Published in final edited form as:

Health Behav Policy Rev. 2014 March 1; 1(2): 161–171. doi:10.14485/HBPR.1.2.8.

Weight-related disparities for transgender college students

Nicole A. VanKim, MPH [Graduate School Trainee]

Division of Epidemiology and Community Health, University of Minnesota School of Public Health, Minneapolis, MN.

Darin J. Erickson, PhD [Assistant Professor]

Division of Epidemiology and Community Health, University of Minnesota School of Public Health, Minneapolis, MN.

Marla E. Eisenberg, ScD, MPH [Associate Professor]

Division of General Pediatrics and Adolescent Health, University of Minnesota, Minneapolis, MN.

Katherine Lust, PhD, MPH, RD [Director of Research]

Boynton Health Research, University of Minnesota, Minneapolis, MN.

B. R. Simon Rosser, PhD [Professor]

Division of Epidemiology and Community Health, University of Minnesota School of Public Health, Minneapolis, MN.

Melissa N. Laska, PhD, RD [Associate Professor]

Division of Epidemiology and Community Health, University of Minnesota School of Public Health, Minneapolis, MN.

Abstract

Objective: The objective of this study was to explore disparities in weight and weight-related behaviors by transgender identity.

Methods: Cross-sectional regression models were fit using 2007-2011 College Student Health Survey data.

Results: Compared to non-transgender, transgender subjects (N=53) were more likely to be either underweight [adjusted relative risk (95% CI): 4.78 (1.61-14.18)] or obese [2.45 (1.21-4.93)], and less likely to meet recommendations for strenuous physical activity [1.16 (1.01-1.34)], strengthening physical activity [1.32 (1.11-1.56)], and screen time [1.20 (1.02-1.41)].

Conclusions: More research is needed to understand the unique social contexts of transgender college students with regard to weight status, physical activity, and screen time in order to effectively inform intervention and policy development and implementation.

Correspondence Ms. VanKim; vank0056@umn.edu.

Human subjects approval statement

The University of Minnesota's Institutional Review Board approved all data collection efforts. These analyses were deemed exempt from review due to the anonymous nature of the dataset.

Keywords

transgender; college health; disparities

Research on weight-related health, including obesity, nutrition, physical activity, and disordered eating, among the transgender community is virtually non-existent.¹ Despite a large body of literature demonstrating meaningful differences in weight and weight behaviors between males and females,²⁻⁶ little research has examined weight disparities across gender beyond the male—female dichotomy. Transgender generally describes “individuals whose gender identity differs from the sex originally assigned to them at birth or whose gender expression varies significantly from what is traditionally associated with or typical for that sex ... as well as other individuals who vary from or reject traditional cultural conceptualizations of gender in terms of the male—female dichotomy.”¹

A recent report from the Institute of Medicine has highlighted transgender health as a priority area for future research.¹ Although existing research is fairly limited, studies have suggested that very high proportions of transgender individuals experience adverse health outcomes including negative mental health, suicidal ideation and attempts, physical and sexual victimization, HIV infection, and lack of access to care.^{1,7-10} There has also been research highlighting sociodemographic disparities with transgender adults more likely than the general adult population to be living in poverty and unemployed.^{10,11} These sociodemographic disparities are of concern given their strong association with health among all populations. A limitation of the majority of existing literature on transgender health, however, has been the reliance on convenience samples as well as not having appropriate non-transgender comparison groups.^{1,7-10} These studies have focused on transgender communities for the purpose of addressing HIV infection and needs, thus targeting recruitment to a particular subset of the transgender community rather than examining the health of the transgender community at-large.¹

Despite being a national public health priority, as highlighted within Healthy People 2020,¹² research on weight and weight-related behaviors among transgender individuals is limited. To our knowledge, only one population-based study to date has explored weight-related health among transgender people.¹¹ Conron and colleagues utilized statewide surveillance data from Massachusetts to examine disparities across a broad variety of health indicators, including weight status. Findings indicated that compared to non-transgender adults (ages 18-64 years), transgender adults were less likely to be overweight. A limitation of this study, however, is that the results were not adjusted for economic factors, such as unemployment and poverty, which are known to differ for transgender and weight-related health. The inclusion of a broad age range may also not capture age-specific disparities in health. Furthermore, measures of weight-related behaviors, such as physical activity and dietary intake, were not included in the analyses. No population-based studies have explored transgender disparities for these weight-related behaviors.

Understanding weight-related behaviors is vital for supporting weight loss and weight gain prevention. Emerging adulthood, typically defined as ages 18-25 years,¹³ is a critical age for weight gain prevention¹⁴ given significant declines in physical activity levels and dietary

quality as well as excess weight gain during this stage of life.^{4,15-22} This developmental period is frequently associated with attending a post-secondary educational institution, some level of independent living, and identity exploration and formation. According to data from the National Transgender Discrimination Survey, a survey of over 6,400 transgender adults in the U.S. and territories, a large proportion of these adults transitioned between the ages of 18-24 years (eg, 46% of female-to-male transgender individuals) or soon after. This finding suggests that emerging adulthood is a substantive period in gender development. Furthermore, 87% of transgender adults in the National Transgender Discrimination Survey had attained at least some college education (compared to only 55% of the general population), thus indicating that the college setting may be a particularly important arena to address weight-related health for transgender people.

This study fills an important research gap by using population-based data to explore transgender disparities across weight status (ie, categories of weight: underweight, normal weight, overweight, and obese) and a variety of weight-related behaviors (including food and drink consumption, physical activity, screen time, unhealthy weight control, and body satisfaction) among college students.

METHODS

Data and study population

Data from the 2007-2011 College Student Health Surveys were merged for these analyses. The College Student Health Survey is administered to 2-year and 4-year college students throughout Minnesota by the University of Minnesota's Boynton Health Service. Details on the survey have been previously described^{23,24} and are also available online (www.bhs.umn.edu/surveys/index.htm). Briefly, the survey covers a wide variety of health topics and is completed through a secure website. For smaller institutions, all students were invited to participate in the study in order to provide sufficient sample sizes for school-specific analyses. At larger institutions, a percentage of students were randomly selected from enrollment rosters provided by the school to participate in the survey. All subjects were invited to participate in the study through postcard mailings and e-mail invitation. Subjects were entered into drawings to win several large prizes.

Forty different colleges participated in the CSHS in 2007-2011, several of which participated in multiple years. The most recent year of survey participation for each school was included in the final merged dataset as well as an additional year of survey participation for six of the schools. These six schools were selected based on the following criteria: survey data for the school was three or more years apart, less than half of enrolled students were sampled, and the probability of a student participating in the survey in more than one year was less than 2%. The probability of a student participating more than once was calculated using retention and graduation rates obtained from the National Center for Education Statistics²⁵ and the sampling probability at each school. This process of including an additional year of data for selected schools was to ensure increased sample size while minimizing potential for bias. The combined dataset included 34,392 students from 40 institutions with an overall response rate of 42%.

Measures

Subjects selected one gender from the following response options: “Male,” “Female,” “Transgender” and “Other”. From 2007-2010, transgender and other were available as a single response option (ie, transgender/other). Beginning in 2011, the options were separated. However, in this dataset, no student selected the “Other” option. For ease of conveying results, in these analyses, gender categories include, “male,” “female,” (both considered “non-transgender”) and “transgender.”

Demographic characteristics were self-reported, and responses were collapsed into the following categories for analysis: race/ethnicity (white or non-white), age (18-20 years, 21-24 years, and 25+ years), relationship status (single, married/domestic partner, and other), living arrangements (parent’s home, residence hall, rent or share rent/other), hours worked for pay (0 hours, 1-19 hours, 20+ hours), and credit card debt (none or any). School type included 4-year or 2-year college.

Thirteen weight-related indicators (including weight status, six measures of food and drink consumption, three measures of physical activity, screen time, unhealthy weight control, and body satisfaction) were categorized for analyses based on existing recommendations for health. Weight status was assessed using body mass index (BMI) calculated from self-reported height and weight and categorized into the following risk-based categories: underweight ($BMI < 18.5 \text{ kg/m}^2$), normal weight ($18.5 \leq BMI < 25$), overweight ($25 \leq BMI < 30$), and obese ($BMI \geq 30$).²⁶ Despite some biases with self-report height and weight, the reliability of these measures are relatively accurate, with correlation coefficients of reported and measured height and weight ranging from 0.85-0.95.²⁷ Fruit and vegetable consumption was assessed using the standard Youth Risk Behavior Surveillance System (YRBS) questions, which included consumption of 100% fruit juice, fruit, green salad, potatoes, carrots, and other vegetables and was subsequently categorized as ≥ 5 servings/day vs. fewer.²⁸ Breakfast consumption included the number of times in the past week that the participant ate breakfast and was dichotomized as 0-4 days/week vs. 5-7 days/week.²⁹ Soda consumption was assessed using a YRBS question and an comparable question was adapted to assess diet soda consumption.²⁸ Both soda and diet soda consumption variables were categorized as ≥ 1 /day vs. < 1 /day. Fast food consumption and restaurant food consumption within the past year was assessed with subjects reporting frequency from response options that ranged from “never” to “several times per day”. Frequent consumption of either fast food or restaurant food have been shown to be associated with increased portion sizes and excess weight,^{30,31} therefore, both fast food and restaurant food consumption was dichotomized as $\geq$ several times/week vs. $<$ several times/week. Questions adapted from YRBS were used to assess moderate physical activity, which are activities that are “not exhausting”, and strenuous physical activity, which are activities where the “heart beats rapidly.”^{24,28} Response categories included “None,” “Less than ½ hour,” “½-2 hours,” “2½-4 hours,” “4½-6 hours,” and “6½ + hours.” To most closely align with existing recommendations, both moderate and strenuous physical activity were categorized as < 2 hours/week vs. ≥ 2.5 hours/week, although this is not an exact alignment, it was the closest option given the response choices for this question.³² An analogous question was used to assess strengthening physical activity.²⁴ Recommendations for strengthening physical

activity for adults are based on frequency per week rather than hours per week. Thus, to most closely align with recommendation, we categorized strengthening physical activity as none vs. any, since the response options did not allow for frequency per week. Examples of activities were provided for each type of physical activity to aid the participant in reporting. The amount of time a participant spent per day watching television and using a computer for something that was not for work or school work, was used to assess screen time.³³ Categories of 14 hours/week vs. <14 hours/week were created for screen time in line with recommendations for young people of less than two hours per day.³⁴ Unhealthy weight control behaviors, which included taking diet pills, vomiting, or taking laxatives and was categorized as any vs. none.²³ Body satisfaction were also assessed and categorized as never/sometimes vs. most of the time/always.²⁹ Overall, similar items have been used in other studies with moderate reliability (test-retest κ ranging from 0.29-0.58; test-retest agreement=83%).^{6,35,36}

Analyses

Subjects with missing data for gender (N=54), subjects who reported ages under 18 years or above 99 years (N=11), and subjects who provided questionable response patterns (N=3) were dropped from these analyses. Questionable response patterns were flagged where subjects provided implausible responses on three or more of seven key variables. This yielded a final analytic sample of 34,324 subjects, of which 53 identified as transgender, 12,253 as male, and 21,748 as female. To assess sociodemographic differences between transgender and non-transgender subjects, unadjusted multinomial regression models were fit. Only sociodemographic characteristics that were significantly different between transgender and non-transgender subjects were used in subsequent adjusted analyses, in order to maximize available power in this small sample of transgender students. Multinomial logistic regression models were fit using a relative risk ratio option for weight status, while relative risk regression models were fit for all dichotomous variables. Our primary model compared transgender and non-transgender subjects. We also fit two additional sets of models: transgender compared to males and transgender compared to females. This was due, in part, to documented differences between males and females in previous literature³⁷ that may obscure differences compared to transgender individuals. Results from both models are discussed in the text and only primary model results are presented in tables. All confidence intervals were adjusted for clustering at the school level. Analyses were conducted using STATA 11 (STATA Corporation, College Station, TX, 2009).

RESULTS

Prevalence and relative risk estimates of sociodemographic characteristics are presented in Table 1. Transgender subjects were less likely to be white than non-transgender subjects [Relative Risk (95% confidence interval) $RR_{\text{transgender vs. non-transgender}}$: 2.03 (1.34-3.08); $RR_{\text{transgender vs. male}}$: 1.84 (1.23-2.75); $RR_{\text{transgender vs. female}}$: 2.16 (1.41-3.31)]. Transgender subjects were less likely to work 20+ hours for pay compared to females only [0.55 (0.32-0.95)]. There were no statistically significant differences in other sociodemographic characteristics between transgender and non-transgender subjects (i.e., school type, age, relationship status, living arrangement, and credit card debt).

Table 2 contains the prevalence and relative risk estimates of the 13 weight-related indicators. Adjusting for race/ethnicity, transgender subjects were more likely than non-transgender subjects to be either underweight [$RR_{\text{transgender vs. non-transgender}}: 4.78$ (1.61-14.18); $RR_{\text{transgender vs. male}}: 5.14$ (1.66-15.96); $RR_{\text{transgender vs. female}}: 3.79$ (1.29-11.11)] or obese [$RR_{\text{transgender vs. non-transgender}}: 2.45$ (1.21-4.93); $RR_{\text{transgender vs. male}}: 2.40$ (1.20-4.83); $RR_{\text{transgender vs. female}}: 2.46$ (1.22-4.99)] compared to being normal weight. There were no differences between transgender and non-transgender subjects in overweight status. Furthermore, transgender subjects were less likely than non-transgender subjects to meet recommendations for strenuous physical activity [$RR_{\text{transgender vs. non-transgender}}: 1.16$ (1.01-1.34); $RR_{\text{transgender vs. male}}: 1.24$ (1.06-1.44); $RR_{\text{transgender vs. female}}: 1.12$ (0.98-1.28)], to engage in any strengthening physical activity [$RR_{\text{transgender vs. non-transgender}}: 1.32$ (1.11-1.56); $RR_{\text{transgender vs. male}}: 1.55$ (1.28-1.88); $RR_{\text{transgender vs. female}}: 1.20$ (1.02-1.42)] and to meet screen time recommendations [$RR_{\text{transgender vs. non-transgender}}: 1.20$ (1.02-1.41); $RR_{\text{transgender vs. male}}: 1.08$ (0.89-1.30); $RR_{\text{transgender vs. female}}: 1.41$ (1.15-1.72)].

There were no significant differences between transgender and non-transgender subjects for fruit and vegetable, breakfast, soda, diet soda, fast food, and restaurant food consumption, moderate physical activity, unhealthy weight control, and body satisfaction (Table 2).

DISCUSSION

Our findings highlight disparities between transgender and non-transgender college students, particularly for weight status, strenuous and strengthening physical activity, and screen time. It appears that among college students, transgender individuals were more likely than non-transgender students to be either underweight or obese, less likely to engage in sufficient strenuous or strengthening physical activity, and more likely to engage in screen time. We observed no significant disparities for any measure of food and drink consumption. For several of the measures (i.e., consumption of diet soda, restaurant food), the direction of the estimate was unfavorable for transgender subjects, and although the magnitude was reasonably sized, the confidence intervals were relatively wide. These wider confidence intervals likely reflect the small sample size of transgender subjects.

There were few sociodemographic differences between transgender subjects and males and females in this population, with the exception of race/ethnicity and employment (compared to females only). These differences were consistent with the findings reported by Conron and colleagues.¹¹ Research on sociodemographic characteristics of transgender people is generally lacking,¹ thus making it difficult to interpret the consistency or discrepancy of our findings. However, similar to some of the findings related to food and drink consumption, several of the estimates for sociodemographic characteristics were reasonably sized (eg, hours worked, living arrangement), but confidence intervals again were fairly wide. Some of these potential sociodemographic differences may be important to consider when designing programs, interventions, or resources for the transgender community.

Our finding that transgender college students were less likely to engage in adequate strenuous and strengthening physical activity and more likely to engage in screen time is of particular concern with regard to the health of this population. Insufficient physical activity

and sedentary behavior are associated with increased risk for numerous adverse health outcomes including excess weight gain, diabetes, high blood pressure, high cholesterol, cardiovascular disease, asthma, and some cancers.³² Furthermore, insufficient physical activity is associated with increased tobacco use and poor mental health among college students,^{24,38} both of which are Healthy People 2020 priority areas for transgender health.¹² Among college students in general, insufficient physical activity is a priority area for intervention^{4,24,38} and the disparity in physical activity indicates that transgender students may need more targeted interventions in order to alleviate the existing disparity and improve their long-term health.

While the physical activity disparities may, in part, explain the disparity in obesity that we also found for transgender subjects, it is not consistent with the finding that some transgender subjects were more likely to be underweight. A small number of studies, primarily using clinical samples, have suggested that people with gender identity disorder (a subset of transgender people) were more likely to be dissatisfied with their bodies.^{39,40} While this finding was inconsistent with our study, which did not find significant differences in body satisfaction, a subset of the transgender population may be inclined to maintain a lower body weight based on their body image perceptions. More research is needed to examine the health behaviors and perceptions associated with weight status and body image among transgender college student in order to more fully understand the weight status disparities found. Furthermore, practitioners may need to consider weight loss or weight gain messages that are sensitive to the gender needs and gender expression of transgender individuals and also work to affirm gender while promoting the importance of weight status and healthy living.

This is the first population-based study to explore a variety of weight indicators specifically among transgender individuals. Assessing transgender individuals can be particularly challenging using random sampling due to low prevalence in the general population. Previous research on transgender communities and individuals has largely relied on convenience samples. Although in comparison to our overall sample the number of transgender subjects is small, it is a sizable number given that our study sample was derived from a random sample and few other datasets have comparable numbers that are amenable to analysis.

Although the inclusion of a transgender option for gender makes this dataset unique, the inability to distinguish male-to-female, female-to-male, or other specific transgender identities is a limitation. Given differences between male and female subjects in existing literature, we would expect there to be differences within a broadly defined transgender group that might have been obscured by treating “transgender” as a homogenous group. This may, for example, explain why transgender individuals were more likely to be underweight or overweight in our study. Unfortunately, specific gender identity was not assessed for those who selected “transgender.” However, even with this information, we would have been limited by the sample size in this assessment. This represents a major limitation of population-based samples for gathering a sufficiently large sample of specific transgender sub-populations to conduct robust analysis.

An additional limitation of this work was that gender was assessed using a single question. With this approach, it is highly possible that we have not captured many individuals who could be classified as transgender (or identify as transgender in certain contexts), but on the survey selected either “male” or “female” in lieu of “transgender.” In addition, subjects who may have previously identified as “transgender” may select “male” or “female” if, for example, they underwent all legal and medical processes to change their gender. Cognitive testing of questions most appropriate to assess transgender status or capture a variety of gender identities on population-based surveys has been limited and existing questions have not been used consistently. Moreover, existing questions have limitations in measurement that have not yet been fully addressed.⁴¹ It is also important to note that because gender was self-reported and there were no additional questions regarding the subjects’ gender, there may be an unmeasured impact particularly on weight for those who are taking exogenous hormones to affirm their gender. For example, a transgender female on exogenous estrogen may gain weight because of the increase in fat storage. Future work on weight status and/or body composition among transgender individuals should consider the effect of medical intervention. Related, future work may also want to consider examining weight behaviors of transgender individuals across different weight status categories in order to more fully understand weight-related disparities among this population.

With regard to measurement in general, there may be biases in these self-reported data that cannot be accounted for, although measures utilized in this study have been broadly used on multiple national surveys and within other research studies. Finally, our sample includes only college students and therefore, may not be generalizable to a broader transgender population. For example, although previous research has shown that transgender people have lower socioeconomic position than non-transgender,^{7,10,11} similar differences were not observed in our sample. This may perhaps be due to the nature and meaning of socioeconomic position in the college student population, which is particularly difficult to measure.⁴²

The findings from this study indicate that weight-related disparities exist between transgender and non-transgender college students. However, because the purpose of the College Student Health Survey is health surveillance, detailed information was not available that might explain the context in which these disparities exist. For example, our findings indicate that transgender individuals are less likely to engage in strengthening physical activity. We could speculate that perhaps experiencing discrimination or transphobia in spaces such as the gym (where one often has to pick a “male” or “female” locker room for use) may deter transgender individuals from engaging in strengthening activities. However, additional contextual data, such as experiences of discrimination, transphobia, or social norms, were not available in our dataset to explore potential contributing factors to the weight and weight behaviors disparities between transgender and non-transgender college students in our study. Future work should specifically explore modifiable aspects of the context for transgender individuals in order to develop effective and inclusive interventions for this population. Furthermore, additional research on other areas of health, such as mental health and substance use, among transgender college students is needed in order to advance our understanding of transgender health.

IMPLICATIONS FOR HEALTH BEHAVIOR OR POLICY

Health behavior interventions related to weight should be inclusive and safe for transgender individuals or be designed specifically for this population. This includes interventions that incorporate the importance of gender as it is linked with weight and weight-related behaviors through strategies that affirm individual gender identities and expressions. Furthermore, strategies should also be sensitive to the unique difficulties individuals face, personally and socially, when transitioning their gender or presenting as gender non-conforming. These difficulties may exacerbate other known barriers, such as access, to meeting weight-related behavioral recommendations. For example, if a transgender student does not feel safe going to a campus recreation center to engage in strengthening physical activity, the barrier of access remains, even if the student can visit the center free of charge. To complement this, more work is needed to understand how weight and weight-related behaviors are perceived by transgender individuals and how best to incorporate their experiences into effective interventions.

With regard to policy, our study found that physical activity was an area of particular concern for transgender college students. Colleges could incorporate policies and procedures that destabilize the male—female dichotomy and recognize a broader range of gender identities, such as providing safe and private changing areas that can be used by transgender students at campus recreation centers. Campus health centers, specifically staff and providers at these centers, should be trained in the unique health needs of transgender students and be able to provide competent and appropriate care that encourages transgender students to maintain a healthy weight while balancing the gender needs of that student. For example, a transgender female gaining weight gain due to exogenous estrogen may need new strategies for maintaining her weight that do not require her to reduce or cease hormone use. Related to health care, allowing for gender options besides “male” and “female” may help create a more inclusive environment for transgender students, provided that practitioners and their staff are well-trained in working with diverse populations without bias.

Overall, health behavior interventions and policies need to be inclusive of transgender students by incorporating and supporting various genders. However, more work is needed in order to more specifically identify the needs of transgender individuals and how best to adapt and create interventions and policies to protect the health of this population.

Acknowledgments

The study was supported primarily by the Eunice Kennedy Shriver National Institute of Child Health & Human Development (NICHD) of the National Institutes of Health under Award Number R21HD073120 (PI: M. Laska). Further support on this project was also provided by NIDDK Award Number T32 DK083250. The content is solely the responsibility of the authors and does not necessarily represent the official view of the National Institutes of Health. In addition, this study was presented at The Obesity Society’s ObesityWeek 2013 meeting.

References

1. Institute of Medicine. The Health of Lesbian, Gay, Bisexual, and Transgender People: Building a Foundation for Better Understanding. Washington, DC: 2011.

2. Ogden CL, Carroll MD, Curtin LR, et al. Prevalence of overweight and obesity in the United States, 1999-2004. *JAMA*. 2006; 295(13):1549–1555. [PubMed: 16595758]
3. Gordon-Larsen P, Hou N, Sidney S, et al. Fifteen-year longitudinal trends in walking patterns and their impact on weight change. *Am J Clin Nutr*. 2009; 89(1):19–26. [PubMed: 19056560]
4. Nelson TF, Gortmaker SL, Subramanian SV, Wechsler H. Vigorous physical activity among college students in the United States. *J Phys Act Health*. 2007; 4:495–508. [PubMed: 18209239]
5. Larson NI, Neumark-Sztainer D, Harnack LJ, et al. Fruit and vegetable intake correlates during the transition to young adulthood. *Am J Prev Med*. 2008; 35(1):33–37. [PubMed: 18482818]
6. Neumark-Sztainer D, Wall M, Larson NI, et al. Dieting and disordered eating behaviors from adolescence to young adulthood: findings from a 10-year longitudinal study. *J Am Diet Assoc*. 2011; 111:1004–1011. [PubMed: 21703378]
7. Clements-Nolle K, Marx R, Guzman R, Katz M. HIV prevalence, risk behaviors, health care use, and mental health status of transgender persons: implications for public health intervention. *Am J Public Health*. 2001; 91(6):915–921. [PubMed: 11392934]
8. Lombardi EL, Wilchins RA, Priesing D, Malouf D. Gender violence: transgender experiences with violence and discrimination. *J Homosex*. 2001; 42(1):89–101. [PubMed: 11991568]
9. Nuttbrock L, Hwahng S, Bockting WO, et al. Psychiatric impact of gender-related abuse across the life course of male-to-female transgender persons. *J Sex Res*. 2010; 47(1):12–23. [PubMed: 19568976]
10. Grant, J.; Mottet, L.; Tanis, J., et al. *Injustice at Every Turn: A Report of the National Transgender Discrimination Survey*. Washington: 2011.
11. Conron KJ, Scott G, Stowell GS, Landers SJ. Transgender health in Massachusetts: results from a household probability sample of adults. *Am J Public Health*. 2012; 102:118–122. [PubMed: 22095354]
12. U.S. Department of Health and Human Services. 2020 Topics & Objectives - Objectives A-Z. Available at: <http://www.healthypeople.gov/2020/topicsobjectives2020/default.aspx>. Accessed December 15, 2013
13. Arnett JJ. Emerging adulthood: A theory of development from the late teens through the twenties. *Am Psychol*. 2000; 55(5):469–480. [PubMed: 10842426]
14. VanKim NA, Larson NI, Laska MN. Emerging adulthood: a critical age for preventing excess weight gain? *Adolesc Med*. 2012; 23:571–588.
15. Gordon-Larsen P, Adair LS, Nelson MC, Popkin BM. Five-year obesity incidence in the transition period between adolescence and adulthood: the National Longitudinal Study of Adolescent Health. *Am J Clin Nutr*. 2004; 80(3):569–575. [PubMed: 15321794]
16. Gordon-Larsen P, The NS, Adair LS. Longitudinal trends in obesity in the United States from adolescence to the third decade of life. *Obesity (Silver Spring)*. 2010; 18(9):1801–1804. [PubMed: 20035278]
17. Nelson MC, Story M, Larson NI, et al. Emerging adulthood and college-aged youth: an overlooked age for weight-related behavior change. *Obesity (Silver Spring)*. 2008; 16(10):2205–2211. [PubMed: 18719665]
18. Nelson MC, Neumark-Sztainer D, Hannan PJ, et al. Longitudinal and secular trends in physical activity and sedentary behavior during adolescence. *Pediatrics*. 2006; 118(6):E1627–E1634. [PubMed: 17142492]
19. Larson NI, Neumark-Sztainer D, Hannan PJ, Story M. Trends in adolescent fruit and vegetable consumption, 1999-2004 - Project EAT. *Am J Prev Med*. 2007; 32(2):147–150. [PubMed: 17234489]
20. Laska MN, Larson NI, Neumark-Sztainer D, Story M. Dietary patterns and home food availability during emerging adulthood: do they differ by living situation? *Public Health Nutr*. 2010; 13(2): 222–228. [PubMed: 19691902]
21. Nelson TF, Gortmaker SL, Subramanian SV, et al. 2007; 31(4):363–373.
22. Harris KM, Gordon-Larsen P, Chantala K, Udry JR. Longitudinal trends in race/ethnic disparities in leading health indicators from adolescence to young adulthood. *Arch Pediatr Adolesc Med*. 2006; 160(1):74–81. [PubMed: 16389215]

23. Laska MN, Pasch KE, Lust K, et al. Latent class analysis of lifestyle characteristics and health risk behaviors among college youth. *Prev Sci*. 2009; 10(4):376–386. [PubMed: 19499339]
24. VanKim NA, Laska MN, Ehlinger E, et al. Understanding young adult physical activity, alcohol and tobacco use in community colleges and 4-year post-secondary institutions: a cross-sectional analysis of epidemiological surveillance data. *BMC Public Health*. 2010; 10(208)
25. National Center for Education Statistics. College Navigator. Available at: <http://nces.ed.gov/collegenavigator/?s=MN>. Accessed October 9, 2012
26. World Health Organization. WHO Technical Report Series 854. Geneva, Switzerland: 1995. Physical status: The use and interpretation of anthropometry.
27. Goodman E, Hinden BR, Khandelwal S. Accuracy of teen and parental reports of obesity and body mass index. *Pediatrics*. 2000; 106:52–58. 1 Pt 1. [PubMed: 10878149]
28. Centers for Disease Control and Prevention. Youth Risk Behavior Surveillance System. Available at: <http://www.cdc.gov/HealthyYouth/yrbs/index.htm>. Accessed January 23, 2006
29. Nelson MC, Lust K, Story M, Ehlinger E. Credit card debt, stress and key health risk behaviors among college students. *Am J Health Promot*. 2008; 22(6):400–407. [PubMed: 18677880]
30. Young LR, Nestle M. The contribution of expanding portion sizes to the US obesity epidemic. *Am J Public Health*. 2002; 92:246–249. [PubMed: 11818300]
31. Diliberti N, Bordi PL, Conklin MT, et al. Increased portion size leads to increased energy intake in a restaurant meal. *Obes Res*. 2004; 12(3):562–568. [PubMed: 15044675]
32. U.S. Department of Health and Human Services. 2008 Physical Activity Guidelines for Americans. Washington, DC: 2008.
33. Widome R, Laska MN, Gulden A, et al. Health risk behaviors among veterans of the Afghanistan and Iraq Wars attending college. *Am J Health Promot*. 2011; 26(2):101–108. [PubMed: 22040391]
34. American Academy of Pediatrics. Children, adolescents, and television. *Pediatrics*. 2001; 107(2): 423–426. [PubMed: 11158483]
35. Eisenberg ME, Neumark-Sztainer D. Friends' dieting and disordered eating behaviors among adolescents five years later: findings from Project EAT. *J Adolesc Health*. 2010; 47(1):67–73. [PubMed: 20547294]
36. Linde JA, Wall MM, Haines J, Neumark-Sztainer D. Predictors of initiation and persistence of unhealthy weight control behaviours in adolescents. *Int J Behav Nutr Phys Act*. 2009; 6:72. [PubMed: 19874599]
37. Laska MN, Pasch KE, Lust K, et al. The differential prevalence of obesity and related behaviors in two- vs. four-year colleges. *Obesity (Silver Spring)*. 2011; 19(2):453–6.
38. VanKim NA, Nelson TF. Vigorous physical activity, mental health, perceived stress, and socializing among college students. *Am J Health Promot*. 2013; 28(1):7–15. [PubMed: 23470187]
39. Vocks S, Stahn C, Loenser K, Legenbauer T. Eating and body image disturbances in male-to-female and female-to-male transsexuals. *Arch Sex Behav*. 2003; 38(3):364–377. [PubMed: 19030979]
40. Bandini E, Fisher AD, Catellini G, et al. Gender identity disorder and eating disorders: similarities and differences in terms of body uneasiness. *J Sex Med*. 2013; 10:1012–1023. [PubMed: 23347389]
41. The GenIUSS Group. Gender-related Measures Overview. Los Angeles, CA: 2013.
42. VanKim NA, Laska MN. Socioeconomic disparities in emerging adult weight and weight behaviors. *Am J Health Behav*. 2012; 36(4):433–445. [PubMed: 22488394]

Table 1

Prevalence and Relative Risk Estimates of Sociodemographic Factors by Gender (N=34,324)

Variable	Transgender (N=53)		Non-transgender (N=34,271)		RR (95% CI)*
	N	%	N	%	
School type					
4-year	36	67.9%	22,277	65.0%	ref
2-year	17	32.1%	11,994	35.0%	0.92 (0.53-1.58)
Race/ethnicity					
White	18	66.0%	28,519	83.3%	ref
Non-white	36	34.0%	5,723	16.7%	2.03 (1.34-3.08)
Age					
18-20 years	15	30.0%	10,883	31.9%	ref
21-24 years	15	30.0%	11,045	32.3%	0.99 (0.49-1.99)
25+ years	20	40.0%	12,239	35.8%	1.19 (0.47-2.98)
Relationship status					
Single	24	45.3%	14,358	41.9%	ref
Married/Dom. Partner	9	17.0%	6,902	20.2%	0.78 (0.32-1.93)
Other	20	37.7%	12,986	37.9%	0.92 (0.53-1.60)
Living arrangement					
Parent's Home	12	22.6%	5,743	16.8%	ref
Residence Hall^	10	18.9%	5,688	16.6%	0.84 (0.32-2.22)
Rent or Share Rent/Other	31	58.5%	22,825	66.6%	0.65 (0.34-1.25)
Hours worked for pay					
0 hours	20	37.7%	9,605	28.2%	ref
1-19 hours	16	30.2%	11,949	35.1%	0.64 (0.33-1.27)
20+ hours	17	32.1%	12,495	36.7%	0.65 (0.37-1.15)
Credit card debt					
Not applicable/None	35	66.0%	21,712	63.5%	ref
Any	18	34.0%	12,487	36.5%	0.93 (0.66-1.32)

* crude relative risk regression models for dichotomous variables; crude multinomial logistic regression models for multinomial variables, with relative-risk ratio option specified; all confidence intervals adjusted for clustering at the school level

Table 2

Prevalence and Adjusted Relative Regression Estimates of Weight Status and Weight-Related Behaviors by Gender (N=34,324)

	Transgender (N=53)		Non-transgender (N=34,271)		
Variable	N	%	N	%	RR (95% CI)*
Weight Status					
Underweight (BMI<18.5 kg/m ²)	7	13.2%	1,232	3.6%	4.78 (1.61-14.18)
Normal weight (ref; 18.5 kg/m ² BMI<25 kg/m ²)	19	35.9%	17,937	52.6%	ref
Overweight (25 kg/m ² BMI<30 kg/m ²)	11	20.8%	8,877	26.0%	1.17 (0.63-2.17)
Obese (BMI 30 kg/m ²)	16	30.2%	6,041	17.7%	2.45 (1.21-4.93)
Fruit and Vegetable Consumption					
Met recommendations (ref)	13	25.0%	5,543	16.3%	ref
Did not meet recommendations	39	75.0%	28,417	83.7%	0.90 (0.77-1.06)
Breakfast Consumption					
5-7 days/week (ref)	27	52.0%	14,948	43.7%	ref
0-4 days/week	26	48.0%	19,287	56.3%	0.85 (0.59-1.22)
Soda Pop Consumption					
<1/day (ref)	44	83.0%	28,334	82.8%	ref
1/day	9	17.0%	5,879	17.2%	1.01 (0.57-1.79)
Diet Soda Pop Consumption					
<1/day (ref)	44	83.0%	29,175	85.3%	ref
1/day	9	17.0%	5,030	14.7%	1.23 (0.66-2.30)
Fast Food Consumption					
<Several times/week (ref)	45	84.9%	28,821	84.2%	ref
>Several times/week	8	15.1%	5,429	15.9%	0.90 (0.51-1.60)
Restaurant Food Consumption					
<Several times/week (ref)	44	83.0%	30,382	88.8%	ref
>Several times/week	9	17.0%	3,838	11.2%	1.47 (0.77-2.80)
Moderate Physical Activity					
2.5 hours/week (ref)	21	40.4%	13,002	38.1%	ref
2 hours/week	31	59.6%	21,172	63.0%	0.95 (0.75-1.20)
Strenuous Physical Activity					
2.5 hours/week (ref)	8	15.1%	9,582	28.0%	ref
2 hours/week	45	84.9%	24,663	72.0%	1.16 (1.01-1.34)
Strengthening Physical Activity					

Variable	Transgender (N=53)		Non-transgender (N=34,271)		RR (95% CI) *
	N	%	N	%	
Any (ref)	25	48.1%	21,325	62.4%	ref
None	27	51.9%	12,871	37.6%	1.32 (1.11-1.56)
Screen Time					
<14 hours/week (ref)	23	43.4%	15,500	45.2%	ref
14 hours/week	30	56.6%	18,759	54.8%	1.20 (1.02-1.41)
Unhealthy Weight Control^a					
None (ref)	44	83.0%	27,229	79.5%	ref
Any	9	17.0%	7,024	20.5%	0.81 (0.40-1.65)
Body Satisfaction					
Most of the time/Always (ref)	20	37.7%	16,437	48.0%	ref
Never/Sometimes	33	62.3%	17,821	52.0%	1.19 (1.00-1.43)

* relative risk regression models for dichotomous variables; multinomial logistic regression models for multinomial variables, with relative-risk ratio option specified; all models are adjusted for race; all confidence intervals adjusted for clustering at the school level

^a includes using laxatives, taking diet pills, binge eating, and vomiting