

The Impact of Active Schools on West Virginia's Adolescent Obesity Rates

Former First Lady Michelle Obama unveiled her anti-obesity initiative “Let’s Move!” just over a decade ago on February 9th, 2010. Yet few empirical papers touch upon the health impacts and efficacy of the initiative and its legacy program, Active Schools. With 24,646 participating Active Schools and 14,355,285 K-12 students across the nation as of 2019¹, the question of efficacy remains unanswered. This research proposal presents a difference-in-differences approach to study the effects of the Active Schools program on adolescent obesity by comparing body mass index trends in West Virginia, where the program was adopted statewide, against states of a similar demographic nature across time. The motivation is to answer the question of “what effects does the Active Schools program have on K-12 obesity measures?” This study will provide critical insight for policymakers who must weigh the efficacy of the program against other potential uses of limited education budgets as well as touch upon the impact of quasi-governmental policies.

Former First Lady Michelle Obama made childhood obesity reduction and prevention her championed cause during the Obama administration. Her Let’s Move! initiative was designed to target the national childhood obesity crisis by raising public awareness of the issue while simultaneously promoting healthier eating and active behavior. The initiative was an urgent response to a rapidly escalating health crisis. For children between the ages of 6 to 11 the obesity rate has increased from 4.2% to 17.4% from 1971 to 2014. Children aged 12 to 19 saw obesity rates climb from 4.6% to 20.6% in the same time frame.² Including the measure of overweight individuals paints an even more dire picture, 31% of children aged 10 to 17 are classified as

¹ Active Schools 2019 Annual Report Card

² National Health and Nutrition Examination Survey data. These figures provided by Partnership for a Healthier America.

either overweight or obese as of 2019.³ Breaking down the percentages by race shows a startling inequality for minorities. 28% of Hispanic males and 25% of black females are obese, compared to 15% of white males and 14% of white females.⁴ The Let's Move! initiative aimed to remedy the problem of childhood obesity by taking a multi-angled approach to improve nutrition and increase physical activity among K-12 students via a number of programs and partnerships. The Active Schools program is just one of many under the Active Schools umbrella and is the focus of this proposal. This program is a nation-wide opt-in program started in 2010 that continues operating today. All Active Schools participants are required to integrate at least 60 minutes of physical activity a day according to the Centers for Disease Control's Comprehensive School Physical Activity Program. Schools are free to implement physical activities of their choosing with the CSPAP providing example exercises such as "Marching in place" or "Jumping with an invisible jump rope" as activities to perform in the classroom.⁵ Schools are also encouraged to coordinate before and after-school activities with local communities, families, and businesses to provide options such as bike riding to school or physical activity clubs that meet at local community parks. The goal of the program is to not only increase the amount of physical activity a student participates in but to provide new opportunities for activity as part of a larger lifestyle change towards a more active daily routine. The reasoning for this is sound. Studies have suggested that exercise early in life may have positive effects on adult voluntary exercise.⁶ That is, early intervention to encourage physical activity may translate to increased physical activity later in life, bringing with it the benefits of a healthy lifestyle. Early intervention in childhood

³ Let's Move! website "Learn the Facts".

⁴ NSCH. 2015-2016

⁵ CSPAP Guide, page 15.

⁶ Acosta, Meek, Shytz, Dlugosz, Vu, and Garland Jr. "Effects of early-onset voluntary exercise on adult physical activity and associated phenotypes in mice."

obesity is known to be more cost effective than reparative costs later in life, also highlighting the economic incentive to address childhood obesity earlier in life (Setren 2009). Other studies support the link between access to exercise and reductions in childhood obesity. One study finds that the existence of a neighborhood park or playground has a statistically significant on reductions in childhood obesity with differences noted for socioeconomic background (Fan and Jin 2014). The finding was that non-Hispanic white youth, with a greater impact for girls and younger children, benefitted the most from access to playgrounds. One finding of relevance for this proposal is that while children living above 133% of the federal poverty line were more likely to benefit from access to playgrounds and parks, it was those under 133% of the federal poverty line that had a greater magnitude of effect. This is of particular interest because 24% of West Virginian children fell under 100% of the federal poverty line as of the 2019⁷. This provides great motivation to see if the Active Schools program is having the intended effect of reducing obesity given that West Virginian school children should be very susceptible to the effects of the treatment.

There is a very limited body of literature regarding the efficacy of the Let's Move! initiative. At the time of writing this proposal there exists no currently published peer-reviewed empirical research paper about the efficacy of the Let's Move! initiative. There exists one doctoral dissertation paper on the efficacy of Active Schools on 5th grade BMI measures in Kansas schools (Loucks 2016) which found no statistically significant effect of Active Schools participation and BMI. This study was possible because of a significant coverage of Kansas schools using personal fitness trackers as part of the state's K-FIT program which provided precise weight measurement data on the children. The dissertation was limited in scope however,

⁷ US Census Bureau. American Community Survey 2018.

data was only collected on 320 5th grade students during the 2014-2015 school year in Kansas. Furthermore, the schools that participated in Active Schools did so via opt-in, which raises concerns about selection bias and internal validity. With only one school year of data and potential issues with internal validity it is hard to accept the significance of the findings or extrapolate the findings to the program as a whole nationwide, as various demographics may respond differently to the Active Schools treatment.

The absence of research on the Let's Move! initiative is possibly due to two significant problems, the non-randomized nature of the treatment programs and the lack of precise continuous data. As previously mentioned, the various programs under the Let's Move! umbrella are all opt-in. This likely introduces selection bias as schools have varying incentives to participate which in turn may over sample schools with high rates of obesity or schools with the available resources to spare for participation in the programs. An additional problem is that no provision exists that the Let's Move! initiative maintain records of student weight or BMI indices. Various executive branch departments were allowed to participate in the initiative and no centralized metrics or records were recorded. The Let's Move! initiative was not a policy established by law, so typical auditing and accountability provisions do not exist. This means that any data on K-12 student weight must come from other external sources such as the CDC's NHANES national survey or data collected by the schools or states themselves.

Thankfully both of these problems can be addressed with a single solution. The state of West Virginia, ranked #2 in the nation for childhood obesity⁸, made Active Schools a state-wide program starting in 2016. This provides a rare opportunity to use an entire state as a treatment

⁸ State of Childhood Obesity, current data is 2017-2018.

group for a difference-in-differences approach similar to the one used in the Miller 2013 study on Massachusetts healthcare reform. This study will track changes in adolescent BMI measures in West Virginia before and after the mandating of Active Schools and compare that trend against similar data from demographically similar states. Data identification and sourcing difficulties are explained in more detail below.

There are a number of mechanisms at work with regards to weight management. Exercise, diet, and healthy sleep are all critical to maintaining a healthy weight. The Let's Move initiative attempted to address two of these in a holistic approach but did nothing to promote healthy sleep. Given that the scope of this study is on K-12 grade students who typically have more strict sleep schedules set by parents than their older high school and college aged peers it is not unreasonable to assume most students experience reasonably similar sleep conditions. To further expand on that potential mechanism would require a substantial research study involving sleep monitoring which is beyond the scope of this proposal. Diet is another mechanism of concern. It is possible to observe the fraction of students who participate in school lunches under certain data sets such as the NHNES (detailed below) which allows for weighting.

Demographic variation also plays a role in obesity risk. Non-white minority individuals experience obesity at statistically higher rates, as do lower income and less educated households. To account for these demographics it is important to select a control state with a very similar makeup to West Virginia. Kentucky is one possible choice and is explained in more detail along with the model below.

The hodgepodge nature of the data presents a challenge that can be overcome with resourcefulness. The Maternal & Child Health Bureau under the Health Resources & Services Administration produces the National Survey of Children's Health annually since 2016, and

every four years previously. This unfortunately limits the pre-treatment observations to the single year 2012. This national survey contains data on approximately 30,000 children between the ages of 0 to 17 but only contains BMI measurements for the age group of 10 to 17-year-olds which limits the sample to roughly the 4th through 12th grades. The data is provided as percentages of respondents and not raw counts which introduces some potential error when reformatting the data for regression use.⁹ One advantage to this data is that it breaks up the BMI data into the four categories of underweight, normal weight, overweight, and obese. This is beneficial because it may show movement between categories that is not normally captured when reporting a state's average BMI. The data contains state identifiers allowing me to select only West Virginian and control state students. There are approximately 550 students surveyed from each state.

The National Health and Nutrition Examination Survey produced by the CDC contains BMI information on a much broader range of students, covering ages 2 through 150. This data is continuous from 2012 through 2020, giving the longest time span of uninterrupted observations among potential data sources. Using the respondent identifying numbers I can filter out all the children of K-12 age who are currently attending school. This data does not contain state identifiers, but it is possible to request such data from the CDC that can be used to pinpoint students by state county, thus allowing an identification of students from treatment and control states. The one disadvantage to this dataset is it only includes approximately 2,000 students in K-12 grades each year. Without knowing a priori the exact locations of each respondent but assuming a randomized sampling, I'm left with about 40 students per state. That's an incredibly small sample size per state but when added to other data sources helps bolster the total sample

⁹ Raw tallies likely still exist and may be available by inquiring with the Bureau.

size. One issue that arises from this aggregation is there's no way of knowing if an individual student was included in more than one survey and thus their data is over representing. Given the small sample sizes, randomization of choosing participants, and size of student populations I do not believe this to be a significant issue, but one worth keeping in mind going forward.

An additional source of potential data is the Presidential Youth Fitness Program. Formerly known as the President's Fitness Challenge, the PYFP records students' BMI data as part of fitness proficiency. This would provide a treasure trove of BMI information that can be linked with specific schools and grades. The data is not publicly available, and more research is needed to see if it can be obtained while respecting confidentiality and privacy provisions.

The state of West Virginia also collects information on student obesity rates¹⁰. However, this information is not publicly available nor is it immediately clear what the data looks like. There is no mention of the data or collection process on any West Virginia state government website. It may still be possible to file a Freedom of Information Act request to discover more about this potential data source. This process is time consuming and less likely to generate useful data than other methods.

Significant time will need to be dedicated to sorting through and cleaning up the data. It is possible to identify which schools are and are not participants of the Active Schools program for the purposes of selectively screening out students attending treated schools in a control state and students attending treated schools in West Virginia prior to the state-wide policy enactment. It is my belief that sufficient data for this project does exist and only requires the time and dedication to accumulate it.

¹⁰ Source: Presidential Youth Fitness Program

As alluded to earlier the model for this study follows a typical difference-in-differences approach. The unit of observation is an individual adolescent child, so the interpretation of the causal effect would be the effect on an individual adolescent's BMI with or without the treatment of being in an Active School. The specific model to be estimated is given below,

$$Y_{it} = \beta_1 + \beta_2 ActiveSchool_i + \beta_3 Time_t + \lambda(ActiveSchool_i * Time_t) + \varphi FE_{it} + \epsilon_{it}$$

Where Y_{it} is the outcome of interest for BMI, β_1 is the intercept term, $ActiveSchool_i$ is the treated indicator variable, $Time_t$ is the time indicator variable (usually denoted Post), $ActiveSchool_i * Time_t$ is the difference in differences estimator, FE_{it} captures state-level fixed effects, and ϵ_{it} is a typical error term. I choose to include the fixed effects to account for various policies that may differ across states and time. The exact fixed effects to be included will depend on the control state(s) selected. As mentioned earlier I view Kentucky as one possible choice for a control state as the demographics are relatively similar to West Virginia's in terms of racial makeup (84.3% vs 92.1% is white, respectively), median household income (\$48,392 vs \$44,921), and highest levels of education attained (85.7% vs 86.5% high school or greater and 23.6% vs 20.3% bachelor's or greater.) Thus one fixed effect for Kentucky could be a weight for racial demographics, as non-white students tend to have higher rates of obesity than their white peers it would be a critical mistake to not account for factors such as this. It's difficult to predict the model results given the complexity of the mechanisms at play and it may even be the case that early intervention on childhood obesity only shows effects later in life, beyond the time scope of this proposal.

There are some potential obstacles in terms of construct validity that must be addressed. The first issue is the likely heterogeneity of treatment. The Active Schools program does not require specific exercises or strict guidelines in the application of student exercise which means

that different schools will implement different regimens which in turn means that there is likely a heterogeneity of treatments; some students will be given rigorous exercise that burns more calories while others may be given less intensive activities. Active Schools participants were encouraged to develop and record their own exercise implementation plans, however actually collecting this information and linking it with observed students is a monumental task and realistically not a feasible approach. The second threat to construct validity is with possible confounding variables that cannot be accounted for such as access to (and the nutritional value of) school provided lunches. The NHNES dataset collects information on school lunch utilization while the NSCH does not, significantly limiting the available data on school lunch utilization. One possible proxy would be to use reimbursement data from the Department of Agriculture. This information, which is broken down by reimbursement level, can serve as a rough proxy for the percentage of students eating school lunches and by association the percentage of students subject to those nutrition levels. The actual nutritional content of school lunches is itself a subject of construct validity. The 2010 Healthy, Hunger-Free Kids act instituted changes in school lunch nutrition with implementation dates roughly overlapping the time scale of this study. Various policies were implemented at different times, such as the nutrition compliance certification going into effect in 2012, which muddies the waters regarding when exactly changes in school nutrition took place. The “final rule” for nutrition was published by the Department on January 26, 2012 and can serve as a rough cut-off date for nutritional reform.

This study provides insight into to a unique program that is the collaborative effort of federal government policy and private enterprise. The Let’s Move! initiative started as a policy goal championed by the former First Lady, took on life through the White House Task Force on Childhood Obesity and various executive branch bureaus, and finally reformed post-Obama

presidency as a partnership between private corporations and the Active Schools program. This complicated history and lack of internal data collection makes the question of efficacy relevant and important as the United States continues to battle the obesity epidemic.

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