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School-Based Body Mass Index (BMI) Screening and Parental Notification in Late Adolescence: Evidence from Arkansas's Act 1220

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Conflicts of Interest

The author declares no conflict of interest in the conduct and reporting of this research.

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IMPLICATIONS AND CONTRIBUTION

This study demonstrated that screening adolescents for their BMI and reporting it to their parents in late adolescence, given prior screening and reporting in early adolescence, was not related to adolescents' health outcomes. These results underscored the importance of understanding the timing of adolescents' exposure to BMI screening and reporting.

ABSTRACT

Purpose: In 2003, Arkansas enacted Act 1220, one of the first comprehensive legislative initiatives aimed at addressing childhood obesity. One important provision of Act 1220 mandated that all children attending public schools be screened for their body mass index (BMI) and the information sent home to their parents. Since then, eight other states have adopted similar school-based BMI screening and notification policies. Despite their widespread adoption and implementation, there is a dearth of empirical studies evaluating such policies, particularly for adolescents. The aim of this study was to evaluate whether adolescents, who had been previously screened in early adolescence, experienced changes in their health outcomes if they continued to receive screening and reporting throughout late adolescence (11th and 12th grades).

Methods: Secondary data from the Centers for Disease Control's (CDC) Youth Risk Behavior Survey (YRBS) were analyzed using the method of difference-in-differences. Changes in outcomes between 10th and 12th grade were compared between a group of students who received screenings throughout 11th and 12th grades versus a later comparison group who were exempt from screening and reporting requirements in 11th and 12th grades.

Results: BMI screening and parental notification during late adolescence, given prior screening and notification in early adolescence, was not significantly related to BMI-for-age z-scores, the probability of being in a lower weight classification or exercise and dietary intake behaviors.

Conclusion: Exposing 11th and 12th graders to BMI screening and reporting, given that they had been exposed in prior grades, was not associated with adolescents' health outcomes.

Keywords: Arkansas Act 1220; Body Mass Index (BMI) Screening; BMI Reporting; Difference-in-Differences; Adolescent Obesity; Youth Risk Behavioral Survey (YRBS)

Between 1980-2010 the adolescent obesity rate in the United States more than tripled [1], reaching an all-time high of 18.4% in 2010 [2]. This increase in adolescent obesity (defined as having a body mass index (BMI) at or above the 95th percentile among children of the same age and sex [2]) has placed a growing number of adolescents at risk for physical and psychosocial problems ranging from type 2 diabetes and high blood pressure to depression and social isolation [3-6]. Adolescent obesity also has broader societal consequences, impacting the US economy due to productivity losses brought about by obesity-related diseases [5].

School districts across the US have played an increasingly prominent role in combating adolescent obesity [3, 4, 7] given their regulatory authority to exert influence over students' eating and exercise behaviors during the school day [3]. One of the first comprehensive legislative initiatives placing public schools front and center in the effort to address obesity and overweight was Arkansas's Act 1220 [8]. As part of Act 1220, beginning in 2003, all children attending Arkansas's public schools were required to be screened by a team of trained health professionals for their BMI [9], and then confidential letters—known as Child Health Reports—were sent home to parents and guardians [10]. Letters included information about a child's weight category based on their BMI-for-age (overweight, at risk for overweight, healthy weight or underweight) and the general health consequences of being overweight or at risk for overweight. Also, based upon guidelines from the American Academy of Pediatrics (AAP), each letter advised parents to ensure their children engaged in frequent exercise, limited their intake of soda and increased their intake of fruits and vegetables.

In the first year of implementation, different school districts across the state held screenings at different times of the school year while Child Health Reports were mailed in June [11] during which over 346,000 letters were sent to approximately 450,000 K-12 public school students [12]. The reported direct costs for screening and reporting have been estimated at \$1.5 million in its initial year, and

\$750,000 annually thereafter (in per student terms, this was \$3.00 per student and \$1.50 per student, respectively [11]). These costs were not definitive as estimates reported in 2009 suggested that the per school cost of screening and reporting in Arkansas could have been as low as \$60 per school or as high as \$500 per school [13]. Since Arkansas implemented its statewide BMI screening and reporting policy in 2003, eight other states have adopted similar BMI screening and parental reporting policies including Alabama, Massachusetts, and Ohio [14]. However, the justification for such programs and, more broadly, community-based strategies aimed at preventing obesity among adolescents, lacks a comprehensive and rigorous empirical basis [15, 16].

Theoretically, both the Health Belief Model (HBM) [17] and Social Cognitive Theory (SCT) [18] may help explain why BMI screening and notification may lead to changes in outcomes. The HBM suggests that notifying parents about their children's BMI—particularly if children classified as overweight or obese—may influence parents' perception of their children's *susceptibility* and *severity* [19] of being overweight and/or obese, which in turn serves as a *cue to action* [15]. This enhanced perception could induce children (and/or their parents) to change their diet and exercise leading to improved outcomes. Social Cognitive Theory (SCT) suggests that informing parents of their children's BMI status will induce parents to undertake changes to improve their children's health if they are convinced that (1) their children's weight status poses a *potential* health threat; (2) changes in children's behaviors (i.e., exercise and dietary practices) may mitigate any potential threats; and finally (3) children (and/or parents themselves) possess the capacity to alter their behaviors to influence their well-being [18]. In both models, parents play a critical role since they decide whether to share BMI information with their child. In one prior study on BMI screening and parental notification policies in Minnesota, though about 79% of parents read notification letters in their entirety, 55% did not discuss the information with their child [20]. Further, according to the only peer-reviewed study of BMI screening

and parent notification to date from California, notification has not been associated with changes in BMI [21]. The study, conducted by Madsen (2011), found no differences in the BMI of children in grades 5, 7 and 9 across time between one group of districts that reported BMI information to parents versus a comparison group of districts that did not report such information [21].

Adherence to BMI screening and reporting in Arkansas has been high with 98.7% of public schools participating in the 2011-12 academic year [22]. In 2007, due to mounting concerns about a lack of a parental opt-out of screening requirements as well as the administrative burden of screening, the Arkansas General Assembly implemented Act 201, which allowed parental opt-out from screenings and exempted children in odd numbered grades as well as in grade 12 [10]. This exemption raised a unique opportunity to compare the health outcomes of adolescents who were subject to screening and reporting in 11th and 12th grades to those who were exempt from screening and reporting in order to understand the effect of screening and reporting requirements in late adolescence. Accordingly, the aim of this study was to evaluate whether adolescents, who had been previously screened in early adolescence, experienced changes in their health outcomes if they continued to receive screening and reporting throughout late adolescence (11th and 12th grades).

RESEARCH DESIGN

Dataset and Measures

Dataset

Secondary data was used from the Youth Risk Behavior Surveillance System (YRBS) for Arkansas that included individual-level data on adolescents attending public schools in Arkansas [23]. Three repeated cross-sections were used: 2005, 2007 and 2009. Since data were collected in the spring of the academic year (AY) which typically spanned from February to May [24], the YRBS dataset year (e.g., 2009) corresponded to the preceding academic year (AY) (e.g., AY 2008-09). The YRBS data contained

no individually identifiable information and were publicly available; therefore, the Institutional Review Board (IRB) at the University of California, Davis determined that the study was not considered research involving human subjects and exempt from review.

Measures

Weight Status. The study's primary outcome measure was an adolescent's BMI calculated based on self-reported height and weight. Two versions were used—one continuous, based upon their BMI-for-age z-score while the other was categorical corresponding to three age and gender adjusted BMI percentiles: Healthy Weight (5th percentile to < 85th percentile); Overweight (85th percentile to < the 95th percentile); Obese ($\geq$ 95th percentile) [25]. BMI percentiles for age and gender have been shown to be highly correlated (.88) with percentage body fat as measured by dual energy X-ray absorptiometry (DXA) scans [26].

Prior research demonstrated that among YRBS respondents, discrepancies between self-reported versus measured height and weight were common [27]. On average, students tended to overestimate their height by 2.7 inches and underestimated their weight by 3.5 pounds (p. 284). As a result, the prevalence of adolescents at risk for overweight and obesity was underestimated versus the prevalence using measured height and weight (p. 285). Though the YRBS only included self-reported height and weight, the data were still valuable in understanding adolescents' weight status [28]; however, readers should be aware of this limitation.

Exercise Behaviors. Measures of adolescents' exercise behaviors included the frequency of participation in vigorous activities for at least 20 minutes in the past 7 days and the frequency of participation in moderate activities for at least 30 minutes in the past 7 days. Both measures were self-reported on a scale from 0 to 7 days, in whole day increments.

Dietary Intake Behaviors. The study used students' self-reports of whether they consumed fruits at least once a day or more as well as whether they consumed vegetables at least once a day or more. Both variables were dichotomous, equaling 1 if they responded affirmatively, 0 otherwise.

Additional Measures. A set of covariates was used including adolescents' self-reported age (in years), gender and racial/ethnic identification (i.e., Non-Hispanic Black or African American; Hispanic or Latino; Non-Hispanic White; and Other).

Validity and Reliability of Exercise and Dietary Intake Behavior Measures. The test-retest reliabilities of the moderate and vigorous activity measures in the YRBS in a sample of middle school students were found to be moderately reliable [29]. As for validity, moderate activity was underestimated versus measures of activity captured by an Actigraph accelerometer, while vigorous activity was overestimated [29]. Differences in the self-reported intake of fruits and vegetables in a sample of high school students using the YRBS questionnaire versus a 24-hour recall method showed that there was underreporting of servings of fruit and vegetables consumed [26]. Thus, self-reported measures of exercise and dietary intake were prone to self-reporting bias, a limitation to the study.

Identification Strategy and Sample

Identification Strategy

A straightforward difference-in-differences approach was used to estimate the effect of BMI screening and reporting in late adolescence, given prior screening and reporting in early adolescence. Changes in outcomes between 10th and 12th grade were compared between a group of students who received screenings throughout 11th and 12th grades (Group A, the “treated” group) versus a later comparison group who became exempt from screening and reporting requirements in 11th and 12th grades (Group B, the “comparison” group). Table 1 shows these two groups. Though each group was not randomly assigned to screening and reporting, due to the exemptions, each group's differential

exposure to the screening and reporting requirement was plausibly unrelated to characteristics of adolescents themselves which would attenuate any potential self-selection bias.

More formally, in a difference-in-differences framework, the first difference captures, in part, the change in outcomes attributable to BMI screening and reporting in both 11th and 12th grades for Group A (the “treated” group): $(\bar{Y}_{GroupA}^{12thGrade} - \bar{Y}_{GroupA}^{10thGrade})$. However, this change also captures other secular trends occurring over time, including exposure to Act 1220’s other health-related initiatives. Thus, in order to isolate the effect of screening and reporting in 11th and 12th grades, it was necessary to know what the change in outcomes would have looked like if these students were not continued to be screened and notified in these grades. To account for this counterfactual trend, Group B (the “comparison” group) students were used as a natural comparison group to form the second difference since they were exempt from screenings in 11th and 12th grades: $(\bar{Y}_{GroupB}^{12thGrade} - \bar{Y}_{GroupB}^{10thGrade})$. Subtracting this second difference from the first difference yielded the difference-in-differences estimator which isolated the effect of BMI screening and notification in 11th and 12th grades on outcomes:

$\delta_1 = (\bar{Y}_{GroupA}^{12thGrade} - \bar{Y}_{GroupA}^{10thGrade}) - (\bar{Y}_{GroupB}^{12thGrade} - \bar{Y}_{GroupB}^{10thGrade})$. Since adolescents experienced screening and reporting prior to 10th grade, δ_1 should be interpreted as *the effect, on average, of experiencing additional BMI screening and reporting in 11th and 12th grades, above and beyond the screening and reporting experienced prior to those grades.*

Regression was used to estimate δ_1 :

$$Y = \beta_0 + \beta_1(GroupA) + \delta_0(12th\ Grade) + \delta_1(GroupA \times 12th\ Grade) + X'Z + \varepsilon \quad (2)$$

where Y is the outcome; $GroupA$ is a dummy variable equal to 1 for adolescents in the group which continued to experience screening and reporting in 11th and 12 grades, while $12th\ Grade$ is a dummy

variable equal to 1 for adolescents observed in 12th grade (the after time period), 0 otherwise. X' is a vector of individual-level controls. δ_1 is the difference-in-differences estimator. ε is the error term.

For continuous outcomes (e.g., BMI-for-age z-score), ordinary least squares (OLS) regression was used. For the categorical weight outcomes, a series of probit regressions were used to estimate the probabilities of adolescents being in a lower versus a higher weight category (e.g., healthy weight versus overweight). Probit regression was also used for fruit and vegetable consumption outcomes. For all probit models, Norton, Wang & Ai's (2004) method was used to transform the coefficient estimate on the interaction term, the difference-in-differences estimator δ_1 .

Analytic Sample

Unweighted sample sizes for each grade-by-year combination used in the analysis were as follows: (1) Group A: 10th graders in 2005 (n=439) and 12th graders in 2007 (n=147); and (2) Group B: 10th graders in 2007 (n=362) and 12th graders in 2009 (n=133). Based on the total unweighted sample size (n=1,081), a power analysis was conducted [30] demonstrating that the study had power of approximately .99 to detect small effects (.04) (the average effect size found across prior childhood and adolescent obesity prevention studies [31]) at a Bonferroni adjusted alpha level of .006 (a more stringent alpha level was adopted to account for multiple hypothesis testing). The samples used were limited given that the two-stage cluster sample design of the YRBS (i.e., schools were sampled first, then students within schools) provided a sample representative of 9-12th graders as a whole, rather than individual grades. Thus, these subsamples of 10th and 12th graders were unlikely to have come from a representative sample of schools and even by applying sample weights, these samples may not have necessarily reflected the underlying population of 10th and 12th grade adolescents attending Arkansas's public schools.

<<Table 1>>

RESULTS

Descriptive Statistics

As shown in Table 2, for each grade-by-year group (e.g., 10th graders in 2005), a majority of adolescents were classified as having a healthy weight, followed by overweight then obese. Also, across each grade-by-year group, approximately a quarter to slightly more than a third of adolescents did not engage in any moderate physical activity, while about a fifth of adolescents participated in vigorous exercise for more than 20 minutes in the past 7 days. Regarding dietary intake behaviors, a majority of adolescents did not consume one or more servings of fruits or vegetables in the past 7 days. Finally, the sample was predominately White Non-Hispanic, followed by Black. Importantly, there were no statistically significant differences in these measures between Groups A and B in 10th grade (before Group B became exempt from screening and reporting) thus ruling out the possibility that these two groups systematically differed from each other on observable characteristics (results available from author).

<<Table 2>>

Examining Pre-Exemption Trends in Weight Status

A critical assumption underpinning this study's difference-in-differences strategy was that trends in outcomes between each group would have moved in tandem had exemptions not occurred [32]. To assess this assumption, pre-trend data were examined under the rationale that if trends in both groups were similar prior to Group B experiencing exemptions in 10th grade, such trends would have continued to be similar after 10th grade. Since pre-trend data were not available in the YRBS dataset, data for the state of Arkansas from the National Survey of Children's Health (NSCH) were used to estimate BMI status for 14-15 year olds in 2003 which roughly corresponded to when 10th graders in 2005 (Group A) was in 9th grade. Also, BMI status was estimated for 12-13 year olds in 2003 corresponding to when

10th graders in 2007 (Group B) was in 7th grade. Though not ideal and a very coarse approximation, relying on data for Arkansas from the NCHS helped determine whether trends were similar in each group prior to 10th grade.

As shown in Table 3, the percentage of adolescents in the obese categories declined in both groups while the percentage in the overweight category increased. For the healthy weight category, the two groups exhibited differential trends—the percentage in the healthy weight category decreased slightly in Group A while there was an increase in Group B. However, neither of these changes in the healthy weight status was statistically significant. This descriptive evidence provided some confidence that trends prior to 10th grade in each group looked relatively similar on observed weight status and therefore, it was plausible to suggest that those trends would have continued to follow a similar pattern after 10th grade in each group.

<<Table 3>>

Main Results

Table 4 reports the difference-in-differences estimators for weight outcomes which are captured by the coefficients on the interaction term (*Group A × 12th Grade*) reported in row three. In terms of the direction of these estimates, these results suggested that screening and reporting in 11th and 12th grades, above and beyond screening and reporting in prior grades, was associated with a lower standardized BMI; a lower probability of being healthy weight versus obese; a lower probability of being overweight versus obese and a higher probability of being a healthy weight versus overweight. Importantly, though the direction of these associations indicated two potentially beneficial effects of additional screenings in late adolescence (lowered BMI and a higher probability of being a healthy weight) none of these findings were statistically significant and therefore, it was not possible to rule out zero effects. These models were refitted to data with BMIs corrected for the systematic underreporting of weight and

overreporting of height and the results remained consistent to those reported above (results available from author).

Table 5 reports the effects of screening and reporting in late adolescence on exercise and dietary intake behaviors. As shown, the direction of the estimates indicated that exposure to screening and reporting through late adolescence was related to more frequent moderate and vigorous exercise as well as a higher probability of consuming vegetables once or more per day, while a lower probability of fruit consumption once or more per day. Yet, as with the results for the weight outcomes, none of these effects were statistically significant.

<< Table 4 >>

<< Table 5 >>

Discussion and Conclusion

This analysis demonstrated that in Arkansas, BMI screening and parental notification during late adolescence (11th and 12th grades), given prior screening and notification in early adolescence, was not significantly related to changes in either adolescents' weight status or their exercise or dietary intake behaviors. There were several important limitations of this study. First, these results focused exclusively on Arkansas and should not be extrapolated to states that have implemented similar BMI screening and reporting programs. Second, though pre-trends demonstrated that trends were relatively similar prior to screening exemptions, there was still a possibility that unobservable time-varying factors may differentially affected each group particularly in years in which adolescents were not observed in the dataset (11th grade). Third, as previously addressed, the study's outcome measures were based on adolescents' self-reports which introduced self-reporting bias. Finally, given the parental opt out provision, adolescents who were exempt from screening may have been systematically different versus

the adolescents who had continued to be screened; however, evidence shows that parental opt-out was relatively low (e.g., 4.13% in 2007-8 [33]).

There are two important implications of this study's results. First, the additional screenings and reportings in 11th and 12th grades did not necessarily lead to any *unintended consequences* such that the weight status or exercise and dietary intake behaviors of adolescents shifted to higher levels of overweight/obesity or lowered frequency of exercise and consumption of fruits and vegetables. This is particularly relevant in light of the concerns reported in Ikeda et al. (2006) suggesting that the BMI screening process itself and the knowledge of BMI information could have had adverse effects. Additionally, results from supplemental analyses (available from author) examining whether there were changes in behaviors to control weight (i.e., use of diet pills) also demonstrated no significant association. Therefore, the evidence presented here may assuage concerns of potentially adverse effects of experiencing repeated BMI screening and reporting through late adolescence.

Second, these results have implications for further research on school-based BMI screening and reporting policies. As previously mentioned, eight other states screen for BMI and report the information to parents and guardians; however, though BMI screening and reporting programs are increasingly commonplace, they are often implemented alongside other school-based interventions such as altering school nutrition and physical activity environments [14]. Given the multi-pronged nature of school-based obesity prevention efforts, the challenge for researchers is how to isolate and evaluate the effect of BMI screening apart from other interventions. Though a rich body of literature has enhanced our understanding of the process of BMI screening and reporting, including the controversies surrounding BMI screening, this current study alongside one conducted by Madsen (2011) [21] represents one of the first novel attempts to rigorously evaluate BMI screening and reporting. In particular, the results of this study underscore the importance of gaining a more thorough understanding of when and for whom BMI

screening and reporting programs might matter the most, especially as adolescents progress from early adolescence into middle and late adolescence. If repeated screenings from middle to late adolescence merely provides information that does not directly alter outcomes, as these findings suggested, then the scarce public resources invested to those screenings could be allocated to better uses, particularly towards interventions that have shown to be effective for adolescents. For example, given that it cost an estimated \$1.50 to screen and report each child [11] in Arkansas, then not screening and reporting in late adolescence represented a direct annual cost savings (in nominal dollars) of approximately \$96,500 in the 2007-8 school year (based upon Arkansas's 11th and 12th grade enrollment of approximately 64,321 students in 2007-8 [34]). Finally, these results highlight the need for continued research to find interventions that have promise in impacting obesity and overweight among adolescents, a demographic often overlooked in the obesity research literature [35].

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Table 1. The timing of exposure to BMI screening and reporting requirements under Arkansas's Act 1220 for two groups (A and B).

YRBSS Year	Academic Year (AY)	Event	Group A (Treatment)		Group B (Comparison)	
			Grade	Subject to BMI Screening and Notification?	Grade	Subject to BMI Screening and Notification?
	2003-4	Act 1220 Enacted	9	Yes	7	Yes
2005	2004-5		10	Yes	8	Yes
	2005-6		11	Yes	9	Yes
2007	2006-7		12	Yes	10	Yes
	2007-8	Screening Exemptions			11	No
2009	2008-9				12	No

Group A
Difference

Group B
Difference

Table 2. Weighted sample univariate descriptive statistics (percentages and 95% confidence intervals) for 10th and 12th grade adolescents in Arkansas

	Group A (treatment)				Group B (comparison)			
	10th Grade (2005)		12th Grade (2007)		10th Grade (2007)		12th Grade (2009)	
	95% CI		95% CI		95% CI		95% CI	
BMI-for-age z-score (mean) (n=1,080)	0.62	(0.48-0.76)	0.53	(0.35-0.71)	0.53	(0.45-0.60)	0.51	(0.32-0.70)
Weight status (%)								
Healthy weight (n=685)	61.2	(55.8-66.4)	59.2	(51.0-66.8)	67	(62.7-71.0)	63.5	(54.2-71.9)
Overweight (n=252)	24	(19.9-28.5)	30.3	(22.9-38.9)	21.3	(17.7-25.4)	21.4	(14.3-30.9)
Obese (n=144)	14.8	(11.0-19.7)	10.6	(7.0-15.5)	11.7	(8.6-15.8)	15.1	(10.3-21.5)
Total (n=1,081)								
Moderate physical activity (# of days in past 7 days for 30 minutes)								
0 days (n=333)	32.8	(29.1-36.8)	25	(15.4-38.0)	35.3	(30.0-41.0)	32.7	(22.2-45.2)
1 day (n=132)	13	(10.7-15.9)	11.5	(6.3-19.9)	11.6	(9.1-14.6)	14.8	(10.1-21.0)
2 days (n=141)	13.8	(10.3-18.2)	10.5	(5.6-18.7)	14.2	(10.6-18.7)	17.4	(10.1-28.4)
3 days (n=91)	10.1	(7.0-14.2)	9.4	(4.9-17.3)	7.1	(4.3-11.7)	5	(2.1-11.4)
4 days (n=73)	6.8	(4.9-9.2)	10.1	(6.6-15.2)	7.2	(4.7-10.7)	3.5	(1.4-8.4)
5 days (n=77)	9.1	(6.7-12.3)	10.4	(5.6-18.4)	6.5	(4.0-10.5)	4.7	(2.5-8.5)
6 days (n=22)	1.0	(0.3-2.8)	4.1	(1.9-8.5)	1.4	(0.5-3.9)	5.6	(2.1-13.9)
7 days (n=167)	13.4	(10.0-17.7)	19	(12.6-27.6)	16.6	(12.0-22.5)	16.5	(11.0-24.0)
Total (n=1,035)								
Vigorous physical activity (# of days in past 7 days for 20 minutes)								
0 days (n=215)	19.7	(16.0-24.0)	19	(11.3-30.0)	21.1	(17.0-25.9)	23.5	(17.4-30.8)
1 day (n=121)	11.8	(9.1-15.1)	15.5	(9.0-25.4)	8.6	(5.5-13.2)	9.6	(6.0-14.9)

Notes: Weighted using YRBS sample weights.

Unweighted sample sizes provided in parentheses.

^a The Other race/ethnicity category includes: American Indian/Alaskan Native; Asian; Native Hawaiian or Other Pacific Islander; Multiple Hispanic/Latino; Multiple Non-Hispanic/Latino.

Table 3. Pre-exemption trends in weight classification outcomes for two groups of 10th graders in Arkansas

Weight Category	Group A (treatment)				Group B (comparison)			
	2003 (NSCH; Arkansas)		2005 (YRBS; Arkansas)		2003 (NSCH; Arkansas)		2007 (YRBS; Arkansas)	
	14-15 year olds		10th graders		12-13 year olds		10th graders	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Healthy Weight	63.3	(57.9-68.7)	61.2	(55.8-66.4)	61.6	(56.2-67.0)	67.0	(62.7-71.0)
Overweight	14.8	(10.8-18.8)	24.0	(19.9-28.5)	12.0	(8.9-15.1)	21.3	(17.7-25.4)
Obese	17.5	(13.2-21.7)	14.8	(11.0-19.7)	20.3	(15.6-25.0)	11.7	(8.6-15.8)

Notes: Data for 2003 are for Arkansas from the National Survey of Childhood Health (NSCH). Data for 2005 and 2007 are from the Youth Risk Behavior Survey (YRBS) for Arkansas. Percentages are weighted using sample weights included in each survey.

Table 4. Difference-in-differences estimates for the relationship between the exposure to BMI screening and parental reporting in late adolescence (11th and 12th grades) and weight outcomes

	(1) BMI (Standardized)	(2) Pr(healthy weight v. obese)	(3) Pr(overweight v. obese)	(4) Pr(healthy weight v. overweight)
Group A	0.105 (0.087)	-0.031 (0.030)	0.063 (0.034)	-0.025 (0.017)
12th Grade	0.060 (0.117)	0.029 (0.059)	-0.016 (0.048)	-0.005 (0.027)
Group A $\times$ 12th Grade	-0.087 (0.167)	-0.055 (0.071)	-0.026 (0.077)	0.078 (0.047)
Age	-0.038 (0.056)	-0.019 (0.021)	0.033 (0.020)	-0.012 (0.010)
White Non-Hispanic	0.017 (0.137)	0.029 (0.057)	-0.043 (0.044)	0.010 (0.023)
Black Non-Hispanic	0.149 (0.163)	0.023 (0.073)	-0.011 (0.059)	-0.010 (0.030)
Hispanic	0.157 (0.209)	0.055 (0.098)	-0.015 (0.088)	-0.030 (0.057)
Male	0.195* (0.081)	-0.014 (0.031)	0.073 (0.038)	-0.043 (0.022)
<i>N</i>	1080	1081	1081	1081

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Model (1) is based on OLS regression while models (2)–(4) are based on probit regressions. In addition to probit models, linear probability models (LPM) were refit to the data which yielded consistent results (results available from author). For all probit models (models (2)–(4)), marginal effects are reported. The reported difference-in-differences estimators for each probit model (the estimates on the interaction term *Group A $\times$ 12th Grade*) and their associated standard errors were obtained using Stata's *inteff* command by Norton, Wang & Ai (2004). All models incorporate YRBS survey weights. Standard errors are in parentheses. One observation was dropped from the sample for model (1) due to missing data.

Models were refitted to adjust BMIs for underreporting of weight and overreporting of height and the results (available from author) remained consistent to those reported above.

Table 5. Difference-in-differences estimates for the relationship between the exposure to BMI screening and parental reporting in late adolescence (11th and 12th grades) and exercise and dietary intake outcomes

	(1) Moderate Exercise	(2) Vigorous Exercise	(3) Pr(Vegetable consumption once a day or more)	(4) Pr(Fruit consumption once a day or more)
Group A	-0.063 (0.181)	-0.419* (0.196)	-0.016 (0.039)	-0.012 (0.032)
12th Grade	-0.004 (0.370)	-0.096 (0.412)	-0.074 (0.063)	-0.061 (0.065)
Group A $\times$ 12th Grade	0.719 (0.369)	0.253 (0.463)	0.024 (0.057)	-0.011 (0.063)
Age	-0.007 (0.118)	-0.171 (0.165)	0.019 (0.016)	0.011 (0.020)
White Non-Hispanic	-0.333 (0.403)	0.390 (0.292)	-0.058 (0.041)	-0.054 (0.046)
Black Non-Hispanic	-1.136** (0.415)	-0.169 (0.326)	-0.034 (0.030)	0.023 (0.032)
Hispanic	-0.821 (0.601)	0.103 (0.540)	-0.080* (0.030)	0.031 (0.055)
Male	0.262 (0.175)	1.017*** (0.177)	0.016 (0.018)	0.017 (0.019)
<i>N</i>	1035	1034	1081	1081

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Models (1) and (2) are based on OLS regression while models (3) and (4) are probit regressions. In addition to probit models, linear probability models (LPM) were refit to the data which yielded consistent results (results available from author). For both probit models (models (3) and (4)), marginal effects are reported and the reported DD estimators for each probit model (the estimates on the interaction term *Group A $\times$ 12th Grade*) and their associated standard errors were obtained using Stata's *inteff* command by Norton, Wang & Ai (2004). All models incorporate YRBS survey weights. Standard errors are in parentheses. Sample sizes for models (1) and (2) reflect missing data.