SDSU
San Diego State University

CENTER FOR HEALTH ECONOMICS AND POLICY STUDIES

WORKING PAPER SERIES

Anti-Bullying Laws and Weight-Based Disparities in Suicidality

Brandyn F. Churchill
American University

Bijesh Gyawali
University of Massachusetts Amherst

Joseph J. Sabia
San Diego State University & IZA

DECEMBER 9, 2024

CHEPS

CENTER FOR HEALTH ECONOMICS AND POLICY STUDIES

San Diego State University

WORKING PAPER NO. 20241201

Anti-Bullying Laws and Weight-Based Disparities in Suicidality

Brandyn F. Churchill, Bijesh Gyawali, and Joseph J. Sabia*

December 9, 2024

Abstract

Appearance-based bullying is common among teenagers and may inflict substantial psychological harm on its victims. Overweight and obese students are both more likely to be bullied at school and more likely to engage in suicidal behaviors than their healthy-weight counterparts. This study is the first to explore how anti-bullying laws (ABLs) affect disparities in suicidality between overweight and obese U.S. high school students compared to their and healthy-weight counterparts. Using data from the National and State Youth Risk Behavior Surveys and a difference-in-differences approach, we find that ABL adoption is associated with a 6-19 percent reduction in suicidal behaviors among overweight or obese teens; estimates for healthy-weight teens are considerably smaller in magnitude and statistically insignificant. Weight-based disparities in suicidal behaviors are reduced most by ABLs among obese teenage girls. An exploration of mechanisms suggests that improvements in the quality of peer interactions in school – rather than ABL-induced changes in body weight (sample selection) or students' own-weight perception – generate disparate mental health gains for at-risk youth. We conclude that curbing targeted bullying based on appearance yields important health benefits.

JEL Codes: I18; I28; J13
Key words: mental health; bullying; social comparison; adolescent health

* Churchill is an Assistant Professor at American University (bchurchill@american.edu). Gyawali is a PhD student at University of Massachusetts Amherst (bgyawali@umass.edu). Sabia is a Professor and Chairman of the Economics Department and the Director of the Center for Health Economics and Policy Studies at San Diego State University (jsabia.cheps@gmail.com). We thank Jessica Brown, Mark Meiselbach, and conference participants at APPAM 2023 and SEA 2023 for helpful comments on earlier versions of this manuscript. Some of the results in this paper are based on restricted-use and/or proprietary data. Readers interested in obtaining access can contact the authors. All interpretations, errors, and omissions are our own.

1. Introduction

According to the Centers for Disease Control and Prevention, 35.4 percent of 2-19-year-olds are classified as overweight or obese (Fryar et al. 2020). Youth excess body weight has been linked to elevated blood pressure (Hagman et al. 2019), early signs of atherosclerosis (Tounian et al. 2001), type 2 diabetes (Baranowski et a. 2006), cancer (Furer et al. 2020), and early death (Lindberg et al. 2020). Over the last twenty years, the share of children and teens classified as overweight or obese has increased by 20 percent (Fryar et al. 2020). Notably, this same period was accompanied by a dramatic deterioration of adolescent mental health, including a 36 percent increase in the share of teens who reported that they seriously considered suicide (CDC 2021), a 175 percent increase in suicide-related youth hospital admissions (Plemmons et al. 2018), and a 57 percent increase in the teen suicide rate (Curtin 2020). Because elevated adolescent body weight may lead to poorer psychological health (Sabia and Rees 2015; Willage 2018; Iwatate et al. 2023), researchers have hypothesized that these trends in adolescent obesity and mental health may be related (Fahart 2015; Small and Aplasca 2016).

Weight-related bullying is one of the most common forms of violence occurring on school property (Puhl et al. 2017; Bucchianeri et al. 2013), and heavier teens – especially overweight and obese teen girls – are more likely to report being bullied at school than their healthy-weight counterparts (Janssen et al. 2004; Wang et al. 2010; Jansen et al. 2014; van Geel et al. 2014; Rupp and McCoy 2019). Figure 1 shows that overweight and obese teens are also up to 24 percent more likely to report having considered, planned, and attempted suicide than their healthy weight counterparts.[2] These disparities have led some public health advocates to urge policymakers to

[2] This finding is consistent with prior evidence suggesting that overweight and obese teenagers are in poorer psychological health than their healthy-weight peers (Erermis et al. 2004; Zeller et al. 2012; Iwatate et al. 2023).

update existing anti-bullying laws (ABLs) to focus on weight- and appearance-related bullying (Obesity Action Coalition 2011; CNN 2011; Puhl et al. 2021).[3] While prior work indicates that anti-bullying laws may be particularly effective at reducing suicide ideation among vulnerable groups such as LGBTQ+ teens (Rees et al. 2022; Liang et al. 2023), little is known about whether these policies are effective at improving the mental health of overweight and obese teens, a large (and growing) population that may be targeted for appearance-based bullying.

State ABLs impose mandates on school districts to develop policies to reduce in-school bullying victimization by (i) increasing punishments for perpetrators of bullying, (ii) training teachers, staff, and parents to detect acts of bullying, (iii) holding school- and district-wide education programs, and (iv) setting accountability standards for schools to enforce anti-bullying policies. As such, these laws may affect overweight and obese teens' psychological health through several channels. First, if ABLs are effective at curbing bullying of overweight teenagers, a reduction in negative peer interactions may improve their psychological health. Importantly, the psychological effect of ABLs may be larger for overweight and obese teens compared to healthy-weight teens if bullying causes more acute psychological harm to the former group (Erermis et al. 2004; Zeller et al. 2012; Iwatate et al. 2023), as excess body weight may be easily observed by peers and difficult to change, especially in the short-run (Jelalian et al. 2008; Ludwig et al. 2012; Thomason et al. 2016). Second, because ABLs increase monitoring of students' behavior, enhanced monitoring may identify youths at risk for mental health problems (including overweight and obese teens) and encourage treatment. Third, by encouraging greater parent-child communication, ABLs could improve students' psychological health through better family relationships. Finally, in a repeated cross-sectional data setting, ABLs may be associated with changes in overweight and

[3] Only three states' anti-bullying laws currently include "body weight" or "physical appearance" as characteristics identifying a youth as being at risk for being bullied (Lessard et al. 2022).

obese students' psychological health if ABLs affect youth body weight, thereby changing the distribution of mental health among overweight and obese students (i.e., sample selection bias).

In this study, we provide new evidence on the relationship between state ABLs and psychological well-being among overweight and obese adolescents. In doing so, we shed light on how ABLs impact weight-based disparities in suicidal behaviors. Using data from the National and State Youth Risk Behavior Surveys (YRBS) and a difference-in-differences identification strategy that exploits over twice as much policy variation than was available to prior authors, we document several key findings. First, we find that ABL adoption is associated with a 1.1 percentage point reduction (6.1 percent) in the likelihood that overweight and obese teens reported seriously considering suicide, a 1.0 percentage point (6.9 percent) reduction in the likelihood that they reported making a suicide plan, a 0.8 percentage point (8.6 percent) reduction in the likelihood that they reported a suicide attempt, and a 0.6 percentage point (18.8 percent) reduction in the likelihood that they reported a suicide attempt requiring medical attention.[4] We do not detect a statistically significant or economically meaningful relationship between ABLs and healthy-weight teens' suicide behaviors, highlighting important heretofore unknown heterogeneity in the psychological health effects of ABLs by youth body weight.[5] Indeed, we find that ABL adoption substantially reduces disparities in suicidal behaviors among overweight and obese versus healthy weight teens.

Second, we show that the negative relationship between ABLs and the likelihood that overweight and obese teens reported attempting suicide is larger for teen girls than teen boys, in line with a large interdisciplinary literature on the gendered relationship between body weight, bullying, and mental health. Third, we find no evidence that ABLs were related to changes in BMI.

[4] While sizable, these estimates are in line with recent work studying the relationship between bullying and suicide (Hansen and Lang 2011; Rees et al. 2022; Hansen et al. *forthcoming*).
[5] See, for example, Dave and Rashad (2009), Myers and Crowther (2009), Wang et al. (2010), Landstedt and Persson (2014), Sabia and Rees (2015), Rapee et al. (2019), and Valois et al. (2019).

Indeed, our estimates are quite precise, allowing us to rule out BMI reductions larger than 0.12 percent and BMI increases larger than 0.48 percent. As such, our findings are unlikely to be explained by sample selection bias.

Finally, we explore two important channels through which ABLs may influence mental health among overweight and obese teens: (i) reductions in school bullying, and (ii) changes in how teens perceive their bodies. We find that state ABLs are associated with a statistically significant 1.2 percentage point reduction in school bullying victimization among overweight and obese teens and a smaller insignificant reduction for healthy-weight teens. This result suggests that while ABLs were broadly effective at reducing school bullying, they were somewhat more effective at reducing bullying for overweight and obese teens. On the other hand, we show that ABLs were not associated with changes in how teens viewed their bodies, or their weight loss goals, regardless of BMI status.

The rest of the paper proceeds as follows: Section 2 discusses the policy motivation and history of state anti-bullying laws, as well as the literature on the economic determinants of self-image and mental health. Section 3 describes the Youth Risk Behavior Survey data and outlines the difference-in-differences empirical approach. Section 4 presents our results, and Section 5 discusses policy implications, study limitations, and areas for future work.

2. Policy Background and Existing Literature

2.1 Policy Background

In 2019, 22 percent of students ages 12 to 18 reported being bullied at school (National Center for Education Statistics 2022). The most common forms of bullying include name-calling and public insults (National Center for Education Statistics 2022), with weight-related bullying being one of the most common forms of violence occurring on school property (Puhl et al. 2017; Bucchianeri et al. 2013). Indeed, overweight and obese students are more likely to experience bullying

victimization, as are female students (Faris and Felmlee 2011), racial/ethnic minority students (Goldweber et al. 2013), students with disabilities (Blake et al. 2016), and sexual minority students (Kann et al. 2016; Rees et al. 2022; Liang et al. 2023).

There is a large interdisciplinary literature linking bullying victimization to reduced academic performance (Eriksen et al. 2014) and increased mental distress (Kaltiala-Heino et al. 1999; Carney 2000; Arseneault et al. 2010; Landstedt and Persson 2014; Mittleman 2019; Ringdal et al. 2020). These relationships are especially pronounced for teens who are already at risk of poor mental health (Kowalski and Limber 2013), such as overweight and obese teens (Erermis et al. 2004; Zeller et al. 2012; Iwatate et al. 2023). In an effort to curb school-based violence, all fifty states and the District of Columbia have adopted an ABL. These policies seek to increase both (i) the likelihood that bullying is detected and (ii) the sanctions imposed on offenders, thereby increasing the expected cost of engaging in bullying behavior.[6] In addition, ABLs seek to educate students and parents about the dangers of bullying, stigmatize its propagation, and generate accountability standards for school districts. Appendix Table 1 lists the effective dates of ABLs over the period 2001-2015. The first state to adopt an ABL was Louisiana (August 1, 2001) and the last was Montana (April 1, 2015).

2.2 Existing Literature

Our paper builds on growing economics literature identifying how peer interactions shape adolescent mental health. For example, Hansen and Lang (2011) found that suicide attempts among teen girls fell 22 percent during the summer months, a pattern they attributed to "negative social interactions" during the school year. More recently, Hansen et al. (*forthcoming*) found that schools that moved from online to in-person instruction following the COVID-19 pandemic experienced a

[6] This may be thought of analogously to Becker's (1968) model of rational crime.

12-18 percent increase in teen suicide. Researchers have also begun exploring how social media use shapes health behaviors. Using both experimental (Allcott et al. 2020; Mosquera et al. 2020) and quasi-experimental methods (Braghieri et al. 2022), this growing literature has found that social media use worsens mental health by facilitating unfavorable social comparisons.

This paper also contributes to a large literature in medicine and public health studying the relationship between body weight and bullying victimization. These studies have shown that overweight and obese youth are more likely to be victims of bullying than their healthy-weight counterparts (Janssen et al. 2004; van Geel et al. 2014) and that these individuals are subsequently more likely to suffer from poor mental health (BeLue et al. 2009; van Vuuren et al. 2019). This literature has also highlighted the interdependent relationship between bullying victimization, how bullying victims perceive their bodies, and their broader mental health (Brixval et al. 2012; Kaltiala-Heino et al. 2016; Patte et al. 2021).[7]

Our study is perhaps most directly related to a growing literature documenting how anti-bullying initiatives affect adolescent mental illness.[8] Studying a randomized control trial in the Netherlands whereby fifteen schools were assigned to participate in an anti-bullying program, Fekkes et al. (2006) documented reductions in bullying victimization and depression among treated students relative to those in the thirty-two comparison schools, though these differences disappeared after the program was completed. Recent quasi-experimental studies leveraging temporal and spatial variation in the adoption of ABLs in the United States have similarly found reductions in bullying victimization (Nikolaou 2017, 2022) and other measures of school violence (Sabia and Bass 2017). More recently, researchers have highlighted the importance of studying how

[7] While these issues have received less attention from economists, recent evidence indicates that individuals with thinner peers are more likely to engage in disordered eating behaviors (Costa-Font and Jofre-Benet 2013; Arduini et al. 2019) and experience behavioral problems (Huang et al. *forthcoming*).
[8] https://www.cdc.gov/healthyyouth/data/yrbs/pdf/YRBS_Data-Summary-Trends_Report2023_508.pdf

anti-bullying efforts affect health disparities, particularly for historically marginalized populations who have been targeted for in-school bullying (Rees et al. 2022). It is to this nascent literature that this study contributes.

This study is the first to study the effects of ABLs on disparities in suicidal behaviors among overweight and obese relative to healthy-weight teens. Given the rising rate of childhood obesity and the ongoing mental health crisis plaguing US teens, our findings will inform how targeted interventions (i.e., anti-bullying policies that target training and education around curbing bullying of vulnerable teens of unhealthy weight) may generate larger health gains as well as reduce psychological health disparities. Moreover, by examining a broad set of mental health outcomes, including changes in self-image, we can more thoroughly explore the potential pathways through which anti-bullying laws affect the mental health of overweight and obese teens. We also explore whether ABLs had an unintended consequence on youth bodyweight by reducing social stigma for this health outcome, perhaps reducing unhealthy weight teens efforts to lose weight. In addition, we add to a growing literature suggesting that marginalized youths with relatively higher propensities for bullying victimization and suicidal behaviors may gain relatively larger benefits from anti-bullying policies. Finally, our study exploits almost twice as much policy variation than was used by prior authors, increasing confidence in our estimates of how ABLs affect school bullying and psychological health.[9]

[9] For example, Rees et al. (2022) examined school bullying and teen suicide ideation using the 2009-2017 YRBS data. As shown in Appendix Table 1, thirty-one states adopted an anti-bullying law in 2009 or earlier, precluding these policies from contributing to their identification. Our data includes pre- and post-adoption data for twenty-three of these states (Alaska, Arizona, Arkansas, Connecticut, Delaware, Florida, Idaho, Iowa, Kansas, Kentucky, Maine, Maryland, Missouri, Nebraska, Nevada, New Mexico, North Carolina, Pennsylvania, Rhode Island, South Carolina, Tennessee, West Virginia, and Wyoming).

3. Data and Methodology

3.1 Data: Youth Risk Behavior Surveys (YRBS)

We obtain information on teen bullying, self-image, and mental health from the 1991-2017 National and State Youth Risk Behavior Surveys.[10] The YRBS are school-based surveys of high school-aged youths' health behaviors that are usually administered during the spring of odd-numbered years. The National YRBS (NYRBS) are collected by the Centers for Disease Control and Prevention to monitor national trends, though are commonly used to evaluate state-level policies (Tauras et al. 2007; Carpenter and Cook 2008; Anderson et al. 2013; Coleman et al. 2013; Atkins and Bradford 2015). The NYRBS include data collected from approximately 14,000 students each year. In contrast, the SYRBS are state-level representative data administered by state health and education agencies. These data are not a subset of the NYRBS and include information on approximately 100,000 students each year. While the SYRBS are collected with assistance from the CDC, state agencies retain the rights to these data. However, forty-four states have permitted the CDC to harmonize their data and release the combined state file. To maximize the number of state-years covered in our sample, we follow the literature and augment the SYRBS with the NYRBS (Anderson and Elsea 2015; Sabia and Anderson 2016; Sabia et al. 2019; Abouk et al. 2023; Cotti et al. 2024). Table 1 reports the summary statistics for our suicide-related outcomes of interest.[11,12]

[10] We use data from the 1991-2017 waves of the YRBS because the final ABL was adopted in 2015. As such, any subsequent data will more heavily weight comparisons of the last treated states to their "already treated" counterparts, and recent developments in the difference-in-differences literature (Goodman-Bacon 2021) have drawn attention to potential pitfalls with these comparisons. However, we show in the appendix that our results are robust to including later waves of data.

[11] We construct these measures from a series of suicide-related questions, including: "During the past 12 months, did you ever seriously consider attempting suicide?"; "During the past 12 months, did you make a plan about how you would attempt suicide?"; "During the past 12 months, how many times did you actually attempt suicide?"; "If you attempted suicide during the past 12 months, did any attempt result in an injury, poisoning, or overdose that had to be treated by a doctor or nurse?" We classify respondents as having attempted suicide if they reported any non-zero number of suicide attempts.

[12] Appendix Table 2 reports the summary statistics for other outcomes of interest.

Throughout our sample period, over 16 percent of teens reported that they had seriously considered suicide and approximately half of those students reported making a suicide attempt.

We define body mass index (BMI) as self-reported weight (in kilograms, calculated from reported pounds) divided by squared height (in meters, calculated from reported height in feet and inches). We classify categories of bodyweight by the respondent's ranking in the age-by-gender specific youth BMI distribution provided by the Centers for Disease Control and Prevention based on national survey data collected from 1963-65 to 1988-94 (CDC 2024) and focus on students who are either healthy weight or students who are classified as overweight or obese.[13] Consistent with prior work showing that overweight and obese teens are at greater risk for suicide than their non-overweight or obese counterparts (Erermis et al. 2004; Zeller et al. 2012; Iwatate et al. 2023), we find that overweight and obese teens were 15 percent more likely to have considered suicide, 16 percent more likely to have made a suicide plan, 24 percent more likely to have attempted suicide, and 23 percent more likely to have required medical intervention following a suicide attempt.

3.2 Empirical Strategy: Difference-in-Differences

Using the YRBS data, we explore the relationship between ABLs and teen mental health outcomes with the following specification:

$$Y_{ist} = \alpha + \beta \cdot ABL_{st} + X'_{ist}\gamma + B'_{st}\pi + \theta_s + \tau_t + \varepsilon_{ist} \quad (1)$$

where the dependent variable, Y_{ist}, is the weight-related outcome for teen *i* in state *s* during time *t*. The independent variable of interest, ABL_{st}, is an indicator for whether a state anti-bullying law was in effect in state *s* in year *t*. The coefficient of interest, β, measures the relationship between state anti-bullying laws and adolescent bullying and mental health outcomes.

[13] In our initial sample, 2.3 percent of teens are underweight, 68.2 percent are healthy weight, 16.3 percent are overweight, and 13.2 percent are obese. Because we are underpowered to say anything about underweight teens, our focus in this paper is on those who are healthy weight compared to those who are overweight or obese.

We include the vector X_{ist} to account for individual-level characteristics that influence health behaviors, including indicators for the respondent's age, sex, and race/ethnicity. The vector X_{ist} also includes an indicator for whether the teen was part of the NYRBS or SYRBS. We also include a vector of state-level time-varying covariates, B_{st}, to control for economic conditions and policy initiatives potentially correlated with bullying, mental health, and/or weight-related outcomes. For example, we include the state unemployment rate (Ruhm 2000; Ruhm 2015) and the natural log of the real value of the minimum wage (Cotti and Tefft 2013; Clark et al. 2020) to account for the relationship between economic conditions and mental health. Given our focus on appearance-related bullying, we include an indicator for whether teens were required to undergo BMI assessments in school, given that these policies may exacerbate social awareness about excess bodyweight (Churchill 2024). We also control for whether the state had adopted a law limiting fast food companies' liability for weight-related harms, given the link between these policies and changes in weight-related behaviors (Wilking et al. 2013; Carpenter and Tello-Trillo 2015). Moreover, because of the established relationship between attitudes toward thinness and indoor tanning bed use (Darlow et al. 2016), the vector B_{st} also controls for state restrictions on youth indoor tanning (Carpenter et al. 2023). We also include a vector of time-invariant state fixed effects, θ_s, to utilize within-state and a vector of location-invariant year fixed effects, τ_t, to capture nationwide shocks to bullying and mental health. Standard errors are clustered at the state level (Bertrand et al. 2004).

Recent work has highlighted potential complications of using a two-way fixed effects (TWFE) approach when there is variation in treatment timing (i.e., staggered adoption) and treatment effect heterogeneity (de Chaisemartin and D'Haultœuille 2020; Sun and Abraham 2021; Callaway and Sant'Anna 2021; Goodman-Bacon 2021; Borusyak et al. *forthcoming*). One issue is

that states treated in period *t* will serve as comparison states for those treated in period *t+1*. If the treatment effect grows over time, then the TWFE estimate – which includes comparisons between newly treated and previously treated units – will be biased toward zero and may have the opposite sign.[14] To address this possibility, we show that our results are robust to using the imputation estimator proposed by Borusyak et al. (*forthcoming*). This alternative estimator works well in our setting where all states in our sample are treated at some point, the data are repeated cross-sectional, and we adjust for state-level time-varying covariates in our baseline specification.

4. Results

4.1 Changes in Mental Health

We begin by exploring whether state ABLs were related to changes in teen suicide behaviors. The dependent variable in Table 2 is an indicator for whether the teen reported having seriously considered suicide. Panel A examines overweight and obese teens, while Panel B limits the sample to healthy weight teens. Panel C pools these groups together and fully interacts the righthand side covariates with an indicator for whether the teen was classified as overweight or obese. Column 1 reports the estimate from a sparse specification including only state and year fixed effects. Column 2 augments this specification with the individual-level demographic controls, while column 3 further includes the state-level time-varying economic and policy controls.

Regardless of our righthand side covariates, Table 2 indicates that ABLs were associated with a statistically significant 1.0 to 1.1 (6.1 percent) percentage point reduction in the likelihood that overweight and obese teens reported that they had attempted suicide (Panel A). Meanwhile, the estimates for healthy weight teens are 80 percent smaller in magnitude and statistically

[14] For a fuller discussion of these issues, including how to decompose the two-way fixed effects coefficient into a weighted average of all possible 2×2 difference-in-differences estimators and the potential for "negative weights," see Goodman-Bacon (2021).

insignificant (Panel B).[15] Moreover, these estimates are statistically different from each other. We find that ABLs reduce the disparity in suicide consideration between overweight and obese teens and their healthy-weight counterparts by a statistically significant 0.9 percentage points, almost 38 percent of the disparity (Panel C). This finding reveals previously unknown and important heterogeneity in ABL effects that is consistent with the hypothesis that ABLs fight appearance-based bullying among psychologically vulnerable teens and reduces disparities in suicidality among overweight and obese versus healthy-weight teens.

In the presence of our covariates and fixed effects, our identification assumption is that suicide attempts among teens in states newly adopting ABLs would have evolved similarly to outcomes in states not concurrently adopting these policies. While not directly testable, we assess the validity of this assumption by replacing our ABL indicator with eight mutually exclusive indicators denoting the survey wave in relation to the adoption of a state ABL; the reference group includes teens interviewed four or more survey waves prior to adoption of an ABL. This dynamic specification allows us to explore whether the likelihood that teens reported attempting suicide was differentially trending in states that eventually adopted an anti-bullying law during the pre-period and to test whether the relationship between ABLs and suicide attempts grew over the post-adoption period.

Figure 2 plots our event study estimates. Consistent with the parallel trends assumption, there is no evidence that the likelihood that overweight and obese teens reported attempting suicide was differentially trending in states prior to when they adopted their ABLs. The pre-trend coefficients (black triangles) are small in magnitude, statistically insignificant, and follow no discernable trend. However, in the post-treatment period, we find a relative reduction in the

[15] Appendix Figure 1 separately examines healthy weight teens, overweight teens, and obese teens.

likelihood that overweight and obese teens reported considering suicide in the year of adoption, as well as evidence that this relationship grew more pronounced over time. Moreover, we can reject the hypothesis that the pre- and post-period coefficients are jointly equal to each other ($p^{Pre = Post}$ = 0.037). Consistent with our static difference-in-differences estimate, we do not detect any evidence of a change in the likelihood that healthy weight teens reported considering suicide (grey circles), and we are unable to reject the null hypothesis that the pre- and post-period coefficients are equivalent ($p^{Pre = Post}$ = 0.434).

Table 3 next explores the relationship between ABLs and a broader collection of suicide behaviors using our preferred specification. We find that ABL adoption is associated with a 1.0 percentage point (6.9 percent) reduction in the probability that an overweight or obese teen had made a suicide plan (Panel A column 2), a 0.8 percentage point (8.6 percent) reduction in the likelihood that an overweight or obese teen reported that they had attempted suicide (Panel A column 2), and a 0.6 percentage point (18.8 percent) reduction in the probability that an overweight or obese teen reported a suicide attempt requiring medical attention (Panel A column 4). Again, we find no evidence that ABLs were associated with reductions in suicide behaviors among healthy weight teens; the corresponding estimates are 50 to 83 percent smaller in magnitude and statistically indistinguishable from zero at conventional levels (Panel B columns 1-4). A test of the statistical difference in the effects of ABLs on overweight/obese versus healthy weight teens in Panel C suggests that the estimates are, in the main, statistically different from one another. This result is consistent with the hypothesis that ABL adoption reduces weight-based disparities in suicidality. Moreover, while we find similar percentage point reductions for each of the outcomes, the more severe outcomes (e.g., suicide attempts) are relatively rarer. As such, our estimates suggest that the most at-risk overweight and obese teens (i.e., those on the margin of attempting suicide) benefited

the most from ABLs and such laws are likely to be particularly successful at reducing disparities in completed teen suicides.[16,17]

4.2 Sensitivity Checks and Exploring Heterogeneity in Treatment Effects

In Table 4, we test the robustness of the relationship between ABLs and suicidal behaviors among overweight and obese teens. The dependent variable in each panel is a different suicide behavior and column 1 reprints our baseline finding. Columns 2 and 3 account for unmeasured regional time shocks, such as changes in local attitudes and policies that might affect mental health, through the inclusion of Census region-by-year fixed effects and Census division-by-year fixed effects, respectively; column 4 augments our baseline specification with state-specific linear time trends;[18] and column 5 reports the estimates obtained from Borusyak et al.'s (*forthcoming*) imputation estimator that expunges the bias potentially present in our TWFE estimates. Across specifications, we continue to find that ABL adoption leads to statistically significant reductions in suicidal behaviors among overweight and obese teens.

There is a large interdisciplinary literature showing that issues around body image and social expectations for thinness are particularly salient for teen girls (Hargreaves and Tiggemann 2004; Myers and Crowther 2009; Bibiloni et al. 2013; Rapee et al. 2019; Valois et al. 2019). Indeed, teen girls classified as overweight or obese are more likely to be targeted for bullying (Warschburger

[16] Appendix Table 3 tests the robustness of our results to including data from the 2019 SYRBS and NYRBS. Because all states were treated by 2015, these later data will not provide any additional identifying variation. Moreover, recent developments in the difference-in-differences literature (Goodman-Bacon 2021) have shown that comparisons between newly treated units and previously treated units can bias estimates toward zero when there is treatment effect heterogeneity. However, we continue to find statistically significant reductions in suicide behaviors among overweight and obese teens following ABL adoption without any change among healthy weight teens.

[17] These estimates are in line with prior work on the relationship between bullying and suicide. Hansen and Lang (2011) found that suicide attempts among teen girls fell 22 percent during the summer months, a pattern they attributed to "negative social interactions." More recently, Hansen et al. (*forthcoming*) found that schools that moved from online to in-person instruction following the COVID-19 pandemic experienced a 12-18 percent increase in teen suicides Bacher-Hicks et al. (2022) found that the transition to online schooling reduced bullying-related internet searches by 30-35 percent and that searches returned to baseline levels when schools reopened.

[18] We note that the inclusion of these trends may bias our estimate to zero if the treatment effect grows over time.

2005) and suffer from poor mental health compared to their overweight and obese male counterparts.[19] Given these gendered relationships, it is possible that ABLs may have been especially beneficial to overweight and obese teen girls. To test this possibility, we again estimate a modified version of our baseline specification on a pooled sampled of all teens that fully interacts the righthand side covariates with indicators for (i) sex and (ii) being classified as overweight or obese. Consistent with prior work on the gendered relationships between body weight, bullying, and mental health, Figure 3 shows that ABLs were associated with substantial reductions in suicidal behaviors for overweight and obese teen girls, but not healthy-weight teen girls, highlighting that ABL adoption reduces disparities in weight-based suicidal behaviors. These results also suggest that our findings are not capturing demographic heterogeneity previously identified in the literature and instead reveal a previously unknown source of heterogeneity.[20]

As discussed above, there is variation in the specific provisions included in ABL statutes with components focused on (i) maintaining records, (ii) enforcing a procedure to investigate reported incidents, (iii) setting a graduated sequence of sanctions for bullying behaviors, (iv) training school faculty and staff and educating parents about identifying, preventing, and responding to bullying, and (iv) setting definitions of bullying that conform with state legislation. To explore whether the relationship between ABLs and suicide behaviors varied with the scope of the statue, we note that the Department of Education (2011) indicates the intensity with which these provisions were included in the ABL legislation. Following prior literature (Rees et al. 2022), we

[19] Sabia (2007) also found evidence that overweight and obese teenage girls, especially white teen girls, experience poorer academic performance than their healthy weight counterparts and posit that race-specific adverse mental health effects of excess body weight may offer a partial explanation.

[20] Appendix Table 4 indicates that these reductions were driven by Black, Hispanic, and other race overweight and obese teens. Given that prior work (Rees et al. 2022) identified a negative relationship between ABLs and suicidal behaviors among teen girls and non-white teens, Figure 3 and Appendix Table 4 offer important evidence that BMI status in our baseline results is not serving as a proxy for these characteristics and is instead an important, previously unknown source of heterogeneity.

classify an ABL as "strong" if the intensity rating is at least a 2 (the highest rating) on at least three of these provisions. The remaining laws are classified as "weak."

Table 5 shows that strong and weak ABLs were both associated with an approximate 1 percentage point reduction in the likelihood that overweight and obese teens reported that they had considered suicide (column 1) and had made a suicide plan (column 2). However, we find that strong ABLs were associated with a statistically significant 1.2 percentage point reduction in the likelihood that overweight and obese teens reported that they had made a suicide attempt, while the corresponding estimate for a weak ABL is half the size in magnitude and not statistically significant (column 3). Overall, Table 5 suggests that, while both strong and weak ABLs reduced suicide behaviors among overweight and obese teens, it was the stronger laws that were associated with larger reductions in the most severe suicide outcomes.[21] This finding is consistent with evidence that more comprehensive ABLs generate the largest reductions in bullying victimization and the largest mental health benefits.

4.3 Changes in School Bullying

In the prior sections, we found that ABLs were associated with reductions in suicide behaviors among overweight and obese teens without any associated changes among healthy-weight teens. We now explore one potential mechanism through which these reductions may have occurred: differential changes in bullying victimization by BMI status. To test this possibility, we examine the relationship between ABL adoption and the likelihood that a teen reporting being bullied at school. In Table 6, we find that ABLs were associated with a statistically significant 1.2 percentage point reduction in the likelihood that overweight and obese teens reported being bullied at school

[21] Appendix Table 5 examines how strong and weak ABLs were associated with changes in suicide behaviors among healthy weight teens. While the estimates are generally inconclusive, there is suggestive evidence that strong ABLs also reduced the most severe suicide behaviors for healthy weight teens.

(column 1). While the result suggests a reduction in school bullying for healthy-weight teens as well, the estimate is not statistically significant (column 2). This difference is starker when we allow the relationship between ABLs and school bullying to vary by the strength of the statue. While we find reductions in school bullying for teens classified as overweight or obese and teens classified as healthy weight following the adoption of a strong ABL, the reduction for overweight and obese teens is over 40 percent larger in magnitude (-0.026 vs. -0.018).[22] Appendix Figure 2 offers suggestive evidence that strong ABLs were more effective at reducing bullying victimization among overweight and obese teen girls, consistent with the mental health patterns. Together, these findings suggest that reductions in exposure to bullying victimization may be one important channel through which overweight and obese teens see improvements in mental health following the adoption of an ABL.

4.4 Changes in Self-Image and Body Weight

There is a large body of evidence showing that peer interactions – including bullying – play an important role in shaping self-image (Spence et al. 1975; Bradford and Lohr 1987; Strahan et al. 2006; Choi and Park 2021), and others have documented a strong link between self-image and other mental health outcomes (Fahart 2015; Haynes et al. 2019; Singh et al. 2020). Moreover, some scholars have speculated that weight-related bullying may be a key driver of overweight and obese teens weight-related health behaviors (Faith et al. 2002; Pulido et al. 2019). Given this work, in Table 7 we explore the relationship between state ABLs, how overweight and obese teens viewed their bodies, and their weight loss goals. The dependent variables in columns 1-3 are indicators for whether teens described their bodies too leniently relative to their BMI, accurately relative to their

[22] Appendix Table 6 shows that the relationship between ABLs and school bullying was most pronounced for overweight and obese teen girls. Similarly, Appendix Table 7 finds that ABLs were associated with much larger reductions in cyberbullying for overweight and obese teen girls than for any other group.

BMI, or too harshly relative to their BMI.[23] Meanwhile, the dependent variables in columns 4-7 are indicators for whether the teens reported that they were trying to lose weight, maintain their weight, gain weight, or do nothing about their weight. Across all outcomes, we do not detect any evidence that ABLs were associated with changes in how overweight teens described their bodies or their weight loss goals.[24]

Finally, in a repeated cross-sectional data setting, ABLs may be associated with overweight or obese students' psychological health if ABLs affect youth body weight, thereby changing the distribution of mental health among overweight and obese students (i.e., sample selection bias). Moreover, it is also possible that by creating a schooling environment with less stigmatizing views toward overweight and obese teenagers, ABLs may have the unintended consequence of incentivizing the accumulation of excess body weight. While Table 7 did not reveal any evidence that ABLs were associated with changes in weight loss goals for overweight and obese, in Table 8 we examine whether ABLs were related to changes in body weight. The sample is all teens. The dependent variable in column 1 is the teen's BMI, while the dependent variables in columns 2-4 are indicators for BMI categories (i.e., healthy weight, overweight, and obese). Importantly, we do not find any evidence that ABLs were associated with changes in weight outcomes. Because our results are precisely estimated, we can rule out BMI reductions larger than 0.12 percent and BMI increases larger than 0.48 percent with 95 percent confidence. Overall, Table 8 indicates that the mental health improvements for overweight and obese teens identified in our prior exhibits are unlikely to be explained by sample selection bias. They also suggest that ABLs to not

[23] For example, an overweight teen describing herself as overweight would have an accurate description, an overweight teen describing herself as "normal" weight would have too lenient of a description, and an overweight teen describing herself as "very overweight" would have too harsh a description (Carpenter and Churchill *forthcoming*).
[24] In Appendix Table 8 we show that state ABLs were unrelated to changes in how healthy weight teens viewed their bodies and their weight loss goals.

unintentionally generate moral hazard-type effects on youth body weight.[25] In summary, our exploration of observable channels suggests that reduced bullying victimization is a likely important mechanism through which ABLs improve the psychological well-being of overweight and obese teenagers.

5. Conclusion

Policymakers and public health advocates argue that US teens are in the middle of both an obesity epidemic (White House 2010) and a mental health crisis (U.S. Surgeon General 2021). Because weight-related bullying is one of the most common forms of violence occurring on school property (Puhl et al. 2017; Bucchianeri et al. 2013) – and bullying has been linked to mental distress and suicide ideation (Hansen and Lang 2011; Kowalski and Limber 2013; Rees et al. 2022; Hansen et al. *forthcoming*) – some researchers speculate that these trends may be related (Fahart 2015; Small and Aplasca 2016).

In this paper, we study how the relationship between policies intended to prevent school bullying and changes in mental health varied by BMI. Leveraging the spatial and temporal variation in state anti-bullying laws and data from the National and State Youth Risk Behavior Surveys, we show that these policies were associated with large reductions in suicidal behaviors for overweight and obese teens without any detected change for underweight or healthy weight teens. We find that ABL adoption reduces disparities in suicidal behaviors between overweight or obese and healthy-weight teens. Consistent with gendered relationships between body weight, bullying, and mental health, we show that these relationships were driven by overweight and obese teen girls. However, we do not detect any evidence that state anti-bullying laws were related to how these teens perceived

[25] Appendix Figure 3 shows that strong and weak ABLs are unrelated to teen girls' BMIs. For strong anti-bullying laws, we can rule out reductions larger than 0.8 percent and increases larger than 0.2 percent. For weak anti-bullying laws, we can rule out reductions larger than 0.1 percent and increases larger than 0.7 percent.

their bodies, their weight-related goals, or their BMIs. Instead, our results suggest that the protective effects of reducing bullying victimization among vulnerable overweight and obese teens, and perhaps increases in monitoring of these marginalized students, may lead to important reductions in their suicidal behaviors.

While this study offers the most comprehensive evidence on the relationship between state ABLs laws and mental health outcomes for overweight and obese teens, it is subject to some limitations. For one, our YRBS measures are self-reported, which likely underestimates the prevalence of suicide ideation. However, for some of our outcomes – such as self-perceived body image – self-reported data are perhaps as interesting as objectively measured clinical outcomes. Additionally, while we were able to examine changes in school bullying victimization and body composition using these data, there are other pathways through which ABLs may improve mental health outcomes, including (i) improving school personnel's ability to identify youths at risk for mental health problems and encourage treatment and (ii) encouraging greater parent-child communication regarding bullying and mental health. Uncovering ways to disentangle these pathways is an important area for future research. Despite these limitations, these results provide the most externally valid and comprehensive evidence on the relationship between state anti-bullying laws and the mental health of overweight and obese teens.

6. References

Abouk, Rahi, Charles J. Courtemanche, Dhaval Dave, Bo Feng, Abigail Friedman, Johanna Catherine Maclean, Michael F. Pesko, Joseph J. Sabia and Samuel Safford. (2023). "Intended and Unintended Effects of E-Cigarette Taxes on Youth Tobacco Use," *Journal of Health Economics* 87: 102720.

Allcott, Hunt, Luca Braghieri, Sarah Eichmeyer, and Matthew Gentzkow (2020). "The Welfare Effects of Social Media," *American Economic Review*, 110(3): 629-676.

Anderson, D. Mark and David Elsea (2015). "The Meth Project and Teen Meth Use: New Estimates from the National and State Youth Risk Behavior Surveys," *Health Economics*, 24(12): 1644-1650.

Anderson, D. Mark, Benjamin Hansen, and Mary Beth Walker (2013). "The Minimum Dropout Age and Student Victimization," *Economics of Education Review*, 35: 66-74.

Arduini, Tiziano, Daniela Iorio, and Eleonora Patacchini (2019). "Weight, Reference Points, and the Onset of Eating Disorders," *Journal of Health Economics*, 65: 170-188.

Arseneault, L., L. Bowes, and S. Shakoor (2010). "Bullying Victimization in Youths and Mental Health Problems: 'Much Ado About Nothing'?" *Psychological Medicine*, 40(5): 717-729.

Atkins, Danielle N. and W. David Bradford (2015). "The Effect of Changes in State and Federal Policy for Nonprescription Access to Emergency Contraception on Youth Contraceptive Use: A Difference-in-Difference Analysis Across New England States," *Contemporary Economic Policy*, 33(3): 405-417.

Bacher-Hicks, Andrew, Joshua Goodman, Jennifer Greif Green, and Melissa K. Holt (2022). "The COVID-19 Pandemic Disrupted Both School Bullying and Cyberbullying," *American Economic Review: Insights*, 4(3): 353-370.

Becker, Gary S. (1968). "Crime and Punishment: An Economic Approach," *Journal of Political Economy*, 76(2): 169-217.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan (2004). "How Much Should We Trust Difference-In-Differences Estimates?" *Quarterly Journal of Economics*, 119(1): 249-275.

BeLue, Rhonda, Francis, Lori Ann Francis, and Brendon Colaco (2009). "Mental Health Problems and Overweight in a Nationally Representative Sample of Adolescents: Effects of Race and Ethnicity," *Pediatrics*, *123*(2): 697–702.

Bibiloni, Maria del Mar, Jordi Pich, Antoni Pons, and Josep A. Tur (2013). "Body Image and Eating Patterns Among Adolescents," 13: 1104.

Blake, Jamilia J., Qiong Zhou, Oi-Man Kwok, and Michael R. Benz (2016). "Predictors of Bullying Behavior, Victimization, and Bully-Victim Risk Among High School Students with Disabilities," *Remedial and Special Education*, 37(5): 285-295.

Borusyak, Kirill, Xavier Jaravel, and Jann Spiess (forthcoming). "Revisiting Event Study Designs: Robust and Efficient Estimation," *Review of Economic Studies*, forthcoming. Accessed at: https://doi.org/10.1093/restud/rdae007.

Bradford, Brown B. and Mary J. Lohr (1987). "Peer-Group Affiliation and Adolescent Self-Esteem: An Integration of Ego-Identity and Symbolic-Interaction Theories," *Journal of Personality and Social Psychology*, 52(1): 47-55.

Braghieri, Luca, Ro'ee Levy, and Alexey Makarin (2022). "Social Media and Mental Health," *American Economic Review*, 112(11): 3660-3693.

Brixval, Carina S., Signe L. B. Rayce, Mette Rasmussen, Bjørn E. Holstein, and Pernille Due (2012). "Overweight, Body Image and Bullying—an Epidemiological Study of 11- to 15-Years Olds," *European Journal of Public Health*, 22(1): 126-130.

Bucchianeri, Michaela M., Marla E. Eisenberg, and Dianne Neumark-Sztainer (2013). "Weightism, Racism, Classism, and Sexism: Shared Forms of Harassment in Adolescents," *Journal of Adolescent Health*, 53(1): 47-53.

Callaway, Brantly and Pedro H.C. Sant'Anna (2021). "Difference-in-Differences with Multiple Time Periods," *Journal of Econometrics*, 225(2): 200-230.

Carney, Jolynn V. (2000). "Bullied to Death: Perceptions of Peer Abuse and Suicidal Behaviour During Adolescent," *School Psychology International*, 21(2): 213-223.

Carpenter, Christopher S. and Brandyn F. Churchill (forthcoming). "'There She Is, Your Ideal': Negative Social Comparisons and Health Behaviors," *Journal of Human Resources*, forthcoming: https://doi.org/10.3368/jhr.0522-12347R1.

Carpenter, Christopher S., Brandyn F. Churchill, and Michelle M. Marcus (2023). "Bad Lighting: Effects of Youth Indoor Tanning Prohibitions," *Journal of Health Economics*, 88: 102738.

Carpenter, Christopher S. and Phil Cook (2008). "Cigarette Taxes and Youth Smoking: New Evidence from National, State, and Local Youth Risk Behavior Surveys," *Journal of Health Economics*, 27(2): 287-299.

Carpenter, Christopher S. and D. Sebastian Tello-Trillo (2015). "Do Cheeseburger Bills Work? Effects of Tort Reform for Fast Food," *Journal of Law and Economics*, 58: 805-827.

Centers for Disease Control and Prevention (2021). Youth Risk Behavior Survey Data Summary & Trends Report: 2011-2021," Accessed at: https://www.cdc.gov/healthyyouth/data/yrbs/pdf/YRBS_Data-Summary-Trends_Report2023_508.pdf.

Centers for Disease Control and Prevention (2024). CDC Extended BMI-for-Age Growth Charts. Accessed at: https://www.cdc.gov/growthcharts/Extended-BMI-Charts.html.

Choi, Boungho and Soowon Park (2021). "Bullying Perpetration, Victimization, and Low Self-Esteem: Examining Their Relationship Over Time," *Journal of Youth and Adolescence*, 50: 739-752.

Churchill, Brandyn F. (2024). "State-Mandated School-Based BMI Assessments and Self-Reported Adolescent Health Behaviors," *Journal of Policy Analysis and Management*, 43(1): 63-86.

Clark, Kathryn L., R. Vincent Pohl, and Ryan C. Thomas (2020). "Minimum Wages and Health Diet," *Contemporary Economic Policy*, 38(3): 546-560.

CNN (2011). "Advocates Want Anti-Bullying Bill to Protect Overweight Kids," Accessed at: http://www.cnn.com/2011/POLITICS/08/08/anit.bullying.bill.fat.acceptance/index.html.

Coleman, Silvie, Thomas S. Dee, and Ted Joyce (2013). "Do Parental Involvement Laws Deter Risk Sex?" *Journal of Health Economics* 32: 873-880.

Costa-Font, Joan and Mireia Jofre-Bonet (2013). "Anorexia, Body Image and Peer Effects: Evidence from a Sample of European Women," *Economica*, 80: 40-64.

Cotti, Chad and Nathan Tefft (2013). "Fast Food Prices, Obesity, and the Minimum Wage," *Economics & Human Biology*, 11(2): 134-147.

Cotti, Chad, Charles Courtemanche, J. Catherine Maclean, Yang Liang, Erik Nesson, and Joseph J. Sabia. (2024). "The Effect of E-Cigarette Flavor Bans on Tobacco Use," National Bureau of Economic Research Working Paper No. 32535.

Curtin, Sally C. (2020). "State Suicide Rates Among Adolescents and Young Adults Aged 10-24: United States, 2000-2018," *National Vital Statistics Report*, 69(11): 1-10.

Dave, Dhaval and Inas Rashad (2009). "Overweight Status, Self-Perception, and Suicidal Behaviors Among Adolescents," *Social Science & Medicine*, 68(9): 1685-1691.

Darlow, Susan D., Carolyn J. Heckman, and Teja Munshi (2016). "Tan and Thin? Associations between Attitudes toward Thinness, Motives to Tan, and Tanning Behaviors in Adolescent Girls," *Psychology, Health, & Medicine*, 21(5): 618-624.

de Chaisemartin, Clement, and Xavier d'Haultfoeuille (2020). "Two-Way Fixed Effects Estimators with Heterogeneous Treatment Effects," *American Economic Review*, 110(9), 2964-2996.

Department of Education (2011). "Common Components in State Anti-Bullying Laws, Policies and Regulations," Accessed at: https://www.stopbullying.gov/resources/laws/key-components.

Erermis, Serpil, Nurcan Cetin, Muge Tamar, Nagehan Bukusoglu, Fisun Akdeniz, Damla Goksen (2004). "Is Obesity a Risk Factor for Psychopathology Among Adolescents?" *Pediatrics International*, 46(3): 296-301.

Eriksen, Tine Louise Mundbjerg, Helena Skyt Nielsen, and Marianne Simonsen (2014). "Bullying in Elementary Schools," *Journal of Human Resources*, 49(4): 839-871.

Fahart, Tilda (2015). "Stigma, Obesity and Adolescent Risk Behaviors: Current Research and Future Directions," *Current Opinion in Psychology*, 5: 56-66.

Faith, Myles S., Mary Ann Leone, Tim S. Ayers, Moonseong Heo, and Angelo Pietrobelli (2002). "Weight Criticism During Physical Activity, Coping Skills, and Reported Physical Activity in Children," *Pediatrics*, 110(2Pt1): e23.

Faris, Robert and Diane Felmlee (2011). "Status Struggles: Network Centrality and Gender Segregation in Same- and Cross-Gender Aggression," *American Sociological Review* 76 (1): 48–73

Fekkes, Minne, Frans I. M. Pijpers, Pauline Verloove-Vanhorick (2006). "Effects of Antibullying School Program on Bullying and Health Complaints," *Archives of Pediatrics & Adolescent Medicine*, 160(6): 638-644.

Fryar, Cheryl D., Margaret D. Carroll, and Joseph Afful (2020). "Prevalence of Overweight, Obesity, and Severe Obesity Among Children and Adolescents Aged 2-19 Years: United States, 1963-1965 through 2017-2018," National Center for Health Statistics: Health E-Stats, Accessed at: www.cdc.gov/nchs/data/hestat/obesity-child-17-18/overweight-obesity-child-H.pdf.

Goodman-Bacon, Andrew (2021). "Difference-in-differences with variation in treatment timing," *Journal of Econometrics*, 225(2): 254-277.

Goldweber, Asha, Tracy Evian Waasdorp, and Catherine P. Bradshaw (2013). "Examining the Link between Forms of Bullying Behaviors and Perceptions of Safety and Belonging among Secondary School Students," *Journal of School Psychology* 51(4): 469-485.

Hagman, Emilia, Pernilla Danielsson, Amira Elimam, and Claude Marcus (2019). "The Effect of Weight Loss and Weight Gain on Blood Pressure in Children and Adolescents with Obesity," *International Journal of Obesity*, 43(1): 1988-1994.

Hansen, Benjamin, Joseph J. Sabia, and Jessamyn Schaller (forthcoming). "In-Person Schooling and Youth Suicide: Evidence from School Calendars and Pandemic School Closures," *Journal of Human Resources*, forthcoming: https://doi.org/10.3368/jhr.1222-12710R2.

Hansen, Benjamin and Matthew Lang (2011). "Back to School Blues: Seasonality of Youth Suicide and the Academic Calendar," *Economics of Education Review* 30 (5): 850–61.

Hargreaves, Duane A. and Marika Tiggemann (2004). "Idealized Media Images and Adolescent Body Image: 'Comparing' Boys and Girls," *Body Image* 1(4): 351-361.

Haynes, Ashleigh, Inge Kersbergen, Angelina Sutin, Michael Daly, and Eric Robinson (2019). "Does Perceived Overweight Increase Risk of Depressive Symptoms and Suicidality Beyond Objective Weight Status? A Systematic Review and Meta-Analysis," *Clinical Psychology Review*, 73: 101753.

Huang, Wei, Elaine M. Liu, and C. Andrew Zuppann (forthcoming). "Relative Obesity and the Formation of Non-cognitive Abilities During Adolescence," *Journal of Human Resources*, forthcoming: https://doi.org/10.3368/jhr.58.2.1018-9812R2.

Iwatate, Eriko, Folefac D. Atem, Eric C. Jones, Jennifer L. Hughes, Takeshi Yokoo, and Sarah E. Messiah (2023). "Association of Obesity, Suicide Behaviors, and Psychosocial Wellness Among Adolescents in the United States," *Journal of Adolescent Health*, 72(4): 526-534.

Jansen, Pauline W., Mariana Verlinden, Anke Dommisse-van Berkel, Cathelijne L. Mieloo, Hein Raat, Albert Hofman, Vincent W.V. Jaddoe, Frank C. Verhulst, Wilma Jansen, and Henning Tiemeier (2014). "Teacher and Peer Reports of Overweight and Bullying Among Young Primary School Children," *Pediatrics*, 134(3): 473-480.

Janssen, Ian, Wendy M. Craig, William F. Boyce, and William Pickett (2004). "Associations Between Overweight and Obesity with Bullying Behaviors in School-Aged Children," *Pediatrics*, 113(5): 1187-1194.

Jelalian, Elissa, Chantelle N. Hart, Robyn S. Mehlenbeck, Elizabeth E. Lloyd-Richardson, Jamie D. Kaplan, Katherine T. Flynn-O'Brien, and Rena R. Wing (2008). "Predictors of Attrition and Weight Loss in an Adolescent Weight Control Program," *Obesity*, 16(6): 1318-1323.

Kaltiala-Heino, Riittakerttu, Matti Rimpelä, Mauri Marttunen, Arja Rimpelä, and Päivi Rantanen (1999). "Bullying, Depression, and Suicidal Ideation in Finish Adolescents: School Survey," *BMJ*, 319: 348-351.

Kaltiala-Heino, Riittakerttu, Vilma Lankinen, Mauri Marttunen, Nina Lindberg, and Sari Fröjd (2016). "Overweight, Perceived Overweight and Involvement in Bullying in Middle Adolescence," *Child Abuse & Neglect*, 54: 33-42.

Kann, Laura, Tim McManus, William A. Harris, Shari L. Shanklin, Katherine H. Flint, Joseph Hawkins, Barbara Queen, et al. (2016). "Youth Risk Behavior Surveillance — United States, 2015," *Morbidity and Mortality Weekly Report: Surveillance Summaries* 65 (6): 1–174.

Kowalski, Robin M., and Susan P. Limber (2013). "Psychological, Physical, and Academic Correlates of Cyberbullying and Traditional Bullying," *Journal of Adolescent Health* 53(1): S13-S20.

Landstedt, Evelina and Susanne Persson (2014). "Bullying, Cyberbullying, and Mental Health in Young People," *Scandinavian Journal of Public Health*, 42(4): 393-399.

Lessard, Leah M., Ryan J. Watson, Hannah L. Schacter, Christopher W. Wheldon, and Rebecca M. Puhl (2022). "Weight Enumeration in the United States Anti-Bullying Laws: Associations with Rates and Risks of Weight-Based Bullying Among Sexual and Gender Minority Adolescents," *Journal of Public Health Policy*, 43(1): 2

Liang, Yang, Daniel I. Rees, Joseph J. Sabia, and Cooper Smiley (2023). "Association Between State Antibullying Policies and Suicidal Behaviors Among Lesbian, Gay, Bisexual, and Questioning Youth," *JAMA Pediatrics*, 177(5): 534-536.

Ludwig, David S. (2012). "Weight Loss Strategies for Adolescents: A 14-Year-Old Struggling to Lose Weight," *JAMA*, 307(5): 598-508.

Mosquera, Roberto, Mofioluwasademi Odunowo, Trent McNamara, Xiongfei Guo, and Ragan Petrie (2020). "The Economic Effects of Facebook," *Experimental Economics*, 23: 575-602.

Mittleman, Joel (2019). "Sexual Minority Bullying and Mental Health from Early Childhood Through Adolescence," *Journal of Adolescent Health*, 64(2): 172-178.

Myers, Taryn A. and Janis H. Crowther (2009). "Social Comparison as a Predictor of Body Dissatisfaction: A Meta-Analytic Review," *Journal of Abnormal Psychology*, 118(4): 683-698.

National Center for Education Statistics (2022). "Measuring Student Safety: New Data on Bullying Rates at School," Accessed at: https://nces.ed.gov/blogs/nces/post/measuring-student-safety-new-data-on-bullying-rates-at-school (October 22, 2023).

Nikolaou, Dimitrios (2017). "Do Anti-Bullying Policies Deter in-School Bullying Victimization?" *International Review of Law and Economics* 50 (June): 1-6.

Nikolaou, Dimitrios (2022). "Identifying the Effects of Bullying Victimization on Schooling," *Contemporary Economic Policy*, 40(1): 162-189.

Obesity Action Coalition (2011). "Bullying, Bullycide and Childhood Obesity," Accessed at: https://www.obesityaction.org/resources/bullying-bullycide-and-childhood-obesity/.

Patte, Karen A., Katelyn Battista, Mark A. Ferro, Richard E. Bélanger, Terrance J. Wade, Guy Faulkner, William Pickett, et al. (2023). "Does Weight Perception and Bullying Victimization Account for Links Between Weight Status and Mental Health Among Adolescents," *BMC Public Health*, 21: 1062.

Plemmons, Gregory, Matthew Hall, Stephanie Doupnik, James Gay, Charlotte Brown, Whitney Browning, Robert Casey, et al. (2018). "Hospitalization for Suicide Ideation or Attempt: 2008–2015." *Pediatrics* 141 (6): e20172426.

Puhl, R. M., Y. Suh, and X. Li (2017). "Improving Anti-Bullying Laws and Policies to Protect Youth from Weight-Based Victimization: Parental Support for Action," *Pediatric Obesity* 12(2): e14-e19.

Puhl, Rebecca M., Leah M. Lessard, Rebecca L. Pearl, Allison Grupski, and Gary D. Foster (2021). "Policies to Address Weight Discrimination and Bullying: Perspectives of Adults Engaged in Weight Management from Six Nations," *Obesity*, 29(11): 1787-1798.

Pulido, Ryne, Courtney Banks, Kelsey Ragan, Dorothy Pang, Jamilia J. Blake, and E. Lisako McKyer (2019). "The Impact of School Bullying on Physical Activity in Overweight Youth: Exploring Race and Ethnic Differences," *Journal of School Health*, 89(4): 319-327.

Rapee, Ronald M., Ella L. Oar, Carly J. Johnco, Miriam K. Forbes, Jasmine Fardouly, Natasha R. Magson, Cele E. Richardson (2019). "Adolescent Development and Risk for the Onset of Social-Emotional Disorders: A Review and Conceptual Model," *Behavior Research and Therapy*, 123: 103501.

Rees, Daniel I., Joseph J. Sabia, and Gokhan Kumpas (2022). "Anti-Bullying Laws and Suicidal Behaviors Among Teenagers." *Journal of Policy Analysis and Management* 41(3): 787-823.

Ringdal, Regine, Hanne Hissen Bjørnsen, Geir Arild Espnes, Mary-Elizabeth Bradley Eilertsen, and Unni Karin Moksnes (2020). "Bullying, Social Support and Adolescents' Mental Health: Results from a Follow-Up Study," *Scandanavian Journal of Public Health*, 49(3): 309-316.

Ruhm, Christopher J. (2015). "Recessions, Healthy No More?" *Journal of Health Economics*, 42: 17-28.

Ruhm, Christopher J. (2000). "Are Recessions Good for Your Health?" *Quarterly Journal of Economics*, 115(2): 617-650.

Rupp, Kristie and Stephanie M. McCoy (2019). "Bullying Perpetration and Victimization Among Adolescents with Overweight and Obesity in a Nationally Representative Sample," *Childhood Obesity*, 15(5): 323-330.

Sabia, Joseph J. (2007). "The Effect of Body Weight on Adolescent Academic Achievement," *Southern Economic Journal*, 73(4): 871-900.

Sabia, Joseph J. and Brittany Bass (2017). "Do Anti-Bullying Laws Work? New Evidence on School Safety and Youth Violence," *Journal of Population Economics*, 30: 473-502.

Sabia, Joseph J. and Daniel I. Rees (2015). "Body Weight, Mental Health Capital, and Academic Achievement," *Review of Economics of the Household*, 13(3): 653-684.

Sabia, Joseph J. and D. Mark Anderson (2016). "The Effect of Parental Involvement Laws on Teen Birth Control Use," *Journal of Health Economics*, 45: 55-62.

Sabia, Joseph J, M. Melinda Pitts, and Laura M. Argys (2019). "Are Minimum Wages a Silent Killer? New Evidence on Drunk Driving Fatalities," *The Review of Economics and Statistics*, 101(1): 192-199.

Singh, Shipra, Carly Jean Thompson, Rahul Kak, Lauren Nicole Smith, and Nadia Quainoo (2020). "Impact of Body Weight Perceptions and Electronic Bullying on Suicide-Related Risk Behaviors among Youth: Results from Youth Risk Behavior Surveillance System, 2015," *Journal of School Health*, 91(1): 29-36.

Small, Leigh and Alexis Aplasca (2016). "Child Obesity and Mental Health: A Complex Interaction," *Child & Adolescent Psychiatric Clinics*, 25(2): 269-282.

Spence, Janet T., Robert Helmreich, and Joy Stapp (1975). "Rating of Self and Peers on Sex Role Attributes and Their Relation to Self-Esteem and Conceptions of Masculinity and Femininity," *Journal of Personal and Social Psychology*, 32(1): 29-39.

Strahan, Erin J., Anne E. Wilson, Kate E. Cressman, and Vanessa M. Buote (2006). "Comparing to Perfection: How Cultural Norms for Appearance Affect Social Comparisons and Self-Image," *Body Image*, 3(3): 211-227.

Sun, Liyang and Sarah Abraham (2021). "Estimating Dynamic Treatment Effects in Event Studies with Heterogeneous Treatment Effects," *Journal of Econometrics*, 225(2): 175-199.

Tauras, John, Lisa Powell, Frank Chaloupka, and Hana Ross (2007). "The Demand for Smokeless Tobacco among High School Students in the United States: The Impact of Taxes, Prices and Policies," *Applied Economics*, 39(1): 31-41.

Thomason, Diane L., Nada Lukkahatai, Hennifer Kawi, Kirsten Connelly, and Jillian Inouye (2016). "A Systematic Review of Adolescent Self-Management and Weight Loss," *Journal of Pediatric Health Care*, 30(6): 569-582.

Tounian, Patrick, Yacine Aggoun, Béatrice Dubern, Venance Varille, Bernard Guy-Grand, Daniel Sidi, Jean-Philippe Girardet, and Damien Bonnet (2001). "Presence of Increased Stiffness of the Common Carotid Artery and Endothelial Dysfunction in Severely Obese Children: A Prospective Study," *The Lancet*, 358(9291): 1400-1404.

US Surgeon General (2021). "Protecting Youth Mental Health," Accessed at: https://www.hhs.gov/sites/default/files/surgeon-general-youth-mental-health-advisory.pdf.

Valois, Darcie D., Christopher G. Davis, Annick Buchholz, Nicole Obeid, Katherine Henderson, Martine Flament, and Gary S. Goldfield (2019). "Effects of Weight Teasing and Gender on Body Esteem in Youth: A Longitudinal Analysis from the REAL Study," *Body Image*, 29: 65-73.

Van Geel, M., Vedder, P., & Tanilon, J. (2014). "Are Overweight and Obese Youths More Often Bullied by Their Peers? A Meta-Analysis on the Relation Between Weight Status and Bullying," *International Journal of Obesity*, *38*(10): 10.

van Vuuren, Cornelia Leontine, Gusta G. Wachter, René Veenstra, Judith J. M. Rijnhart, Marcel F. van der Wal, Mai J. M. Chinapaw, and Vincent Busch (2019). "Associations between Overweight and Mental Health Problems among Adolescents, and the Mediating Role of Victimization," *BMC Public Health*, 19(1): 612.

Wang, Jing, Ronald J. Iannotti, and Jeremy W. Luk (2010). "Bullying Victimization Among Underweight and Overweight U.S. Youth: Differential Associations for Boys and Girls," *Journal of Adolescent Health*, 47(1): 99-101.

Warschburger, Petra (2005). "The Unhappy Obese Child," *International Journal of Obesity*, 29(S2): 127-129.

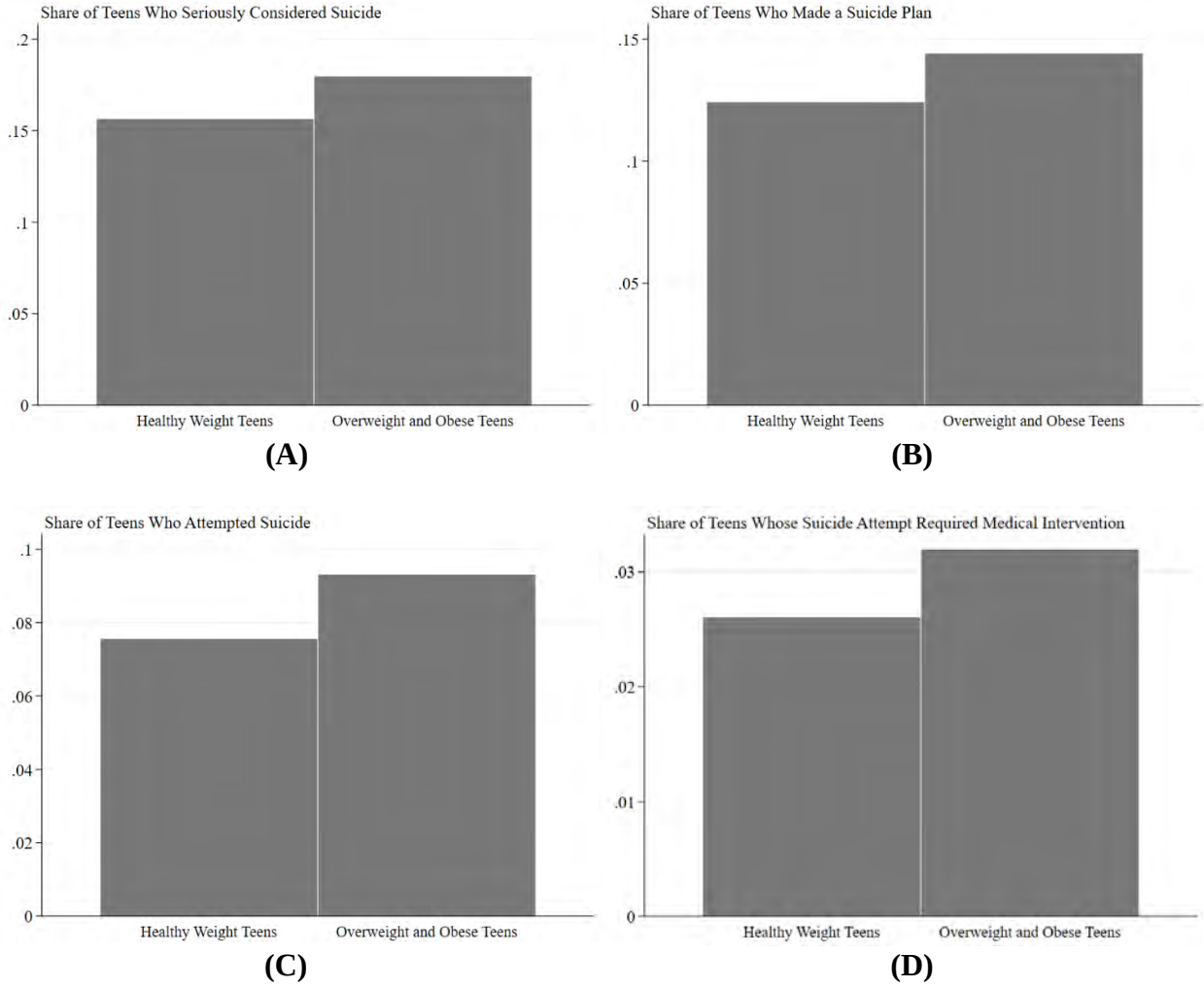
White House (2010). "Let's Move: The Epidemic of Childhood Obesity," Accessed at: https://letsmove.obamawhitehouse.archives.gov/learn-facts/epidemic-childhood-obesity (August 24th, 2023).

Wilking, Cara L. and Richard A. Daynard (2013). "Beyond Cheeseburgers: The Impact of Commonsense Consumption Acts on Future Obesity-Related Lawsuits," *Food and Drug Law Journal*, 68: 229-239.

Willage, Barton (2018). "The Effect of Weight on Mental Health: New Evidence Using Genetic IVs," *Journal of Health Economics*, 57: 113-130.

Zeller, Meg H., Jennifer Reiter-Purtill, Todd M. Jenkins, and Megan B. Ratcliff (2012). "Adolescent Suicidal Behavior Across the Excess Weight Status Spectrum," *Obesity*, 21(5): 1039-1045.

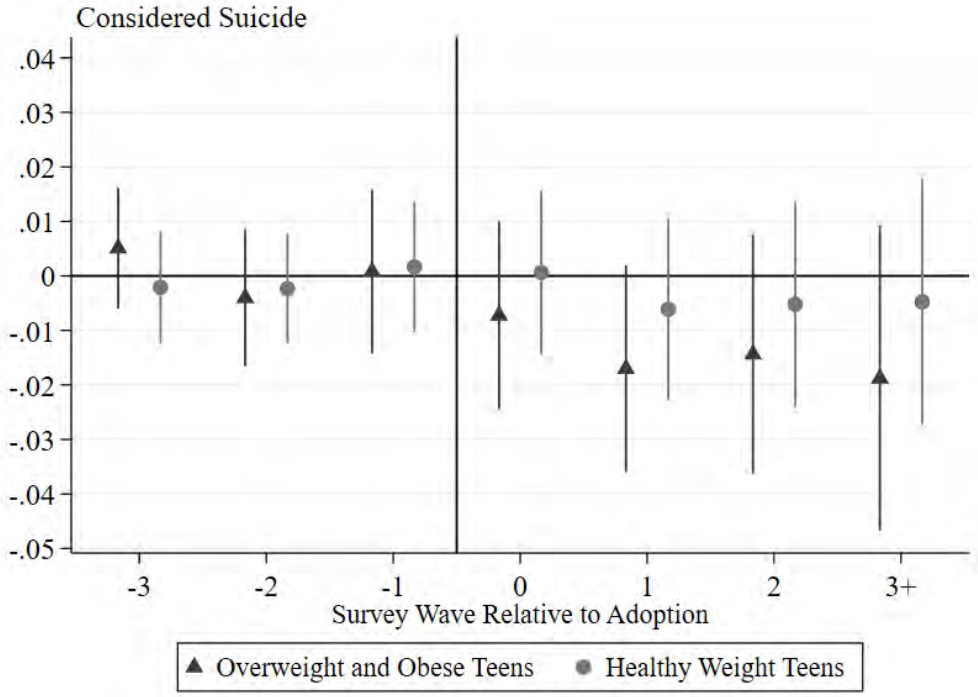
Figure 1: Overweight and Obese Teens Were More Likely to Report Having Considered, Planned, and Attempted Suicide



Source: National and State Youth Risk Behavior Surveys, 1999-2017

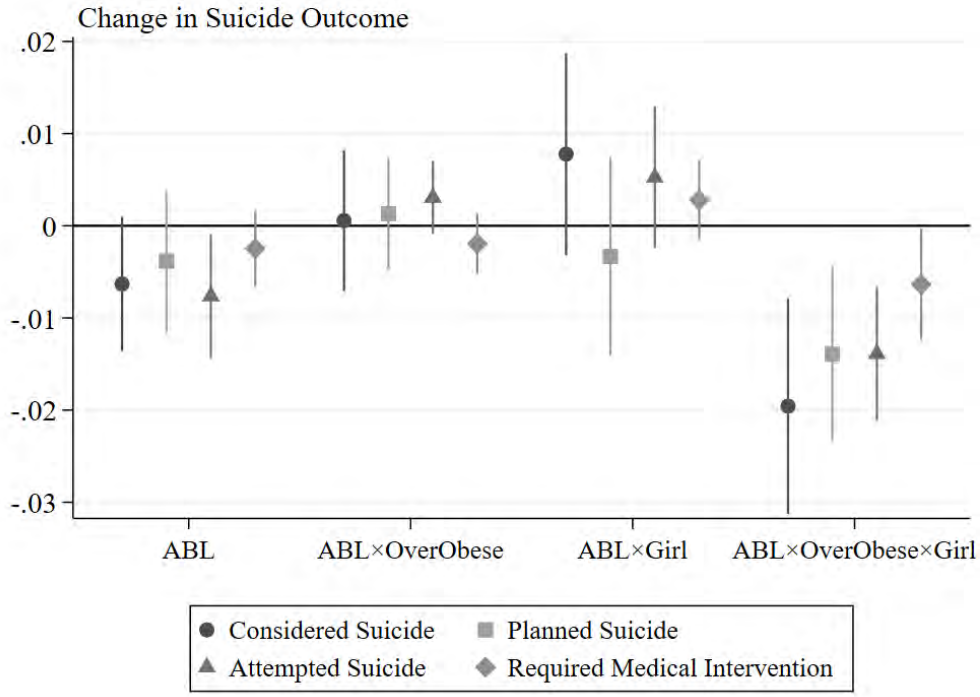
Note: Panel A plots the share of teens who reported that had seriously considered suicide, Panel B plots the share of teens who had reported making a suicide plan based on their BMI status, Panel C plots the share of teens who reported that they had attempted suicide, and Panel D plots the share of teens who reported that they had attempted suicide and required medical intervention.

Figure 2: The Reduction in Suicide Attempts Among Overweight and Obese Teens Was Limited to the Post-Period



Source: National and State Youth Risk Behavior Surveys, 1999-2017
Note: The figure denotes how suicidal behaviors evolved around the adoption of a state anti-bullying law. The reference group includes overweight teens interviewed five or more waves prior to the adoption of an anti-bullying law. The dependent variable is an indicator for whether the teen reported that they had attempted suicide. The markers denote the point estimates, and the corresponding vertical bars denote the 90 percent confidence intervals. The dark squares plot the point estimates for overweight and obese teens, while the lighter grey circles plot the point estimates for health weight teens. Standard errors are clustered at the state level.

Figure 3: The Reductions in Suicide Outcomes for Overweight and Obese Teenagers Was Independent of and Concentrated Among Teen Girls



Source: National and State Youth Risk Behavior Surveys, 1999-2017

Note: The circles indicate results where the dependent variable is an indicator for whether the teen reported seriously considering suicide, the squares indicate results where the dependent variable is an indicator for whether the teen reported making a suicide plan, the triangles indicate results where the dependent variable is an indicator for whether the teen reported attempting suicide, and the diamonds indicate results where the dependent variable is an indicator for whether the teen reported requiring medical attention after a suicide attempt. The markers report the point estimates, and the solid lines indicate the corresponding 90 percent confidence intervals. The estimates are obtained from a modified version of equation (1) whereby the righthand side variables are fully interacted with indicators for being (i) overweight or obese and (ii) a teen girl. Standard errors are clustered at the state level.

Table 1: Summary Statistics for the Suicide-Related Outcomes

	(1)	(2)	(3)
Sample →	All Teens	Healthy Weight Teens	Overweight and Obese Teens
Considered Suicide	0.163	0.156	0.180
	(0.370)	(0.363)	(0.384)
Planned Suicide	0.130	0.124	0.144
	(0.336)	(0.330)	(0.351)
Attempted Suicide	0.081	0.075	0.093
	(0.272)	(0.264)	(0.291)
Required Medical Intervention	0.028	0.026	0.032
	(0.164)	(0.159)	(0.167)

Source: National and State Youth Risk Behavior Surveys, 1999-2017

Note: Each row reports the sample mean and standard deviation (in parentheses) for the outcome of interest. Column 1 reports statistics for all teens, column 2 reports statistics for healthy teens, and column 3 reports statistics for overweight and obese teens. All variables in columns 2 and 3 are statistically different from each other at conventional levels ($p < 0.01$).

Table 2: State Anti-Bullying Laws Improved Overweight and Obese Teens' Mental Health

	(1)	(2)	(3)
Panel A: Overweight and Obese Teens			
ABL	-0.010**	-0.010**	-0.011**
	(0.004)	(0.004)	(0.004)
Mean	0.180	0.180	0.180
R^2	0.003	0.021	0.021
Observations	355,990	355,990	355,990
Panel B: Healthy Weight Teens			
ABL	-0.002	-0.002	-0.002
	(0.004)	(0.004)	(0.004)
Mean	0.156	0.156	0.156
R^2	0.004	0.013	0.013
Observations	811,931	811,931	811,931
Panel C: Full Sample			
ABL	-0.002	-0.002	-0.002
	(0.004)	(0.004)	(0.004)
ABL × Overweight or Obese	-0.008**	-0.009**	-0.009***
	(0.003)	(0.003)	(0.003)
Mean	0.163	0.163	0.163
R^2	0.004	0.016	0.016
Observations	1,167,921	1,167,921	1,167,921
State and Year FE?	Y	Y	Y
Demographic Controls?		Y	Y
Economic and Policy Controls?			Y

Source: National and State Youth Risk Behavior Surveys, 1999-2017

Note: The dependent variable is an indicator for whether the teen had considered suicide. The independent variable of interest is an indicator for whether the state had adopted a school anti-bullying law, and the estimates are obtained from equation (1). Column 1 uses a sparse specification including state and survey year fixed effects. Column 2 augments this specification with demographic characteristics, including indicators for race/ethnicity (Black, Hispanic, and white with other omitted), age (12-17 with 18+ omitted), sex (male with female omitted), and whether the teen was sampled from the NYRBS or SYRBS. Column 3 further includes state-level time-varying economic and policy controls, including indicators for whether the state required students to receive BMI assessments in school, whether the state limited fast food companies liability for weight-related harms, whether the teen was bound by a youth indoor tanning prohibition, whether a parent was required to be present for the teen to use an indoor tanning bed, whether the teen was required to obtain parental consent for indoor tanning, the natural log of the real value of the effective minimum wage, and the state unemployment rate. Panel A examines overweight and obese teens, while Panel B examines healthy weight teens. Panel C examines all teens and fully interacts the independent variable of interest and righthand side covariates with an indicator for being overweight or obese. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 3: State Anti-Bullying Laws Reduced Suicide Ideation and Attempts Among Overweight and Obese Teens

	(1)	(2)	(3)	(4)
Outcome →	Considered Suicide	Planned Suicide	Attempted Suicide	Suicide Attempt Required Medical Attention
Panel A: Overweight and Obese Teens				
ABL	-0.011**	-0.010*	-0.008**	-0.006**
	(0.004)	(0.005)	(0.004)	(0.003)
Mean	0.180	0.144	0.093	0.032
R^2	0.021	0.015	0.014	0.005
Observations	355,990	374,926	321,278	279,347
Panel B: Healthy Weight Teens				
ABL	-0.002	-0.005	-0.005	-0.001
	(0.004)	(0.005)	(0.003)	(0.002)
Mean	0.156	0.124	0.075	0.026
R^2	0.013	0.009	0.010	0.004
Observations	811,931	872,225	752,194	651,924
Panel C: Full Sample				
ABL	-0.002	-0.005	-0.005	-0.001
	(0.004)	(0.005)	(0.003)	(0.002)
ABL × Overweight or Obese	-0.009***	-0.004	-0.004*	-0.005***
	(0.003)	(0.003)	(0.002)	(0.002)
Mean	0.163	0.130	0.081	0.028
R^2	0.016	0.012	0.012	0.005
Observations	1,167,921	1,247,151	1,073,472	931,271

Source: National and State Youth Risk Behavior Surveys, 1999-2017

Note: The dependent variable in column 1 is an indicator for whether the teen had seriously considered suicide, in column 2 for whether the teen planned a suicide attempt, in column 3 for whether the teen attempted suicide, and in column 4 for whether the teen's suicide attempt required medical attention. The independent variable of interest is an indicator for whether the state had adopted a school anti-bullying law, and the estimates are obtained from equation (1). Panel A examines healthy weight teens, while Panel B examines overweight and obese teens. Panel C examines all teens and fully interacts the independent variable of interest and righthand side covariates with an indicator for being overweight or obese. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 4: The Relationship is Robust to Alternative Controls for Time-Varying Spatial Heterogeneity and Estimation Strategies

	(1)	(2)	(3)	(4)	(5)
Specification →	Baseline	(1) + Census Region-by-Year Fixed Effects	(1) + Census Division-by-Year Fixed Effects	(1) + State-Specific Linear Time Trends	BJS Imputation
Panel A: Considered Suicide					
ABL	-0.011**	-0.010**	-0.013**	-0.006	-0.010***
	(0.004)	(0.004)	(0.005)	(0.005)	(0.003)
Mean	0.180	0.180	0.180	0.180	0.180
R^2	0.021	0.021	0.022	0.022	-
Observations	355,990	355,990	355,990	355,990	288,397
Panel B: Planned Suicide					
ABL	-0.010*	-0.011**	-0.013**	-0.006	-0.013***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.003)
Mean	0.144	0.144	0.144	0.144	0.144
R^2	0.015	0.015	0.015	0.015	-
Observations	374,926	374,926	374,926	374,926	303,291
Panel C: Attempted Suicide					
ABL	-0.008**	-0.008**	-0.008**	-0.004	-0.003
	(0.004)	(0.003)	(0.004)	(0.004)	(0.005)
Mean	0.093	0.093	0.093	0.093	0.093
R^2	0.014	0.014	0.015	0.015	-
Observations	321,278	321,278	321,278	321,278	262,825
Panel D: Suicide Attempt Required Medical Attention					
ABL	-0.006**	-0.006**	-0.007**	-0.005**	-0.009***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
Mean	0.032	0.032	0.032	0.032	0.032
R^2	0.005	0.005	0.006	0.007	-
Observations	279,347	279,347	279,347	279,347	235,677

Source: National and State Youth Risk Behavior Surveys, 1999-2017

Note: The dependent variable in Panel A is an indicator for whether the teen had seriously considered suicide, in Panel B for whether the teen planned a suicide attempt, in Panel C for whether the teen attempted suicide, and in Panel D for whether the teen's suicide attempt required medical attention. The independent variable of interest is an indicator for whether the state had adopted a school anti-bullying law. The sample includes overweight and obese teens. Column 1 reports the results from equation (1). Column 2 uses the baseline specification from equation (1) but augments it with Census region-by-year fixed effects, while column 3 instead includes Census division-by-year fixed effects. Column 4 again uses the baseline specification augmented with state-specific linear time trends. Finally, column 5 uses imputation estimator proposed by Borusyak et al. (forthcoming) to account for potential issues arising from staggered adoption and heterogeneous treatment effects. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 5: Stronger State Anti-Bullying Laws Were Associated with More Pronounced Improvements in Overweight and Obese Teens' Mental Health

	(1)	(2)	(3)	(4)
Outcome →	Considered Suicide	Planned Suicide	Attempted Suicide	Suicide Attempt Required Medical Attention
Strong ABL	-0.010*	-0.011*	-0.012**	-0.006*
	(0.006)	(0.006)	(0.005)	(0.003)
Weak ABL	-0.011**	-0.009	-0.006	-0.006
	(0.005)	(0.006)	(0.004)	(0.004)
Mean	0.180	0.144	0.093	0.032
R^2	0.021	0.015	0.014	0.005
Observations	355,990	374,926	321,278	279,347

Source: National and State Youth Risk Behavior Surveys, 1999-2017

Note: The dependent variable in column 1 is an indicator for whether the teen had seriously considered suicide, in column 2 for whether the teen planned a suicide attempt, in column 3 for whether the teen attempted suicide, and in column 4 for whether the teen's suicide attempt required medical attention. The independent variables of interest are indicators for whether the state had adopted a strong or weak anti-bullying law, and the estimates are obtained from equation (1). Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 6: Anti-Bullying Laws Reduced School Bullying

	(1)	(2)	(4)	(5)
BMI →	Overweight and Obese Teens	Healthy Weight Teens	Overweight and Obese Teens	Healthy Weight Teens
ABL	-0.012**	-0.009		
	(0.006)	(0.006)		
Strong ABL			-0.026**	-0.018**
			(0.011)	(0.008)
Weak ABL			-0.008	-0.006
			(0.007)	(0.007)
R^2	0.026	0.017	0.032	0.024
Mean	0.211	0.192	0.211	0.192
Observations	225,282	495,264	217,849	480,793

Source: National and State Youth Risk Behavior Surveys, 2001-2017

Note: The dependent variable is an indicator for whether the respondent reported being bullied at school. The independent variable of interest in columns 1 and 2 is an indicator for whether the state had adopted a school anti-bullying law. The independent variables of interest in columns 3 and 4 are indicators for whether the state had adopted a strong anti-bullying law or a weak anti-bullying law. The estimates are obtained from equation (1). Columns 1 and 3 examine overweight and obese teens. Columns 2 and 4 examine healthy weight teens. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 7: State Anti-Bullying Laws Were Unrelated to Overweight and Obese Teens' Body Image or Weight Loss Goals

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Outcome →	Self-Description Relative to BMI			Current Weight Goals			
	Too Lenient	Accurate	Too Harsh	Lose Weight	Maintain Weight	Gain Weight	Nothing
ABL	-0.004	0.005	-0.002	0.003	-0.003	0.001	-0.002
	(0.005)	(0.005)	(0.001)	(0.006)	(0.003)	(0.004)	(0.003)
Mean	0.650	0.326	0.024	0.652	0.123	0.088	0.138
R^2	0.095	0.082	0.011	0.100	0.029	0.046	0.017
Observations	351,616	351,616	351,616	335,656	335,656	335,656	335,656

Source: National and State Youth Risk Behavior Surveys, 1999-2017

Note: The dependent variable in column 1 is an indicator for whether a teen described his/her body as lighter than his/her BMI, in column 2 accurately, and in column 3 as heavier relative to his/her BMI. The dependent variable in column 4 is an indicator for whether the teen reported trying to lose weight, in column 5 for trying to maintain weight, and in column 6 for trying to gain weight. The dependent variable in column 7 is an indicator for the teen reporting that he/she was not attempting to do anything about his/her weight. The independent variable of interest is an indicator for whether the state had adopted a school anti-bullying law. The sample includes overweight and obese teens, and the regressions include the full set of controls from equation (1). Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 8: State Anti-Bullying Laws Were Unrelated to Changes in Teen BMI

	(1)	(2)	(3)	(4)
Outcome →	BMI	Healthy Weight	Overweight	Obese
ABL	0.050	-0.005	0.001	0.004
	(0.034)	(0.003)	(0.002)	(0.003)
Mean	23.291	0.698	0.167	0.137
R^2	0.042	0.022	0.004	0.019
Observations	1,362,741	1,362,741	1,362,741	1,362,741

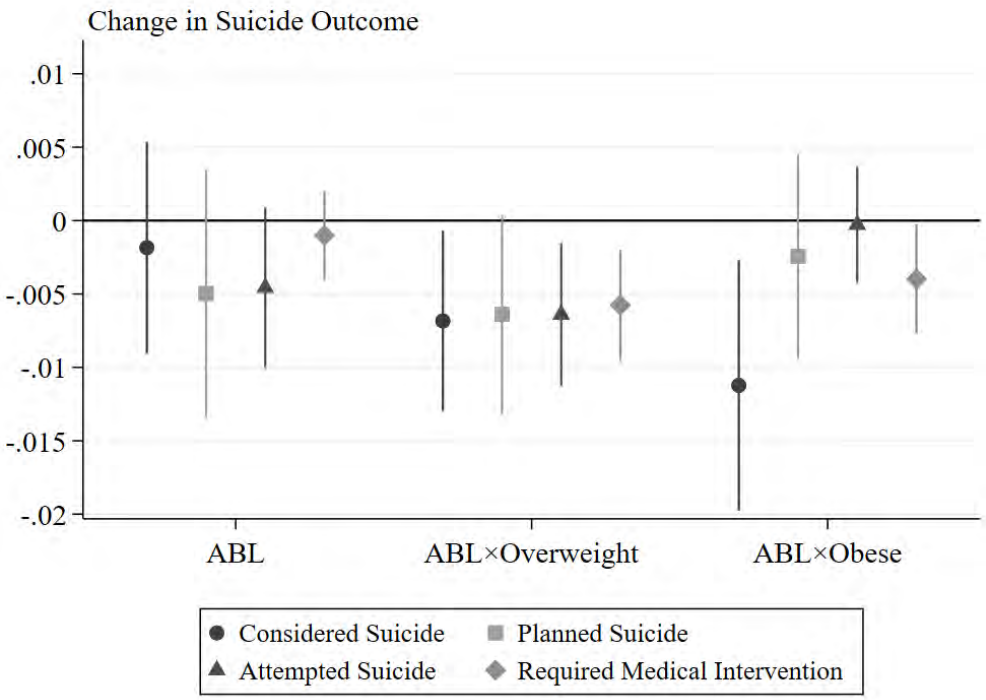
Source: National and State Youth Risk Behavior Surveys, 1999-2017

Note: The dependent variable in column 1 is the respondent's BMI, in column 2 an indicator for being classified as healthy weight, in column 3 an indicator for being classified as overweight, and in column 4 an indicator for being classified as obese. The regressions are estimated using equation (1). Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

7. Appendix

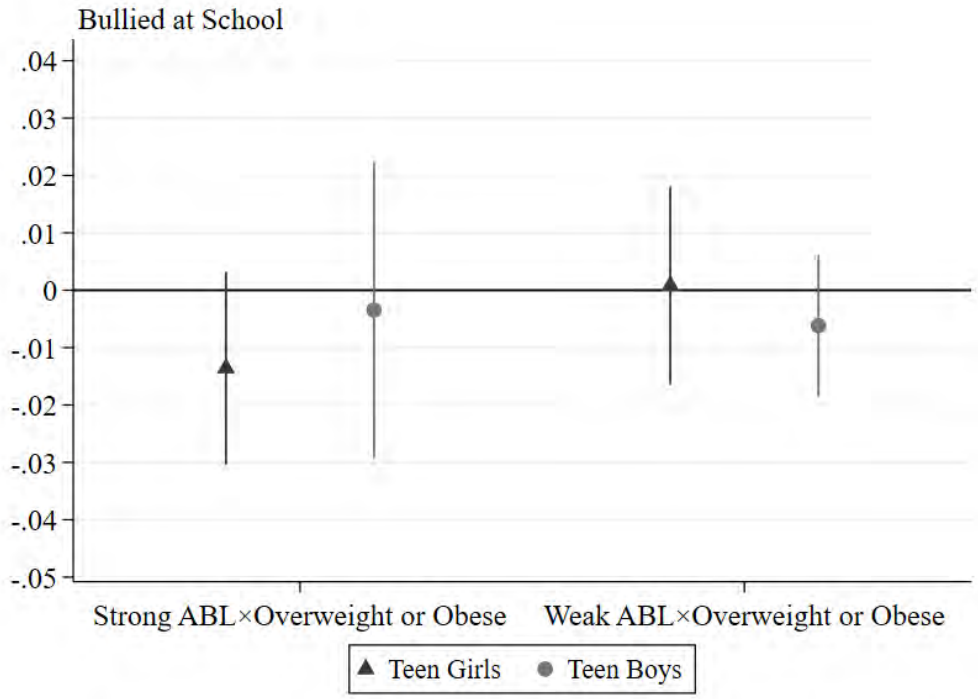
Appendix Figure 1: Anti-Bullying Laws and Changes in Suicide Behaviors, by Overweight and Obesity Status



Source: National and State Youth Risk Behavior Surveys, 1999-2017

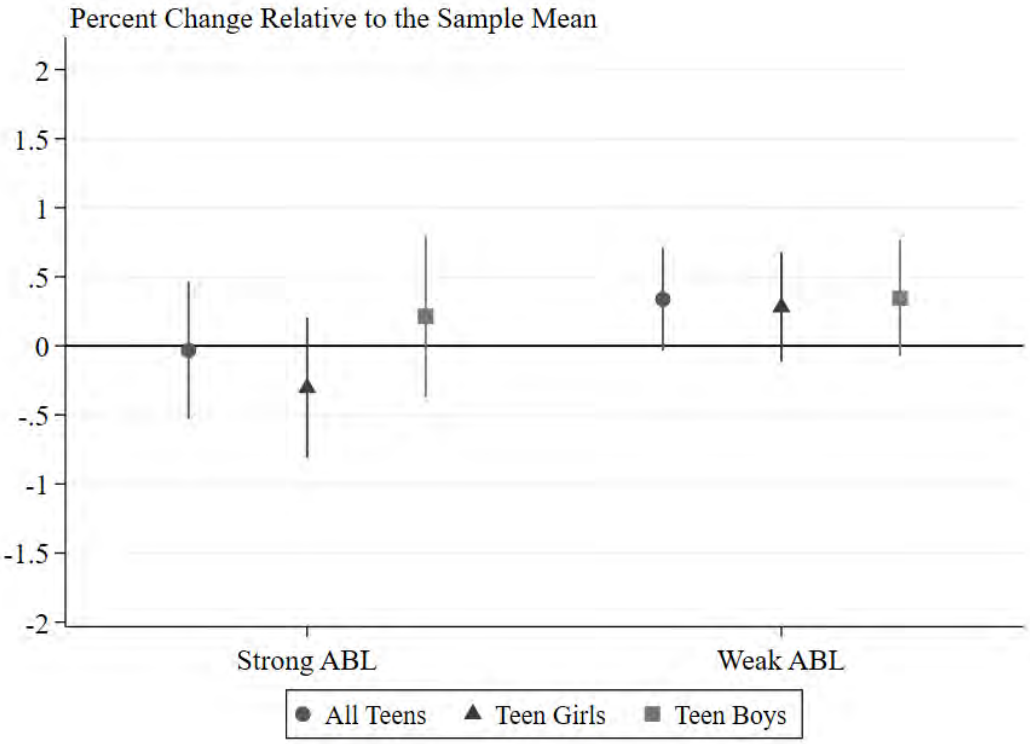
Note: The circles indicate results where the dependent variable is an indicator for whether the teen reported seriously considering suicide, the squares indicate results where the dependent variable is an indicator for whether the teen reported making a suicide plan, the triangles indicate results where the dependent variable is an indicator for whether the teen reported attempting suicide, and the diamonds indicate results where the dependent variable is an indicator for whether the teen reported requiring medical attention after a suicide attempt. The markers report the point estimates, and the solid lines indicate the corresponding 90 percent confidence intervals. The estimates are obtained from a modified version of equation (1) whereby the righthand side variables are fully interacted with indicators for being (i) overweight or (ii) obese. Standard errors are clustered at the state level.

Appendix Figure 2: Strong Anti-Bullying Laws Are Associated with Larger Reductions in Bullying of Overweight and Obese Teen Girls



Source: National and State Youth Risk Behavior Surveys, 1999-2017
Note: The dependent variable is an indicator for whether the teen reported being bullied at school. The results are obtained using a pooled sample of teens and a modified version of equation (1) that fully interacts the righthand side covariates with an indicator for being overweight or obese. We separately analyzed the relationship for teen girls and teen boys. The dark grey triangles indicate the point estimate for teen girls, while the lighter grey circles indicate the point estimate for overweight and obese teen boys. The vertical lines indicate the corresponding 90 percent confidence intervals. Standard errors are clustered at the state level.

Appendix Figure 3: Strong Anti-Bullying Laws Are Unrelated to Changes in Teen BMI



Source: National and State Youth Risk Behavior Surveys, 1999-2017
Note: The dependent variable is the teen's BMI. The circles plot estimates for the full sample, the triangles for a sample of teen girls, and the squares for a sample of teen boys. The results are obtained using a a modified version of equation (1) that examines whether states had adopted strong anti-bullying laws or weak anti-bullying laws. The estimates are reported as a percent change relative to the sample mean. The vertical lines indicate the corresponding 90 percent confidence intervals. Standard errors are clustered at the state level.

Appendix Table 1: Policy Dates

State	Date	State	Date
Alabama	07/01/2010	Montana	04/01/2015
Alaska	07/01/2007	Nebraska	07/01/2009
Arizona	08/12/2005	Nevada	07/01/2005
Arkansas	02/16/2003	New Hampshire	01/01/2011
California	01/01/2004	New Jersey	09/01/2011
Colorado	08/08/2001	New Mexico	04/04/2007
Connecticut	02/01/2009	New York	07/01/2010
District of Columbia	06/22/2012	North Carolina	12/31/2009
Delaware	01/01/2008	North Dakota	07/01/2012
Florida	12/01/2008	Ohio	09/29/2010
Georgia	08/01/2011	Oklahoma	11/01/2002
Hawaii	07/11/2011	Oregon	01/01/2004
Idaho	07/01/2006	Pennsylvania	01/01/2009
Illinois	06/28/2010	Rhode Island	09/01/2004
Indiana	07/01/2005	South Carolina	01/01/2007
Iowa	09/01/2007	South Dakota	07/01/2012
Kansas	07/01/2008	Tennessee	01/01/2006
Kentucky	11/30/2008	Texas	O6/17/2011
Louisiana	08/01/2001	Utah	09/01/2012
Maine	09/01/2006	Vermont	01/15/2007
Maryland	07/01/2009	Virginia	07/01/2013
Massachusetts	12/31/2010	Washington	08/01/2011
Michigan	06/07/2012	West Virginia	12/01/2001
Minnesota	08/01/2007	Wisconsin	08/15/2010
Mississippi	12/30/2010	Wyoming	12/31/2009
Missouri	09/01/2007		

Source: Rees et al. (2022)

Appendix Table 2: Additional Summary Statistics

	(1)	(2)	(3)
Sample →	All Teens	Healthy Weight Teens	Overweight and Obese Teens
Bullied at School	0.198	0.192	0.211
	(0.399)	(0.394)	(0.408)
Described Body Too Leniently	0.320	0.178	0.650
	(0.466)	(0.383)	(0.477)
Described Body Accurately	0.551	0.647	0.326
	(0.497)	(0.478)	(0.469)
Described Body Too Harshly	0.129	0.174	0.024
	(0.335)	(0.379)	(0.153)
Trying to Lose Weight	0.453	0.367	0.652
	(0.498)	(0.482)	(0.476)
Trying to Maintain Weight	0.190	0.219	0.123
	(0.392)	(0.413)	(0.328)
Trying to Gain Weight	0.160	0.191	0.088
	(0.367)	(0.393)	(0.283)
Not Doing Anything for Weight	0.197	0.222	0.138
	(0.398)	(0.416)	(0.345)

Source: National and State Youth Risk Behavior Surveys, 1999-2017

Note: Each row reports the sample mean and standard deviation (in parentheses) for the outcome of interest. Column 1 examines all teens, column 2 healthy weight teens, and column 3 overweight and obese teens.

Appendix Table 3: The Relationship Between State Anti-Bullying Laws and Overweight and Obese Teens' Mental Health Using Additional Years of Data

	(1)	(2)	(3)	(4)
Outcome →	Considered Suicide	Planned Suicide	Attempted Suicide	Suicide Attempt Required Medical Attention
Panel A: Overweight and Obese Teens				
ABL	-0.009*	-0.009	-0.009**	-0.005*
	(0.005)	(0.006)	(0.004)	(0.003)
Mean	0.183	0.147	0.094	0.032
R^2	0.022	0.016	0.014	0.005
Observations	411,306	437,108	370,218	313,024
Panel B: Healthy Weight Teens				
ABL	-0.002	-0.005	-0.006	-0.001
	(0.005)	(0.006)	(0.004)	(0.002)
Mean	0.158	0.125	0.076	0.026
R^2	0.012	0.009	0.009	0.004
Observations	921,309	999,741	852,698	717,437
Panel C: Full Sample				
ABL	-0.002	-0.005	-0.006	-0.001
	(0.005)	(0.006)	(0.004)	(0.002)
ABL × Overweight or Obese	-0.007**	-0.004	-0.003	-0.004**
	(0.003)	(0.003)	(0.002)	(0.002)
Mean	0.165	0.132	0.081	0.028
R^2	0.017	0.012	0.012	0.004
Observations	1,332,615	1,436,849	1,222,916	1,030,461

Source: National and State Youth Risk Behavior Surveys, 1999-2019

Note: The dependent variable in column 1 is an indicator for whether the teen had seriously considered suicide, in column 2 for whether the teen planned a suicide attempt, in column 3 for whether the teen attempted suicide, and in column 4 for whether the teen's suicide attempt required medical attention. The independent variable of interest is an indicator for whether the state had adopted a school anti-bullying law, and the estimates are obtained from equation (1). Panel A examines healthy weight teens, while Panel B examines overweight and obese teens. Panel C examines all teens and fully interacts the independent variable of interest and righthand side covariates with an indicator for being overweight or obese. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Appendix Table 4: Heterogeneity in the Relationship Between State Anti-Bullying Laws and Suicide Outcomes of Overweight and Obese Teens, by Race/Ethnicity

	(1)	(2)	(3)	(4)
Sample →	Black Teens	Hispanic Teens	White Teens	Other Race Teens
Panel A: Considered Suicide				
ABL	-0.015**	-0.019**	-0.003	-0.017**
	(0.007)	(0.008)	(0.005)	(0.008)
Mean	0.158	0.181	0.181	0.202
R^2	0.015	0.022	0.023	0.025
Observations	61,887	69,481	178,577	46,045
Panel B: Planned Suicide				
ABL	-0.011	-0.005	-0.006	-0.018**
	(0.009)	(0.008)	(0.005)	(0.008)
Mean	0.131	0.151	0.140	0.170
R^2	0.010	0.018	0.015	0.021
Observations	57,892	63,242	207,285	46,507
Panel C: Attempted Suicide				
ABL	-0.015**	-0.011	-0.005	-0.002
	(0.006)	(0.011)	(0.004)	(0.006)
Mean	0.103	0.114	0.079	0.116
R^2	0.007	0.015	0.013	0.018
Observations	41,717	56,749	183,615	39,197
Panel D: Suicide Attempt Required Medical Attention				
ABL	-0.004	-0.011*	-0.005**	-0.008
	(0.007)	(0.006)	(0.003)	(0.005)
Mean	0.038	0.040	0.026	0.040
R^2	0.007	0.008	0.004	0.008
Observations	39,998	53,398	151,033	34,918

Source: National and State Youth Risk Behavior Surveys, 1999-2017

Note: The dependent variable in Panel A is an indicator for whether the teen had seriously considered suicide, in Panel B for whether the teen planned a suicide attempt, in Panel C for whether the teen attempted suicide, and in Panel D for whether the teen's suicide attempt required medical attention. The independent variable of interest is an indicator for whether the state had adopted a school anti-bullying law. The sample is overweight and obese teens, and the regressions are estimated using equation (1). Column 1 examines overweight and obese Black teens, column 2 overweight and obese Hispanic teens, column 3 overweight and obese white teens, and column 4 overweight and obese teens of all other races/ethnicities. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Appendix Table 5: Stronger State Anti-Bullying Laws Were Associated with Mental Health Improvements Among Healthy Weight Teens

	(1)	(2)	(3)	(4)
Outcome →	Considered Suicide	Planned Suicide	Attempted Suicide	Suicide Attempt Required Medical Attention
Strong ABL	0.001	-0.012*	-0.008*	-0.000
	(0.006)	(0.006)	(0.004)	(0.002)
Weak ABL	-0.003	-0.001	-0.002	-0.001
	(0.005)	(0.006)	(0.004)	(0.002)
Mean	0.156	0.124	0.075	0.026
R^2	0.013	0.009	0.010	0.004
Observations	811,931	872,225	752,194	651,924

Source: National and State Youth Risk Behavior Surveys, 1999-2017

Note: The dependent variable in column 1 is an indicator for whether the teen had seriously considered suicide, in column 2 for whether the teen planned a suicide attempt, in column 3 for whether the teen attempted suicide, and in column 4 for whether the teen's suicide attempt required medical attention. The independent variables of interest are indicators for whether the state had adopted a strong anti-bullying law or a weak anti-bullying law, and the estimates are obtained from equation (1). The sample is healthy weight teens. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Appendix Table 6: Strong State Anti-Bullying Laws Were Most Effective at Reducing School Bullying for Overweight and Obese Teen Girls

	(1)	(2)	(3)	(4)
BMI →	Overweight and Obese Teen Girls	Overweight and Obese Teen Boys	Healthy Weight Teen Girls	Healthy Weight Teen Boys
Panel A: Any Anti-Bullying Law				
ABL	-0.014**	-0.013	-0.012	-0.007
	(0.007)	(0.009)	(0.008)	(0.006)
R^2	0.031	0.015	0.017	0.013
Mean	0.244	0.183	0.213	0.167
Observations	101,983	123,299	267,542	227,722
Panel B: Variation by Strength of Anti-Bullying Law				
Strong ABL	-0.035**	-0.025	-0.021	-0.022***
	(0.015)	(0.016)	(0.013)	(0.006)
Weak ABL	-0.008	-0.009	-0.008	-0.003
	(0.006)	(0.010)	(0.009)	(0.007)
R^2	0.031	0.015	0.017	0.013
Mean	0.244	0.183	0.213	0.167
Observations	101,983	123,299	267,542	227,722

Source: National and State Youth Risk Behavior Surveys, 2001-2017

Note: The dependent variable is an indicator for whether the respondent reported being bullied at school. The independent variable of interest in columns 1 and 2 is an indicator for whether the state had adopted a school anti-bullying law. The independent variables of interest in columns 3 and 4 are indicators for whether the state had adopted a strong anti-bullying law or a weak anti-bullying law. The estimates are obtained from equation (1). Columns 1 and 3 examine overweight and obese teen girls. Columns 2 and 4 examine overweight and obese teen boys. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Appendix Table 7: State Anti-Bullying Laws Were Most Effective at Reducing Cyberbullying for Overweight and Obese Teen Girls

	(1)	(2)	(3)	(4)
BMI →	Overweight and Obese Teen Girls	Healthy Weight Teen Girls	Overweight and Obese Teen Boys	Healthy Weight Teen Boys
ABL	-0.025**	-0.008	-0.009*	-0.011***
	(0.010)	(0.005)	(0.005)	(0.003)
R^2	0.025	0.013	0.007	0.006
Mean	0.217	0.200	0.110	0.103
Observations	98,274	258,630	119,575	222,163

Source: National and State Youth Risk Behavior Surveys, 2001-2017

Note: The dependent variable is an indicator for whether the respondent reported being bullied at school. The independent variable of interest in columns 1 and 2 is an indicator for whether the state had adopted a school anti-bullying law. The independent variables of interest in columns 3 and 4 are indicators for whether the state had adopted a strong anti-bullying law or a weak anti-bullying law. The estimates are obtained from equation (1). Columns 1 and 3 examine overweight and obese teen girls. Columns 2 and 4 examine overweight and obese teen boys. Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Appendix Table 8: State Anti-Bullying Laws Were Unrelated to Changes in Healthy Weight Teens' Self-Image or Weight-Related Goals

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Self-Description Relative to BMI			Current Weight Goals			
Outcome →	Too Lenient	Accurate	Too Harsh	Lose Weight	Maintain Weight	Gain Weight	Nothing
ABL	0.002	0.002	-0.004	0.000	0.006*	-0.001	-0.005
	(0.004)	(0.005)	(0.004)	(0.005)	(0.003)	(0.003)	(0.004)
Mean	0.650	0.326	0.024	0.652	0.123	0.088	0.138
R^2	0.020	0.014	0.049	0.099	0.003	0.073	0.016
Observations	819,518	819,518	819,518	783,134	783,134	783,134	783,134

Source: National and State Youth Risk Behavior Surveys, 1999-2017

Note: The dependent variable in column 1 is an indicator for whether a teen described his/her body as lighter than his/her BMI, in column 2 accurately, and in column 3 as heavier relative to his/her BMI. The dependent variable in column 4 is an indicator for whether the teen reported trying to lose weight, in column 5 for trying to maintain weight, and in column 6 for trying to gain weight. The dependent variable in column 7 is an indicator for the teen reporting that he/she was not attempting to do anything about his/her weight. The independent variable of interest is an indicator for whether the state had adopted a school anti-bullying law. The sample includes health weight teens, and the regressions include the full set of controls from equation (1). Standard errors, shown in parentheses, are clustered at the state level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$