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School-based health services and educational attainment: Findings from a national longitudinal study

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ABSTRACT

This study examined whether availability and use of different types of school-based health services (SBHS) during adolescence were associated with educational attainment in adulthood. Data from the National Longitudinal Study of Adolescent to Adult Health (Add Health) were analyzed in 2018 to assess relationships between different types of SBHS provided by schools and use of SBHS among adolescents in 1995, and educational attainment in young adulthood (2001 – 02) and later adulthood (2008). Multi-level linear regression models included SBHS such as providing immunizations, physical exams and emotional counseling at the school level, and receiving a school-based physical exam, emotional counseling or family planning counseling at the individual level, with other school and individual characteristics included as covariates. At the school level, providing immunizations in 1995 was associated with higher educational attainment in 2001–02 and 2008. Providing physical exams and physical fitness/recreation centers also were marginally associated with higher educational attainment in 2001–02 and 2008, respectively. At the individual level, receiving a physical exam at school in 1995 was associated with higher educational attainment in 2001–02, while receiving emotional counseling at school was inversely associated with educational attainment in 2008. None of the other types of SBHS at the school or individual level were associated with later educational attainment. This study suggests that preventive SBHS such as immunizations, physical exams and physical fitness/recreation centers may contribute to academic achievement and higher educational attainment during young and later adulthood.

1. Introduction

To identify and help adolescents who are in need of health care, a growing number of schools provide on-site health services, often in collaboration with community health agencies. Over 2000 schools in the U.S. now have school-based health centers (SBHCs), which provide comprehensive, convenient health care services for school children and adolescents in all 50 states and the District of Columbia (School-Based Health Alliance, n.d.). The number of SBHCs increased significantly from 1999 to 2014 as part of a national effort to provide cost-effective and easily accessible health care services for youth who may lack access to affordable health care (School-Based Health Alliance, n.d.). The Affordable Care Act included a $200 million appropriation to improve delivery and expansion of SBHC services from 2010 to 2013 (National Conference of State Legislatures, n.d.). SBHCs typically have primary care and behavioral health providers and offer preventive and treatment services including physical exams, immunizations and oral and vision screenings. Many SBHCs also provide reproductive, substance use and mental health services.

Some research suggests that SBHCs not only provide adolescents with greater access to primary health care, but also may help adolescents academically as it is believed that healthy children are ready and able to learn (Knopf et al., 2016). Studies have examined effects of the presence/absence of SBHCs (i.e., availability of health services) and use of SBHC services on educational outcomes. For example, a study in one California elementary school found that after an SBHC opened in 2004, over the next four years there was a 74% decline in the number of first grade students who could not attend school due to lack of a physical examination (Foy and Hahn, 2009). A study of over 800 public high schools in California found a positive association between SBHC presence and the percentage of students participating in college board exams, but no association between SBHC presence and academic achievement indicators (e.g., graduation rates), using propensity score matching to control for potential selection factors (Bersamin et al.,

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2016). Additionally, a retrospective study of students, teachers and parents who completed the Learning Environment Survey for public schools in a northeastern city in the U.S. found a positive association between schools having SBHCs and a higher overall rating of the school learning environment (Strolin-Goltzman, 2010). This study also used propensity score matching to control for possible school self-selection effects, and suggests that SBHCs may help to improve academic expectations, communication, school safety and respect, and student engagement.

A study with elementary, middle and high school students found higher levels of school connectedness among students who used SBHC services, which was in turn positively related to academic performance (Strolin-Goltzman et al., 2014). A longitudinal study of ninth graders over five school semesters found a significant increase in school attendance among students who used school-based medical services compared to non-users, and greater increases in grade point average (GPA) among school-based mental health service users compared to non-users; propensity score matching was used in this study to control for self-selection factors (Walker et al., 2010). Another study of a cohort of ninth graders in an urban school district found a significant 33% reduction in school dropout by 12th grade among students who used SBHC services with low-to-moderate frequency compared to non-users (Kerns et al., 2011). However, there was no difference in the school dropout rate among students who were frequent users of SBHC services compared to non-users.

A systematic review of research on SBHCs by Knopf et al. (2016) concluded that SBHCs can have a beneficial effect on academic achievement, but that additional research is needed to address methodological limitations of prior studies. These limitations include inadequate controls for possible selection factors at the school and student levels, lack of adequate baseline data for assessment of SBHC effects over time, non-representative samples, and limited research on the long-term effects of SBHCs on academic outcomes. Additionally, very few studies have investigated possible effects of both the availability and use of school-based health services (SBHS) on educational attainment, and whether the types of health services provided by schools and used by students are differentially predictive of educational outcomes (Walker et al., 2010).

The present study helps to address these limitations and questions by using data from the National Longitudinal Study of Adolescent to Adult Health (Add Health). The Add Health study provides information about availability and utilization of various types of health services typically provided by SBHCs and other potentially beneficial health-related services provided during adolescence, and educational attainment in adulthood. We examine relationships between availability and utilization of different types of SBHS and educational attainment with the national Add Health cohort, controlling for potential confounding or selection variables.

2. Methods

2.1. Add health study sample

This study is based on computer-assisted in-home interview data collected from 11,435 individuals who participated in the Add Health study during adolescence (1995) and young adulthood (2001–02), and from 9933 individuals who participated during adolescence (1995) and later adulthood (2008) (Harris et al., 2009). Of the 9933 individuals who participated in the 2008 Add Health study, 9929 also participated in 2001–02. Participants were in grades 7–12 in 1995. The study also uses data collected from parents in 1995 (85% biological mother, 10% female guardian or head of household) and school administrators at 129 schools that served grades 6–12 in 1994–95. The final study sample is based on schools that had an adequate number of students for multilevel analyses; school administrators who responded to survey questions about SBHS and other school characteristics; parent participation in interviews; individuals for whom study sample weights were available during adolescence and adulthood; and who provided complete data for study variables.

2.2. Measures

2.2.1. Educational attainment

In 2001–02, respondents were asked, “What is the highest grade or year of regular school you have completed?” Possible responses (and corresponding values) ranged from 6th grade (6) to 12th grade (12), 1 year of college (13) to 5 or more years of college (17), and from 1 year of graduate school (18) to 5 or more years of graduate school (22). In 2008, respondents were asked, “What is the highest level of education that you have achieved to date?” Possible responses (and corresponding recoded values) ranged from 8th grade or less (8) to high school graduate (12), from some vocational/technical training after high school (13) to completed college with a bachelor's degree (16), from some graduate school (17) to completed a doctoral degree (22), and from some post baccalaureate professional education (e.g., law school, medical school) (17) to completed baccalaureate professional education (e.g., law school, medical school) (22). We note that values for the 2008 educational attainment measure were recoded from original values in the Add Health public use dataset to be more comparable to 2001–02 values, and to reflect the number of years of formal education. The correlation between 2008 education attainment variables with original and recoded values was 0.96 ($p < .001$).

2.2.2. Use of school-based health services

In 1995, respondents were asked whether in the past year they received a routine physical examination, and if so, where they received the examination (private doctor's office, community health clinic, school, hospital, some other place). Similarly, they were asked whether and where they received psychological or emotional counseling, drug or alcohol abuse treatment, family planning counseling or services, testing or treatment for a sexually transmitted disease or AIDS, and prenatal/postpartum health care in the past year. A dichotomous variable was created for each type of health service received at school.

Respondent characteristics that could be associated with use of SBHS in adolescence and educational attainment in adulthood include GPA, parent education, health insurance coverage, general health status, and demographic characteristics. Measures for these variables are described below.

2.2.3. Grade point average

In 1995, respondents were asked to report their grade in each of four subject areas (English or language arts, mathematics, history or social studies, and science) during the most recent grading period, with the following possible responses: “A,” “B,” “C,” “D or lower,” “Didn't take this subject,” and “Took this subject, but it wasn't graded this way.” The latter two response options were coded as missing, and an average grade was computed for the four subject areas based on a four-point scale (D = 1 to A = 4).

2.2.4. Parent education

Parents were asked, “How far did you go in school?” with response options (and corresponding values) ranging from 8th grade or less (1) to professional training beyond a 4-year college or university (9), and never went to school (10). The latter response option was recoded to 1.

2.2.5. Health insurance coverage

Parents were asked, “What type of health insurance does [name of child] have?” with the following response options: “Medicare (from Social Security),” “Medicaid,” “Individual or group private coverage (such as Blue Cross or Cigna),” “Prepaid health plan (such as HMO or CHAMPUS),” “Other,” and “None.” A dichotomous variable was created to indicate whether the child had any health insurance coverage in

1995.

2.2.6. General health status

Respondents were asked, "In general, how is your health?" with five possible responses ranging from "Excellent," to "Poor." Responses to these questions were reverse coded to create a general health status variable ranging from 1 to 5 with a higher value representing better subjective health.

2.2.7. Demographic characteristics

Respondents reported their ethnicity and race (Hispanic, white, African-American, Asian, Native American, Other), biological sex, and birth date age. Age variables from 2001 to 02 and 2008 were included in the analyses as covariates.

2.2.8. Availability of school-based health services

School administrators were asked whether the following services were provided on school premises: athletic and non-athletic physical exams, treatment for minor illnesses or injuries, diagnostic screenings (e.g., sickle cell anemia, sexually transmitted diseases), immunizations, family planning counseling, drug awareness/resistance program, alcohol and drug abuse treatment, emotional counseling, nutrition/weight loss program, and a physical fitness/recreation center. A dichotomous variable was created for each type of SBHS. We note that several other types of SBHS were included in the questionnaire (e.g., treatment for sexually transmitted diseases), but less than 5% of schools provided those services for them to be included as variables in the analyses.

2.2.9. Other school characteristics

Other school characteristics included student population size, which was provided as an ordinal variable in the Add Health dataset to protect school identity (1 = 1–400 students, 2 = 401–1000 students, 3 = 1001–4000 students); public or private; grades served by the school, which was treated as a dichotomous variable (high school grades 9–12 only vs. non-high school grades); and urbanicity, which was treated as two dummy variables (rural and suburban vs. urban).

2.3. Data analysis

Data analyses were conducted in 2018. Descriptive statistics for study variables were first examined. Multi-level linear regression analyses were then conducted to assess relationships between SBHS variables at the school and individual level in 1995 and educational attainment in 2001–02 and 2008. Regression models also included other school- and individual-level characteristics as covariates. All analyses were conducted in HLM version 7.03 software to adjust for the multistage sampling design, as schools were sampled within regions of the U.S. and student observations were nested within schools in 1995 (Harris et al., 2009). Sample weights were applied when obtaining descriptive statistics for study variables at the individual level and in all multi-level regression analyses. Sample weights for 2001–02 and 2008 were based on school-specific grade-sex-race subpopulations eligible for in-home interviews in 1995, and the sample weights generated for 1995 interview data (Tourangeau and Hee-Choon, 1999).

3. Results

3.1. School characteristics

As shown in Table 1, about 42% of the schools were located in the southern U.S., 42.6% were high schools, 9.3% were private schools, 46.5% were medium-sized schools, and 55% were in suburban areas. About 42% of schools provided physical examinations, and over half of the schools provided treatment for minor illnesses and injuries, emotional counseling, or drug awareness/resistance programs. Less than

Table 1
School characteristics (N = 129).

Variable	Percent
Region[a]	
West	21.7
Midwest	22.5
South	41.9
Northeast	14.0
High school (only grades 9–12)	42.6
Private	9.3
Student population size	
1–400	23.3
401–1000	46.5
1001–4000	30.2
Urbanicity	
Urban	30.2
Suburban	55.0
Rural	14.7
School-based health services	
Physical exams (athletic or non-athletic)	41.9
Treatment for minor illnesses or injuries	58.9
Diagnostic screenings	9.3
Immunizations	9.3
Emotional counseling	56.6
Drug awareness/resistance program	84.5
Alcohol or drug abuse treatment	41.9
Nutrition/weight loss program	15.5
Family planning counseling	8.5
Physical fitness/recreation center	38.0

[a] Region is treated as a random effect in regression analyses, while other school characteristics are included as fixed effects.

Table 2
Individual characteristics, by follow-up year(s), mean (standard deviation) or percent[a].

Variable[b]	Follow-up year(s)	
	2001–02 (N = 11,435)	2008 (N = 9933)
Educational attainment at follow-up	13.3 (1.9)	14.2 (2.3)
Age at follow-up	21.8 (1.7)	28.8 (1.8)
Grade level		
7 (%)	18.8	18.9
8 (%)	17.6	17.8
9 (%)	17.4	17.3
10 (%)	16.2	16.3
11 (%)	15.0	15.3
12 (%)	14.7	14.1
Female (%)	48.8	50.5
Hispanic (%)	10.2	10.2
White (%)	78.9	79.9
African-American (%)	16.0	15.1
Asian (%)	4.2	4.1
Native American (%)	4.9	4.8
No health insurance coverage (%)	11.5	11.4
Grade point average	2.8 (0.7)	2.8 (0.8)
Parent education	5.4 (2.3)	5.4 (2.2)
General health status	3.9 (0.9)	3.9 (0.9)
SBHS received in past year		
Physical exam (%)	10.5	10.2
Emotional counseling (%)	4.3	4.3
Alcohol or drug counseling (%)	1.3	1.4
Family planning counseling/services (%)	0.7	0.7
STD or HIV testing or treatment (%)	0.5	0.4
Prenatal or postpartum services (%)	0.2	0.1

[a] Descriptive statistics are weighted, while sample sizes are unweighted.
[b] Descriptive statistics for educational attainment and age are based on interviews in 2001–02 and 2008. Descriptive statistics for all other variables are based on interviews in 1995.

Table 3
Results of multi-level linear regression analyses, beta (standard error).

Variable	Educational attainment	
	2001–02	2008
School level		
High school	0.54 (0.11)**	0.46 (0.14)**
Private	0.89 (0.16)**	0.77 (0.20)**
School size	0.25 (0.08)**	0.28 (0.10)*
Suburban	0.16 (0.10)	0.10 (0.13)
Rural	0.17 (0.15)	−0.01 (0.18)
Physical exams (athletic or non-athletic)	0.18 (0.09)†	0.11 (0.12)
Treatment for minor illnesses or injuries	−0.10 (0.09)	−0.09 (0.11)
Diagnostic screenings	−0.03 (0.15)	0.31 (0.19)
Immunizations	0.39 (0.17)*	0.52 (0.22)*
Emotional counseling	−0.02 (0.09)	−0.08 (0.12)
Drug awareness/resistance program	−0.11 (0.13)	−0.24 (0.17)
Alcohol or drug abuse treatment	−0.13 (09)	−0.11 (0.12)
Nutrition/weight loss program	−0.06 (0.13)	−0.19 (0.17)
Family planning counseling	−0.27 (0.18)	−0.34 (0.26)
Physical fitness/recreation center	0.07 (0.10)	0.23 (0.13)†
Individual level		
Age	0.16 (0.01)**	−0.01 (0.02)
Female	0.19 (0.04)**	0.33 (0.05)**
Hispanic	−0.02 (0.07)	0.06 (0.10)
White	−0.006 (0.11)	−0.14 (0.15)
African-American	0.06 (0.12)	−0.06 (0.16)
Asian	0.21 (0.13)	0.12 (0.17)
Native American	0.01 (0.10)	−0.34 (0.14)*
No health insurance coverage	−0.35 (0.06)**	−0.48 (0.08)**
Grade point average	0.90 (0.03)**	1.19 (0.04)**
Parent education	0.16 (0.01)**	0.22 (0.01)**
General health status	0.13 (0.02)**	0.11 (0.02)**
Physical exam	0.20 (0.07)**	0.07 (0.08)
Emotional counseling	−0.15 (0.09)	−0.43 (0.13)**
Alcohol or drug counseling	−0.005 (0.18)	−0.16 (0.24)
Family planning counseling/services	−0.07 (0.23)	−0.51 (0.29)
STD or HIV testing or treatment	−0.17 (0.30)	−0.18 (0.42)
Prenatal or postpartum services	−0.32 (0.48)	−0.49 (0.60)

† $p = .07$.
* $p < .05$.
** $p < .01$.

10% of schools provided diagnostic screenings, immunizations, or family planning counseling.

3.2. Individual characteristics

Descriptive statistics for individual-level variables (Table 2) indicate an average of 1–2 years of post-secondary educational attainment in young adulthood (2001–02), and later adulthood (2008). In 1995, about half of the sample was female, 10% of the sample was Hispanic, almost 80% of the sample was white. Over 11% of parents reported that their child did not have health insurance coverage in 1995. Regarding SBHS, over 10% of students reported getting a physical exam at school in 1995, while about 4% received some type of emotional counseling. Just over 1% of students received alcohol or drug abuse counseling in 1995, and less than 1% received family planning counseling/services, screening or treatment of STDs or HIV, or prenatal/postpartum services.

3.3. Multi-level analyses

Results of multi-level linear regression analyses indicate a significant positive association between schools providing immunizations in 1995 and higher educational attainment in 2001–02 when controlling for other school- and individual-level characteristics (Table 3). There also was a marginally significant association between schools providing physical exams in 1995 and higher educational attainment in 2001–02 ($p = .06$). None of the other types of SBHS provided by schools in 1995 were associated with educational attainment in 2001–02. Other school-level covariates associated with higher educational attainment in 2001–02 included high school and private school status, and school size. At the individual level, receiving a physical exam at school in 1995 was associated with higher educational attainment in 2001–02 when controlling for school and other individual characteristics. None of the other types of SBHS used or received by adolescents in 1995 were associated with educational attainment in 2001–02. Age, gender (female), parent education, GPA and general health status were positively associated with higher educational attainment in 2001–02, while not having health insurance was inversely related to educational attainment during young adulthood.

Higher educational attainment in 2008 also was positively associated with schools providing immunizations in 1995, and was marginally associated with schools having a physical fitness recreation center ($p = .07$). None of the other types of SBHS provided by schools in 1995 were associated with educational attainment in 2008. High school and private school status, and school size were positively related to higher educational attainment in 2008. At the individual level, receiving emotional counseling and not having health insurance in 1995 were inversely related to educational attainment in 2008, while gender (female), parent education, GPA and general health status were positively associated with educational attainment. None of the other types of SBHS used or received by adolescents in 1995 were associated with educational attainment in 2008.

4. Discussion

Findings of this study suggest that availability and utilization of certain types of SBHS during adolescence are predictive of higher educational attainment in adulthood. In the Add Health cohort, attending a school that provided immunizations and receiving a physical exam at school during adolescence was associated with higher educational attainment in young adulthood when controlling for potential confounding or selection variables. Schools providing physical exams in 1995 also was marginally associated with higher educational attainment in young adulthood. Availability of immunizations at school in 1995 also was positively associated with higher educational attainment in later adulthood, while availability of a physical fitness recreation center was marginally associated with educational attainment in later adulthood when controlling for potential confounding or selection variables. These results suggest that preventive health care services and facilities that promote physical activity and other healthy behaviors may also help to improve academic performance and educational attainment.

We acknowledge that these findings do not provide evidence of a causal and likely complex relationship between SBHS and educational attainment. Further research is needed to more rigorously assess whether and how different types of SBHS may affect academic achievement and long-term educational attainment. In particular, investigation of potential mechanisms through which SBHS such as immunizations and physical exams may affect educational attainment would provide stronger evidence for their hypothesized effects. Possible mechanisms include prevention or early identification and treatment of medical conditions that would otherwise interfere with school attendance and academic achievement. Previous research suggests that availability of SBHS may be positively related to academic expectations, communication, school safety and respect, and student engagement, which could contribute to academic performance and educational attainment (Strolin-Goltzman, 2010). SBHS may also affect academic performance and long-term educational attainment through school connectedness, as suggested by a previous study on utilization of SBHC services by middle and high school students (Strolin-Goltzman et al., 2014).

Contrary to expectations, receiving emotional counseling at school was inversely related to educational attainment in later adulthood, and there was no association between receiving alcohol or drug counseling and educational attainment. This may reflect mental health or

substance use problems experienced during adolescence that interfered with academic achievement and longer-term educational attainment. Similarly, availability of emotional counseling or alcohol/drug abuse treatment at school were not associated with educational attainment either in 2001–02 or 2008. These findings also are somewhat unexpected as prior studies indicate that availability of school-based mental health services, which could include substance abuse counseling and treatment, is associated with lower risks for depression, substance use, and suicide among adolescents (Paschall and Bersamin, 2018a; Paschall and Bersamin, 2018b). Further research is needed to better understand what type(s) of mental health services are being provided by schools and how effective those services are in helping adolescents with school engagement and academic achievement.

Other types of SBHS provided by schools, including drug awareness/resistance programs, nutrition/weight loss programs, and family planning counseling/services were not associated with educational attainment in adulthood. The reported use of school-based family planning counseling/services, STD/HIV screening or treatment, and prenatal/postpartum services also was unrelated to educational attainment. These findings suggest that these types of SBHS have little or no effect on academic achievement and educational attainment when adjusting for potential confounding or selection variables.

Findings of this study should be considered in light of several potential limitations, including study attrition through loss to follow-up and non-response to interview questions, which may have affected analysis results in unknown ways. Social desirability and recall bias may have influenced responses to interview questions. Imprecise measurement of the type of SBHS provided by schools and used by adolescents also may have influenced the extent to which relationships with educational attainment in adulthood could be detected. Inadequate statistical power may have resulted from low percentages of adolescents who reported using SBHS. Adolescents were not asked about their use of some types of SBHS provided by schools, such as physical fitness/recreation centers, which might have been predictive of educational attainment.

Additionally, because the Add Health study began over 20 years ago, our findings may not accurately represent current SBHS and their potential long-term effects on educational attainment. Although it would be difficult to accurately compare current provision of SBHS in middle and high schools across the U.S. with prior decades, we do know that a larger number of schools have SBHCs now compared to 20 years ago (School-Based Health Alliance, n.d.), and that a number of recent studies indicate beneficial effects of SBHCs and utilization of SBHC services on school attendance and academic performance (Strolin-Goltzman et al., 2014; Walker et al., 2010; Kerns et al., 2011). A review of evidence by the Centers for Disease Control and Prevention indicates the importance of health among children and adolescents for academic achievement and longer-term educational attainment (Centers for Disease Control and Prevention, 2014), thus supporting the continuing value of SBHS and SBHCs.

The above limitations notwithstanding, this is the first study to examine possible long-term effects of SBHS typically provided by SBHCs on educational attainment with a large national cohort of individuals. Our findings suggest that preventive health services such as immunizations and physical exams may have long-term beneficial effects on educational attainment. SBHS may be particularly beneficial for disadvantaged youth who otherwise would not have access to health care services, but more in research is needed to determine whether SBHS and SBHCs help to reduce inequities in both health care and long-term educational outcomes (Knopf et al., 2016).

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Conflicts of interest statement

The authors declare no conflicts of interest.

Ethical approval

All study procedures were approved by the Institutional Review Board of the Pacific Institute for Research and Evaluation.

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