Distribution Agreement

In presenting this thesis as a partial fulfillment of the requirements for a degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis in whole or in part in all forms of media, now or hereafter now, including display on the World Wide Web. I understand that I may select some access restrictions as part of the online submission of this thesis. I retain all ownership rights to the copyright of the thesis. I also retain the right to use in future works (such as articles or books) all or part of this thesis.

Hannah Lerner April 02, 2014

Social Influence and Weight Misperception in Overweight and Obese Young Adult Women

by

Hannah Lerner

Dr. EunSeok Cha, PhD, MPH, MSN, CDE, RN
Adviser

Department of Biology

Dr. EunSeok Cha, PhD, MPH, MSN, CDE, RN
Adviser

Dr. Arri Eisen, PhD
Committee Member

Dr. Christopher Beck, PhD
Committee Member

Amanda Mummert, MA
Committee Member

April 2014

Social Influence and Weight Misperception in Overweight and Obese Young Adult Women

By

Hannah Lerner

Dr. EunSeok Cha, PhD, MPH, MSN, CDE, RN

Adviser

An abstract of
a thesis submitted to the Faculty of Emory College of Arts and Sciences
of Emory University in partial fulfillment
of the requirements of the degree of
Bachelor of Sciences with Honors

Department of Biology

2014

Abstract

Social Influence and Weight Misperception in Overweight and Obese Young Adult Women

By Hannah Lerner

Aim: The purpose of this study is to explore the effect of social influences on body image disturbance in young adult women. Specifically, we examined the perception accuracy of overweight and obese young adult women considered by friend group BMI.

Methods: Participants were recruited from the greater Atlanta area using paper flyers placed in 8 colleges and universities, and e-flyers through a university email list, as part of a larger study of the development of diabetes prevention in young adults. For the current study, data from 43 young adult women aged 18-29 were used. Anthropometric assessment by a trained nurse was performed to obtain BMI. The Body Image Assessment Tool- Body Dimension (BIAS-BD) assessed perceived and ideal body sizes for individuals and peers. Descriptive statistics and a two-way analysis of variance (ANOVA) was performed on perception accuracy and friend group BMI.

Results: Participants that were categorized as overweight had a significantly higher mean misperception (-6.009) than obese 1 and obese 2 and 3 participants (-2.784, .6744), $F(2,40) = 11.291$, $p=.000$. There is no statistically significant difference between mean ideal BMI between the young women with normal and overweight/obese friend groups ($t=-.654$, $p=.528$). Friend group BMI also did not play a statistically significant role in perceived BMI or perception accuracy ($t=-.238$, $p=.813$; $t=.168$, $p=.867$).

Conclusion: This study was the first to attempt to understand the effect social influence has on weight misperception in young adult women. This study offered the first look into how peer BMI affected young adult women's weight misperception. Clinicians should be aware of the differences in perception accuracy of overweight and obese women. They should create an atmosphere of weight loss that can support overweight women to accurately perceive their body image. For obese women, interventions should target increasing body dissatisfaction and self esteem not perception accuracy.

Social Influence and Weight Misperception in Overweight and Obese Young Adult Women

By

Hannah Lerner

Dr. EunSeok Cha, PhD, MPH, MSN, CDE, RN

Adviser

A thesis submitted to the Faculty of Emory College of Arts and Sciences
of Emory University in partial fulfillment
of the requirements of the degree of
Bachelor of Sciences with Honors

Department of Biology

2014

Acknowledgements

I would like to thank everyone who helped me through out this experience. Firstly, to my advisor Dr. EunSeok Cha who has been my mentor and guide for the past three years. You have helped me become the person I am today and have guided me in achieving all of my goals. Thank you to Bryan Klapes who has spent many hours teaching me statistics and guiding me through interpreting and using them in this paper. I would also like to thank Amanda Mummert who took so much time out of her busy schedule to look over all my drafts and send me many good ideas and articles. Thank you to Dr. Arri Eisen and Dr. Christopher Beck for taking the time to be on my committee. Thank you Dr. Kevin Kim for assisting me in interpreting the data. Finally, I want to thank my family and friends for supporting me throughout the process.

Table of Contents

List of Figures and Tables

Introduction

Young adulthood is a transition period when social influences are shifting [1]. In this period, young adults are leaving the home to go to college or enter the work force. The influential people that determine their health beliefs and behaviors change from predominately parents to peers during this window of vulnerability [2]. In childhood, family is the major target for interventions as they are the child's most important social mediator of obesity [3]. This changes in adolescence when the media and peers become as important as the family as social influences [4, 5]. For instance, overweight adolescent girls are more likely to be friends with more overweight girls than normal weight girls [6]. In addition, adolescents and adults with obese friends are more likely to become obese [7]. Finally in adulthood, social influences shift once again to partners and peers [8]. The shift in social influences during young adulthood may significantly contribute to risky weight gain and health behaviors. As young adults are generally perceived as healthy and stable, many studies on the social influence of health behaviors overlook young adults despite their vulnerability to potential health risks such as weight gain during this period [1].

During this transition, obese young adults are at risk for having a negative body image that could lead to other health concerns [9]. In particular, obese young adult women are more affected by body image issues than men [10]. There is a need to examine how social influence affects body image in overweight and obese young women since these women are encountering both the difficulty of emerging adulthood as well as facing negative body image issues. Understanding how social influence affects the body image of young women will contribute to the planning of future interventions that aim to promote health in overweight and obese young

women. This paper will work to add to the literature concerning how social influence effects body image in young adult women by accomplishing the following specific aims:

Aim 1: Examine the difference between perceived and actual body size in overweight and obese young adult women.

Aim 2: Understand how peer BMI affects young adult women's body perception.

Background

The Obesity Epidemic in American Young Adults and its Health Effects

The 31.9% of American women between the ages of 20-39 who are obese (BMI >30) are at an increased risk for many health problems because of their weight [11]. As BMI increases so does an individual's risk for type 2 diabetes, hypertension, and coronary heart disease [12, 13]. Since these health issues start later on in life, obese young adults may not think about their health. At this age, both normal and obese adults appear to have the same clinical health status [14]. Given this, neither practitioners, family members, nor themselves may recognize the health issues and concerns with being obese at this young age. The majority of obese young adults perceive themselves to be healthy but are only leaving themselves at risk to acquiring health problems later on.

Physical health problems are not the only risks associated with obesity in young adulthood. Many overweight and obese young adults encounter social discrimination throughout all facets of their lives, in schools, in the media, and in the workplace [10]. For example, studies show that overweight and obese young adults are more likely have lower education levels [15, 16]. They are also less likely to be married and have lower incomes [15]. Since young adulthood is a time of transition as young adults leave their family home and enter college or the workforce, obese and overweight young adults may be at an increased vulnerability to this discrimination.

For these reasons, it is crucial for them to create health habits now. This age should be targeted for weight loss interventions to allow young adults to lose weight while they are young and live without this discrimination.

Obesity and Social Influence

The importance of social networks and social influence on the spread of obesity has largely been left out of research on the obesity epidemic, though among adults some research has identified that obesity can be spread through friends, siblings, and partners [8]. This means that the people closest to an individual can influence their weight gain and disease incidence. One possible mechanism to explain how obesity is spread through social networks is changing social norms. Social norms are the implied but often unsaid rules that cause people to behave like those around them [17]. In the case of obesity, as the average body mass index (BMI) of Americans increase, people may reevaluate what normal is leading to obesity becoming normalized. People that normalize obesity are more likely to under assess their weight status and not correctly recognize themselves as overweight [18]. This mechanism is one way that social influence is able to spread obesity in adults.

Social norms can also influence young adults who are transitioning into new lives in different places with different friends. For example, female college students who moved from Japan, an area with a lower average BMI, to the United States, an area with a higher average BMI, shifted their ideas on body image to idealize larger body sizes than they had wanted two months earlier when they first arrived in the US [19]. Since social networks can effect the spread of health ideas and behaviors that can cause obesity, understanding which of these social factors, like social influences and social norms, in young adults lead to the spread of obesity is a good place to begin to target age-specific interventions to prevent the spread of obesity.

Body Image in Overweight and Obsese Young Adults

Body image is described as how a person thinks or feels about their body [20]. When individuals have a negative body image, they are more likely to have body dissatisfaction and body misperception. Body dissatisfaction is a problem where people dislike their body and desire it to be different [20]. Lower body satisfaction during adolescence is a predictor of becoming overweight as a young adult [21, 22]. Body misperception, another issue associated with body image, is when overweight or obese individuals can't correctly recognize their body size [23]. Body image and its associated problems are increasingly becoming common among obese and overweight individuals [9, 24].

There are differences in body dissatisfaction by gender, race, and level of obesity. As individuals become more obese, body dissatisfaction proportionally increases [10]. Females and Caucasians are more likely to have higher body dissatisfaction than males and other races [10]. Considering the fact that body misperception and body dissatisfaction are common among all strata of obese and overweight individuals understanding the health problems associated with them are necessary.

Body dissatisfaction can lead to a number of varying health problems for individuals through out their lives. Among adolescents, lower body satisfaction is correlated with many unhealthy behaviors like binge eating, smoking, and reduced physical activity [20, 25, 26]. Other mental health issues, including depression and low self-esteem, are also associated with body dissatisfaction [24, 26]. Treating the multitude of factors that cause body dissatisfaction could ameliorate many of these secondary health issues.

Like body dissatisfaction, obese individuals are more likely to misperceive their body size than normal weight individuals [10, 27]. However, as BMI increases, overweight and obese

individuals are more likely to accurately perceive their body size [28]. These individuals may be too large to ignore their weight status. Other overweight obese individuals who don't accurately perceive their weight status can either under assess or over assess it. Men, African Americans, and people with no undergraduate degree are most likely to under assess their body size [9, 28, 29], whereas women and Caucasians are more likely to over assess their body size [28].

Although body misperception may cause significant health issues for young adults suffering from them, many overweight and obese young adults do not recognize their misperception [9]. Neither over assessing nor under assessing your body size is beneficial to young adult health. Studies show that individuals that under assess their weight are less likely to attempt to or be motivated to lose weight [9, 29]. They are also more likely to believe that being overweight or obese is not a health risk [9, 29]. This misperception can lead to a perceived satisfaction with their current health but this contentment could be mitigating the real health risks of being overweight [9, 23]. On the other hand, overweight and obese young adults who over assess their weight status are at an increased risk to practice unhealthy dieting habits [30].

Body Image and Social Influences in Obese and Overweight Young Adults

The Social Comparison Theory hypothesizes that people are more likely to compare themselves to those who they are most similar to [31]. For obese and overweight young adults, this theory provides direction to show that young adults would be most likely to compare their body sizes to their peers and friends. In fact, a study evaluating college students showed that they were most likely to compare their bodies to the general population and not to models or athletes [32]. If overweight and obese young adults are surrounded by mostly overweight and obese peers, they could evaluate their body size and health directly to similar peers and be more satisfied with their body size. However, if their peers are mostly normal weight, they may not be

able to accurately perceive their body size and be dissatisfied with their current body [31]. This mechanism could explain the way that obesity and body image issues are spread through social groups.

Social norms influence many health behaviors. A study by Crandall demonstrated that among college women binge eating was being spread through social groups [33].The length of the friendship affected how alike the friends became in their binge eating behaviors. The longer the girls were friends the more alike their binge eating was. Crandall concluded that social norms and modeling were what caused the women to conform to the binge eating norms of the group. If binge eating and obesity can be spread through friend in young adults, it would not seem implausible that body image could also be transmitted through social influences. While adolescents have been thoroughly studied, few studies have looked into the spread of body image ideas through social influences in young adults.

Adolescent studies have shown friend groups have similar levels of body image concerns and unhealthy dieting behaviors. A study by Paxton et al., examined the effect adolescent friendships had on body image and found that for these girls, friendship groups had similar scores for body image concern, dietary restraint, and frequency of extreme weight loss behaviors [24]. The friendship groups that were more likely to report more significant body concerns were friends that had higher BMIs and friends who talked more about weight loss. Additionally, they described their friends as a source of influence, made more frequent comparisons about their bodies within the circle, perceived their friends as concerned about weight loss, and were more likely to participate in peer weight-related teasing [24]. It is not well known if this is because girls with similar background ideologies are more likely to become friends, or if it is because these girls became more like each other after they became friends.

A recent study investigated if the similarity in body dissatisfaction among adolescent friend groups was spread by selection or socialization. Rayner et al. found that girls selected for new friends that had comparable levels of body image concern to themselves [34]. This study also showed that the level of body dissatisfaction was mediated by friendships through this selection process. These studies show that there is an important connection between social influence and body image. The way people view their bodies is dependent on the people around them.

A review of the literature found that social influences can affect both obesity and body dissatisfaction, but it did not show any articles that looked at how social influence and body misperception were associated, especially in young adult women. Incorporating the previous literature with what we still don't know, Figure 1 guided this study's conceptual framework. In this study, we hypothesized that among the study group of young adult women, actual, ideal, and perceived body size would vary in relation to peer group BMI.

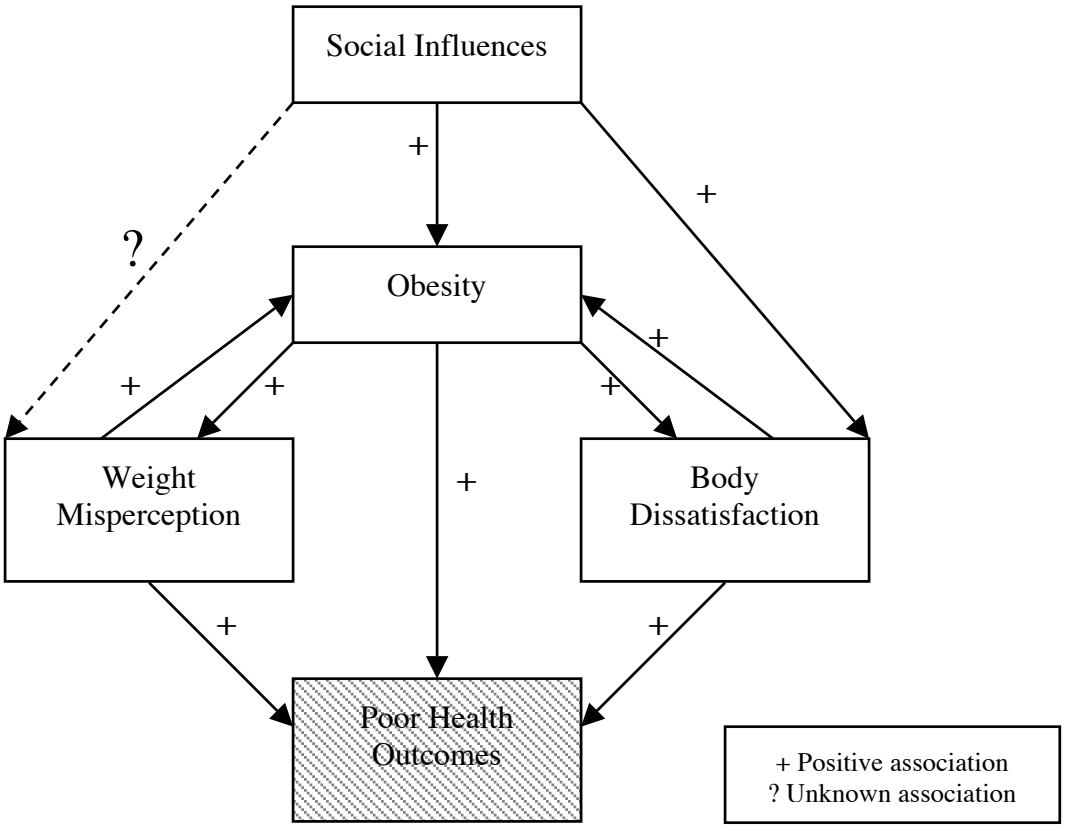

Figure 1. Conceptual Framework

Method

Recruitment and Eligibility Criteria

Participants were recruited from the greater Atlanta area as part of a larger diabetes prevention study after approval from the Emory University Institutional Review Board [35]. Recruitment flyers were placed at eight universities and colleges as well as in the waiting rooms of diabetes clinics. Electronic versions of these flyers were also emailed to a mailing list of all undergraduates at one university. Additionally, participants were recruited by self-referral through individuals who had already volunteered to participate. Participants were excluded from the study if they were pregnant or following a physician supervised exercise or diet regimen. The parent study included males and females who were between the ages of 18-29, overweight (BMI 25-29) or obese (BMI>30), and exercised less than 90 minutes per week. Since the majority of the participants in the parent study were females, we focused on female young adults in this sub-study. Additionally in this study, we individuals with a BMI of higher than 39.5 were excluded due to the limitations of the Body Image Assessment Tool-Body Dimension (BIAS-BD) (see more details in the measurement section).

Variables and Measures

Actual body size was collected by measuring the BMI of the participant. When participants attended a diabetes screening test at one of two hospitals in the greater Atlanta area. The screening included a height and weight assessment conducted by research nurses. BMI was calculated as weight in kilograms divided by height in meters squared.

The Body Image Assessment Tool-Body Dimension (BIAS-BD) was used to measure the perceived body size and the ideal body size of the participant. This tool has been used and validated [36] and asks participants to select from 34 contour body figure drawings 17 males

figures and 17 female figures. The contour body figures range from having BMIs of 16.92 to 39.48 for the female figures and 16.68 to 38.92 for the male figures [36]. Participants were asked to identify which figure they felt correlated with their current body size and their ideal body size.

The BIAS-BD was also used to find the average BMI of each participant's social influences. The survey asked participants to identify the top three influential male and female relationships in their social circles and which figure drawing best represented the physical appearance of this person. The relationships that were used in this study were relationships identified as "friend", "peer", and "roommate". These were selected because they fit within the study's definition of a peer: someone who is specified by the participant to be influential and within the same age range as the individual [37, 38]. This was believed to be the best way to identify friend groups because self-identification of peer groups is most important when determining the social influence of the group on the individual [37]. After calculating the BMI of each person in the participant's peer group, the average BMI was found. The peer groups were then categorized as normal (BMI<25) or overweight/obese (BMI≥25).

Statistical Analysis

The data was analyzed using the software program IBM SPSS software. Participants were stratified into three groups: Overweight (25≤BMI<30), Obese 1 (30≤BMI<35), and Obese 2 (35≤BMI≤39.48). Friend groups were split into two groups: Normal (BMI<25) and Overweight/Obese (BMI≥25). Perception accuracy of weight status was calculated by subtracting actual BMI from perceived BMI. Negative numbers would indicate that the participants perceived themselves to be larger than they actually were and positive numbers would mean they believed they were smaller than they actually were. To assess perception accuracy between different BMI categories, a one way ANOVA test was used. To compare

differences between friend groups for mean ideal body size, actual body size, perceived body size and perception accuracy two sample significance tests about a mean were performed. A two way ANOVA was used to see how friend groups affect perception accuracy of individuals by varying BMI category.

Results

Descriptive Statistics

The larger diabetes prevention study enrolled 126 male and female participants who were between the ages of 18-29, overweight or obese, and exercised less than 90 minutes per week. However, males and young adults with a BMI of greater than 39.5 were excluded from this study. Thus, 43 female young adults with a BMI range of 26.79 to 38.76 were used in the final data analysis. Participants' characteristics and their social network means are presented in Table 1. On average, participants were 23.85 years old with a BMI of 32.74. They generally perceived themselves to be obese, but identified themselves as having a BMI almost 3 points higher than was actually observed among subjects (BMI: 35.51, difference of -2.72). The average ideal body size was overweight (BMI: 25.6). Average BMI of the social groups that the friends reported was slightly overweight (BMI: 26.70).

Table 1.
Descriptive Statistics for Individual Characteristics and Social Network

Variable	N	Mean	Min.	Max.	St. Dev.
Age (years)	43	23.85	19.59	29.71	3.44
Actual Body Size (BMI)	43	32.74	26.79	38.76	3.02
Perceived Body Size (BMI)	43	35.51	22.56	39.48	3.70
Perception Accuracy of Body Image	43	-2.719	-11.66	8.37	4.21
Ideal Body Size (BMI)	41	25.62	16.92	36.66	4.60
Total Friend Group Perceived BMI (BMI)	41	26.70	18.89	37.09	4.14

Note. Incomplete surveys led to sample sizes of less than 43 for ideal body size and Total Friend Group Perceived BMI.

Accuracy of Actual Body Size Perception

A one-way ANOVA tested for differences in perception accuracy between the three weight categories into which the participants were stratified, finding that perception accuracy was significantly different across the three categories (See Table 2: $F(2,40)= 11.29$, $p<.001$). Participants that were categorized as overweight had a significantly higher mean weight status

misperception than obese 2 individuals (μ_{dif}=-6.68, p<.001). Obese 1 participants had a significantly higher mean misperception than obese 2 and 3 pariticpants (μ_{dif}=-3.46, p<.001). The obese 2 group documented the lowest misperception (μ=.67).

Table 2.
One-Way ANOVA Results and Descriptive Statistics for perception accuracy of body size by actual body mass index category

BMI category	Perception accuracy of body image			
	Observed Mean	SD		n
Overweight (25≤BMI<30)	-6.01	4.23		12
Obese 1 (30≤BMI<35)	-2.78	3.59		19
Obese 2 (35≤BMI≤39.48).	.674	2.06		12
Source	df	MS	F	η^2
BMI category	2	134.08	11.29***	.36
Error	40	11.88		

Note. The assumption of homogeneity of variance has been violated, evidenced by a significant Levene's test, $F(2,40)= 3.89$, $p= .029$. Independent t-tests assuming non-equal variances show significant differences between 3 groups. Post-hoc observed power, computed using α = .05, is .99. *** indicates significance at p = .001.

Multiple Comparisons and Mean Differences in perception accuracy of body image by actual body mass index category

Comparison	Mean Difference	SE	CI
Overweight vs. Obese 1	-3.22	1.47	-7.05, .60
Overweight vs. Obese 2	-6.68***	1.36	-10.30, -3.07
Obese 1 vs. Obese 2	-3.46**	1.02	-6.03, -.89

Note. Tamhane *post hoc* tests were conducted using 95% confidence intervals for means. ** indicates significance at α = .01, *** indicates significance at α = .001.

How Friend Group BMI affects Perception Accuracy, Actual Body Size, and Ideal Body Size

Table 3 shows how friend group BMI affects the participant's ideal body size, actual body size, perceived body size, and perception accuracy. There was no statistically significant difference between mean ideal body size between the young women with normal and overweight/obese friend groups (t=.20, p=.84). This means that the participant's ideal body size was the same no matter the BMI of their friend group. The true mean difference in actual body size between young women with normally weighted friends and young women with

overweight/obese friends was not statistically significantly different (t=.02, p=.99). Friend group BMI also did not play a statistically significant role in perceived body size or perception accuracy (t=-.24, p=.81; t=.17, p=.87, respectively). Overall, these results indicated that friend group BMI did not affect the body misperception of the participant or their ideal body size.

Table 3.
Mean Ideal Body Size, Actual Body Size, Perceived Body Size and Perception Accuracy for individuals with normal and overweight/obese friend groups

	Friend Group				Levene's test
	Normal (n=13)	Overweight/Obese (n=27)	t	df	F
Ideal Body Size (BMI)	26.09	25.76	.21	36	3.22
Actual Body Size (BMI)	32.75	32.73	.02	39	1.06
Perceived Body Size (BMI)	35.36	35.67	-.24	38	.65
Perception Accuracy	-2.61	-2.86	.17	38	1.60

Note. All tests assume equal variances, supported by non-significant Levene's tests.

Table 4 stratifies the participants and then compares the effect friend group BMI, either normal or overweight/obese, has on perception accuracy of own BMI. There were no significant interaction between a woman's actual body size and friend group BMI, on the mean perception accuracy of body image, $F(2, 34)=.63$, $p=.54$. Controlling for friend group BMI, there is still a significant difference between varying actual body size categories and perception accuracy, $F(2,34)=10.63$, $p<.001$. In summary, these results mirror the results from Table 2 and 3 indicating that the only variable that had an effect on body misperception in participants was actual body size.

Table 4.

Two-Way ANOVA Results and Descriptive Statistics for perception accuracy of body size by actual body mass index category and friend group body mass index category

Actual Body Size	Friends' BMI category	Perception accuracy of body image		
		Mean	SD	N
Overweight	Normal	-7.99	4.43	3
Overweight	Overweight/Obese	-5.60	4.43	8
Obese 1	Normal	-2.46	5.63	6
Obese 1	Overweight/Obese	-3.25	2.53	11
Obese 2	Normal	1.20	1.82	4
Obese 2	Overweight/Obese	.674	2.23	8

Source	df	MS	F	η^2	Power
Actual Body Size	2	138.85	10.63***	.39	.98
Friends' BMI category	1	.61	.05	.001	.055
Interaction	2	8.27	.63	.036	.15
Error	34	13.06			

Note. The assumption of homogeneity of variance has not been violated, evidenced by a non-significant Levene's test, $F(5,34)= 2.22$, $p= .075$. *** indicates significance at $\alpha = .001$.

Discussion

In this study, it was shown that the higher the BMI the more likely a young woman is to accurately perceive her weight status. Women who were overweight but not obese misperceived their weight status more than all other participants, being the most likely to believe that they were heavier than they actually were. Similar to the results documented here, a previous study observed that obese individuals were more likely to recognize their overweight status [28]. It may be more difficult for people who are obese to overlook or avoid their weight status, making it less likely for them to misperceive body size. While this study did not address perception of body size in men, previous research has shown that women more often overestimate their body size than men [28], indicating that women may be at a greater risk for the negative outcomes associated with misperception than men. These risks, like unhealthy dieting, could cause many health problems in the future [30]. The results presented here suggest that women who are overweight but not obese are a key population that required individualized weight loss promotion programs, as their body misperception may impede intervention efforts.

Though misperception of weight status may not be the dominant issue for obese individuals, they are still at risk for other body image issues, such as body dissatisfaction and low self esteem [10]. These body image issues can make losing weight harder in part because they may be dealing with co-morbid conditions associated with negative body image like binge eating, low physical activity, and depression [20, 26]. As obese women already recognize that they are obese, weight loss intervention programs may be best served by allocating funds towards activities that increase body satisfaction and self-esteem. In contrast, this project's findings suggest that programming targeting overweight females should focus on education about weight and body composition to promote true awareness of one's body size. Overweight

women who believe they are heavier than they actually are may be more discouraged to lose weight, as they may perceive target weight loss goals as out of reach or unattainable. This may be further confounded by unhealthy dieting and weight loss practices, as have previously been observed among overweight women [39]. When treating overweight women, clinicians should be aware these patients are at risk for overestimating their weight status and how this misperception may effect treatment plans related to not only weight loss but possibly to other conditions that they also viewed inappropriately. Incorporating healthy body perception support into a weight loss treatment plan could facilitate a more accurate recognition of weight status. This could create a supportive atmosphere for overweight women that would reinforce a healthy body image and better support continued weight loss or the maintenance of achieved target weight.

The majority of the studies conducted among adolescents examining how social influences affect body dissatisfaction found that social influences affects body image concern leading them to have higher body dissatisfaction [24, 34]. In this study, we found that the BMI of young adult friends did not affect a woman's perception of their own BMI. Young adults and adolescents may not be comparable in how social influences affect their body perception. This may be because weight misperception is established during adolescence or childhood and the perception patterns of participants in this study were well established prior to forming their current friend groups. Perception patterns are being set up in elementary school children, girls as young as 6 to 8 years old are influenced by their friends to desire to be thinner [40]. Even at this early age girls are exhibiting dissatisfaction with their bodies and are establishing their weight misperception. This suggests that childhood may be a key formative period in which peer

influences have a lasting impact on body perception, with young adult peer groups being less influential.

There remain several other interpretations for our contradictory findings that young adult peer group did not impact weight perception. One explanation is that friends might be less influential then previously hypothesized. A study in female adolescents by Woelders et al showed that though friend groups had similar levels of body dissatisfaction during an initial interview, but after following the girls for a year their friendships did not affect the individual girl's body image concern [41]. This study is highlighting the importance of selection as a primary factor in how friend groups become alike in their body image. Selection of friend groups with similar levels of body image concerns might be the only social factor that is affecting body image. Other social influences, like modeling and social norms, might not play a role in the establishment of body misperception in young adult women. Another interpretation is that young adult women may be selecting for friends that have similar levels of weight misperception independent of their friend's BMIs. Similar to the study by Rayner et al where girls selected for friends with similar body image concern [34], young adult women may be selecting for friend solely based on their body misperception not on a shared body size. The weight of a friend may not be a mediator of weight misperception, but rather the misperception may be inherent to the establishment of the friendship.

Other important factors leading to weight misperception may not have been captured by this study. For example, the Tripartite Influence model of body image argues that peers, family, and the media are the core influences on the development of body image in young adults [2, 42]. This model argues that peers, family and the media are used as a direct way for young adults to compare their appearance. The family and the media also contribute to the establishment of

either a positive or negative body image by defining what an ideal body is. This study did not examine family influences on weight perception based on previous research indicating that the family role in social life declines in young adulthood [1]. Based on the Tripartite Influence model, some researchers might argue that without capturing all three modes of influence – peer, family, and media – it is not possible to examine body image and body perception. It could be possible that when apart these three variables have no effect on body misperception, but when they are put together they can affect perception accuracy in young adults.

While our findings demonstrate statistically significant data differences in weight misperception depending on one's actual body size, there are a few limitations to consider when interpreting the results of the study. Our small sample size may mean that future studies are unable to replicate our findings, and we agree that an increased sample size would have positively increased the power of our analyses and allowed for stronger assertions about the data. A post-hoc power analysis showed that the sample sized needed to see an effect was 262. Recruiting substantially more participants would be a valuable addition to the study but might not be feasible. The primary measurement instrument used in this study, the BIAS-BD, is also limited in some regards. In particular, the figures depicted in the questionnaire only went up to a BMI of 39.48 which automatically excluded a number of participants who took part in the parent diabetes study. Participants with a BMI ≥40 were purposefully excluded because the BIAS-BD would have forced them to always underestimate perceived body size regardless of their true weight perception. Excluding this group from the study could have affected the analysis of the social influence on weight misperception, in particular leading to an overestimation of perception accuracy in the Obese 2 group, since people with larger BMIs are more likely to accurately perceive their body size. Understanding how morbidly obese women (BMI ≥40) view their

weight status and how their friend group affects them is important for clinicians targeting this population and an area ripe for future research. Thus, we recommend that the BIAS-BD tool be updated or revised to more accurately represent the true distribution of BMI in the United States so that future research can examine weight misperception among all weight groups. Another limitation within the study was that this was a secondary data analysis. Without the ability to clarify questionnaire with the participants, some data may have been lost. A primary data analysis could allow for a more accurate data collection.

Conclusion

This study was the first to our knowledge to attempt to understand the effect social influence has on weight misperception in young adult women. This study offered the first insight into how peer BMI affected young adult women's weight misperception, finding that the higher an individual's BMI the more likely they are to perceive their weight accurately. The lack of social influence on weight misperception is important for clinicians to know when creating weight loss interventions for overweight and obese females. Specifically, overweight females may not benefit from a weight loss intervention that recruited friends when trying to change weight perception. For these overweight young women, more individualized interventions that incorporate teaching accurate body perception would be the most beneficial. In contrast, obese young women would be most helped by weight loss interventions that focused on increasing body satisfaction and self esteem. This study has highlighted the importance of studying the effect of social influences on body image issues. Further research that can further illuminate the interconnectedness between these two ideas would allow practitioners to create the optimal settings for overweight and obese young women to lose weight and become healthy.

References

1. Nelson, M.C., et al., *Emerging adulthood and college-aged youth: an overlooked age for weight-related behavior change*. Obesity (Silver Spring), 2008. **16**(10): p. 2205-11.
2. Lau, R.R., M.J. Quadrel, and K.A. Hartman, *Development and Change of Young Adults' Preventive Health Beliefs and Behavior: Influence from Parents and Peers*. Journal of Health and Social Behavior, 1990. **31**(3): p. 240-259.
3. Sung-Chan, P., et al., *Family-based models for childhood-obesity intervention: a systematic review of randomized controlled trials*. Obesity Reviews, 2013. **14**(4): p. 265-278.
4. Fields, A.E. and N.R. Kitos, *Social and interpersonal influences on obesity in youth: Family, peers, and society*, in *Obesity in youth: Causes, consequences, and cures*, L.J. Heinberg and K.J. Thompson, Editors. 2009, US: American Psychological Association: Washington, DC. p. pp. 59-76.
5. Brown, B.B., M.M. Dolcini, and A. Leventhal, *Transformations in peer relationships at adolescence: Implications for health-related behavior*, in *Health risks and developmental transitions during adolescence*, J. Schulenberg, J.L. Maggs, and K. Hurrelmann, Editors. 1997, Cambridge University Press: New York, NY, US. p. 161-189.
6. Valente, T.W., et al., *Adolescent Affiliations and Adiposity: A Social Network Analysis of Friendships and Obesity*. Journal of Adolescent Health, 2009. **45**(2): p. 202-204.
7. Cunningham, S.A., et al., *Is there evidence that friends influence body weight? A systematic review of empirical research*. Social Science & Medicine, 2012. **75**(7): p. 1175-1183.
8. Christakis, N.A. and J.H. Fowler, *The spread of obesity in a large social network over 32 years*. N Engl J Med, 2007. **357**(4): p. 370-9.
9. Duncan, D.T., et al., *Does perception equal reality? Weight misperception in relation to weight-related attitudes and behaviors among overweight and obese US adults*. Int J Behav Nutr Phys Act, 2011. **8**: p. 20.
10. Schwartz, M.B. and K.D. Brownell, *Obesity and body image*. Body Image, 2004. **1**(1): p. 43-56.
11. Ogden CL, C.M., Kit BK, Flegal KM, *Prevalence of obesity in the United States, 2009-2010*, N.C.f.H. Statistics, Editor 2012, NCHS data brief: Hyattsville, MD.
12. NIH, N.O.E.I., *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults*, 1998.
13. Holt, R.I.G., *Obesity - an epidemic of the twenty-first century: an update for psychiatrists*. Journal of Psychopharmacology, 2005. **19**(6 suppl): p. 6-15.
14. Jarrett, B., et al., *The influence of body mass index, age and gender on current illness: a cross-sectional study.(ORIGINAL ARTICLE)(Report)*. International Journal of Obesity, 2010. **34**(3): p. 429.
15. Gortmaker, S.L., et al., *Social and economic consequences of overweight in adolescence and young adulthood*. The New England journal of medicine, 1993. **329**(14): p. 1008-12.
16. Novak, M., C. Ahlgren, and A. Hammarstrom, *A life-course approach in explaining social inequity in obesity among young adult men and women*. International journal of obesity (2005), 2006. **30**(1): p. 191-200.
17. Bicchieri, C. and R. Muldoon, *Social Norms*, in *The Stanford Encyclopedia of Philosophy*, E.N. Zalta, Editor 2011

18. Hammond, R.A., *Social influence and obesity*. Curr Opin Endocrinol Diabetes Obes, 2010. **17**(5): p. 467-71.
19. Bagrowicz, R., C. Watanabe, and M. Umezaki, *Is Obesity Contagious by Way of Body Image? A Study on Japanese Female Students in the United States*. J Community Health, 2013.
20. Grogan, S., *Body image and health: contemporary perspectives*. J Health Psychol, 2006. **11**(4): p. 523-30.
21. Quick, V., et al., *Personal, behavioral and socio-environmental predictors of overweight incidence in young adults: 10-yr longitudinal findings*. Int J Behav Nutr Phys Act, 2013. **10**: p. 37.
22. Rehkopf, D.H., et al., *The relative importance of predictors of body mass index change, overweight and obesity in adolescent girls*. Int J Pediatr Obes, 2011. **6**(2-2): p. e233-42.
23. Leontiadis, G.I.H., C.W., *Body Size Misperception: A Novel Determinant in the Obesity Epidemic*. Archives of Internal Medicine, 2010. **170**(18): p. 1695-1700.
24. Paxton, S.J., et al., *Friendship clique and peer influences on body image concerns, dietary restraint, extreme weight-loss behaviors, and binge eating in adolescent girls*. J Abnorm Psychol, 1999. **108**(2): p. 255-66.
25. Neumark-Sztainer, D., et al., *Does Body Satisfaction Matter? Five-year Longitudinal Associations between Body Satisfaction and Health Behaviors in Adolescent Females and Males*. Journal of Adolescent Health, 2006. **39**(2): p. 244-251.
26. Sonneville, K.R., et al., *Body satisfaction, weight gain and binge eating among overweight adolescent girls*. Int J Obes (Lond), 2012. **36**(7): p. 944-9.
27. Docteur, A., et al., *Body perception and satisfaction in obese, severely obese, and normal weight female patients*. Obesity (Silver Spring), 2010. **18**(7): p. 1464-5.
28. Paeratakul, S., et al., *Sex, race/ethnicity, socioeconomic status, and BMI in relation to self-perception of overweight*. Obes Res, 2002. **10**(5): p. 345-50.
29. Gregory, C.O., et al., *Health perceptions and demographic characteristics associated with underassessment of body weight*. Obesity (Silver Spring), 2008. **16**(5): p. 979-86.
30. Jáuregui-Lobera, I., et al., *Weight misperception, self-reported physical fitness, dieting and some psychological variables as risk factors for eating disorders*. Nutrients, 2013. **5**(11): p. 4486.
31. Festinger, L., *A Theory of Social Comparison Processes*. Human Relations, 1954. **7**(2): p. 117-140.
32. Franzoi, S. and J. Klaiber, *Body Use and Reference Group Impact: With Whom Do We Compare Our Bodies?* Sex Roles, 2007. **56**(3-4): p. 205-214.
33. Crandall, C.S., *Social contagion of binge eating*. Journal of Personality and Social Psychology, 1988. **55**(4): p. 588-598.
34. Rayner, K.E., et al., *Adolescent girls' friendship networks, body dissatisfaction, and disordered eating: Examining selection and socialization processes*. J Abnorm Psychol, 2013. **122**(1): p. 93-104.
35. Cha, E., et al., *Characteristics of American Young Adults With Increased Risk for Type 2 Diabetes: A Pilot Study*. The Diabetes Educator, 2013. **39**(4): p. 454-463.
36. Gardner, R.M.J.L.M.G.L., *Development and validation of a new figural drawing scale for body-image assessment: the BIAS-BD*. Journal of Clinical Psychology, 2009. **65**(1): p. 113-122.

37. Manski, C.F., *Identification of Endogenous Social Effects: The Reflection Problem*. The Review of Economic Studies, 1993. **60**(3): p. 531-542.
38. Trogdon, J.G., J. Nonnemaker, and J. Pais, *Peer effects in adolescent overweight*. Journal of Health Economics, 2008. **27**(5): p. 1388-1399.
39. Malinauskas, B., et al., *Dieting practices, weight perceptions, and body composition: A comparison of normal weight, overweight, and obese college females*. Nutrition Journal, 2006. **5**(1): p. 11.
40. Dohnt, H. and M. Tiggemann, *The contribution of peer and media influences to the development of body satisfaction and self-esteem in young girls: a prospective study*. Dev Psychol, 2006. **42**(5): p. 929-36.
41. Woelders, L.C.S., et al., *Friendship Group Influences on Body Dissatisfaction and Dieting Among Adolescent Girls: A Prospective Study*. J. Adolesc. Health, 2010. **47**(5): p. 456-462.
42. Van Den Berg, P., et al., *The Tripartite Influence model of body image and eating disturbance A covariance structure modeling investigation testing the mediational role of appearance comparison*. Journal of Psychosomatic Research, 2002. **53**(5): p. 1007-1020.