma play a key role in healthy physical and psychological behaviors (Himmelstein, Puhl, & Quinn, 2017). The ways different individuals choose to cope with experiencing any kind of weight stigma is another area of research that should be explored in conjunction with the results of this study.

Previous studies have also found that there may be negative physiological effects as a result of being weighed, especially by a medical professional, such as elevated blood pressure (Schvey, Puhl, & Brownell, 2014). This phenomenon has been so prevalent in cases of hypertension, it has been deemed “white coat syndrome,” indicating that patients’ blood pressures may spike when being taken in the presence of a medical

professional. Research into whether or not this phenomena is truly valid, or whether it has some sort of limit, is essential.

Pearson (2-tailed) correlations revealed a positive correlation between BMI and blood pressure ( $r = 0.518, p < 0.01$ ), which is consistent with findings from another study that analyzed women's BMIs and blood pressures (Major, Eliezer, & Rieck, 2012). Significant correlations were also found between higher BMIs and lower mean attractiveness scores ( $r = -0.339, p < 0.05$ ), lower mean fatness scores ( $r = -0.502, p < 0.01$ ), and higher mean desire to change body scores ( $r = 0.612, p < 0.01$ ). In other words, female participants with higher BMIs felt that they were less attractive and fatter than those with lower BMIs. Participants with higher BMIs also had a much higher desire to change their bodies. These findings support prior research that states that weight stigma can be very psychologically damaging (Hunger, Major, Blodorn, & Miller, 2015).

### **Implications**

The results of this study hold implications for all workers in the healthcare field. This study supports the idea that weight stigma could lead to severe psychological health consequences; therefore, it is fundamental that healthcare providers have a deep understanding of all aspects of weight stigma and the effects that it can have on overall health. In addition, weight stigma is a widespread public health issue that well-informed individuals should be aware of. This project adds to the body of knowledge that attempts to understand weight stigma and its individual physiological and psychological effects.

### **Limitations**

There are many limitations to undergraduate thesis projects with the strict time constraints and limited funds for materials. The small sample size of 50 participants in this study is an important limitation. The difficulty in generalizing these findings to the

broader population is limiting as well. All of the participants were young women attending a private undergraduate institution, making them fundamentally different from the rest of women in the general population at large in key ways. Since all of the participants were college-age, it is possible that negative psychological or physiological effects of being weighed in women may appear in middle-aged or older women, rather than young women in their late teens and twenties. Lastly, one of the biggest limitations of this study was the reliance on mechanical equipment, including the scale and blood pressure/pulse monitor. The weight, blood pressure, and pulse data is only as reliable and valid as the machines are. The height measurements were taken by hand, and were therefore subject to the possibility of human error or inaccuracy.

### **Future Research**

Future research must continue to understand the physiological and psychological effects that being weighed might have on people, contributing to the larger issue in our society of weight stigma. Stigma of any kind is often perpetuated between an individual and society, creating a vicious cycle that is difficult to escape (Tomiya, 2012). Research needs to look more closely at women of different age groups and discern how being weighed may impact them psychologically and physiologically. It is also important to try to understand what role body mass index might play in the psychological and physiological outcomes of being weighed. A stronger emphasis for future research should also be placed on how stigmatizing thoughts and actions from others in society, and within the individual, impact women specifically, since they experience a tremendous amount of stress and pressure in regards to weight and body appearance (Major, Eliezer, & Rieck, 2012). The ultimate goal of future research on weight stigma in women should

be to fully understand it to the point where thoughts, attitudes, and actions can be changed in society to eradicate weight stigma.

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## Appendix

Table 1

### *Descriptive Statistics*

| Variable                         | Control Group |          |    | Treatment Group |          |    |
|----------------------------------|---------------|----------|----|-----------------|----------|----|
|                                  | M             | SD       | N  | M               | SD       | N  |
| BP                               | 117.9524      | 11.21372 | 21 | 117.6552        | 8.87724  | 29 |
| Pulse                            | 78.9048       | 16.92012 | 21 | 73.6207         | 13.39620 | 29 |
| Esteem                           | 29.4762       | 4.69330  | 21 | 29.2069         | 4.69330  | 29 |
| Anxiety                          | 88.0000       | 29.06200 | 21 | 90.0690         | 24.14825 | 29 |
| Mean Attractiveness Score        | 46.9524       | 23.42062 | 21 | 40.0230         | 20.50028 | 29 |
| Mean Desire to Change Body Score | 46.7937       | 35.21923 | 21 | 61.9080         | 33.45690 | 29 |
| Mean Fatness Score               | 52.8095       | 25.48280 | 21 | 45.4253         | 24.03798 | 29 |

Table 2

*One-Way ANOVA Analysis*

|                                  | F     | Significance |
|----------------------------------|-------|--------------|
| Variable                         |       |              |
| Blood Pressure                   | 0.011 | 0.917        |
| Pulse                            | 1.518 | 0.224        |
| Esteem                           | 0.036 | 0.851        |
| Anxiety                          | 0.075 | 0.785        |
| Mean Attractiveness Score        | 1.235 | 0.272        |
| Mean Desire to Change Body Score | 2.379 | 0.130        |
| Mean Fatness Score               | 1.093 | 0.301        |

Table 3

*Partial Table of Pearson Correlations with Body Mass Index*

|     | Mean Attractiveness Score | Mean Desire to Change Body Score | Mean Fatness Score | Blood Pressure |
|-----|---------------------------|----------------------------------|--------------------|----------------|
| BMI | -0.339*                   | 0.612**                          | -0.502**           | 0.518**        |

\*. Correlation is significant at the 0.05 level (2-tailed)

\*\* . Correlation is significant at the 0.01 level (2-tailed)