Trends in BMI and weight perception among young adults: An analysis of gender, race, and educational disparities

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Abstract

Social science research shows that high body mass index (BMI) is associated with a number of socioeconomic disadvantages including low pay and social isolation. It is clear that excess weight can be problematic. What is less clear is how race, gender, and educational attainment influence how and when excess weight is perceived as problematic. Using data from the National Longitudinal Study of Youth, 1997 cohort, this study tracks changes in BMI, weight perception, and educational attainment from age 16 to 30. Throughout young adulthood, compared to men with similar BMIs, women are substantially more likely to see their weight as problematic, misidentify their weight status, and to attempt to lose weight. Overall results indicate that gender and race differences in weight pessimism and optimism emerge in childhood, persist throughout adolescence, and expand at the end of young adulthood.

(Extended abstract)

Introduction

When does someone become fat[1]? Medical professionals' label someone "fat" when their weight-to-height ratio exceeds the cutoff for a healthy weight. However, medical cutoffs rarely consider social preferences, and, especially for weight, often fail to account for variation in healthy bodies. Survey and experimental research strongly indicates that social characteristics, especially gender and race, influence weight perception (Rucker and Cash, 1992). One study, for example, found that women with medically healthy bodyweights reported feelings of shame and frustration with their "fat" bodies while men with medically risky bodyweights reported feelings of satisfaction with their weight (McKinley, 1998). It is clear that social and medical definitions of fatness do not always align. What is less clear is how and when this divergence emerges and what the social and medical consequences might be when there is failure to overlap.

Research on health disparities and the social determinants of health has long established that the less-healthy live shorter and more painful lives than their healthy counterparts (Lynch and von Hippel 2016; Mirowsky and Ross 2003); but what does it mean to be less healthy? One of the most prevalent measures of poor health is obesity, typically measured as having a body mass index (BMI) greater than or equal to 30[2]. Obesity is recorded in medical records, represents a category of risk for health insurance, and is reported as a community-level measure of poor health (Flegal et al., 2002). Obesity as a measurement tool is highly valued by public health and medical professionals, but as a recent article in *Sociological Science* (Maralani and McKee, 2017) shows, the association between obesity and socioeconomic outcomes is more closely associated with socially constructed race and gender ideals than medically defined thresholds for risk. This work, and other recent studies on medical health thresholds (Fletcher, 2014; Katzmarzyk et al., 2011), suggests that the biological and social costs of obesity vary by social context, and that for many social groups the social perception of weight is more relevant than medical cutoffs.

Despite the frequently observed positive relationship between physician care and positive health outcomes, many medically unhealthy adults fail to seek care and many medically healthy adults engage in practices that are unhealthy in order to improve their already "good" health. Imagine a thin young woman forgoing a meal a day to achieve what she perceives as the ideal bikini body. Social science and anecdotal evidence overwhelmingly suggests that individuals' do not use medically defined thresholds when thinking about an ideal weight. So what do they use? The answer rests in the difference between sociocultural and medical definitions of ideal weight.

The medical definition of ideal weight is a weight that is not associated with elevated risk for obesity-related disorders (Hubert et al., 1983). Medical definitions of ideal weight focus on the avoidance of risk or harm. Alternatively, social/cultural bodyweight ideals focus on maximizing social rewards rather than avoiding risk (Altabe, 1998; Maralani and McKee, 2017). Social rewards are relevant to socioeconomic contexts; for example, some studies have shown

[1] While obesity is a measureable medical condition, fat or fatness is a subjective social construct. Fat is in the eye of the beholder and is subject to individual and social opinions and beliefs.

[2] Body mass index (BMI) is a weight to height ratio ($BMI = \frac{Kilograms}{Meters^2}$) used to assess risk of sickness and early death. BMI is classified into four medical risk categories: Underweight (< 18.5), Recommended weight (18.5 to 24.9), Overweight (25 to 29.9), and Obese (≥ 30).

that the ideal weight for an average white woman is typically less than the ideal weight for the average black woman with similar education and income (Pager et al., 2009).

Understanding how bodyweight perception interacts with social context is important for a number of reasons. First, health policy is at its best when social context is considered. Clarifying social variation in perception of weight could improve policies designed to reduce population-level obesity and obesity-related health problems for specific social groups. Second, establishing how race, gender, and educational attainment interact to influence weight perception is sociologically interesting and fundamental to good health policy.

Using longitudinal data that tracks changes in weight perception, BMI, and educational attainment, this study asks the following questions:

1. How do weight intentions and perceptions change from adolescence to young adulthood?
2. When do disparities in weight intention and perception emerge and how do they change over time?
    a. Do race, gender, and educational attainment intersect to alter the emergence and trajectories of weight perception?
3. When and how do weight intentions diverge from medical thresholds of overweight and obesity?

Methodological approach

This study uses data from the National Longitudinal Survey of Youth 1997 Cohort (NLSY97), a nationally representative sample of nearly 9,000 adolescents that were 12 to 16 years old by the end of 1996 and have been surveyed annually until 2011 and biennially from 2013 onward. The NLSY97 is a longitudinal dataset with a number of advantages. First, the NLSY97 includes specific annual questions about weight intention and perception. Weight intention is assessed with a four-item measure: are you currently (1) "trying to lose weight," (2) "trying to gain weight," (3) "trying to stay the same weight," or (4) "not trying to do anything about my weight." Weight perception is assessed with a five-item measure: how do you describe your weight: (1) "very underweight," (2) "slightly underweight," (3) "about the right weight," (4) "slightly overweight," or (5) "very overweight." Second, the survey collects annual self-reported height and weight measurements that can be easily converted into BMI and weight categories. Finally, the NLSY97 includes a number of sociodemographic confounding variables related to the social construction of health outcomes including educational attainment, family socioeconomic status, race, gender, income, optimism, depression, aptitude test scores, and pregnancy/childbirth outcomes. Educational attainment is an ordinal variable with five reduced levels: (1) high school dropout, (2) high school diploma (or GED), (3) associate's degree, and (4) bachelor's degree, (5) graduate degree. The educational attainment variable is given its final value at age 30.

To answer the research questions posed above, I will first use descriptive methods to visualize BMI and weight intention distribution by race, gender, and educational attainment from age 16 to 30. Along with ordinal logistic regressions, these visualizations will establish baseline disparities by social status at the onset of young adulthood. Next, I will fit a within-person fixed-effects model that estimates how sensitive weight perceptions are to changes in BMI over time by race, gender, and educational attainment. The fixed-effects model will distinguish between

changes in weight perception associated with weight (change in BMI) and social status (fixed for race and gender, time-varying for educational attainment).

Preliminary results

Table 1 summarizes changes in BMI, weight intention, and weight perception at age 17 and 30 by race/ethnicity and gender. As expected, among men and women, BMIs increase from age 17 to 30, as do intentions to lose weight. As early as age 17, there are clear gender differences in weight intentions. For example, despite relatively similar average BMIs and rates of obesity, approximately 50% of all girls wanted to lose weight at age 17 compared to only approximately 22% of boys. Gender differences in weight intentions are consistent among whites, blacks, and Hispanics at age 17. Results in Table 2 confirm disparities observed at age 17 persist into young adulthood. For example, at age 30 a substantially higher proportion of overweight women see themselves as overweight (63.4%) compared to similarly heavy men (35.3%). Figure 2 and the heat maps (Figures 3 and 4) indicate important shifts in weight perception and intention from age 16 to 30 for both men and women.

Figure 1 shows that despite BMIs that are statistically equivalent among men and women, large gender differences in weight perception and intention exist at age 16 and persist throughout young adulthood. For example, at age 16, 49% of women and 24% of men report they are trying to lose weight. Though smaller, a gender gap in weight perception is also present in Figure 1; from age 16 to 27 more than 50% of men report they are about the right weight. By age 18, fewer than 50% of women report they are about the right weight. Additionally, at age 20 when the average BMI for men and women reaches the threshold for overweight (BMI $\geq$ 25), only 25% of men report they are trying to lose weight compared to 50% of women. In every year of the survey, there is a gender difference in weight perception and intention.

The results in Figure 1 further highlight gender differences in thresholds for socially acceptable weight. Following the black dashed line on the lower panel in Figure 1, BMI 24.5 (age 20) is the first time fewer than 50% of women indicate they are about the right weight. Not until an average BMI of 27.4 (age 26) do fewer than half of men report they are about the right weight.

The results in Figure 2 reveal a gender divergence in BMI and perception of a healthy weight. For each weight intention at age 16, the figure shows a stacked bar chart of weight intention at age 30. Women more frequently report trying to lose weight regardless of BMI at age 16. For example, 38% of men who reported they were trying to stay the same weight at age 16 are trying to lose weight at age 30 compared to 47% for women.

The heat maps in Figures 3 and 4 visualize an overall trend of gender differences in weight perception. The heat maps show percent trying to lose weight at each unit of BMI from 20 to 35. From age 16 to 30, compared to men, a higher percentage of women report they intend to lose weight at age each BMI level. This is clear evidence that gender differences in weight perception exist across the BMI distribution and remain relatively stable, emerge in early adolescence, and persist until at least age 30.

Conclusion

Overall results indicate that throughout young adulthood, compared to men with similar BMIs, women are substantially more likely to see their weight as problematic, misidentify their weight status, and to attempt to lose weight.

Next steps

After further visualizing descriptive trends in the data, I will use regression methods to estimate thresholds in fatness accounting for confounding factors. To estimate socially constructed thresholds at specific ages, I will use a logistic regression with the dependent variable weight loss intention (1=trying to lose weight, 0=all other options) and the independent variable BMI. Using this regression, I can estimate the predicted probability of trying to lose weight by BMI, race, gender, and educational attainment at any age observed in the data. Finally, I will use a fixed-effect longitudinal regression equation to estimate changes in weight perception by age and weight status to better understand how changes in weight over time influence the social construction of ideal weight within social groups.

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Tables

Table 1. Descriptive statistics by gender and race/ethnic status, twenty imputations (NLSY97).

	Male			Female		
	White (N=2,413)	Black (N=1,169)	Hispanic (N=977)	White (N=2,252)	Black (N=1,166)	Hispanic (N=924)
BMI age 17	23.761	24.658	24.891	22.926	25.550	24.159
BMI age 30	27.961	28.553	29.568	27.235	30.534	28.775
Weight status age 17						
Recommended weight (BMI < 25)	0.697	0.657	0.657	0.782	0.602	0.679
Overweight (BMI ≥ 25)	0.208	0.224	0.224	0.143	0.226	0.200
Obese (BMI ≥ 30)	0.096	0.120	0.120	0.075	0.173	0.121
Weight status age 30						
Recommended weight (BMI < 25)	0.335	0.323	0.323	0.455	0.283	0.357
Overweight (BMI ≥ 25)	0.356	0.342	0.342	0.285	0.277	0.301
Obese (BMI ≥ 30)	0.309	0.336	0.336	0.260	0.440	0.342
Degree Status age 30						
Less than high school	0.091	0.145	0.145	0.079	0.103	0.144
High school diploma/GED	0.543	0.683	0.683	0.433	0.570	0.563
Associate's degree	0.078	0.046	0.046	0.089	0.096	0.086
Bachelor's degree	0.202	0.104	0.104	0.279	0.145	0.152
Graduate degree	0.086	0.022	0.022	0.120	0.086	0.054
Weight Intention age 17						
Trying to lose weight	0.233	0.207	0.207	0.500	0.434	0.502
Trying to gain weight	0.246	0.332	0.332	0.068	0.163	0.112
Trying to stay the same weight	0.238	0.271	0.271	0.212	0.225	0.199
Not trying to do anything about weight	0.283	0.190	0.190	0.220	0.178	0.187
Weight Intention age 30						
Trying to lose weight	0.433	0.431	0.431	0.569	0.560	0.619
Trying to gain weight	0.090	0.132	0.132	0.066	0.089	0.065
Trying to stay the same weight	0.220	0.239	0.239	0.174	0.186	0.170
Not trying to do anything about weight	0.258	0.198	0.198	0.191	0.166	0.146
Weight Perception age 17						
Very underweight	0.019	0.026	0.026	0.008	0.021	0.020
Slightly underweight	0.173	0.136	0.136	0.081	0.091	0.080
About the right weight	0.595	0.702	0.702	0.534	0.547	0.509
Slightly overweight	0.193	0.121	0.121	0.328	0.273	0.313
Very overweight	0.019	0.015	0.015	0.049	0.068	0.079
Weight Perception age 30						
Very underweight	0.009	0.019	0.019	0.005	0.012	0.006
Slightly underweight	0.082	0.103	0.103	0.040	0.058	0.041
About the right weight	0.430	0.514	0.514	0.337	0.345	0.294
Slightly overweight	0.408	0.318	0.318	0.458	0.413	0.453
Very overweight	0.071	0.046	0.046	0.160	0.173	0.206

Table 2. Weight perception by weight status at age 30, by gender (N=8,901).

	Weight perception at age 30					
	Male			Female		
Weight status at age 30	Under-weight	About the Right Weight	Over-weight	Under-weight	About the Right Weight	Over-weight
Recommended weight (BMI < 25)	23.5%	68.5%	8.0%	11.7%	64.4%	23.9%
Overweight (BMI ≥ 25)	6.6%	58.1%	35.3%	5.0%	31.6%	63.4%
Obese (BMI ≥ 30)	5.75%	32.2%	62.2%	5.1%	15.7%	79.2%

Figures

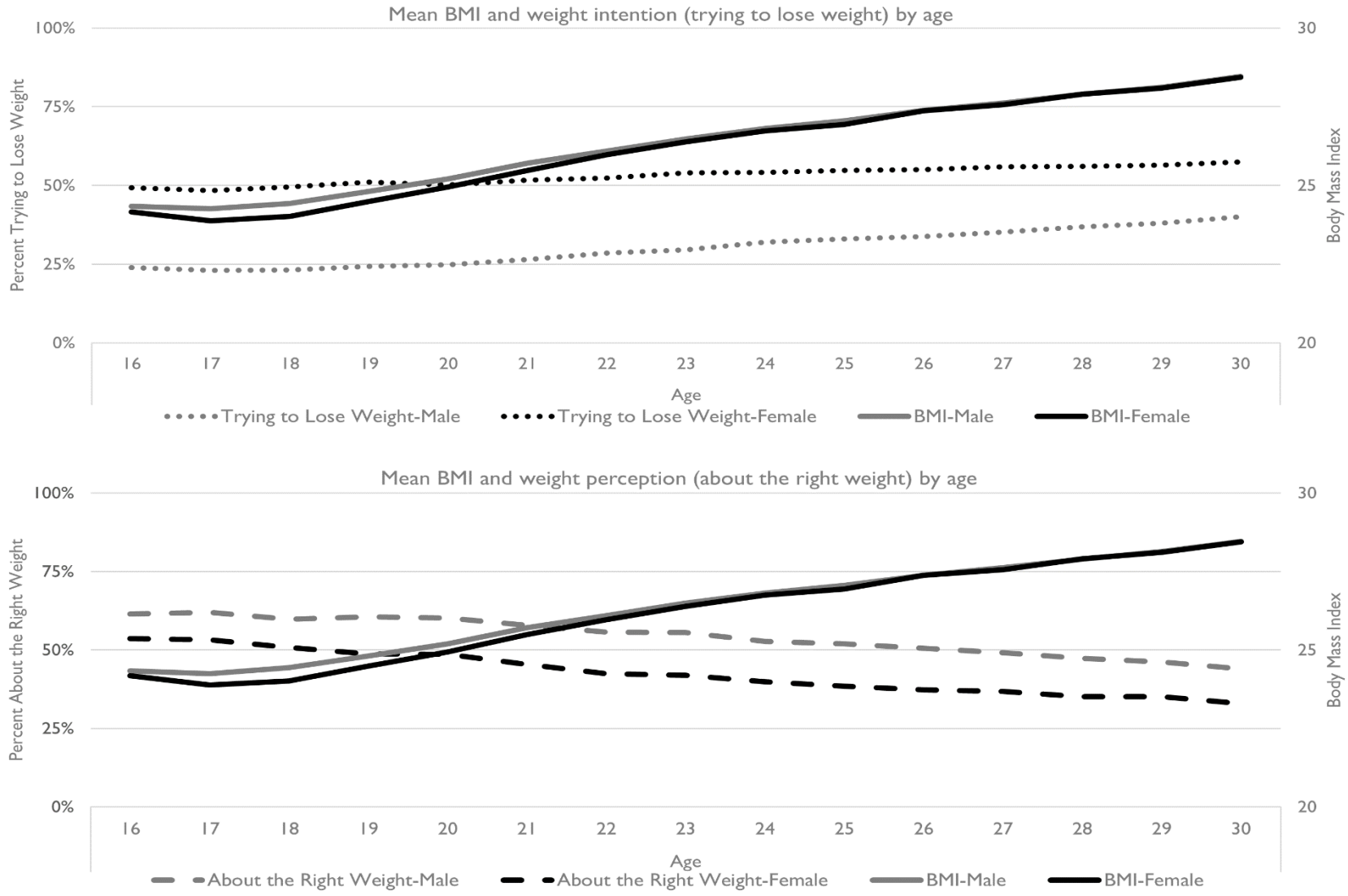

Figure 1. BMI, weight intention, and weight perception by gender from age 16 to 30.

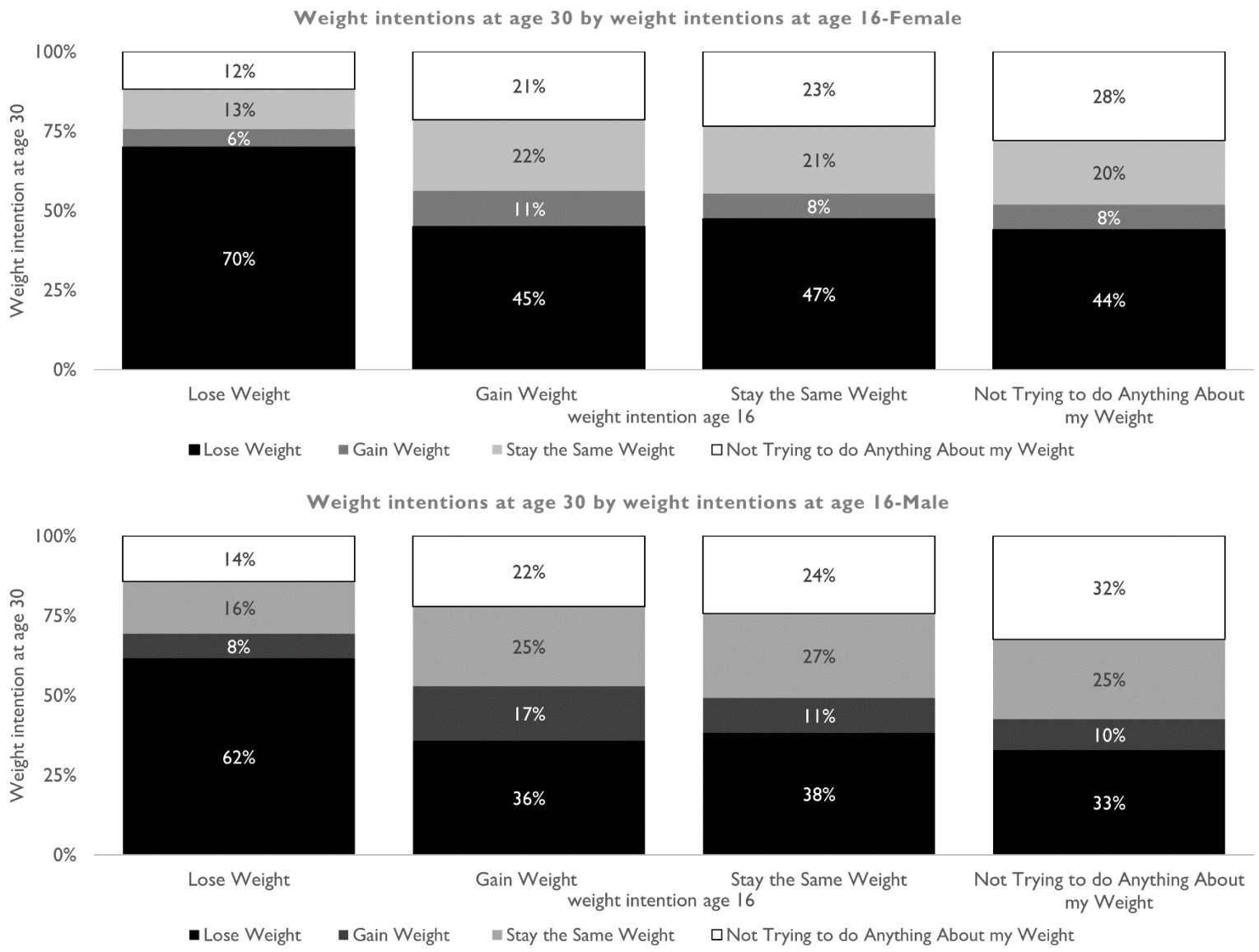

Figure 2. Weight intentions at age 30 by weight intention at age 16 by gender.

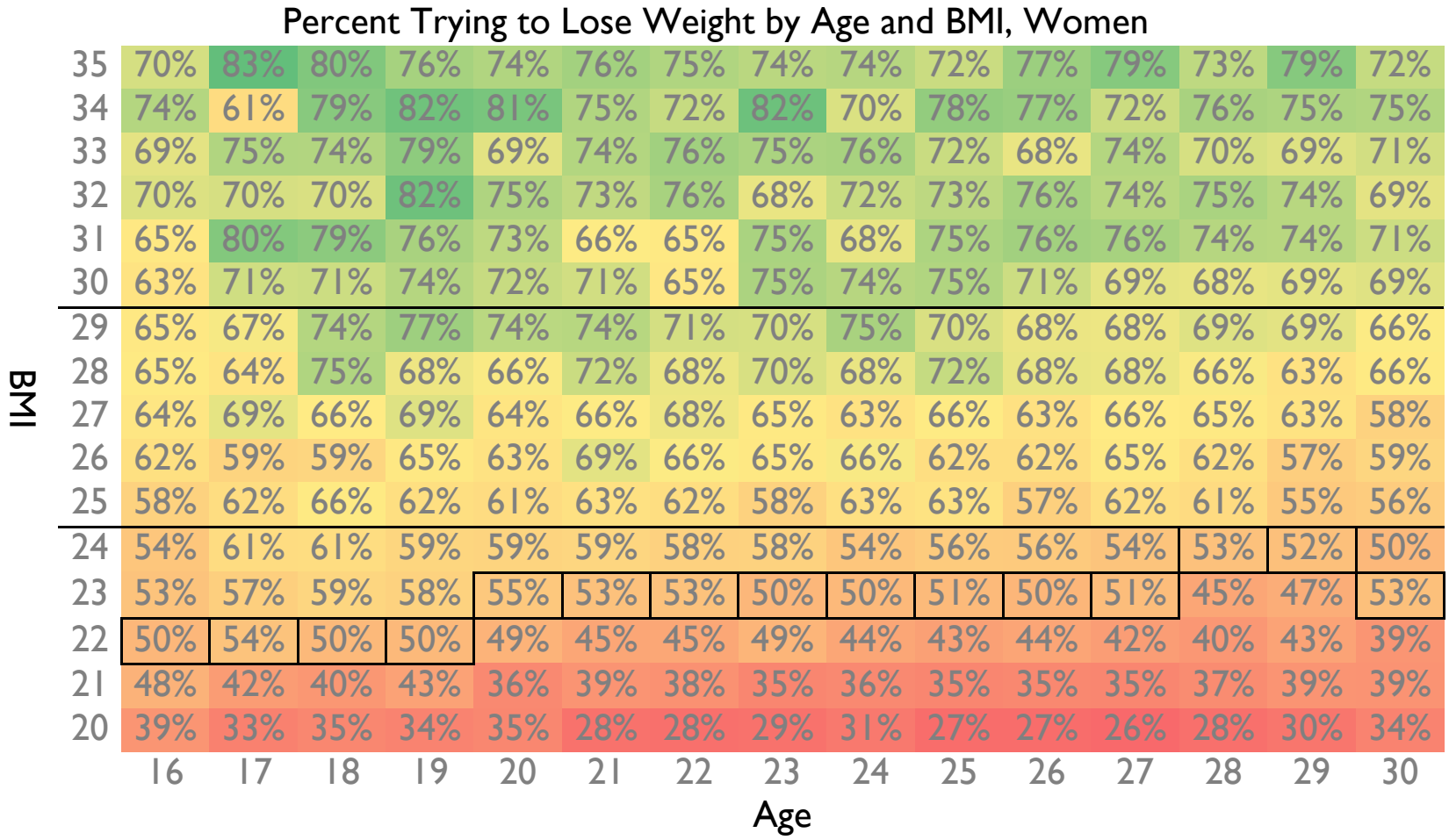

Figure 3. Heat map of percent trying to lose weight by BMI and age for women. Red coloration indicates low percent responding they are trying to lose weight and green coloration indicates high percent responding they are trying to lose weight.

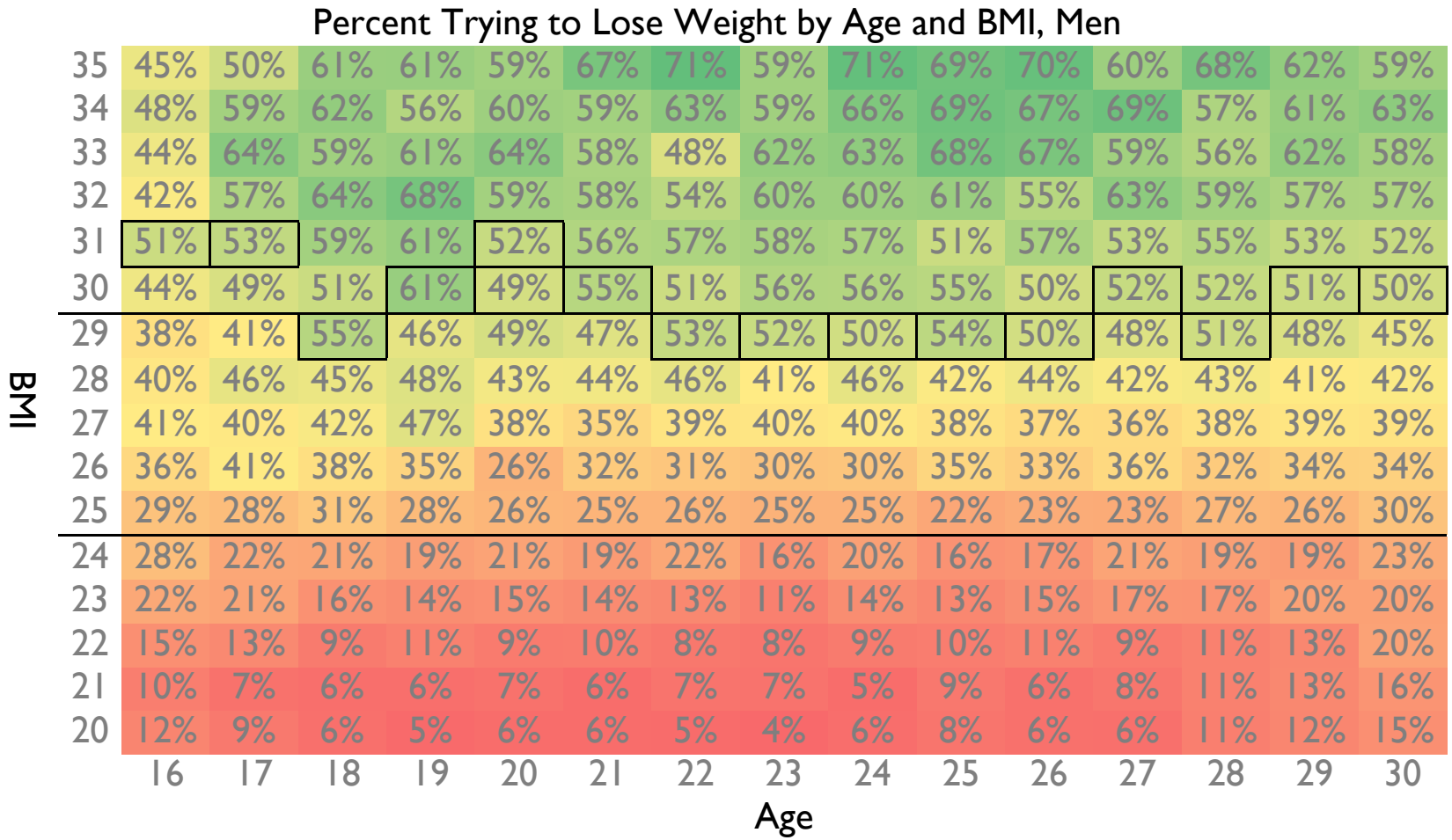

Figure 4. Heat map of percent trying to lose weight by BMI and age for men. Red coloration indicates low percent responding they are trying to lose weight and green coloration indicates high percent responding they are trying to lose weight.