The Impact of School Nurse Staffing Policies on Student Health and Education

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Abstract

The availability of school nurse services is stretched thin at many K-12 schools in the United States—a trend only exacerbated by the COVID-19 pandemic. Previous literature has focused on the efficacy of school nurse practices but provides education policymakers with inadequate evidence to inform broader staffing policies. With the goal of closing this gap, this study uses multivariable regression on combined school nursing employment and student health and academic data to determine whether full-time school nurses have a greater impact on student health and wellbeing than part-time nurses. Findings show that full-time nurses correlate with better health and academic outcomes and have a detectably greater relationship with these outcomes than part-time nurses along several, but not all, measures studied. Recommendations for further research and policy action with respect to school nurses include increased data transparency, additional full-time school nurse hiring and funding, and the promotion of school nursing career paths.

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Introduction

The COVID-19 pandemic has thrust school health into the spotlight, revealing the extent of challenges faced by the healthcare workers who are entrusted with the health of America's schoolchildren. School nurses have been called on to manage quarantines and promote vaccination on top of their already packed schedules, which has made them subject to backlash from parents and school communities, exacerbating school nurses' feelings of being overworked and causing some to leave the field (Anthes, 2021; Klass, 2020). This troubling trend is a blow to an already stretched-thin school nurse workforce; most school nurses covered more than one school and the majority of schools relied on non-health-care-trained staff to support student health (Willgerodt et al., 2018). The most recent US nationwide survey of school nurses found that only 40 percent of schools had a full-time school nurse, and one quarter had no nurse at all (Willgerodt et al., 2018); America's schoolchildren were facing a dearth of school nursing care, even before the pandemic.

Pandemic responsibilities aside, a school nurse's job responsibilities are numerous: they include health education, administration of medication and treatments to students with chronic diseases, emergency preparedness, screening for health conditions, record-keeping, and care coordination with other healthcare professionals in the community (Council on School Health, 2016). These duties are especially important as chronic health conditions, mental and behavioral health problems, and outbreaks of contagious diseases due to declining vaccination rates are becoming increasingly common in American schools (Maughan et al., 2018). In many settings, the employment of a part-time nurse is not enough and creates harmful uncertainty among

students and teachers about the availability of health services (Hill & Hollis, 2012). When a school nurse is not present to provide health services, the job falls to teachers or goes unfulfilled.

But, for some students, especially those in poverty, school-based healthcare services are the *only* ones they have ready access to; three percent of US children—about 2 million children—had no usual source of healthcare and five percent are uninsured—about 3.5 million children (Albanese, 2014; Federal Interagency Forum on Child and Family Statistics, 2021). Even insured children can face many other challenges in their home lives and communities that make school-based healthcare their best option. However, policymakers may believe such services are tangential to the school system's main educational mission, resulting in underfunding and inadequate support of nurses when faced with budget shortfalls (Johnson, 2017).

To rectify this deficiency, policymakers must see evidence of how policy decisions about school nursing programs improve student learning and wellbeing. As educators center more on whole-child educational strategies in policymaking, evidence that the hiring of school nurses has concrete positive impacts on students will be necessary to promote efficient and effective hiring of school nurses. This research attempts to identify such effects and illuminate how education policymakers can choose optimal methods for employing school nurses and answer the question: which kinds of school nurses have the most impact and how can they be best utilized?

I will begin with a literature review covering the effects of school nurse interventions on health and academic outcomes, the wider benefits of school nurses to schools, and school nurse staffing and workload. I will then discuss the significance and implications of my work. Next, I will lay out my quantitative methods, including data sources, variables of interest, and statistical models, as well as the strengths and limitations of my analysis. I will then present and discuss

my results, striving to contextualize the size and significance of the gains that can be realized by full-time nurses. This section will also propose possible explanations and mechanisms behind the results. Finally, I will offer recommendations for how school health data and school nurse staffing policies could be improved in light of my findings and conclude.

Literature Review

School Nurse Interventions Effect on Student Health Outcomes

Research has found that certain school nursing interventions have a quantifiable impact on measures of student health. One of the most studied areas of school nurse practice is the support of students with chronic health conditions such as asthma, diabetes, and obesity. Studies of various school health policies addressing asthma—such as case management, record-keeping, health education, healthcare coordination, and administration of medication, which are almost always carried out by school nurses—show positive effects on student frequency and severity of symptoms, quality of life, and disease management (Leroy et al., 2017; Carpenter et al., 2013; Engelke et al., 2014; Halterman et al., 2011). Similarly, both qualitative and quantitative studies of students with diabetes show that interventions from a school nurse can improve symptoms, education, and safety at school (Stefanowicz & Stefanowicz, 2018). The Schroeder et al., 2016 review of studies focusing on student education and counseling provided by school nurses for weight management found small but significant decreases in body mass index (BMI), and BMI percentile; nurses can help students with healthy weights, even if they may not be sufficient on their own to address the American obesity epidemic.

The above publications focusing on certain chronic conditions are simply the tip of the iceberg in terms of research on the effectiveness of school nursing interventions. In one review of 65 studies that attempt to link health and education outcomes to school nurse interventions in

the National Association of School Nurses (NASN) school nursing framework categories of care coordination, community/public health principles, leadership, and quality improvement, 26% of articles found significant effects in a wide variety of categories (Best et al., 2018). Specifically, care coordination—also called "case management"—is the school nursing intervention that gets the most attention from researchers, resulting in established ideas about the components, challenges, and impacts of coordination for a variety of student populations and health metrics (Best et al., 2018; McClanahan & Weismuller, 2015). Health outcomes measured in published work run the gamut, including improved dietary behaviors in overweight students, improvement in asthma symptoms and willingness to take medication, improved student self-management of chronic conditions, improved quality of life scores, a decrease in average days missed due to illness, more accurate student beliefs about sexual health, fewer students with incomplete immunization records, a decrease in allergic reactions, and health care cost savings (Best et al., 2018).

Effect of School Nurse Interventions on Education Outcomes

While policymakers in schools certainly care about the health and wellbeing of their students, the primary focus of their institutions is student learning. The literature shows that these two are connected, most comprehensively through school absences. There is a robust body of scholarship describing the importance of student attendance for academic performance. Even moderate rates of absences can greatly affect student performance—multiple absences decrease a high school student's probability of graduating, and chronic absenteeism serves as a very good predictor of freshman course failure—though studies that found this largely overlooked student health as a major cause of absences (Allensworth & Easton, 2007; Balfanz & Byrnes, 2012). Chang & Romero, (2008) found that chronic absence in early grades is associated with lower

academic performance, and the importance of good attendance is especially important for students coming from disadvantaged socioeconomic backgrounds.

Absenteeism rates have been found to be higher for children with asthma, and, correspondingly, a study of school nurse referral to asthma diagnosis and treatment services was associated with a measurable decrease in absences among asthmatic students, though no statistically significant associations of the intervention with test scores were observed. (Taras & Potts-Datema, 2005; Moricca et al., 2013). Outside of research specific to asthma, school nurses also have been shown to have an effect on student absence from school; Pennington & Delaney, (2008) found that students evaluated by a school nurse were less likely to be sent home than students evaluated by other school personnel. However, a different study found that students were not referred to school nurses for being frequently absent and there was no significant correlation between student absence rates and whether they were seen by a school nurse (Weismuller et al., 2007). Though results are somewhat mixed, this body of work provides a theoretical bridge that explains why several studies—though fewer than those measuring student health directly—have observed the effects of school nurse practice on academic performance metrics.

In a review of several articles using experimental or quasi-experimental methods to find direct linkages between school nurse interventions and academic outcomes, Yoder, (2020) found that too few studies focused on achievement to be conclusive, though studies that measured absenteeism and missed class time showed more consistently positive results from nursing interventions. Also included in Yoder's review, asthma interventions that included school nurses produced statistically significant improvements in academic outcomes in some but not all studies that focused on asthma, and school nurse interventions in the areas of infection control, case

management, and evaluation of illness were also shown to affect academic metrics (Yoder, 2020). A previous literature review analysis came to similar conclusions: nursing interventions decreased absences and other risk factors for poor school performance, but only two studies found effects on academic performance—specifically graduation rates (Maughan, 2003). Like the research on school nurse interventions in connection to student health metrics, this research tends to focus on specific student populations and specific interventions, leaving room for a more general analysis of the impact of school nurses on overall education outcomes.

Generalized Benefits to Schools

Though these studies have found evidence of positive effects from certain types of nursing interventions, the interventions are piecemeal and describe adjustments in practice that must be implemented by nurses rather than schools or districts. Less research exists that examines actions taken by education administrators and organizations to improve student health through school nursing programs. The work discussed above does not give educational policymakers the kind of high-level, more general information about nurse effectiveness that is relevant to staffing decisions. This paper will aim to provide recommendations for these school and district leaders on how to best utilize school nurses, given that several studies have already shown that school nurses can provide improvements in areas relevant to overall school goals. Over and above the specific recommendations for duties that should be assigned to school nurses, leaders need to know how their practices on employing school nurses and hiring additional practitioners will benefit their students and schools.

Wang et al. (2014) sought to answer this need by conducting a cost-benefit analysis of a Massachusetts school nursing program, the Essential School Health Services Program (ESHS). They accounted for cost savings of school nurses in comparison to the provision of the same

services to children in a hospital/clinical care setting and productivity losses of teachers and parents who would have to administer care themselves if not for the school nurse. In an analysis robust to the author's assumptions, the study showed that the ESHS program generated a net benefit of $98 million to society, with the largest benefit coming from teacher productivity savings—$129 million (Wang et al., 2014). Another study found that the addition of a full-time nurse decreased the number of students with school days missed due to illness, especially for asthmatic students; the authors calculated that cost-savings from such benefits outweighed the cost of hiring the nurses. (Rodriguez et al., 2013)

Confirming the assumption made by Wang et al. (2014) that a lack of nursing care can have deleterious effects on the ability of teachers to teach, qualitative investigation(s) of teachers with students that suffer from chronic conditions have shown that teachers were often expected to administer medical care and accommodations themselves despite commonly complaining about lack of communication regarding student conditions, lack of training on how to manage the conditions, and disruptions to classroom environments caused by unhealthy students (Selekman, 2017). Previously, other work had set out to quantify such effects, using surveys to conclude that the presence of a school nurse reduced teachers' instructional time lost to healthcare, though they used imprecise, self-reported measures to measure such time (Baisch et al., 2011, Hill & Hollis, 2012). Instead of focusing on a specific nursing intervention, as in the previously discussed literature, Baisch et al. (2011) differentiated treatment and control groups by the receipt of federal funding to hire a full-time nurse for schools, finding that treated schools kept better health records that identified more students with health conditions and had higher immunization rates (Baisch et al., 2011). Hill & Hollis (2012) also found that teachers believed nurses decreased early releases, and that the employment of a school nurse made teachers feel

more confident about the safety of their students with chronic conditions (Hill & Hollis, 2012). Though that study's survey did not seek such information, the authors discovered that teachers believed the variability of a part-time school nurse's hours diminished the extent to which they benefited teachers (Hill & Hollis, 2012).

The Wang et al. (2014) Massachusetts cost-benefit analysis focuses on one school nursing program, even though variation in nursing policies—such as part-time versus full-time staffing—across different school districts might cause their costs and benefits to vary widely. It also does not consider all benefits to student health, such as care coordination and case management discussed in other parts of the literature; there may be services that are uniquely provided by school nurses that were not accounted for when compared to hospital nursing costs. Student academic and absenteeism benefits beyond early dismissal from school were also not considered, though these are noted benefits of school nurses in other aforementioned sources. This paper will seek to incorporate such metrics, though without the use of the financial data Wang et al. (2014) were able to access, to create a better picture of the unique benefits the general employment of school nurses can provide.

Other research examines the existence and distribution of policies that mandate schools employ a school nurse; in examining data on school health policies collected by the CDC, McCabe et al. (2020) finds a statistically significant positive relationship between the existence of a school district's policy on the presence of school nurses and the existence of school district policies that help students manage chronic health conditions in school (McCabe et al., 2020). However, the McCabe et al. analysis does not speak to the effectiveness of school nurses; the correlation it uncovers concerns attitudes of school districts towards student health rather than the impacts of nursing services. While McCabe et al. describe trends in policy, the

implementation and effect of those policies are missing from its commentary, which diminishes its usefulness for policymakers and creates a gap this thesis seeks to fill. Finally, the McCabe et al. study does not distinguish between the content of the policies it studied; however, discussion in the literature about school nurse workload has revealed that a school district policy mandating the employment of a school nurse may fail to account for the full picture of factors that influence school nursing efficacy.

School Nurse Staffing and Workload – Factors Affecting the Impact of Nursing Care

According to a recent review, much research on the determinants and effects of nurse workload exists in non-school nursing settings, though the literature does not clearly speak to which aspects of workload should be considered when creating nurse staffing policies (Griffiths et al., 2020). The review found that hospitals often used patient volume and comparison to similar wards to set nurse staffing, also considering "non-patient contact" duties as part of the workload, though whether the volume was measured in necessary tasks or complexity of patients, and whether hospital environments should factor in, varied (Griffiths et al., 2020). However, there may be significant differences between clinical and school environments when it comes to conceptualizing a nurse's workload and the impact of staffing levels. Several authors have attempted to evaluate school nurse workload, though fewer have attempted to determine the effects of variation in workload. Endsley conducted a scoping review of nursing literature describing workload for acute care, community health, and mental health nursing and suggested that some of the concepts such as patient indicators, assistive staff, environmental factors, missed nursing care, and nurse satisfaction could also be used to measure school nursing workload (Endsley, 2017).

Addressing some of these informational areas, a nationwide survey of nurses was designed to gather comprehensive information about the nature of school nurse employment conditions and practice across the country; it found that the majority of school nurses covered more than one school and that the majority of schools relied on non-health-care-trained staff to support student health (Willgerodt et al., 2018). Schools with Registered Nurses (RNs) on staff were more likely to provide chronic and individualized care than those with only Licenses Nurses (LNs) and the authors predict a shortage of school nurses in the next 10-15 years due to the age distribution of nurses and non-competitive pay (Willgerodt et al., 2018). This evaluation leaves open the question of how these trends in school nursing employment connect to any outcomes. This study will seek to identify the possible impact of such trends on students.

The Nurse-to-student ratio has been a commonly accepted measure of nurse workload that relates to nursing efficacy—the NASN's recommendation was 1:750 for years, though now they support more complex measures of workload (Jameson et al., 2020; National Association of School Nurses, 2020). Testing the importance of ratios in predicting nurse performance, Guttu (2004) analyzed data from North Carolina, finding that counties with ratios above one nurse to 1,000 students performed worse, providing significantly fewer services to children with asthma, injuries, vision problems, and in need of counseling services (Guttu et al., 2004). In a more recent study of North Carolina school districts, lower school nurse ratios were associated with fewer absences due in students with asthma and, among students with diabetes, better knowledge, and management of their condition (Best et al., 2021).

However, the nurse-to-student ratio is still not the full picture: the population a school nurse cares for is far from uniform, and the characteristics of student bodies have been found to differentially increase the impact of school nursing. A review of school nurse workload

measurement tools found that many schools do not use one—those that do incorporate nurse-to-student ratios weighted by the "complexity" of student health needs (Jameson et al., 2020). However, these tools have not been rigorously assessed for validity or performance in practice, and possibly relevant elements such as nurse qualifications and characteristics, tasks, work environment, and socioeconomic backgrounds remain overlooked (Jameson et al., 2020).

In a case study of a school district that implemented a staffing formula based on both social determinants of health data and student caseloads—with 80% of the weight on social determinants of health, much more consideration that would typically be given—and a logic model laying out the duties and goals for these nurses, an evaluation showed the two policy changes improved student health outcomes as well as parent and teacher satisfaction, especially in socioeconomically "higher need" schools (Daughtry & Engelke, 2018). This case study is only one example of increased nurse staffing leading to health improvements, and since both the logic model and increased nurse staffing were implemented at the same time, it is difficult to disentangle the effects of these two policy interventions from each other. By utilizing previously collected data, where nurses were not informed of how their effectiveness would be evaluated, and by controlling for variables that may indicate school need, this thesis may be able to better isolate the effect of increased school nurse staffing.

Daughtry and Engelke's work does suggest that the social conditions of a school influence a nurse's workload and efficacy, and theirs is not the only evidence. School nurse practice recommendations include connecting students to resources to overcome socioeconomic limitations to good health, accommodating students and parents with low literacy and low English proficiency, striving for culturally sensitive care, and advocacy for structural improvements to social determinants of health in their community (Schroeder et al., 2021).

Several frameworks for school nursing also include addressing social determinants of health as a priority (Association for Supervision and Curriculum Development & Centers for Disease Control and Prevention, 2014; Council on School Health, 2016; National Association of School Nurses, 2015). This suggests that nurse workload increases in schools where social determinants of health are poor, since following these recommendations adds to a nurse's responsibilities. Qualitative research in Chicago Public Schools corroborates this, finding that lack of parent knowledge of the chronic illness reporting process made it difficult for them to update 504 plans and manage student conditions (Rivkina et al., 2014). The study also found that part-time nurses spread across multiple schools were not a sufficient resource to correct for this deficit, resulting in the school district displaying rates of documented chronic illness that suggest major underreporting (Rivkina et al., 2014).

The Chicago Teacher's Union (CTU) position paper also suggests that such underreporting is a consequence of insufficient school nurse employment and argues that it is an area where more robust school nursing stands to benefit schools by helping them qualify for more funding (CTU Education Policy Department, 2016). Though the CTU believed that current school nurse staffing was insufficient, specifically taking issue with the district's outsourcing of nursing positions to a private company, there is no other research that focuses on the use of outsourcing to staff schools with nurses, either to determine how prevalent it is or how it might affect practice and student health outcomes. The CTU did not go so far as to connect their complaints about outsourced nurses with student health outcomes. Though this research does not deal with outsourcing, it does attempt to fill the gap between information about nurse hiring and student health outcomes.

Significance

Current debates in American educational policy tend to focus on funding and curriculum, yet, as schools are essential services to society, they encompass more than learning. Other essential dimensions are the stewardship and protection of American youth and the preparation of students to become functioning and productive members of society. These objectives can be greatly hindered by poor student health, making the contributions of school nurses an underappreciated necessity. As policymakers search for ways to make and keep education in the United States competitive on a world stage, tools to support students wholistically are key.

The problem of limited funding for the nation's schools requires that policymakers choose evidence-based and effective expenditures. Prior research shows that school nurses positively affect the health and academic performance of students, but this research lacks generalizability and application to the policy decisions that education administrators face. Therefore, this research seeks to analyze sound data on school nurse policy and student outcomes—drawn from across the nation—in a way that better suits policymakers' needs. By investigating the impact school nurse staffing policies have on students, this paper will provide policymakers additional evidence for making the staffing decisions that promote healthy and safe school environments—school environments that are as conducive to student learning and growth as possible.

Positionality Statement

I have benefitted from the individualized care of a school nurse in my early education, though I had much less personal contact with the profession as time progressed. This past benefit may have introduced unconscious bias in favor of positive results, though I have made every

effort to let the results of statistical analysis speak for themselves. Primary data collection was not performed by an interviewer but rather collected in standardized forms, either web-based or on paper. This limits the possibility that the positionality of the data collecting agent influenced the data gathered.

Methods

Data Collection

Data on state-level nurse employment policies were retrieved from the 2016 and 2018 School Health Profiles (SHP) data, from surveys conducted by the Centers for Disease Control (CDC) (Brener, ND et al., 2017; Centers for Disease Control and Prevention, 2019a). The SHPS survey is conducted biannually in the spring and consists of questionnaires self-administered to principals and health education teachers in regular public secondary schools (teaching at least one grade between 6th and 12th) in the United States. In 36 states (32 in 2018), the surveys were administered to a sample of schools chosen with random, systematic, equal-probability sampling. In 12 states (11 in 2018) questionnaires were administered to all secondary schools in the state. For all states included in this analysis—all except Iowa and Colorado—the CDC weighted the data to create representative samples of all secondary schools in each state. I describe this data as 'state-level' data in that, for each state, it reports a percentage of respondents who answered a question a certain way.

In 2016, 27 states administered the survey on paper using computer-scannable booklets, while 21 used web-based systems, though paper surveys were available in the event of technical difficulty. In 2018, 18 were administered on paper, and 25 by web-based systems. State health departments were in charge of sending out and collecting materials as well as promoting

participation through written reminders, phone calls, and emails. Though principals and health education teachers are likely the most knowledgeable individuals about a school's health policies and practices, there remains a possibility that inaccurate responses exist due to a lack of knowledge, or imperfect implementation of policies. The survey items used in this research originate only from the questions administered to school principals. More details about the survey methods of the SHP are published elsewhere (Brener, ND et al., 2017; Centers for Disease Control and Prevention, 2019).

Data on student-level health behaviors and outcomes were retrieved from the 2017 and 2019 Youth Risk Behavior Surveys (YRBS), which are administered to high school students by CDC biannually and designed to assess health risk behaviors that contribute to common causes of morbidity, mortality, and social problems in youth. Content areas covered included unintentional injury and violence, tobacco use, drug and alcohol use, sexual activity, diet, and physical activity. The sample covered students in a nationally representative sample of school districts (both public and private). Stratified sampling was conducted in three stages: county, school, and classroom. Students self-administered the anonymous questionnaire by filling out a scannable booklet and the CDC Institutional Review Board approved the survey with appropriate measures to protect students' privacy and agency. Additional information about YRBS survey methods is published elsewhere (Centers for Disease Control and Prevention, 2020).

Variables

Independent (Nursing Employment) Variables

The 2 treatment variables were constructed from 2 questions in the SHP survey described in the table below.

Table 1: Independent Variable Coding

Variable Name	Question(s) in SHP	Possible Responses	Coding
Full-Time Nurse Percentage	Is there a full-time registered nurse who provides health services to students at your school? (A full-time nurse means that a nurse is at the school during all school hours, 5 days per week.)	*Yes, No*	State-level percentages of schools responding "yes" calculated by the CDC incorporating survey weights.
Part-Time Nurse Percentage	Is there a part-time registered nurse who provides health services to students at your school? (A part-time nurse means that a nurse is at the school less than 5 days per week, less than all school hours, or both.)	*Yes, No*	State-level percentages of schools responding "yes" calculated by the CDC incorporating survey weights.

These variables are not mutually exclusive, meaning a respondent could answer "yes" to both if a school has both a part-time and a full-time nurse. Thus, in some states, adding together the two percentages calculated from these questions yields a number slightly higher than 100. Additionally, these questions do not account for an environment with more than one nurse of

either type, so schools with one full-time nurse and schools with two full-time nurses are not represented any differently in the data. There is also a possibility that some respondents may equate having several part-time nurses splitting five days of all-hours work between them with having a full-time nurse, whereas other respondents may not. Therefore, these are imperfect measurements of school nurse employment, but nevertheless are the highest quality state-level statistics I have found.

Outcome variables

Student Health and Risk Behaviors from YRBS

The six YRBS variables were constructed from 12 questions in the 2017 and 2019 YRBS surveys and dichotomized according to the procedures described in the table below. These variables measure student behaviors or experiences school nurses might be able to influence, through some combination of chronic disease care, health education, care coordination, or counseling. Additionally, previous literature has indicated that these outcomes may be influenced by school nurse services.

Table 2: Outcome Variable Coding

Variable	Question in YRBS	Possible Responses	Coding
Diagnosed with Asthma	Has a doctor or nurse ever told you that you have asthma?	*Yes, No, Not sure*	1 if "yes", 0 otherwise.
Perception of Being Overweight	How do **you** describe your weight?	*Very underweight*	1 if "very overweight" or

		Slightly underweight *About the right weight* *Slightly overweight* *Very overweight*	"slightly overweight," 0 otherwise.
Overweight Based on BMI - Percentage of students who had obesity or were overweight (students who were >= 85th percentile for body mass index, based on sex- and age-specific reference data from the 2000 CDC growth charts).	What is your sex? How old are you? How tall are you without your shoes on? How much do you weigh without your shoes on?	*Male, Female* *Students asked to fill in numerical answers for all other questions.*	1 if between 85 and 95 percentiles (overweight) or 95 percentile and above (obese), 0 otherwise.
Smoking - Percentage of students who currently smoked cigarettes or cigars or used smokeless tobacco	During the past 30 days, on how many days did you smoke cigarettes? During the past 30 days, on how many days did	*0 days, 1 or 2 days, 3 to 5 days, 6 to 9 days, 10 to 19 days, 20 to 29 days, all 30 days*	1 if "1 or 2 days", "3 to 5 days", "6 to 9 days", "10 to 19 days", "20 to 29

or electronic vapor products (on at least 1 day during the 30 days before the survey)	you use an electronic vapor product? During the past 30 days, on how many days did you use chewing tobacco, snuff, dip, snus, or dissolvable tobacco products, such as Copenhagen, Grizzly, Skoal, or Camel Snus? (Do not count any electronic vapor products. During the past 30 days, on how many days did you smoke cigars, cigarillos, or little cigars?		days", or "all 30 days" to any of the four questions, 0 otherwise.*
Recent Dentist Visit	When was the last time you saw a dentist for a check-up, exam, teeth cleaning, or other dental work?	*During the past 12 months* *Between 12 and 24 months ago* *More than 24 months ago*	1 if "during the past 12 months," 0 otherwise.

		Never *Not sure*	
Depression	During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities?	*Yes, No*	1 if "yes", 0 otherwise.

** Variable pre-calculated by the CDC*

The literature on school nurse interventions and asthma treatment is robust, motivating its inclusion in this analysis (Leroy et al., 2017; Carpenter et al., 2013; Engelke et al., 2014; Halterman et al., 2011). Chronic disease management as an important dimension of school nurse activities can also be represented by the two variables measuring weight-related health issues, which have also been studied in previous literature (Schroeder et al., 2016, Best et al., 2018). Nurses can also help students with weight management through health education, which has also been studied as a tool to prevent smoking behaviors, therefore motivating the inclusion of the Smoking variable in this analysis (Cameron et al., 1999). Care coordination, which includes referrals to other health providers, is represented in this analysis through the Recent Dentist Visit variable. School nurses often encounter dental emergencies, conduct dental screenings, and refer students to oral healthcare providers in the course of their work (Nelson et al., 2021). Finally, as mental health is becoming an increasingly salient concern in schools, and school nurses are well-positioned to provide some level of screening or treatment, an outcome variable describing

depression symptoms is also included, as supported by some previous research (Best et al., 2018).

Questionnaire items asking about testing for sexually transmitted infections (STIs)—which could speak to a nurse's effect on sexual health and care coordination—and suicidal thoughts or actions—which might be a metric related to mental health that is be more responsive to treatment and nurse intervention—were also considered but excluded from this analysis due to large percentages of non-response from student survey-takers.

Additional Outcome Variables

Health education and record-keeping interventions by school nurses have been shown to increase vaccination compliance, which is becoming an especially salient component of public health in schools (Swallow & Roberts, 2016). Therefore, I chose to include flu vaccination as an outcome variable, focusing specifically on seasonal flu vaccination due to its greater degree of variation in coverage compared to required vaccinations. Flu Vaccination data was sourced from the National Immunization Survey - Flu (NIS-Flu), which reports the cumulative percentage of children 13-17 years old who had received a flu vaccination in each month of the 2016-17 and 2018-19 flu seasons (National Center for Immunization and Respiratory Diseases (NCIRD), 2022). These seasons are the first recorded data on flu vaccination after the SHP surveys were completed in spring 2016 and 2018 respectively. This age group was chosen for analysis because it has the most significant overlap with the student populations being served by high school nurses documented in the SHP data. However, students at private schools get counted in the NIS-Flu but private schools are not represented in the SHP data.

The percentage vaccinated in each state in November was chosen as an outcome variable due to the CDC's recommendation that people should ideally be vaccinated by the end of October (Centers for Disease Control and Prevention, 2019). It was unclear whether vaccination was measured at the beginning or end of a given month in the data, so November was used to ensure that all October vaccinations were counted. The data on child vaccination was collected through cell phone surveys of parents, who self-reported their child's vaccination date, and the data were weighted to create representative averages for each state, month, and age group. Additional information about the NIS-Flu can be found elsewhere (Centers for Disease Control and Prevention, 2017).

Previous research in the field has suggested that there are certain academic outcomes that may be particularly responsive to school nurse policy. This paper's literature review shows that absence rates, high school dropout rates, and test scores are possible relevant measurements—at the very least, they have been used previously in studies of school nurse effectiveness (Maughan, 2003; Moricca et al., 2013; Pennington & Delaney, 2008; Weismuller et al., 2007).

Data on student absences are most reliably available in the form of average daily attendance (ADA), which is the total number of days every student attended school divided by the number of days in the school year and is reported by the US Department of Education National Center for Education Statistics (NCES) (National Center for Education Statistics, 2020). I standardized attendance data by calculating ADA as a percentage of fall enrollment, which is also reported by the NCES (National Center for Education Statistics, 2021). This data is not broken down by grade level, but rather covers all public schools, both elementary and secondary. Additionally, it cannot differentiate between absences caused by illness or injury versus other causes like a student moving, skipping school, or being taken out of school for a

vacation. Therefore, ADA is an imperfect measure of the true outcome of interest: attendance due to illness or injury for students in the public secondary schools measured by the SHP.

I used the Adjusted Cohort Graduation Rate (ACGR) by state as reported by the National Center for Education Statistics to represent high school completion in my analysis (U.S. Department of Education, Office of Elementary and Secondary Education, 2021). The ACGR represents the percent of freshmen in a starting cohort who graduate high school within four years, adjusted for students who transfer in or out of the state in some way (McFarland, 2019). Data is only available up until the students graduating in the 2018-19 school year, meaning ACGR is not available for those students who were freshmen when the 2018 SHP was conducted. As a result, I matched state-level rates of seniors graduating in the 2015-16 and 2017-18 school years with the 2016 and 2018 SHP data for this analysis. Each state reports its own information on high school graduation rates. Small differences in calculation methods are more likely to play in when rates are broken down by student characteristics rather than the general statewide rates used here.

I used the 2017 and 2019 results from eighth-graders taking the math and reading National Assessment of Educational Progress (NAEP) to measure academic progress (U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2017). Eighth-graders were chosen because they were the only student population represented by the secondary schools in SHP for whom data was available in 2017 and 2019. These tests are standardized and data is collected across all 50 states, using representative samples of public school students, with administration turning to a web-based format for the first time in 2017 (*About the NAEP Mathematics Assessment*, n.d.; *About the NAEP Reading Assessment*, n.d.). Mathematics tests cover “number properties and operations; measurement;

geometry; data analysis, statistics, and probability; and algebra" (*About the NAEP Mathematics Assessment*, n.d.). Reading tests were designed to measure reading comprehension of literary and informational texts across a variety of dimensions (A*bout the NAEP Reading Assessment*, n.d.).

In addition to analyzing the relationship of school nurse employment with average NAEP scores by state, I also used the percent of students in a state meeting the NAEP "proficient" benchmark on the math and reading tests. This may be a more relevant measure of academic performance if nurses have a greater impact on students who are struggling: close to but not quite meeting desired learning targets. In addition, these students may be the ones policymakers are most concerned with helping. Proficiency is defined as "solid academic performance and competency over challenging subject matter," as determined by a panel of teachers, education experts, and members of the general public (National Center for Education Statistics, 2021). Though the Commissioner of the NCES concluded that more exploration is needed to determine the full validity of achievement levels, the NAEP test is useful because it holds students across all states to a singular benchmark (National Center for Education Statistics, 2021). More information about the NAEP tests is published elsewhere (*About the NAEP Mathematics Assessment*, n.d.; *About the NAEP Reading Assessment*, n.d.).

Method of Statistical Analysis

Seven Ordinary Least Squares regression models paired the full-time and part-time nurse percentage variables with one of the state-level outcome variables discussed above, to estimate the effect of the former on the latter. These models included controls for demographic and socioeconomic variables. The models control for the percent of schools in the state with a school-based health center, a statistic included in the SHP data, meant to approximate the

availability of healthcare in the state. I also include a control for the amount of money spent per pupil in the state, to represent the tradeoff education policymakers face between funding full-time nurses as opposed to only part-time nurses or no nurses in order to leave funds for other health and academic services (U.S. Census Bureau, 2016b). Demographic controls included the share of votes received by Donald Trump in the 2016 presidential election, the number of enrolled students in the state that are below the federal poverty line, and the percentage of enrolled middle school and high school students in the state that identify as white (Federal Election Commission, 2017; US Census Bureau, 2016a; U.S. Department of Education, 2016). These controls were chosen because they are factors that commonly correlate with both health and educational outcomes—failure to isolate them would bias the results. Finally, I controlled for whether the data came from the 2016 or 2018 SHP.

To estimate the effects of full-time and part-time nursing on individual student health, each student's response in the YRBS was paired with the full-time nurse and part-time nurse percentages from their home state. The same controls as used in the state-level regressions were included in the YRBS regressions. Additionally, fixed effects for respondents' reported race and sex were also included as controls. Individual-level response data from the 2017 and 2019 Youth Risk Behavior Surveys include the sampling weights used by the CDC to produce state-level averages. Statistical literature disagrees about whether weighted least squares (WLS) or ordinary least squares (OLS) regression methods are more appropriate for data with survey weights (Jones, 2019; Solon et al., 2013). I have run linear probability regressions using both methods in models with otherwise identical specifications. The WLS results are presented in the Results section, and OLS results are included in the appendix.

Additionally, not all states asked students every question on their YRBS questionnaires. The list of such states that did not include any data for each question used in this analysis can be found in Table 3 of Appendix A. The states that do not have any responses to the question introduce exogenous selection into the sample, which likely does not introduce bias because of the inclusion of state-level regressors and controls in the models. However, even in states that did include the question, some students did not provide responses. The percent of students with missing responses in asking states is reported in Table 2 of Appendix A. All outcome measures, except for the asthma and smoking variables, had under 10% of responses missing, which is a theorized threshold beyond which excluding missing data will likely bias results (Bennett, 2001). The reported coefficients in this section were produced by regressions where missing responses were excluded.

To check the robustness of missing values, I calculated several more regressions with imputed data: data for which I filled in the missing responses. Either all missing responses were coded as 1 (for example, assuming all students who did not respond were diagnosed with asthma) or 0 (for example, assuming no students who did not respond were diagnosed with asthma). The estimates of the resulting regressions, therefore, provide lower and upper bounds on the possible effect of nurses on asthma. The results of these imputed data regressions are reported in the appendix using both Weighted Least Squares and Ordinary Least Squares methods, and they generally do not complicate the interpretations of regression coefficients generated from the models where missing responses are excluded.

All analysis was performed in R version 4.1.0 with statistical packages *tidyverse, reshape2, haven, here, usdata, estimatr, sandwich, lmtest, kable, xtable,* and *sjPlot*. The code used to produce my results is available upon request.

Strengths and Limitations

Strengths

The data utilized for this analysis incorporated multiple school environments spread across the United States and measured effects across all types of students in a state, not a subset of the population. For those who wish to apply the conclusions of this analysis to varying environments, this is an improvement upon the case study nature of much of the previous research on school nurses. The SHP and YRBS surveys are rigorously and carefully designed surveys, a fact that reduces the possibility of data irregularities or bias in measurement affecting the results.

Limitations

School nurse policies were not experimentally assigned randomly to states in the sample, creating a threat to the validity of this study's causal inferences. Even though the statistical models in this study seek to control for covariate factors that may influence policy choices and student health, unobserved factors may still be at play. Because two separate surveys were combined for this analysis, they were not conducted at the same time. During the time gap between the two rounds of data collection, states might have made policy changes that resulted in an incorrect match between an outcome measurement and treatment variable. The time required for a recent change in policy to create an effect that can be identified in the outcomes data is also ambiguous. If schools switched to a new policy on school nurses shortly before filling out the SHP survey, the intervening year between that data collection and the YRBS survey may not have been sufficient for the policy to be implemented and begin affecting students.

Additionally, SHP data on nursing policies were summarized at the state level, not the school or even district level—there may be significant variation across schools and districts both in school nurse staffing and social determinants in health that influence nursing workload and effectiveness. Nurses do their work at the school level, not the state or even district level, and therefore school-level data could have been a more sensitive instrument of measurement. Unfortunately, the data used in this analysis is not granular enough to pick up that variation. School-level data was unusable for this analysis due to a combination of the rarity of surveys collecting data on the school-level and anonymization of what school and district level data does exist to preserve privacy. Additionally, SHP and YRBS data only cover middle and high school students, not elementary school students. Nurses might have a bigger impact in elementary schools since younger children are less able to manage health conditions by themselves, but this cannot be estimated due to a lack of data.

It should also be noted that many of the state-level academic metrics measure true "learning" indirectly, particularly test scores. Additionally, the populations included in the calculation of these variables do not perfectly align with the student populations served by the nurses reported in the SHP surveys. For example, ADA incorporates attendance for elementary school students as well as secondary school students whose schools are represented in the SHP. This added variation in outcome measurement could introduce bias into the results if elementary attendance and high school nurse staffing are correlated in ways not controlled for in the regression models. However, if some of this correlation comes from nurse staffing levels in elementary schools, the positive bias would simply be in line with a general call for more school nurses. In some ways measuring outcomes in this way is useful, as public schools are evaluated on these metrics, which are therefore often the targets of policy interventions. However,

measurement error still poses a threat of bias and therefore threatens the validity of any causal inference implied by this analysis.

All survey responses utilized in this analysis were collected before the COVID-19 pandemic, but now school nurses face a new set of pandemic challenges that increase their workload and change how they must divide their time between responsibilities. Therefore, conclusions drawn from this pre-pandemic information may overestimate a contemporary school nurse's impact on outcomes not related to the pandemic. Conversely, without including in the analysis outcomes made newly relevant by the pandemic, such as the extent of infectious disease spread within schools or quarantine absences, this study could also underestimate the true, overall need for school nurses. An interesting avenue of further research may be to determine whether the pandemic has impacted the results found in this analysis, or even to examine the impact of increased nurse staffing on COVID-19 cases identified within schools, districts, and states.

Results

State-Level Outcomes

Table 1 shows the results of seven different regressions, each regressing a different state-level outcome variable on the same set of regressors. These regressors include the percent of schools with a full-time nurse in a state, the percent of schools with a part-time nurse, and a set of state-level demographic controls. Each variable representing a percentage is defined on a scale from zero to one hundred for ease of interpretation.

I also ran hypothesis tests to determine whether the coefficients of full-time and part-time nurses significantly differ from one another. This test consisted of regressing each outcome variable on full-time nurse percentage, the sum of both full-time and part-time nurse percentages, and the set of controls from the original regressions. The reported coefficient on full-time nurse percentage gives the difference between the full-time and part-time nurse percentage coefficients in the original regressions. The model reports standard errors appropriate to the hypothesis test for equivalence of the two coefficients, allowing me to determine whether full-time nurses have a different effect than part-time nurses.

Table 3: State-Level Outcome Regression Results

Outcome Variable	Full-Time Nurse Estimate	Part-Time Nurse Estimate	Difference in Coefficients
Flu Vaccination	5.970e-02	-6.556e-02	1.253e-01**
Graduation Rates	7.003e-02**	1.025e-02	5.978e-02**
Attendance	1.958e-02	-2.896e-03	2.248e-02
Reading Scores	5.830e-02**	3.550e-02	2.280e-02
Reading Proficiency	7.569e-02***	5.018e-02**	2.551e-02
Math Scores	5.856e-02*	4.136e-02	1.720e-02
Math Proficiency	6.059e-02*	5.641e-02	4.184e-03

. p<0.1; * p<0.05; ** p<0.01; *** p<0.001

Note: All significance tests calculated using heteroskedastic robust standard errors
See Appendix B for more extensive regression results.

Considering the flu vaccination model, an increase in schools with a full-time nurse by one percentage point corresponds to an increase in flu vaccination by November for 13-17-year-old children by 0.06 percentage points. However, this effect is not statistically significant, while the coefficient on part-time nurse percentage is negative and also not statistically significant. The

next model shows that an increase in schools with a full-time nurse by one percentage point corresponds to a 0.07 percentage point increase in a state's high school graduation rate. This is statistically significant at the one percent level. The coefficient on part-time nurses is positive but not statistically significant. In the ADA model (average daily attendance per pupil enrolled in fall), an increase in schools with a full-time nurse by one percentage point corresponds to a small increase in a state's average daily attendance that is not statistically different from zero. As with the flu vaccination regression, the coefficient on part-time nurse percentage is negative yet also not statistically significant. This model has very little explanatory power over attendance at all, with an adjusted R-squared statistic at less than ten percent and an insignificant F-statistic.

The difference between full-time and part-time nurses is statistically significant at the one percent level in the case of both flu vaccination coverage and graduation rates. An increase of one percentage point in schools with a full-time nurse in a state has a 0.125 percentage point increase in flu vaccination coverage relative to a one percentage point increase in schools with a part-time nurse. This increase is 0.06 percentage points for graduation rates.

Increasing the percentage of schools in a state that employs a full-time nurse has a statistically significant positive association with student achievement in math and reading on the National Assessment of Educational Progress. This relationship is robust to whether achievement is measured using test scores or percentages of students reaching "proficient" levels. The coefficients on part-time nurse percentage are positive as well, though only displaying some level of statistical significance when reading proficiency is the outcome of interest. The differences between full-time and part-time nurse percentages are all positive but not statistically significant. I cannot reject the possibility that part-time and full-time nurses have the same effect on academic test outcomes at the state-level.

Individual YRBS Survey Response Outcomes

Table 4: Individual YRBS Survey Response Regression Results

Outcome Variable	Full-Time Nurse Estimate	Part-Time Nurse Estimate	Difference in Coefficients
Asthma	-1.293e-04	5.727e-05	-1.866e-04
Recent Dentist Visit	-1.172e-04*	-1.527e-04 .	1.051e-05
Overweight (Self-Perception)	-1.119e-03***	3.220e-04***	-1.441e-03***
Overweight (BMI)	1.982e-05	-3.452e-04*	3.650e-04**
Depression	-2.044e-04*	-1.377e-04	-6.667e-05
Smoking	-1.634e-03***	-1.372e-03***	-2.617e-04*

.p<0.1; * p<0.05; ** p<0.01;*** p<0.001

Note: I tested two different measures of weight, one using student responses to a survey question asking them how they perceived their weight, and one determining whether they were overweight or obese based on their calculated BMI (using height, weight, and sex information).
Note: All significance tests were calculated using heteroskedastic robust standard errors
See Appendix C for more extensive regression results and OLS results.

With the WLS specification, an increase in schools with full-time nurses in a respondent's state by one percentage point is associated with a decrease of 0.013 percentage points in the likelihood of reporting they have been diagnosed with asthma, but this result shows no statistical significance. The coefficient on part-time nurses is small and positive, and not statistically significant. Regressions using imputed data methods corroborate this lack of significance: they take on opposite signs depending on the imputation method. Testing the difference between full-time and part-time nurse coefficients shows that the full-time nurse percentage result for asthma reporting is a larger, negative coefficient than that of the part-time nurse percentage, but this difference is not statistically significant.

The OLS model estimates an effect of -0.04 percentage points. This effect is statistically significant at the one percent level, and the coefficient on part-time nurse percentage is even larger, negative, and significant. Part-time nurse percentage in the OLS model has an effect that is 0.02 percentage points larger in magnitude. In other words, part-time nurses are associated with a change in students reporting asthma that is 0.02 percentage points more negative than the change associated with full-time nurses.

The association of increasing the percentage of schools in a state that employs a full-time or part-time nurse by one percent with the likelihood a respondent visited a dentist in the previous year is -0.012 percentage points, and statistically significant. The coefficient for part-time nurses is also negative, though only significant at the ten percent level. These results are also negative and significant for the OLS specification. In the models using both the WLS and OLS specifications with missing data omitted, the difference between the effect of full-time nurse percentage and part-time nurse percentage is positive, meaning part-time nurses have a greater negative effect, but not statistically significant.

In the WLS regression, a one percentage point increase of schools in a state employing a full-time nurse corresponds to a 0.1 percentage point decrease in the likelihood a student sees themselves as either slightly or very overweight. This value is positive but small for part-time nurses in the same regression, and both results are statistically significant. In the OLS model (see appendix), the signs of the coefficients are reversed but only the effect of part-time nurses is statistically significant.

When using the more objective measure of having an overweight BMI, the coefficients on full-time nurse percentage in both WLS and OLS models are positive but small and not statistically significant. With the WLS method, the coefficient on part-time nurse percentage is

more negative than the one on full-time nurse percentage and the difference is statistically significant; part-time nurse percentage is associated with a larger decrease in the likelihood a student has an overweight BMI. This difference is notable in that it is a deviation from the usual differences in coefficients seen for other outcome variables, including the other measure of weight. In the OLS method, the full-time nurse percentage coefficient is also more positive than the part-time nurse percentage and the difference is also statistically significant—this result even holds with varying missing value imputation methods.

A one percentage point increase of schools in a state employing a full-time nurse corresponds to a statistically significant 0.02 percentage point decrease in the likelihood a student reports experiencing depression symptoms of extended sadness or hopelessness. This result for part-time nurses is a 0.014 percentage point decrease and is not statistically significant. The difference between full-time nurses and part-time nurses is small and not statistically significant, though it does show that the correlation for full-time nurses is more negative. The OLS regression yields very similar results, but the difference between coefficients becomes statistically significant. Additionally, the imputation of missing data does not meaningfully change the results in terms of sign.

Increasing the proportion of schools in a state employing a full-time nurse by one percentage point yields a statistically significant decrease of 0.16 percentage points in the likelihood a student reports having smoked in the 30 days prior to the survey. This decrease is 0.13 percentage points for a one percentage point increase in part-time nurse percentage and is also statistically significant. The result for full-time nurse percentage is larger in magnitude than the coefficient on part-time nurses by .026 percentage points, a statistically significant result. The sign and significance of these coefficients hold when using an OLS model, though the difference

in coefficients increases in magnitude when using OLS as opposed to WLS. Imputing missing data does not substantially change coefficients on full-time nurse percentage but does produce coefficients of different signs for part-time nurse percentage, which in turn produces differently signed differences in coefficients.

Standardized Coefficients

Though several of these results are statistically significant, their size and practical significance must also be considered. Because each outcome variable is measured in different units and has varying base rates, reporting the standardized versions of the coefficients makes it easier to tell whether school nurse percentage is strong enough to noticeably affect real-world outcomes. Table 3 reports the standardized regression coefficients, in order of magnitude.

Table 5: Standardized Regression Results

Outcome Variable	Standardized Full-Time Nurse Estimate	Standardized Part-Time Nurse Estimate
Graduation Rates **	0.4760***	0.0470
Reading Proficiency	0.3850***	0.1722**
Reading Scores	0.3197**	0.1314 .
Math Proficiency	0.2611*	0.1640
Math Scores	0.2588*	0.1233
Attendance	0.2262	-0.0226
Flu Vaccination **	0.2198	-0.1629
Smoking ***	-0.1068***	-0.0606***
Overweight (Self-Perception) ***	-0.0753***	0.0146***
Asthma	-0.0165	0.0049
Depression	-0.0126*	-0.0057

Recent Dentist Visit	-0.0074*	-0.0065 .
Overweight (BMI) **	0.0013	-0.0156*

*Note: . p<0.1; ** p<0.05; *** p<0.01;**** p<0.001*
Note: significance markers on the leftmost column (variable names) indicate the statistical significance of the difference between coefficients on full-time and part-time nurse percentages.
Note: Coefficients from the WLS regression models are used for YRBS outcomes.

Increasing the percent of full-time nurses by one standard deviation (almost 30 percentage points) does not correlate with an increase in any of the outcome variables (either state-level or YRBS) by more than half of one of their own standard deviations. Standardized coefficients for the percent of part-time nurses are even smaller than those for full-time nurse percentages. Additionally, standardized regression coefficients for YRBS outcome variables are smaller than all standardized regression coefficients for state-level variables.

Discussion

An increase in the percentage of schools in a state with a full-time nurse is associated with a statistically significant increase ($p < 0.05$) in graduation rates, reading scores and proficiency, and math scores and proficiency. It is associated with a decrease in the percentage of children who report smoking, seeing themselves as overweight, having depression symptoms, and recent dentist visits. For some outcomes, the coefficient for full-time nurse percentage is larger than the coefficient for part-time nurse percentage by a statistically significant amount: for graduation rates, flu vaccination, smoking, and perception of being overweight. The only dimension along which part-time nurses have a greater desired effect is the percentage of students who have overweight BMIs.

Full-time nurses fairly consistently have a larger association with student health outcomes than part-time nurses. This could be explained by full-time nurses having a greater

amount of time available to plan and execute health education programming, build relationships with students, or focus on care coordination, instead of only having time to focus on the most immediate needs of individual students. For academic outcomes specifically, a mechanism noted by Hill and Hollis (2012) could be at work: teachers have more certainty about the availability of a full-time nurse and are therefore able to focus their attention more squarely on student learning instead of student health. No matter which aspects of full-time practice drive the result, it is apparent that full-time nurses have a detectably greater relationship with student health and learning than part-time nurses.

In contrast to this conclusion, there are a few results that do not appear immediately intuitive, such as the different results for each measure of being overweight, negative coefficients on recent dentist visits, statistically insignificant results for attendance in light of significant results for other academic outcomes, and small, insignificant coefficients for outcomes like asthma, which literature has found to be affected by school nurses.

Firstly, the coefficient on full-time school nurse percentage is negative for the outcome of a student's perception of themselves as overweight, which could be driven either by a decrease in the number of children who are actually overweight, and/or improved body positivity encouraged by the health education and or supportive atmosphere a nurse might provide. Part-time nurse percentage has a positive result with respect to this outcome, though substantially smaller in size, translating to my finding that full-time nurse percentage is significantly more correlated with a decrease in self-perception of being overweight. Interestingly, one could also consider that the health education provided by a nurse might increase self-perception of overweightness by teaching students more accurately about what healthy versus unhealthy weights look like.

Such an explanation would not apply to the results for the other weight-related outcome measure: overweight BMI, though health education could encourage healthier eating and exercise habits. Though no significant result for full-time nurse percentage is detected for this outcome, the part-time percentage coefficient is the opposite sign as the part-time coefficient for the self-perception measurement of weight. BMI has been criticized as a flawed measure of weight-related health, not taking into account bone structure, muscle density, or underlying health conditions (Nordqvist, 2022). It could be the case that part-time nurses tend to take BMI at face value, educating students to define their body image by BMI and acting to decrease obesity and overweightness as defined by BMI, while full-time nurses encourage students to look past BMI and more truthfully evaluate whether they are healthy at their weight. More focused study on how nurses address weight, perhaps including qualitative evidence as to how nurses view BMI, is necessary to either validate or disprove this theory.

Secondly, it seems curious that the model predicts a decrease of students seeing a dentist within the previous year when nurse percentages increase. If nurses are effective at connecting students to regular dental care providers through their key function of care coordination, one would expect to see a positive coefficient. Though regular visits to maintain dental health are recommended, it is possible that nurses only reduce the amount of dentist visits that are precipitated by specific dental problems and that they do not increase the number of regular cleanings. If school nurses are educating students on proper tooth care, this may prevent dentist visits for emergencies, thereby yielding the negative coefficients from this analysis. As before, more focused study would be needed to determine whether this explanation is correct.

Next, though the literature suggests that nurses can improve academic performance through the channel of reducing absences, this analysis finds a statistically significant positive

correlation between full-time nurses with graduation rates and test scores despite not detecting a similar effect for attendance. Pennington and Delaney (2008) found that nurses sent kids home less often than teachers did, so this gap initially seems odd. However, children who only partially miss days of school may not be counted as absent in many schools. As a result, nurses keeping students in the classroom for a larger portion of the school day may not appear to have an effect on attendance in official records, as opposed to keeping students in the classroom for a larger proportion of days out of the year. Both forms of increased attendance would presumably improve learning outcomes, perhaps accounting for improved graduation rates and test scores despite no observed change in average daily attendance.

Also, some children may be missing more days of school to get the necessary medical care their school nurse has helped them obtain or recognize a need. This effect could be offsetting improvements in attendance for other groups of students for whom nurses did decrease absences. However, breaking down attendance by student characteristics is not within the scope of the data collected for this analysis. More detailed data on who misses school, when, and how much could help to explain exactly how school nurses affect attendance. As it stands, the gap in effect sizes and significance for daily attendance versus graduation reveals that nurses are helping students stay in school in the long-term more so than in the short-term.

Nurses may well have an effect on academic performance by improving the quality of a student's in-classroom experiences rather than quantity—it may be easier for students who feel healthier to concentrate in class, thereby enabling them to learn more. Additionally, the mechanism suggested by Hill and Hollis (2012) through which nurses free up teachers to be more productive when they do not have to worry about dealing with student health concerns themselves, could also explain this result. Though attendance is a key predictor of student

success, it is not the only one, so nurses may be contributing to other predictors such as teacher quality, supportive school climates, and improved mental healthcare as mechanisms for observed improvements in test scores and graduation rates.

A fourth curious result arises from the YRBS outcome measuring asthma, which is relatively quite small when one considers that some of the strongest findings of the effectiveness of school nurses in previous literature come from the study of asthmatic students. However, the outcome data in this analysis measures the diagnosis of asthma rather than treatment. While asthma is preventable to an extent, nurses may not have their effect on prevention, but rather in providing better treatment. A similar logic could explain the small coefficient on the variable measuring depression symptoms—nurses can only control a subset of the factors that contribute to depression, namely physical health, but may have a larger impact on helping treat depression when it does occur. Access to treatment for depression, however, was not readily measurable using the YRBS data.

In the case of the asthma diagnosis outcome, it seems conceptually plausible that the coefficient could have been positive because nurses can refer possibly asthmatic students to a care provider who can give them an official diagnosis. The observed negative result could be due to a reduction in the spread of respiratory illnesses that can be risk factors for developing asthma in children, or reduced smoking behavior as demonstrated as the negative coefficient on smoking. However, this seems tenuous given the population studied was high-school-age students, at which point they are less susceptible to newly developing asthma than younger children. It, therefore, seems likely that this result could be due to missing data bias or omitted variable bias, or is simply a precisely-estimated zero effect.

Though all of these regression coefficients are interesting, they are still quite abstract when considering why policymakers should be interested in this study: to determine whether hiring full-time nurse nurses is worthwhile. To that end, I have performed back-of-the-envelope calculations that contextualize my results in terms of the number of students that could potentially be helped. Each estimate is based on slightly different hypothetical policies.

In policy one, the percentage of schools with a part-time nurse is added to the percentage of schools with a full-time nurse—the percentage of schools with part-time nurses becomes zero and the percentage of schools with full-time nurses is capped at 100. This is meant to approximate a policy in which all part-time nurses are hired into full-time positions, though it is only approximate since schools with part-time nurses and schools with full-time nurses are not mutually exclusive categories. In policy two, the percentage of schools in each state with a part-time nurse is reduced to zero and the percentage of schools with a full-time nurse becomes 100. This approximates a policy in which all schools get a full-time nurse but all part-time nurse positions are eliminated. In policy three, the percentage of schools with a part-time nurse does not change but the percentage of schools with a full-time nurse becomes 100. This represents a policy in which each school gets a full-time nurse and part-time nurses are not affected.

These changes in percentages on the individual state-level are translated to changes in outcome variables via the regression coefficients, and these changes in outcomes are then multiplied by the size of the relevant child populations in each state—either those enrolled in school or the overall population (U.S. Department of Education, 2016; US Census Bureau, 2018). The affected population in each state has been aggregated to the national level. It is important to note that this calculation implicitly assumes that the regression coefficients represent the causal effects of school nurse hiring on health and academic outcomes.

Table 6: Estimated Number of Children Affected by Possible Policies

Outcome Variable	Policy one	Policy two	Policy three
Students Diagnosed with Asthma	-1,048	-1,188	-832
Average Daily Attendance	369,051	432,948	379,023
Students with Depression Symptoms	-240	-461	-1,316
Children Vaccinated for Flu	1,067,136	1,162,709	564,712
Graduating Students	311,319	387,102	450,743
Students Proficient in Math	-8,330	13,017	127,492
Overweight Students (BMI)	2,248	2,270	128
Overweight Students (Self-Perception)	-7,991	-9,202	-7,203
Students Proficient in Reading	30,749	57,416	159,255
Students with a Recent Dentist Visit	320	193	-754
Students Smoking	-233	-2,000	-10,514

Note: Additional vaccinations were calculated using the total population in a state aged 12-17. Changes in ADA were calculated using fall enrollment, which was part of the data used to originally calculate the ADA statistic. Additional graduating students were calculated by high school enrollment numbers. Test scores were calculated with an approximation of the number of students in 8th grade: calculating one third of middle school enrollment.
Note: The calculated change in graduating students refers to a four-grade cohort of students enrolled in high school in 2018, not just for those who were seniors in 2018.
*Note: Outcomes with a * indicate that the regression coefficient for full-time nurses is statistically significant at the $p < 0.05$ level.*

Differing effect sizes and directions across policies can be attributed to the different treatment of part-time nurses in each of the policies. Policy three, though it would appear most generous on paper, sometimes affects fewer students due to the coefficient on part-time nurses indicating an undesirable impact on students for certain outcomes. Considering that there were about 43.5 million children enrolled nationally in public schools in the fall of 2018, these estimates appear quite small. However, when considering the effect of nurses across all of these various health and education outcomes together, the case for hiring additional full-time school

nurses becomes slightly more compelling. Additionally, due to the school funding control included in each model, these improvements theoretically could be realized without any change in education spending.

It is not immediately clear from this analysis and the resulting back-of-the envelope calculations whether hiring additional full-time nurses is beneficial enough to justify changes in policy. My results are small and not completely consistent across outcome measures, though I have presented explanations as to how these inconsistencies may reflect the true channels by which school nurses actually relate to student health and education. In the proceeding section, I offer recommendations for ways to investigate these results and inconsistencies further, as well as considerations for implementing a possible expansion of full-time nurse hiring in the United States.

Recommendations

One of the biggest obstacles to this research was accessing data on the details of school health policies, which should be an important component of holding schools accountable for our children's wellbeing. My results could be much more precise and useful to practitioners if I had school or district level data and could investigate other elements of school nurse hiring practices such as maximum student to nurse ratios, certification requirements, and outsourcing. Additionally, more granular data would make it easier for future researchers to conduct other types of data analysis that could produce more convincing causal effect estimates, such as difference-in-differences or regression discontinuity designs. There does not seem to be a convincing rationale for the anonymization of school-level and district-level data collected from the CDC's surveys when public schools already publish so much data about academic policies

and performance. Both those who seek to learn about and improve public education and the parents who send their kids to public schools suffer from the current lack of transparency on school health policies.

The relatively small result sizes found in this analysis might make policymakers wary about spending the money to hire full-time nurses. However, arguments can still be made for policies that result in the hiring of more full-time school nurses in public schools. Firstly, the implication of a tradeoff between school nurses and other education funding is already controlled for, to an extent, in my study design. It would be easy to make a recommendation that policymakers should add school nurses to their budget, raising overall school spending, but the results of these regressions where funding is held constant shows that full-time nurses still have an effect even when overall spending levels don't increase along with their hiring. The specific programs the money for nurses comes from might change the net effect on health and education outcomes, but those considerations must be dealt with in other published education policy research.

Additionally, the benefits of the increased presence of school nurses found in this study can be quantified as monetary benefits, to be more easily compared to the cost of nurses. For example, the estimated net social value of an additional high school graduate in the US is about $300,000 (Vining & Weimer, 2019). A substantial amount of money can also be saved by preventing teens from smoking and vaping: in 2014 the US spent about $7,000 annually per adult smoker, and teens who use e-cigarettes are four times more likely to start smoking than those who do not (Owotomo et al., 2020; US Department of Health and Human Services, 2014). Flu vaccination is also cost-saving—the benefit of vaccinating an additional child for the flu in a given year has been estimated at $4, rising to $35 when the vaccination is part of a group

vaccination effort like the ones school nurses may oversee and advocate for (Salleras, 2013; White, 1999).

Improvements to school nursing services center on some of the vital yet often overlooked objectives of public education: producing healthy and productive citizens. This starts in childhood and adolescence, especially in areas like mental health and nutrition. Innovations in healthcare delivery are at the center of many policy debates and expanding services to schools might take the strain off traditional hospital-and-insurance channels. Using school spaces that are more easily accessible to residents and centered in communities to provide basic, primary healthcare services to students could be preventative, keeping them from needing more expensive hospital care. This would free up financial and hospital resources for the types of care that cannot be provided effectively in schools. Thus, hiring more school nurses could have implications for the US healthcare system at large, not just schools.

The following policy recommendations suggest ways to implement the hiring of more full-time nurses, assuming a policymaker has reviewed the above evidence and wants to pursue the increase. School districts are not currently held accountable for the population health of their students, so there are no strong incentives to encourage better nurse hiring, but this could be changed. Incorporating school health practices and outcomes into school accountability data tools or content standards is one avenue for changing the incentives schools face (Healthy Schools Campaign, 2019). The Federal government and states could better tie funding streams to student health outcomes—currently funding programs at the federal level are fragmented between several agencies, and requirements for receiving money include student health only as one possible target schools can choose among several (Healthy Schools Campaign, 2019; Temkin et al., 2021). Currently, grant programs that do target student health focus mainly on

chronic absenteeism and violence prevention, even though these are not the only factors—or even the most important factors—that affect overall student health (Temkin et al., 2021).

More direct action is also an option: state governments or school districts could take the decisive step of requiring certain higher levels of nurse staffing in schools. Only two states—Delaware and Vermont—currently require a full-time nurse to be present in schools (National Association of State Boards of Education, 2021). 35 other states specify some level of nursing below that or otherwise have a policy on who can be considered a school nurse based on certification, and 13 states do not have a policy on school nurse availability at all (National Association of State Boards of Education, 2021). However, this option could face several challenges: unfavorable state politics, resistance if limited additional funding is allocated for hiring nurses, and a supply of school nurses unable to meet the required increase in demand.

There is certainly room for the school nurse workforce to expand, and it should. Trends indicate that the responsibilities of a school nurse will only grow as the population of students with chronic health conditions and behavioral conditions grows due to advances in medical technology (Maughan et al., 2018). However, the aging demographics of the current school nurse workforce and non-competitive pay suggest we may not be able to meet this challenge (Willgerodt et al., 2018). Pandemic-related stressors have likely only exacerbated a shortage of people willing to work as school nurses. The supply of school nurses must therefore keep up with demand in order to implement a policy that puts more full-time nurses in schools.

An increased pay scale is one way to entice nurses to work in schools – the median wage for a Registered Nurse in a public school is approximately $61,000 annually, compared to $77,600 for Registered Nurses as a whole, so there is room for improvement (Bureau of Labor Statistics, 2021a, 2021b). Other ways to grow the school nurse workforce are innovations in

school nursing practices that make the job easier and promotion of the career path in nursing schools. Easing licensing requirements is another potential way to make school nursing more attractive, but, as previously mentioned there is little to no data available to study the effect this might have on nurse effectiveness. Some of the policies suggested to incentivize entrance to the teaching profession may also be applicable to school nursing: the aforementioned greater pay, adequately funding pensions, educational debt support, and fostering school environments that give school nurses autonomy to use their expertise in optimizing student health (Garcia & Weiss, 2020).

Conclusion

This research has approached the issues of school nurse hiring and effectiveness through quantitative analysis of data from schools and teenage students across US states. Specifically, my analysis has focused on answering the question: does the employment of a full-time nurse in school affect student learning and wellbeing? State-level percentages of schools employing full-time and part-time nurses were used as independent variables and regressed against a variety of health and academic outcomes: flu vaccination, attendance, graduation rates, and test scores. This same data was also applied to individual responses of high schoolers to risk-behavior survey questions—regarding asthma diagnoses, dental care, weight, mental health, and smoking behavior—to determine whether the level of nurse staffing in their state could predict their responses.

Full-time nurses have statistically significant positive associations with standardized test performance and graduation rates, though not daily attendance, and weaker associations with flu vaccination. Furthermore, for certain outcome variables—flu vaccination, graduation rates, asthma, self-perception of being overweight, and smoking behavior—full-time nurse percentage

has a significantly more promising association with desired outcomes than part-time nurse percentage. However, all relationships tend to occur on a small scale.

The results of this research have implicated several avenues for policy action to move research on school nurses forward and ultimately improve student health and learning. These involve increased data availability on the school nurse profession; providing paths for schools to hire full-time nurses through some combination of accountability incentives, funding, and requirements; and encouraging the entrance of nurses into the school nursing field with increased pay and other improvements to their work environment. This study has sought to fill gaps in the school nurse literature by focusing on hiring practices that would be relevant to education policymakers rather than on nursing practice. However, more evidence is still needed on other characteristics of school nurses and school-level effects to get a clear picture of how schools should employ nurses to best improve student health and wellbeing.

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Appendix A: Data Summary Tables

Table 1: Summary of SHP Nurse Employment Data (2016 and 2018 Combined)

	Average	Standard Deviation	Minimum	Maximum
Percent of Schools with a Full-Time Nurse	51.84382	29.85477	1.9	98.8
Percent of Schools with a Part-Time Nurse	41.36629	19.46920	10.6	85.6

Table 2: Summary of YRBS Individual-Level Outcome Variables (2017 and 2019 Combined)

	(Unweighted) Proportion of Respondents	Standard Deviation of Respondents	Percent of Responses Missing
Overweight (Self-Perception)	0.054	0.227	0.083
Overweight (BMI)	0.295	0.456	0.094
Recent Dentist Visit	0.758	0.429	0.082
Asthma	0.245	0.430	0.160
Depression	0.323	0.468	0.020
Smoking	0.265	0.441	0.138

Table 3: Exclusion of YRBS Outcomes by State

	States not Including Survey Item
Asthma	CT, NV, ND, RI, SD, VT
Recent Dentist Visit	CO, DE, ME, NC, VT
Overweight (Self-Perception)	AK, GA, ME, NV, NH, NM, NY, RI, WI
Overweight (BMI)	All States Included
Depression	All States Included
Smoking	AL, AR, CA, CO, CT, DE, FL, GA, HI, ID, IA, NH, NJ, NC, NA

Table 4: Summary of State-Level Outcome Variables (2016 and 2018 Combined)

	Average	Standard Deviation	Minimum	Maximum
Flu Vaccination Coverage	41.71	7.84	27.20	64.80
Graduation Rate	84.74	4.24	71.00	91.00
Average Daily Attendance per Pupil	93.20	2.50	86.43	100.05
NAEP Reading Score	264.03	5.26	251.70	277.78
Percent Students Reading Proficient	33.93	5.67	23.29	49.32
NAEP Math Score	281.56	6.53	266.51	297.04
Percent Students Math Proficient	33.27	6.70	18.79	49.69

Table 5: Summary of State-Level Control Variables (2016 and 2018 Combined)

	Average	Standard Deviation	Minimum	Maximum
Percent of Schools with a School-Based Health Center	21.79	9.32	6.00	52.00
Percent of White Students	59.43	18.89	12.30	90.99
Percent of Students Below Poverty Line	18.12	4.19	9.41	28.04
Per-Pupil Spending	12288.25	3491.52	6953.00	24048.00
2016 Trump Vote Share	0.49	0.10	0.30	0.68

Appendix B: Regressions on State-Level Outcomes

Table 1: Regression Results for Flu Vaccination Outcome

	Flu Vaccination Percentage		
Predictors	*Estimates*	*std. Error*	*p*
Intercept	-3693.88372 *	1480.15468	**0.015**
Pct Schools with a Full-Time Nurse	0.05970	0.03804	0.121
Pct Schools with a Part-Time Nurse	-0.06556	0.05594	0.245
Pct Schools with School-based Health Center	0.07959	0.08961	0.377
Pct Enrollment of White Students	0.03914	0.06156	0.527
2016 Trump Vote Share	-13.18263	14.90892	0.379
Percent Enrollment of Students in Poverty	-0.09235	0.23935	0.701
Per-Pupil Education Spending	0.00036	0.00030	0.236
Year	1.85174 *	0.73392	**0.014**
Observations	89		
R^2 / R^2 adjusted	0.393 / 0.332		

**p<0.05 ** p<0.01 *** p<0.001*

Table 2: Regression Results for Graduation Rate Outcome

	Graduation Rate		
Predictors	*Estimates*	*std. Error*	*p*
Intercept	-1236.31440	835.37809	0.143
Pct Schools with a Full-Time Nurse	0.07003 **	0.02086	**0.001**
Pct Schools with a Part-Time Nurse	0.01025	0.03742	0.785
Pct Schools with School-based Health Center	0.07172	0.04874	0.145
Pct Enrollment of White Students	0.06446	0.03305	0.055
2016 Trump Vote Share	13.16464	9.06801	0.150
Percent Enrollment of Students in Poverty	-0.43563 **	0.13562	**0.002**
Per-Pupil Education Spending	-0.00026	0.00022	0.236
Year	0.65258	0.41512	0.120

Observations	89
R^2 / R^2 adjusted	0.434 / 0.377

**p<0.05 ** p<0.01 *** p<0.001*

Table 3: Regression Results for Average Daily Attendance Outcome

	Average Daily Attendance		
Predictors	*Estimates*	*std. Error*	*p*
Intercept	702.77172	548.12888	0.204
Pct Schools with a Full-Time Nurse	0.01958	0.01475	0.188
Pct Schools with a Part-Time Nurse	-0.00290	0.01923	0.881
Pct Schools with School-based Health Center	0.00496	0.03244	0.879
Pct Enrollment of White Students	-0.03576	0.01841	0.056
2016 Trump Vote Share	0.32394	4.42166	0.942
Percent Enrollment of Students in Poverty	-0.09781	0.10067	0.334
Per-Pupil Education Spending	-0.00010	0.00012	0.398
Year	-0.30027	0.27163	0.272
Observations	89		
R^2 / R^2 adjusted	0.142 / 0.057		

**p<0.05 ** p<0.01 *** p<0.001*

Table 4: Regression Results for Reading Scores Outcome

	NAEP Grade 8 Reading Scores		
Predictors	*Estimates*	*std. Error*	*p*
Intercept	3822.32291 ***	688.94765	**<0.001**
Pct Schools with a Full-Time Nurse	0.05830 **	0.01868	**0.003**
Pct Schools with a Part-Time Nurse	0.03550	0.01876	0.062
Pct Schools with School-based Health Center	-0.10367 *	0.04114	**0.014**
Pct Enrollment of White Students	0.14941 ***	0.02522	**<0.001**
2016 Trump Vote Share	-18.60389 **	5.77661	**0.002**
Percent Enrollment of Students in Poverty	-0.48201 ***	0.08615	**<0.001**

Per-Pupil Education Spending	-0.00024	0.00018	0.183
Year	-1.75935 ***	0.34167	**<0.001**
Observations	89		
R^2 / R^2 adjusted	0.709 / 0.680		

**p<0.05 ** p<0.01 *** p<0.001*

Table 5: Regression Results for Reading Proficiency Outcome

	NAEP Grade 8 Reading Proficiency Percentage		
Predictors	*Estimates*	*std. Error*	*p*
Intercept	2659.15755 ***	714.71461	**<0.001**
Pct Schools with a Full-Time Nurse	0.07569 ***	0.01738	**<0.001**
Pct Schools with a Part-Time Nurse	0.05018 **	0.01787	**0.006**
Pct Schools with School-based Health Center	-0.10012 *	0.03867	**0.011**
Pct Enrollment of White Students	0.15970 ***	0.02668	**<0.001**
2016 Trump Vote Share	-24.00029 ***	5.58438	**<0.001**
Percent Enrollment of Students in Poverty	-0.52209 ***	0.09185	**<0.001**
Per-Pupil Education Spending	-0.00023	0.00018	0.200
Year	-1.29623 ***	0.35446	**<0.001**
Observations	89		
R^2 / R^2 adjusted	0.7360.709		

** p<0.05 ** p<0.01 *** p<0.001*

Table 6: Regression Results for Math Scores Outcome

	NAEP Grade 8 Math Scores		
Predictors	*Estimates*	*std. Error*	*p*
Intercept	1736.24095	955.41410	0.073
Pct Schools with a Full-Time Nurse	0.05856 *	0.02600	**0.027**
Pct Schools with a Part-Time Nurse	0.04136	0.03348	0.220
Pct Schools with School-based Health Center	-0.16844 **	0.05793	**0.005**
Pct Enrollment of White Students	0.14192 ***	0.03323	**<0.001**

2016 Trump Vote Share	-11.86401	7.44050	0.115
Percent Enrollment of Students in Poverty	-0.79795 ***	0.13128	**<0.001**
Per-Pupil Education Spending	-0.00020	0.00023	0.402
Year	-0.71468	0.47365	0.135
Observations	89		
R^2 / R^2 adjusted	0.607 / 0.568		

**p<0.05 ** p<0.01 *** p<0.001*

Table 7: Regression Results for Math Proficiency Outcome

	NAEP Grade 8 Math Proficiency Percentage		
Predictors	*Estimates*	*std. Error*	*p*
Intercept	947.60721	955.12304	0.324
Pct Schools with a Full-Time Nurse	0.06059 *	0.02464	**0.016**
Pct Schools with a Part-Time Nurse	0.05641	0.03489	0.110
Pct Schools with School-based Health Center	-0.18374 **	0.05807	**0.002**
Pct Enrollment of White Students	0.14202 ***	0.03349	**<0.001**
2016 Trump Vote Share	-14.35326	7.24891	0.051
Percent Enrollment of Students in Poverty	-0.78478 ***	0.12882	**<0.001**
Per-Pupil Education Spending	-0.00009	0.00021	0.665
Year	-0.44713	0.47332	0.348
Observations	89		
R^2 / R^2 adjusted	0.632 / 0.595		

**p<0.05 ** p<0.01 *** p<0.001*

Appendix C: Regressions on Individual-Level Health Data from the Youth Risk Behavior Survey

Table 1: Ordinary Least Squares Model Results for YRBS Outcome Variables

Outcome Variable	Full-Time Nurse Estimate	Part-Time Nurse Estimate	Difference in Coefficients
Asthma	-3.883e-04***	-5.463e-04***	1.581e-04*
Recent Dentist Visit	-2.385e-04 ***	-2.490e-04 **	3.547e-05
Overweight (Self-Perception)	7.913e-06	-1.694e-03***	1.702e-03***
Overweight (BMI)	-1.974e-05	-3.232e-04***	3.035e-04***
Depression	-2.374e-04***	-8.997e-05	-1.475e-04*
Smoking	-2.702e-03***	-1.398e-03***	-1.304e-03***

Note: . p<0.1; * p<0.05; ** p<0.01; *** p<0.001

Table 2: WLS and OLS Regression Results for Asthma Diagnosis Outcome

	Asthma Diagnosis (WLS)		**OLS**	
Predictors	*Estimates*	*p*	*Estimates*	*p*
Pct Schools with a Full-Time Nurse	-0.00012932 (0.00009688)	0.182	-0.00038826 *** (0.00005728)	**<0.001**
Pct Schools with a Part-Time Nurse	0.00005727 (0.00013827)	0.679	-0.00054633 *** (0.00008817)	**<0.001**
Difference in coefficients	-0.00018660 (0.00012362)	0.131	0.00015807 * (0.00007800)	**0.043**
Pct Schools with School-based Health Center	0.00018972 (0.00019468)	0.330	0.00088532 *** (0.00011872)	**<0.001**
2016 Trump Vote Share	-0.10325008 ** (0.03986156)	**0.010**	-0.06314049 ** (0.02174260)	**0.004**
Year	0.00482554 * (0.00230340)	**0.036**	-0.00394792 *** (0.00091098)	**<0.001**
Sex	0.00855440 (0.00443205)	0.054	0.01475204 *** (0.00172434)	**<0.001**
Race: American Indian/Alaska Native	-9.56633949 * (4.64436833)	**0.039**	8.21404744 *** (1.83640128)	**<0.001**

Race: Asian	-9.60688063 * (4.64408991)	**0.039**	8.15500933 *** (1.83618932)	**<0.001**
Race: Black of African American	-9.48473792 * (4.64426902)	**0.041**	8.27259104 *** (1.83629114)	**<0.001**
Race: Hispanic/Latino	-9.54548247 * (4.64418779)	**0.040**	8.22340327 *** (1.83639442)	**<0.001**
Race: Missing	-9.50855421 * (4.64403382)	**0.041**	8.22634989 *** (1.83629174)	**<0.001**
Race: Multiple Races	-9.49396968 * (4.64401599)	**0.041**	8.25585737 *** (1.83623801)	**<0.001**
Race: Native Hawaiian/Other Pacific Islander	-9.47501717 * (4.64330318)	**0.041**	8.26828994 *** (1.83589039)	**<0.001**
Race: White	-9.55399881 * (4.64413289)	**0.040**	8.18880720 *** (1.83634507)	**<0.001**
Pct Enrollment of White Students	0.00021994 (0.00017673)	0.213	0.00040046 *** (0.00008288)	**<0.001**
Percent Enrollment of Students in Poverty	0.00337484 *** (0.00056547)	**<0.001**	0.00007875 (0.00028224)	0.780
Per-Pupil Education Spending	0.00000031 (0.00000077)	0.690	0.00000032 (0.00000046)	0.476
Observations	248658		248658	
R^2 / R^2 adjusted	0.245 / 0.245		0.251 / 0.251	

**p<0.05 ** p<0.01 *** p<0.001*

Table 3: Missing Data Imputation Results for Asthma Diagnosis Outcome

	NAs Coded as 1 (WLS)		**NAs Coded as 0 (WLS)**		**NAs Coded as 1 (OLS)**		**NAs Coded as 0 (OLS)**	
Predictors	*Estimates*	*p*	*Estimates*	*p*	*Estimates*	*p*	*Estimates*	*p*
Pct Schools with a Full-Time Nurse	-0.00212458 * ** (0.00009512)	**<0.001**	0.00047576 * ** (0.00008697)	**<0.001**	-0.00077041 * ** (0.00005585)	**<0.001**	-0.00014343 * * (0.00004733)	**0.002**
Pct Schools with a Part-Time Nurse	-0.00259221 * ** (0.00014051)	**<0.001**	0.00084527 * ** (0.00013091)	**<0.001**	-0.00449925 * ** (0.00008768)	**<0.001**	0.00079250 * ** (0.00007787)	**<0.001**

Difference in coefficients	0.00046763 *** (0.00012524)	**<0.001**	0.00372884 *** (0.00007729)	**<0.001**	-0.00036951 *** (0.00011701)	**0.002**	-0.00093593 *** (0.00006681)	**<0.001**
Observations	293306		293306		293306		293306	
R^2 / R^2 adjusted	0.333 / 0.333		0.220 / 0.220		0.393 / 0.393		0.215 / 0.215	

**p<0.05 ** p<0.01 *** p<0.001*

Table 4: OLS and WLS Regression Results for Recent Dentist Visit Outcome

	Recent Dentist Visit (WLS)		**OLS**	
Predictors	*Estimates*	*p*	*Estimates*	*p*
Pct Schools with a Full-Time Nurse	-0.00011722 (0.00008725)	**0.039**	-0.00023853 *** (0.00004822)	**<0.001**
Pct Schools with a Part-Time Nurse	-0.00015269 (0.00013904)	**0.055**	-0.00024904 ** (0.00008365)	**0.003**
Difference in coefficients	0.00001051 (0.00007430)	0.887	0.00003547 (0.00012759)	0.781
Pct Schools with School-based Health Center	0.00042575 * (0.00021273)	**0.045**	0.00085963 *** (0.00011632)	**<0.001**
2016 Trump Vote Share	-0.09762523 ** (0.03754856)	**0.009**	-0.32417200 *** (0.02234489)	**<0.001**
Year	-0.00751577 ** (0.00230970)	**0.001**	0.00347228 *** (0.00085747)	**<0.001**
Sex	-0.03712260 *** (0.00448141)	**<0.001**	-0.03027734 *** (0.00165297)	**<0.001**
Race: American Indian/Alaska Native	15.95644480 *** (4.65786166)	**0.001**	-6.15473851 *** (1.72831895)	**<0.001**
Race: Asian	16.00163300 *** (4.65788424)	**0.001**	-6.10041259 *** (1.72827051)	**<0.001**
Race: Black of African American	15.91348207 *** (4.65840962)	**0.001**	-6.17461490 *** (1.72835485)	**<0.001**
Race: Hispanic/Latino	15.95539037 *** (4.65818235)	**0.001**	-6.12554535 *** (1.72840650)	**<0.001**

Race: Missing	15.92949222 *** (4.65766203)	**0.001**	-6.17908702 *** (1.72836113)	**<0.001**
Race: Multiple Races	16.03706840 *** (4.65814125)	**0.001**	-6.08368895 *** (1.72833072)	**<0.001**
Race: Native Hawaiian/Other Pacific Islander	15.92563636 *** (4.65756075)	**0.001**	-6.19320683 *** (1.72827376)	**<0.001**
Race: White	16.06876746 *** (4.65808566)	**0.001**	-6.02576159 *** (1.72837503)	**<0.001**
Pct Enrollment of White Students	0.00072859 *** (0.00017102)	**<0.001**	0.00123466 *** (0.00008821)	**<0.001**
Percent Enrollment of Students in Poverty	-0.00330216 *** (0.00051047)	**<0.001**	-0.00020563 (0.00026972)	0.446
Per-Pupil Education Spending	0.00000187 ** (0.00000070)	**0.008**	-0.00000299 *** (0.00000042)	**<0.001**
Observations	260434		260434	
R^2 / R^2 adjusted	0.736 / 0.736		0.767 / 0.767	

**p<0.05 ** p<0.01 *** p<0.001*

Table 5: Missing Data Imputation Results for Recent Dentist Visit Outcome

	NAs Coded as 1 (WLS)		**NAs Coded as 0 (WLS)**		**NAs Coded as 1 (OLS)**		**NAs Coded as 0 (OLS)**	
Predictors	*Estimates*	*p*	*Estimates*	*p*	*Estimates*	*p*	*Estimates*	*p*
Pct Schools with a Full-Time Nurse	-0.00009979 (0.00008436)	0.237	-0.00010898 (0.00008826)	0.217	-0.00011895 * (0.00004601)	**0.010**	-0.00056346 ** (0.00004909)	**<0.001**
Pct Schools with a Part-Time Nurse	0.00002114 (0.00013349)	0.874	-0.00069727 ** (0.00013987)	**<0.001**	0.00021465 * (0.00007722)	**0.005**	-0.00141749 ** (0.00008567)	**<0.001**
Difference in coefficients	-0.00012092 (0.00012289)	0.325	-0.00033361 ** (0.00006976)	**<0.001**	0.00058829 ** (0.00012824)	**<0.001**	0.00085402 ** (0.00007605)	**<0.001**
Observations	281453		281453		281453		281453	
R^2 / R^2 adjusted	0.749 / 0.749		0.699 / 0.699		0.783 / 0.783		0.716 / 0.716	

**p<0.05 ** p<0.01 *** p<0.001*

Table 6: WLS and OLS Regression Results for Overweight Self-Perception Outcome

	Overweight Self-Perception (WLS)		**OLS**	
Predictors	*Estimates*	*p*	*Estimates*	*p*
Pct Schools with a Full-Time Nurse	-0.00111916 *** (0.00003834)	**<0.001**	0.00000791 (0.00003327)	0.812
Pct Schools with a Part-Time Nurse	0.00032203 *** (0.00007597)	**<0.001**	-0.00169365 *** (0.00005641)	**<0.001**
Difference in Coefficients	-0.00144118 *** (0.00008389)	**<0.001**	0.00170156 *** (0.00006051)	**<0.001**
Pct Schools with School-based Health Center	0.00250429 *** (0.00013494)	**<0.001**	-0.00259831 *** (0.00005899)	**<0.001**
2016 Trump Vote Share	-0.62677853 *** (0.02397774)	**<0.001**	-0.23685206 *** (0.01049285)	**<0.001**
Year	0.00489913 ** (0.00186437)	**0.009**	-0.00647663 *** (0.00051148)	**<0.001**
Sex	-0.03081860 *** (0.00375937)	**<0.001**	-0.01507872 *** (0.00082797)	**<0.001**
Race: American Indian/Alaska Native	-9.39808925 * (3.76131011)	**0.012**	13.44375478 *** (1.02898256)	**<0.001**
Race: Asian	-9.41441110 * (3.76113472)	**0.012**	13.47536533 *** (1.02898919)	**<0.001**
Race: Black of African American	-9.41917285 * (3.76165688)	**0.012**	13.45763740 *** (1.02907355)	**<0.001**
Race: Hispanic/Latino	-9.38305138 * (3.76218259)	**0.013**	13.49773364 *** (1.02899569)	**<0.001**
Race: Missing	-9.42990716 * (3.76163245)	**0.012**	13.46378567 *** (1.02903759)	**<0.001**
Race: Multiple Races	-9.40240567 * (3.76163103)	**0.012**	13.46886845 *** (1.02907024)	**<0.001**
Race: Native Hawaiian/Other Pacific Islander	-9.37705945 * (3.76085061)	**0.013**	13.57233998 *** (1.02870699)	**<0.001**
Race: White	-9.42067042 * (3.76163622)	**0.012**	13.46466563 *** (1.02902542)	**<0.001**

Pct Enrollment of White Students	-0.00114316 *** (0.00008824)	**<0.001**	-0.00213045 *** (0.00005848)	**<0.001**
Percent Enrollment of Students in Poverty	0.00477324 *** (0.00048647)	**<0.001**	0.00712299 *** (0.00023416)	**<0.001**
Per-Pupil Education Spending	-0.00000650 *** (0.00000047)	**<0.001**	-0.00000590 *** (0.00000051)	**<0.001**
Observations	232194		232194	
R^2 / R^2 adjusted	0.198 / 0.198		0.134 / 0.134	

**p<0.05 ** p<0.01 *** p<0.001*

Table 7: Missing Data Imputation Results for Overweight Self-Perception Outcome

	NAs Coded as 1 (WLS)		**NAs Coded as 0 (WLS)**		**NAs Coded as 1 (OLS)**		**NAs Coded as 0 (OLS)**	
Predictors	*Estimates*	*p*	*Estimates*	*p*	*Estimates*	*p*	*Estimates*	*p*
Pct Schools with a Full-Time Nurse	-0.00082711 ** (0.00005780)	**<0.001**	-0.00086110 ** (0.00003493)	**<0.001**	-0.00101383 ** (0.00004284)	**<0.001**	0.00040555 ** (0.00002524)	**<0.001**
Pct Schools with a Part-Time Nurse	0.00025984 ** (0.00009807)	**0.008**	0.00051664 ** (0.00007375)	**<0.001**	-0.00305282 ** (0.00007679)	**<0.001**	-0.00110540 ** (0.00005120)	**<0.001**
Difference in coefficients	-0.00108695 ** (0.00010581)	**<0.001**	0.00203898 ** (0.00007797)	**<0.001**	-0.00137774 ** (0.00007487)	**<0.001**	0.00151094 ** (0.00005526)	**<0.001**
Observations	250223		250223		250223		250223	
R^2 / R^2 adjusted	0.193 / 0.193		0.191 / 0.191		0.233 / 0.233		0.115 / 0.115	

**p<0.05 ** p<0.01 *** p<0.001*

Table 8: WLS and OLS Regression Results for Overweight BMI Outcome

	Overweight BMI (WLS)		**OLS**	
Predictors	*Estimates*	*p*	*Estimates*	*p*

Pct Schools with a Full-Time Nurse	0.00001982 (0.00009492)	0.835	-0.00001974 (0.00005078)	0.697
Pct Schools with a Part-Time Nurse	-0.00034519 * (0.00013780)	**0.012**	-0.00032320 *** (0.00007927)	**<0.001**
Difference in coefficients	0.00036501 ** (0.00012326)	**0.003**	0.00030345 *** (0.00007289)	**<0.001**
Pct Schools with School-based Health Center	0.00071769 *** (0.00021536)	**0.001**	0.00080701 *** (0.00012074)	**<0.001**
2016 Trump Vote Share	0.12021657 *** (0.03640340)	**0.001**	0.19865059 *** (0.01446954)	**<0.001**
Year	0.00708124 ** (0.00225286)	**0.002**	0.00304069 *** (0.00083210)	**<0.001**
Sex	0.02789778 *** (0.00441391)	**<0.001**	0.03721967 *** (0.00160803)	**<0.001**
Race: American Indian/Alaska Native	-14.12621132 ** (4.54327566)	**0.002**	-5.98732947 *** (1.67792516)	**<0.001**
Race: Asian	-14.30199791 ** (4.54376516)	**0.002**	-6.13950187 *** (1.67787597)	**<0.001**
Race: Black of African American	-14.16671138 ** (4.54422824)	**0.002**	-5.99316899 *** (1.67796580)	**<0.001**
Race: Hispanic/Latino	-14.14187158 ** (4.54403604)	**0.002**	-6.00315512 *** (1.67799033)	**<0.001**
Race: Missing	-14.18758653 ** (4.54379874)	**0.002**	-6.04381176 *** (1.67792606)	**<0.001**
Race: Multiple Races	-14.18120021 ** (4.54409806)	**0.002**	-6.03434436 *** (1.67794399)	**<0.001**
Race: Native Hawaiian/Other Pacific Islander	-14.12014131 ** (4.54320533)	**0.002**	-5.94385417 *** (1.67789837)	**<0.001**
Race: White	-14.25119506 ** (4.54404107)	**0.002**	-6.08521050 *** (1.67798954)	**<0.001**
Pct Enrollment of White Students	0.00055107 *** (0.00016112)	**0.001**	0.00026485 *** (0.00005675)	**<0.001**
Percent Enrollment of Students in Poverty	0.00567546 *** (0.00051389)	**<0.001**	0.00197803 *** (0.00022524)	**<0.001**
Per-Pupil Education Spending	-0.00000026 (0.00000072)	0.722	0.00000132 ** (0.00000042)	**0.002**

Observations	317486	317486
R^2 / R^2 adjusted	0.327 / 0.327	0.304 / 0.304

**p<0.05 ** p<0.01 *** p<0.001*

Table 9: Missing Data Imputation Results for Overweight BMI Outcome

	NAs Coded as 1 (WLS)		**NAs Coded as 0 (WLS)**		**NAs Coded as 1 (OLS)**		**NAs Coded as 0 (OLS)**	
Predictors	*Estimates*	*p*	*Estimates*	*p*	*Estimates*	*p*	*Estimates*	*p*
Pct Schools with a Full-Time Nurse	0.00005514 (0.00009452)	0.560	-0.00001020 (0.00009091)	0.911	0.00030939 *** (0.00005078)	**<0.001**	-0.00018894 *** (0.00004822)	**<0.001**
Pct Schools with a Part-Time Nurse	-0.00052839 *** (0.00013725)	**<0.001**	-0.00023563 (0.00013155)	0.073	-0.00024630 *** (0.00007940)	**0.002**	-0.00036333 *** (0.00007501)	**<0.001**
Difference in coefficients	0.00058353 *** (0.00012269)	**<0.001**	0.00055570 *** (0.00007288)	**<0.001**	0.00022544 (0.00011679)	0.054	0.00017440 * (0.00006880)	**0.011**
Observations	347027		347027		347027		347027	
R^2 / R^2 adjusted	0.381 / 0.381		0.300 / 0.300		0.366 / 0.366		0.277 / 0.277	

**p<0.05 ** p<0.01 *** p<0.001*

Table 10: WLS and OLS Regression Results for Depression Symptoms Outcome

	Depression Symptoms (WLS)		**OLS**	
Predictors	*Estimates*	*p*	*Estimates*	*p*
Pct Schools with a Full-Time Nurse	-0.00020440 * (0.00009273)	**0.027**	-0.00023744 *** (0.00004995)	**<0.001**
Pct Schools with a Part-Time Nurse	-0.00013773 (0.00013596)	0.311	-0.00008997 (0.00007827)	0.250
Difference in coefficients	-0.00006667 (0.00012103)	0.582	-0.00014747 * (0.00007142)	**0.039**
Pct Schools with School-based Health Center	-0.00071763 *** (0.00021289)	**0.001**	0.00034311 ** (0.00011780)	**0.004**

2016 Trump Vote Share	-0.11468587 ** (0.03584301)	**0.001**	0.12998661 *** (0.01402430)	<**0.001**
Year	0.02943323 *** (0.00221022)	<**0.001**	0.02042494 *** (0.00080970)	<**0.001**
Sex	-0.19325290 *** (0.00434625)	<**0.001**	-0.18371449 *** (0.00155813)	<**0.001**
Race: American Indian/Alaska Native	-58.68694743 *** (4.45729129)	<**0.001**	-40.63341119 *** (1.63277825)	<**0.001**
Race: Asian	-58.76328343 *** (4.45733819)	<**0.001**	-40.72128031 *** (1.63271096)	<**0.001**
Race: Black of African American	-58.76233596 *** (4.45781165)	<**0.001**	-40.71183194 *** (1.63281580)	<**0.001**
Race: Hispanic/Latino	-58.69225708 *** (4.45766206)	<**0.001**	-40.63578977 *** (1.63282478)	<**0.001**
Race: Missing	-58.72223628 *** (4.45753881)	<**0.001**	-40.66606901 *** (1.63277459)	<**0.001**
Race: Multiple Races	-58.69706232 *** (4.45760762)	<**0.001**	-40.63516768 *** (1.63278601)	<**0.001**
Race: Native Hawaiian/Other Pacific Islander	-58.74009555 *** (4.45724373)	<**0.001**	-40.65885828 *** (1.63272988)	<**0.001**
Race: White	-58.73698795 *** (4.45759023)	<**0.001**	-40.70045807 *** (1.63282718)	<**0.001**
Pct Enrollment of White Students	-0.00018910 (0.00015898)	0.234	-0.00026247 *** (0.00005519)	<**0.001**
Percent Enrollment of Students in Poverty	0.00371666 *** (0.00050762)	<**0.001**	0.00097952 *** (0.00022001)	<**0.001**
Per-Pupil Education Spending	-0.00000104 (0.00000070)	0.136	0.00000115 ** (0.00000040)	**0.004**
Observations	340733		340733	
R^2 / R^2 adjusted	0.374 / 0.374		0.352 / 0.352	

**p<0.05 ** p<0.01 *** p<0.001*

Table 11: Missing Data Imputation Results for Depression Symptoms Outcome

	NAs Coded as 1 (WLS)		**NAs Coded as 0 (WLS)**		**NAs Coded as 1 (OLS)**		**NAs Coded as 0 (OLS)**	
Predictors	*Estimates*	*p*	*Estimates*	*p*	*Estimates*	*p*	*Estimates*	*p*

Pct Schools with a Full-Time Nurse	-0.00019553 * (0.00009265)	**0.035**	-0.00020775 * (0.00009175)	**0.024**	-0.00027494 ** (0.00005000)	**<0.001**	-0.00021421 ** (0.00004930)	**<0.001**
Pct Schools with a Part-Time Nurse	-0.00005508 (0.00013606)	0.686	-0.00020112 (0.00013444)	0.135	-0.00003508 (0.00007836)	0.654	-0.00010920 (0.00007728)	0.158
Difference in coefficients	-0.00014045 (0.00012106)	0.246	-0.00023986 ** (0.00007152)	**0.001**	-0.00000663 (0.00011910)	0.956	-0.00010501 (0.00007052)	0.136
Observations	347027		347027		347027		347027	
R^2 / R^2 adjusted	0.384 / 0.384		0.367 / 0.367		0.361 / 0.361		0.346 / 0.346	

**p<0.05 ** p<0.01 *** p<0.001*

Table 12: WLS and OLS Regression Results for Recent Smoking Outcome

	Recent Smoking (WLS)		**OLS**	
Predictors	*Estimates*	*p*	*Estimates*	*p*
Pct Schools with a Full-Time Nurse	-0.00163356 *** (0.00009747)	**<0.001**	-0.00270201 *** (0.00006397)	**<0.001**
Pct Schools with a Part-Time Nurse	-0.00137190 *** (0.00014735)	**<0.001**	-0.00139790 *** (0.00010012)	**<0.001**
Difference in coefficients	-0.00026166 * (0.00012817)	**0.041**	-0.00130411 *** (0.00009479)	**<0.001**
Pct Schools with School-based Health Center	0.00372227 *** (0.00019097)	**<0.001**	0.00193840 *** (0.00012659)	**<0.001**
2016 Trump Vote Share	0.57307251 *** (0.02983573)	**<0.001**	0.32456302 *** (0.01708337)	**<0.001**
Year	0.01911223 *** (0.00238012)	**<0.001**	0.03771641 *** (0.00093968)	**<0.001**
Sex	0.04710006 *** (0.00459779)	**<0.001**	0.04179755 *** (0.00179530)	**<0.001**
Race: American Indian/Alaska Native	-38.51378623 *** (4.80406635)	**<0.001**	-75.87676989 *** (1.89698039)	**<0.001**
Race: Asian	-38.74295469 *** (4.80425111)	**<0.001**	-76.09957186 *** (1.89687951)	**<0.001**

Race: Black of African American	-38.70707736 *** (4.80445230)	**<0.001**	-76.06252734 *** (1.89695104)	**<0.001**
Race: Hispanic/Latino	-38.66305518 *** (4.80402462)	**<0.001**	-75.95998178 *** (1.89699430)	**<0.001**
Race: Missing	-38.57029890 *** (4.80393808)	**<0.001**	-75.92839839 *** (1.89693736)	**<0.001**
Race: Multiple Races	-38.62193463 *** (4.80432109)	**<0.001**	-75.96685340 *** (1.89696098)	**<0.001**
Race: Native Hawaiian/Other Pacific Islander	-38.46567810 *** (4.80463407)	**<0.001**	-75.82791499 *** (1.89692715)	**<0.001**
Race: White	-38.59766840 *** (4.80386752)	**<0.001**	-75.95914107 *** (1.89699601)	**<0.001**
Pct Enrollment of White Students	-0.00164234 *** (0.00018915)	**<0.001**	-0.00207105 *** (0.00006723)	**<0.001**
Percent Enrollment of Students in Poverty	-0.00374653 *** (0.00049267)	**<0.001**	-0.00249407 *** (0.00028024)	**<0.001**
Per-Pupil Education Spending	0.00001351 *** (0.00000081)	**<0.001**	0.00001892 *** (0.00000051)	**<0.001**
Observations	232606		232606	
R^2 / R^2 adjusted	0.247 / 0.247		0.293 / 0.293	

**p<0.05 ** p<0.01 *** p<0.001*

Table 13: Missing Data Imputation Results for Recent Smoking Outcome

	NAs Coded as 1 (WLS)		**NAs Coded as 0 (WLS)**		**NAs Coded as 1 (OLS)**		**NAs Coded as 0 (OLS)**	
Predictors	*Estimates*	*p*	*Estimates*	*p*	*Estimates*	*p*	*Estimates*	*p*
Pct Schools with a Full-Time Nurse	-0.00219578 ** (0.00010306)	**<0.001**	-0.00113476 ** (0.00008610)	**<0.001**	-0.00204759 ** (0.00006448)	**<0.001**	-0.00257728 ** (0.00005954)	**<0.001**
Pct Schools with a Part-Time Nurse	0.00066810 ** (0.00014946)	**<0.001**	-0.00192768 ** (0.00012253)	**<0.001**	0.00155344 ** (0.00010037)	**<0.001**	-0.00303921 ** (0.00008600)	**<0.001**
Difference in	-0.00286387 *	**<0.001**	-0.00360103 *	**<0.001**	0.00079291 ** (0.00010323)	**<0.001**	0.00046192 ** (0.00007877)	**<0.001**

coefficients	(0.00012941)**	(0.00009648)**		
Observations	269059	269059	269059	269059
R^2 / R^2 adjusted	0.435 / 0.435	0.197 / 0.197	0.411 / 0.411	0.253 / 0.253

**p<0.05 ** p<0.01 *** p<0.001*