

**ON BULLYING, MENTAL HEALTH, AND WEIGHT PERCEPTION**

**Jennifer Tennant**  
Ithaca College

**Wahid Khan**  
California Policy Lab, UCLA

**ABSTRACT**

No previous studies have directly looked at how bullying affects weight perception, which is a gap this article is attempting to fill. We study the effect of being bullied on negative health outcomes in order to more carefully understand and quantify all the costs of bullying. We use propensity score matching techniques to make the samples of the Youth Risk Behavior Surveillance System more comparable. Bullying is associated with a weight disconnect in which a person perceives themselves as overweight when they are not. Twice as many bullied adolescents suffer from depression than those who were not bullied. Focusing on bullying prevention and intervention may have spillover effects on other adolescent mental health costs.

**INTRODUCTION**

The statistics on bullying are alarming. According to a 2016 report by the National Center of Education Statistics, more than 20 percent of students age 12-18 reported being bullied at school (US Department of Education, 2016). These incidents of bullying can be broken down into various types, including being called names, subject of rumors, physically assaulted, and intentionally excluded from activities (US Department of Education, 2016). Increases in technology and the prevalence of smart phones has led to an increase in cyberbullying – “the willful and repeated harm inflicted through the use of computers, cellphones, and other electronic devices” (Cyberbullying, n.d.). Hinduja and Patchin report that one-third of middle schoolers and high schoolers state that they have been cyberbullied in their lifetimes, and one in six have been cyberbullied in the past 30 days (2018).

In response to this public health crisis, as of 2015, all states have anti-bullying laws, although the laws vary in effectiveness (Bullypolice.org, n.d.). According to the watchdog group Bully Police, effective anti-bullying laws clearly define bullying, mandate these protections, have a cyberbullying clause, and provide counseling for the victims.

Srabstein et al. concur and say that "zero tolerance by itself is ineffective, unless it is accompanied by significant improvement in school climate, leading to peer support, mutual respect, better interaction, and an enhanced sense among the victims of 'security at school'" (2008, pp. 15-16). Sabia and Bass (2017) state that the typical anti-bullying law doesn't improve student well-being, although states that mandate school districts to "implement strong, comprehensive anti-bullying policies are associated with a 7 to 13 % reduction in school violence and an 8 to 12 % reduction in bullying."

Bullying can lead to myriad negative health outcomes, as well as negative economic outcomes. Manzella (2018) states that "bullying may have serious negative labor market consequences by disrupting cognitive and non-cognitive skill development." She also says that bullying can be "financial problematic" for schools, increasing operating costs in order to respond to incidents and loss of revenue due to low attendance, both of the bullies and the victims. Mukerjee (2018) also focuses on the long-term economic costs of bullying, reporting that men who were bullied as teenagers earned 23 percent less than men who were not bullied.

This article will focus on weight perception, which can be a pathway to many negative health outcomes, which can lead to negative economic consequences as well. Are bullied kids more likely than those who aren't bullied to think they are overweight when they are not? Using data from the Youth Risk Behavior Surveillance System (YRBSS), we create a "disconnect" variable: if a child reports overweight/obese status but is medically not. This perception of being overweight and/or the disconnect variable may affect disordered eating behavior and broader mental health issues. Since the bullied population may be demographically different from those who are not bullied and the data are not longitudinal, causal mechanisms are not clear. We employ a propensity score matching technique to generate a "propensity to be bullied" variable; within that matched sample, it will be easier to compare outcomes of those who are actually bullied against those who are not. We want to study the effect of being bullied on these outcomes in order to more carefully understand and quantify the full societal and economic costs of bullying.

Pediatric, economic, and sociological literature offers a wealth of information on bullying and negative health outcomes. In 1999, Kaltiala-Heino, Rimpela, Marttunen, Rimpela and Rantanen studied Finnish adolescents to assess the relationship between being bullied, being a school bully, depression, and suicidal tendencies. They concluded that adolescents who are both being bullied and bullies themselves are at risk of depression and suicide. Messias, Kindrick and Casto (2014) utilized 2011 YRBSS data to determine that adolescents being bullied demonstrated higher risks of depression and suicidal tendencies. They also noted that females comprised the larger share of cyberbullying targets and reported higher levels of depression. In a study of people from southern Australia, Allison, Roeger, and Reinfeld-Kirkman (2009) found that those who were bullied at school in childhood had significantly worse mental and physical health outcomes in adulthood.

No previous studies have directly looked at how bullying affects weight perception, which is a gap this article is attempting to fill. However, there have been studies that have considered how overweight perception impacts mental health issues, disordered eating, and suicidal behaviors. Daniels (2005) conducted an analysis of the 1999 and 2001 waves of YRBSS data to identify a relationship between weight, weight perception, weight control behaviors, and the relationship between these variables and symptoms of mental depression among approximately 13,000 students. Symptoms of depression were related to *perceived* weight, while no statistically significant relationship

existed between self-reported depressive symptoms and actual Body Mass Index (BMI). Subjects who considered themselves as either underweight or overweight had a 35 percent chance of experiencing depressive symptoms. Females were 20 percent more likely to view themselves as underweight or overweight when compared to males. Eichen, Conner, Daly and Faber (2010) collected a nationally representative sample of 11,103 adolescents from the 2007 YRBSS dataset. They observed that the overestimation of weight among "normal weight adolescents" as well as "accurate perceptions of weight among overweight adolescents" were significantly associated with a higher incidence of disordered eating. Also using YRBSS, Dave and Rashad (2009) focused on weight perception's effect on suicidality, implementing an empirical methodology based on simultaneous-equations models and stratified samples. Their results indicated that the perception of being overweight has a strong impact on the suicide behavior of girls. The results were statistically insignificant for boys. According to their data, 23 percent of girls and seven percent of boys who were not overweight think of themselves as such. They conclude: "...among adolescents who perceived themselves as being very overweight, the risk of attempting suicide is more than twice relative to those who perceive themselves to be of normal weight" (Dave and Rashad, 2010, p. 1686).

These studies have shown weight perception to be a very important mechanism in mental health, disordered eating, and suicidality. However, this perception may be flawed. Among obese adolescents, in the United States from 1999 to 2007, 3 out of 10 obese adolescents do not know they are overweight and reported they were "about right" or "underweight" (Edwards et al., 2010). Male respondents were more likely to perceive their own weight statuses poorly than female respondents. African-American and Hispanic respondents were significantly more likely to misperceive than white respondents (Edwards et al., 2010). Yan, Zhang, Wang, Stoesen and Harris (2009) echo similar findings, reporting that 25 percent of girls and 33.2 percent of boys misclassified their own weight status (p. 354). The misclassification goes both ways as many overweight adolescents, boys in particular, did not perceive themselves as overweight. 60.5 percent of overweight boys and 40.1 percent of overweight girls considered themselves to be "about the right weight" (Yan et al., 2009, pp. 356-357). Park (2011) found that underestimation of weight status was more prevalent than overestimation across sex, race/ethnicity, and income levels.

Weight perception and weight control behaviors differ significantly by sex and race. High proportions of normal-weight white girls consider themselves overweight and have attempted "drastic measures to lose weight" (Strauss, 1999). Focusing on US adolescents, Talamayan et al. (2006) analyzed the prevalence of overweight misperceptions and weight-control behaviors. They found that females were more likely to perceive themselves as overweight than males. Overweight misperceptions were most prevalent among white and Hispanic adolescents and the lowest among African-American adolescents; the prevalence of weight control behavior also varied similarly by ethnicity. Grade level, geographic region or metropolitan status did not statistically significantly affect weight perception. The authors suggest that obesity prevention programs should address weight misperceptions and the harmful effects of unhealthy weight control measures even among normal weight adolescents (Talamayan et al., 2006, p. 365).

## METHODS

The Centers for Disease Control and Prevention (CDC) established the Youth Risk Behavior Surveillance System (YRBSS) in 1990 “to monitor health behaviors that contribute markedly to the leading causes of death, disability, and social problems among youth and adults in the United States” (Youth Risk Behavior Surveillance System, n.d.). Among other purposes, it was designed to “determine the prevalence of health behaviors” and “monitor progress toward achieving the Healthy People objectives” (Youth Risk Behavior Surveillance System, n.d.).

We analyze eight years of data: 1999, 2001, 2003, 2005, 2007, 2009, 2011, and 2013. We choose to start from 1999 because questions related to BMI were not asked in prior years. We don't include the 2015 wave of data because it dropped a number of the disordered eating variables we use in our analysis.

The questions provide information about participants' age, sex, race, body mass index (BMI), weight perception, substance abuse, eating behaviors, mental health indicators, and experience with bullying. A novel part of this dataset is that it includes a variable on the *perception* of one's weight in addition to a respondent's actual weight and BMI. Responses to the weight perception question range from very underweight to very overweight. The dataset also asks dieting/eating behavior questions, including ones about fasting and diet-pill use. It also includes a question to measure depression, which asks about feeling sad or hopeless for two weeks or more and refraining from usual activities. The YRBSS has a number of bullying-related questions, including ones that focus on cyberbullying, being bullied on school property, and being threatened at school.

We use the propensity score matching technique to compare bullied adolescents with the rest of the population, which we define as those adolescents who self-report to have not been bullied in the survey. Rosenbaum and Rubin (1983) introduced the technique of propensity score matching. As described in Tennant (2012), it “is a way to create ‘similar’ groups that can be compared in terms of both observed and unobserved characteristics.” A propensity score matched sample takes characteristics of the bullied group (for example sex, age, race, and body mass index) and “draws a sample from the rest of the population so that the proportions of certain demographic characteristics of the control group align with the [bullied] group” (Tennant, 2012).

Propensity scores are the predicted probabilities from a probit model that estimates the probability of being in a treatment group. In this article, the treatment group is the bullied group, and the control group is the not-bullied group. “Propensity to be bullied” is estimated using age, sex, race, ethnicity and BMI as regressors. Parents' level of education and household income were not measured in this dataset, so unfortunately are not included in the estimation. We can match a respondent who reports to have been bullied to a respondent in the control group using their respective propensity scores. We use the command `psmatch2` with nearest neighbor match with replacement in Stata to create propensity scores and then the matched samples. Treatment observations are limited to those within the propensity score range of the controls. The findings were robust when height and weight were used distinctly as regressors in the propensity score matching, instead of BMI. These sensitivity analyses are available upon request.

The demographics of the original samples are quite different. Using the non-matched samples, we find that 27 percent of bullied adolescents are fifteen years old, compared with 22 percent of the rest of the population. We observe that about 50 percent of all reported bullied adolescents are female. As for those adolescents who are medically

defined as overweight or obese, we find that bullied teens are statistically significantly more likely to be obese or overweight than those who are not bullied.

Table 1 shows the demographics of the propensity score matched sample. In this matched sample, the means for bullied and not-bullied adolescents are not significantly different, except for obese adolescents, white adolescents, and those age twelve and below.

## RESULTS

Table 2 compares weight perception, mental health and disordered eating outcomes among the propensity score matched samples. We observe that 33.98 percent of the bullied population perceived themselves as slightly or extremely overweight, compared to 31.00 percent of those who weren't actually bullied but had the same propensity to be bullied, a statistically significant difference. Twelve percent of the bullied group also experienced an overweight disconnect: they think of themselves as obese or overweight even when that is not the case. This is significantly higher than the overweight disconnect for the not-bullied population. Interestingly, there is no statistically significant difference between the bullied and not-bullied matched samples for underweight disconnect. This may have something to do with the different societal views on the concepts of overweight and underweight, regardless of their effects on actual health.

A perception of being overweight or obese, even if a misperception, may lead to dieting and disordered eating. As discussed previously, the literature has shown that weight perception is more important than actual weight with regard to mental health issues. 49.7 percent of bullied adolescents reported that they wanted to lose weight, significantly higher than the 45.34 percent of the non-bullied sample. Two interesting things are revealed here – that bullied adolescents are significantly more likely to want to lose weight than non-bullied adolescents, but also that regardless of bullying, about half of American teens want to lose weight. There are larger differences between bullied and non-bullied adolescents when we look at actual disordered eating. In the propensity score matched sample, we find that 20.15 percent of bullied teens fasted for 24 hours or more in order to lose weight, compared with 10.76 percent of their non-bullied counterparts. Ten percent of bullied adolescents used diet pills, significantly more than the 5.02 percent of their non-bullied peers. 8.48 percent of bullied teens vomited in order to lose weight, compared with 3.34 percent of the matched sample who were not bullied.

Table 2 also delves into a number of mental health issues. It shows a strong association with being bullied and depression. In the propensity score matched sample, 48.86 percent of bullied adolescents report experiencing depression, compared to 25.52 percent of those who were not bullied. Suicide ideation, plans, and attempts were also significantly higher in the bullied population. 31.02 percent of bullied adolescents thought about suicide, while 26.08 percent planned, and 18.32 percent attempted. These are much higher rates than those who have the same propensity to be bullied, but weren't actually bullied. For that control population, the percentages of those who ideated, planned, and attempted were 13.77 percent, 10.55 percent, and 6.38 percent, respectively.

The final variable that Table 2 outlines is whether or not the respondent feels unsafe at school. Unsurprisingly, those who were actually bullied are much more likely to report that they feel unsafe at school, at 16.7 percent compared with 3.62 percent. It is interesting that those who have not been bullied also report feeling unsafe at school. This

elucidates the bullying terrorizing mechanism and its scope – even if you haven't been bullied, your friends have been, your siblings have been, and you might be next.

### *Cyberbullying*

Tables 1 and 2 looked at all types of bullying – in-person bullying, cyberbullying, and being threatened at school. With the rise of smart phones and social media, we wanted to also focus solely on cyberbullying and its effects. Does cyberbullying have similar effects as all types of bullying? Could it even be more harmful than school-based bullying since one can never get away from it? Tables 3 and 4 mirror Tables 1 and 2 and investigate these questions. Before using propensity score matching techniques, we find that 70.04 percent of those who are cyberbullied are female, compared with 47.16 percent in the rest of the population. 55.52 percent of those who are cyberbullied are white, non-Hispanic, compared to 43.74 percent of the non-cyberbullied population.

Table 3 shows the demographics of the propensity score matched samples, that is “propensity to be cyberbullied” based on age, race, sex, and a medical definition of overweight and obesity. In the matched sample, none of the means are significantly different, except for “age 12 and below.”

Table 4 compares weight perception, disordered eating, and mental health outcomes for the cyberbullied propensity score matched samples. The results are very similar to Table 2, which compared those outcomes with matched samples of a more expansive definition of bullying. Actually being cyberbullied leads to a significantly larger prevalence of overweight disconnect, disordered eating, depression, suicidality, and feeling unsafe at school. Like the general bullied matched sample, there is no statistically significant difference between the likelihood of having an underweight disconnect based on whether or not one was actually cyberbullied. An interesting thing to note is that the prevalence of all of these variables are higher in the cyberbullied matched sample than the more expansive bullied matched sample. The prevalence is higher for both those who were cyberbullied and those who were not. For example, Table 4 shows that 36.25 percent of those who were cyberbullied thought about suicide compared with 14 percent of their matched counterparts who were not. When looking in Table 2 at suicide ideation, the percentages are 31.02 percent and 13.77 percent, respectively. This increase in prevalence for both those who were actually cyberbullied and those who were not could be the case because cyberbullying may be more destructive than on-site bullying because of its unceasing nature, because girls are more likely to be cyberbullied and therefore the matched sample has a higher female proportion, or a combination of factors.

### **DISCUSSION**

Adolescents who are bullied are demographically different from those who are not bullied but propensity score matching can help calibrate the samples and help us make comparative arguments. These matched samples show that significantly more bullied adolescents experience depression, perceive themselves to be overweight, have an overweight disconnect, and participate in disordered eating than those who are not bullied. Over thirty percent of bullied adolescents have ideated suicide at some point, compared to fourteen percent of the rest of the population.

While propensity score matching is not a causal technique, it shows that the higher association of false weight perception in those who are bullied might increase the negative effects of bullying. These results imply that focusing on bullying prevention and intervention may have spillover effects on many other adolescent mental health costs, including costs of disordered eating, depression, and suicide. These spillover effects are ubiquitous and could be quite large. For example, the size of the weight loss market in 2007 was \$55 billion, according to a study by Marketdata (Overweight, n.d.). A recent edition of the CDC's *Morbidity and Mortality Weekly Report* states that in 2014, death rates from suicide for kids age 10-14 for the first time exceeded death rates from motor vehicle accidents (QuickStats, n.d.). When looking at suicides specifically, the Centers for Disease Control states that, in 2015, the average suicide cost \$1,287,534, due to medical and work costs of the victim and the survivors (Centers for Disease Control, n.d.). Focusing on bullying prevention and education could have effects on weight perception, disordered eating, feeling safe at school, depression and anxiety, and suicidal ideation and attempts.

#### IMPLICATIONS FOR HEALTH BEHAVIOR OR POLICY

All states now have anti-bullying laws, but these laws vary in levels of effectiveness. However, these laws must be funded mandates instead of just "encouraging" school districts to take a stand against bullying. The laws also need to acknowledge the mental and emotional health consequences of bullying and provide resources for counseling for victims and bystanders. Giving these laws "teeth" and devoting resources to them will not only help deter bullying but also will improve the mental and emotional health of both those who are bullied as well as witnesses.

Healthy People 2020 is a far-reaching and ambitious set of objectives created by the United States Office of Disease Prevention and Health Promotion. One of its goals is "improv[ing] mental health through prevention and by ensuring access to appropriate quality mental health services" (Healthy People 2020, n.d.). They note that "the greatest opportunity for prevention is among young people" and that research in the past 20 years has provided evidence that "school-based violence prevention can reduce the base rate of aggressive problems in an average school by 25 to 33 percent" (Healthy People 2020, n.d.).

Many states use Healthy People 2020 as a guide to improve physical, mental, and emotional health in their states (*State and Territorial Healthy People Plans, n.d.*). In New York, the state in which we live or have lived, the prevention agenda for 2013-2018 used Healthy People 2020 as one of its guides when creating its objectives. Two general priorities include Promot[ing] a Healthy and Safe Environment and Promot[ing] Mental Health and Prevent[ing] Substance Abuse (*State and Territorial Healthy People Plans, n.d.*). In the former category, New York focuses on injuries, violence, and occupational health, but doesn't mention school health in general or bullying specifically. Objectives in New York's mental health priority include reducing the percentage of adolescents who feel sad or hopeless by 10 percent and reducing adolescent suicide attempts by 10 percent (New York State Department of Health, n.d.). However, there is no specific mention about bullying prevention and intervention as a way to achieve these objectives. We believe that a focus on bullying must be included in future revisions of Healthy People and its state offshoots to help it achieve its health-based goals. Furthermore, focusing on bullying will have spillover effects on weight perception and mental health, which will help us better quantify – and hopefully reduce -- all of its economic costs.

## REFERENCES

- Allison, S., L. Roeger, and N. Reinfeld-Kirkman.** (2009) Does school bullying affect adult health? Population survey of health-related quality of life and past victimization. *Australia and New Zealand Journal of Psychiatry* 43(12): 1163-1170.
- Bullypolice.org.** Bully Police USA: A Watchdog Organization – Advocating for bullied children and reporting on state anti-bullying laws (on-line). Available at: <http://www.bullypolice.org>. Accessed August 27, 2018.
- Centers for Disease Control.** Suicide: consequences (on-line). Available at: <https://www.cdc.gov/violenceprevention/suicide/consequences.html> . Accessed August 27, 2018.
- Cyberbullying.** Cyberbullying Research Center (on-line). Available at: <http://www.cyberbullying.us>. Accessed August 27, 2018.
- Daniels, S.** (2005) Overweight in children and adolescents: Pathophysiology, consequences, prevention, and treatment. *Circulation* 111(15): 1999-2012.
- Dave, D. and I. Rashad.** (2009) Overweight status, self-perception, and suicidal behavior among adolescents. *Social Science and Medicine* 68(9): 1685-1691.
- Edwards, N., S. Pettingell, and I. Borowsky.** (2010) Where perception meets reality: Self-Perception of weight in overweight adolescents. *Pediatrics* doi: 10.1542/peds.2009-0185.
- Eichen, D., B. Conner, B. Daly, and R. Fauber.** (2010) Weight perception, substance use, and disordered eating behaviors: Comparing normal weight and overweight high school students. *Journal of Youth and Adolescence* 41(1): 1-13.
- Healthy People 2020: Mental health and mental disorders** (on-line). Available at: <https://www.healthypeople.gov/2020/topics-objectives/topic/mental-health-and-mental-disorders> . Accessed September 10, 2018.
- Hinduja, S., and J.W. Patchin.** Cyberbullying identification, prevention, and response. Cyberbullying Research Center 2018 (on-line). Available at: <http://www.cyberbullying.org>. Accessed August 27, 2018.
- Kaltiala-Heino, R., M. Rimpela, M. Marttunen, A. Rimpela, et al..** (1999) Bullying, depression, and suicidal ideation in Finnish adolescents: school survey. *BMJ (Int Ed)* 319(7206): 348-351.
- Manzella, J.** (2018). Are states winning the fight? Evidence on the impact of state laws on bullying in schools. *Economics of Education Review* 64: 261–281.
- Messias, E., K. Kindrick, and J. Castro.** (2014) School bullying, cyberbullying, or both: Correlates of teen suicidality in the 2011 CDC Youth Risk Behavior Survey. *Comprehensive Psychiatry* 55(5): 1063-1068.
- Mukerjee, S.** (2018). Childhood bullying and labor market outcomes in the United States. *Atlantic Economic Journal* 46(3): 313–335.
- New York State Department of Health.** New York State prevention agenda 2013-2018: Priorities, focus areas, goals and objectives, 1/25/2013 (revised: March 16, 2015) (on-line). Available at: [https://www.health.ny.gov/prevention/prevention\\_agenda/2013-2017/tracking\\_indicators.htm](https://www.health.ny.gov/prevention/prevention_agenda/2013-2017/tracking_indicators.htm) . Accessed September 10, 2018.
- Overweight and Weight Loss Statistics (on-line).** Available at: <http://www.worldometers.info/weight-loss/>. Accessed August 27, 2018.



- Park, E.** (2011) Overestimation and underestimation: Adolescents' weight perception in comparison to BMI-based weight status and how it varies across socio-demographic factors. *Journal of School Health* 81(2): 57-64.
- QuickStats:** Death rates for motor vehicle traffic injury, suicide, and homicide among children and adolescents aged 10-14 years – United States, 1999-2014 (on-line) *MMWR Morb Mortal Wkly Rep* 2016;65:1203. doi: <http://dx.doi.org/10.15585/mmwr.mm6543a8> . Accessed September 10, 2018.
- Rosenbaum, P.R. and D. Rubin.** (1983) The central role of the propensity score in observational studies for causal effects. *Biometrika* 70(1): 41-55.
- Sabia, J. J. and B. Bass.** (2017) Do anti-bullying laws work? New evidence on school safety and youth violence. *Journal of Population Economics* 30(2): 473–502
- Srabstein, J., B. Berkman, and E. Pyntikova.** (2008) Antbullying legislation: A public health perspective. *Journal of Adolescent Health* 42: 11-20.
- State and Territorial Healthy People Plans** (on-line). Available at: <https://www.healthypeople.gov/2020/healthy-people-in-action/State-and-Territorial-Healthy-People-Plans> . Accessed September 10, 2018.
- Strauss, R.** Self-reported weight status and dieting in a cross-sectional sample of young adolescents: National Health and Nutrition Examination Survey III. (1999) *Archives of Pediatric and Adolescent Medicine* 153(7): 741-7.
- Talamayan, K., A. Springer, S. Kelder, E. Gorospe, et al.** (2006) Prevalence of overweight misperception and weight control behaviors among normal weight adolescents in the United States. *Scientific World Journal* 6: 365-373.
- Tennant, J.** (2012) Disability, employment, and income: Are Iraq/Afghanistan-era U.S. veterans unique? *Monthly Labor Review* August: 3-10.
- U.S. Department of Education.** Student reports of bullying: Results from the 2015 School Crime Supplement to the National Crime Victimization Survey. NCES 2017-015 (on-line). December 2016. Available at: <https://nces.ed.gov/pubs2017/2017015.pdf>. Accessed August 27, 2018.
- Yan, A., G. Zhang, M. Wang, C. Stoesen, et al.** (2009) Weight perception and weight control practice in a multiethnic sample of US adolescents. *Southern Medical Journal* 102(4): 354-360.
- Youth Risk Behavior Surveillance System.** Youth Risk Behavior Surveillance System (YRBSS) Overview (on-line). Available at: <https://www.cdc.gov/healthyyouth/data/yrbs/overview.htm>. Accessed August 27, 2018.

**Table 1: Demographics of matched samples of bullied adolescents and rest of population**

Variable	Percent of Bullied Adolescents	Percent of Rest of Population	t-statistic	Are means significantly different?
Age 12	0.12	0.03	2.31	Yes
Age 13	0.07	0.16	-1.3	No
Age 14	11.79	12.08	-0.55	No
Age 15	26.61	26.73	-0.17	No
Age 16	25.85	25.92	-0.1	No
Age 17	22.82	22.72	0.15	No
Age 18 +	12.73	12.36	0.68	No
Female	49.76	50	-0.3	No
White, non-Hispanic	47.49	49.69	-2.8	Yes
Black, non-Hispanic	16.24	16.99	-1.21	No
Hispanic	25.61	25.29	0.47	No
Overweight	16.43	16.5	-0.12	No
Obese	14.75	13.11	2.85	Yes

"Bullied adolescents" are those who answered yes to either questions 24, 25, or 17 of the Youth Risk Behavior Surveillance System, which asks children if they had been bullied, cyberbullied, or threatened at school, respectively.

$p < .05$ .

N(Bullied adolescents) = 13,387; N(Not bullied adolescents) = 79,824, Source YRBSS 1999-2013

**Table 2: Weight perception, mental health, and disordered eating outcomes, matched samples of bullied adolescents and the rest of the population**

Variable	Percent of Bullied Adolescents	Percent of rest of population	t-statistic	Are means significantly different?
Owgt percept.	33.98	31	4	Yes
Owgt disconnect	11.67	10.63	2.2	Yes
Uwgt disconnect	8.87	9.24	-0.79	No
Depressed	48.86	25.52	32.18	Yes
Lose weight	49.7	45.34	5.53	Yes
Fasts 24 hours +	20.15	10.76	17.66	Yes
Uses diet pills	10.22	5.02	13.19	Yes
Vomits	8.48	3.34	14.99	Yes
Suicide ideation	31.02	13.77	28.4	Yes
Suicide plan	26.08	10.55	27.79	Yes
Suicide attempt	18.32	6.38	25.52	Yes
Unsafe at school	16.7	3.62	31.79	Yes

"Bullied adolescents" are those who answered yes to either questions 24, 25, or 17 of the Youth Risk Behavior Surveillance System, which asks children if they had been bullied, cyberbullied, or threatened at school, respectively.

$p < .05$ .

N(Bullied adolescents) = 13,387; N(Not bullied adolescents) = 79,824, Source YRBSS 1999-2013

**Table 3: Demographics of matched samples of cyberbullied adolescents and rest of population**

Variable	Percent of Bullied Adolescents	Percent of Rest of Population	t-statistic	Are means significantly different?
Age 12	0.12	0	2	Yes
Age 13	0.09	0.16	-0.64	No
Age 14	11.07	10.66	0.44	No
Age 15	24.75	24.88	-0.1	No
Age 16	25.12	24.72	0.33	No
Age 17	25.78	26.56	-0.61	No
Age 18 +	13.06	13.03	0.03	No
Female	70.04	69.54	0.37	No
White, non-Hispanic	55.52	56.02	-0.35	Yes
Black, non-Hispanic	9.54	9.76	-0.24	No
Hispanic	23.1	22.88	0.18	No
Overweight	16.49	16.49	0	No
Obese	12.44	11.78	0.68	Yes

"Cyberbullied adolescents" are those who answered yes to question 25 of the Youth Risk Behavior Surveillance System, which asks children if they had been cyberbullied.

$p < .05$ .

N(Bullied adolescents) = 3,208; N(Not bullied adolescents) = 18,359. Source YRBSS 1999-2013

**Table 4: Weight perception, mental health, and disordered eating outcomes, matched samples of cyberbullied adolescents and the rest of the population**

Variable	Percent of Cyberbullied Adolescents	Percent of rest of population	t-statistic	Are means significantly different?
Owgt percept.	37	32.64	3.17	Yes
Owgt disconnect	14.65	11.63	3.17	Yes
Uwgt disconnect	6.58	7.26	-0.91	No
Depressed	57.08	27.96	21.64	Yes
Lose weight	59.13	51.53	5.29	Yes
Fasts 24 hours+	25.75	12.34	12.53	Yes
Uses diet pills	11.16	4.21	9.67	Yes
Vomits	10.63	2.99	11.26	Yes
Suicide ideation	36.25	14	19.22	Yes
Suicide plan	29.83	10.69	17.8	Yes
Suicide attempt	20.64	5.67	16.72	Yes
Unsafe at school	14.15	4.18	13.09	Yes

"Cyberbullied adolescents" are those who answered yes to question 25 of the Youth Risk Behavior Surveillance System, which asks children if they had been cyberbullied.  
 $p < .05$ .

N(Cyberbullied adolescents) = 3,208; N(Not bullied adolescents) = 18,359. Source YRBSS 1999-2013