Published in final edited form as:

J Sch Nurs. 2016 August ; 32(4): 241–245. doi:10.1177/1059840516634805.

Assessing the Impact of School Based Health Centers on Academic Achievement and College Preparation Efforts: Using Propensity Score Matching to Assess School-Level Data in California

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Abstract

This study examines the association between School-Based Health Center (SBHC) presence and school-wide measures of academic achievement and college preparation efforts. Publicly available educational and demographic data from 810 California public high schools were linked to a list of schools with an SBHC. Propensity score matching, a method to reduce bias inherent in non-randomized control studies, was used to select comparison schools. Regression analyses, controlling for proportion of English Language Learners, was conducted for each outcome including: proportion of students participating in three College Board Exams, graduation rates, and meeting University graduation requirements. Findings suggest that SBHC presence is positively associated with college preparation outcomes, but not with academic achievement outcomes (graduation rates or meeting state graduation requirements). Future research must examine underlying mechanisms supporting this association, such as school connectedness. Additional research should explore the role that SBHC staff could have in supporting college preparation efforts.

Keywords

School-Based Health Center (SBHC); Academic; Youth; College Preparedness

Prior research has noted a positive relationship between school-based health center (SBHC) access and use and better academic outcomes including attendance, drop-out, grade point average, and school tardiness (Community Preventive Services Task Force, 2015; Desocio, O'Toole J, Nemirow, Lukach, & Magee, 2007; Strolin-Goltzman, Sisselman, Melekis, & Auerbach, 2014; Walker, Kerns, Lyon, Bruns, & Cosgrove, 2010). Several pathways have been posited to explain this relationship: SBHCs may improve access to health care, improve health status, and/or reduce health risk behaviors, and thereby remove barriers to learning as well as increase school attachment or connectedness (Bradley & Greene, 2013; Geierstanger, Amaral, Mansour, & Walters, 2004; Strolin-Goltzman, 2010). For example, SBHC users were more likely to report higher levels of school assets such as caring relationships with adults, high expectations, and meaningful participation (Stone, Whitaker, Anyon, & Shields, 2013); an important mechanism by which SBHCs may indirectly support positive academic outcomes.

Admission to college is influenced by a variety of student efforts. Academic achievement, such as grades or graduation rates, reflects multiple lifelong influences, including progress in middle and elementary school, as well as poverty or limited English proficiency. College preparation such as taking advanced placement courses also strongly reflects student efforts made in high school, which may reflect educational motivation and school connectedness (Centers for Disease Control and Prevention, 2009). Many of the same underlying mechanisms noted above which may support the association between SBHCs and school related outcomes may also contribute to other academic outcomes, including college preparation and high school graduation. For example, high school dropout rates have been linked to specific health issues including mental health, teen pregnancy, substance abuse, and vision issues (Freudenberg & Ruglis, 2007). Providing youth with low-cost health services and resources to address health issues may serve to increase graduation rates. Offering health services in a school may also relieve teaching burdens due to poor student health and thereby improve the classroom environment and engagement of students. Similarly, the added presence of caring adults provide additional social capital which may promote school connectedness and improve adolescent motivation to attend university (Strolin-Goltzman et al., 2014). While the current study does not examine mechanisms of action, it proposes to undertake the first step of establishing an association and hypothesizing that efforts towards college preparation at the school level will be improved in the presence of a SBHC.

Unfortunately, many SBHC impact studies suffer from small sample sizes and therefore limited statistical power, often a function of the high costs and logistical difficulties of collecting data across a large number of schools. However new approaches that make use of linked datasets and propensity score matching (Bersamin et al., 2016) will be used to address these challenges and address the stated hypothesis. The current study will examine the association of SBHC presence and school-wide measures of academic achievement and college preparation efforts among California high school students, a state with a large SBHC presence.

Method

Procedure

Publicly available educational and aggregated student demographic data from 2012 was downloaded from the California Department of Education (CaDoED) website and matched on school ID. Analyses were restricted to regular/traditional California schools that had enrolled 9th through 12th graders and a student body of at least 100. Alternative, Regional Occupational Programs, charter, and community day schools were excluded as they serve unique student populations. Schools in counties without any SBHCs were also excluded, for a final sample of N = 810 schools. A list of all California schools served by an on-site clinic was obtained from the California School-Based Health Alliance website¹ and then linked to CaDoED data. California has 243 SBHCs with a majority located in high schools (47%), followed by elementary schools (26%) and middle schools (11%) (California School-Based Health Alliance, 2016). This study was approved as exempt by the Prevention Research Center's Institutional Review Board.

Instrumentation

SBHC presence—A dichotomous variable (yes/no) indicated the presence of an on-site SBHC. Schools that had only a school-linked or mobile clinic were coded as not having an on-site SBHC.

Academic Achievement & College Preparation Efforts—The CaDoED Data and Statistics Branch provides annual aggregated data on student academic achievement and college preparation outcomes. Academic achievement outcomes examined included school-level graduation rates (as measured by the number of 12th-grade graduates [including summer graduates but excluding students with high school equivalencies]) and the percent of 12th graders who completed all classes necessary for public university entry. College preparation outcomes included the percent of eligible students who took each of the College Board exams for college applications including the Scholastic Aptitude Test (SAT), American College Test (ACT) and Advanced Placement (AP) exams.

School demographics—School-level data on school size (total enrollment), percent receiving free or reduced-price lunches (FRL), and percent of English language learners (ELL) were included as covariates. Preliminary analyses found that the proportion of students who were Hispanic and Black was highly collinear with FRL; we therefore included only FRL in the final regression models.

Sampling and Data Analysis Strategy

Because schools with and without SBHCs differ systematically and by design on school-level characteristics related to academic outcomes (Geierstanger et al., 2004), propensity score matching was employed to create an appropriate comparison group for the intervention SBHC schools. Propensity score matching is a method used to adjust for selection bias in observational studies of causal effects (Austin, 2011). It is designed to improve the match

¹<http://www.schoolhealthcenters.org/school-health-centers-in-ca/locations/sbhcs-by-county/>

between SBHC schools and comparison or control schools, using demographic or other characteristics. Propensity scores are generated for every school and then selected treatment schools are matched to a control school based on those scores. In the current study, a propensity score for all schools was created based on FRL and school size. For each SBHC intervention school, two control schools with the closest propensity scores were selected as matching schools. The final sample of $N = 296$ comprised $n = 99$ SBHC intervention schools and $n = 197$ control schools.

For each outcome we conducted a series of regression analyses, controlling only for proportion ELL, which was significantly lower among matched-comparison schools. All analyses were completed using SPSS 21.

Results

Preliminary results suggest that propensity score matching (PSM) worked to reduce differences between the SBHC schools and the matched-comparison schools. On average 53.7% students in the SBHC schools received FRL compared to 55.9% in the matched-comparison schools and 45.1% in the non-matched comparison schools (Table 1). Unadjusted regression models regressing SBHC presence on each outcome, indicates a significant negative association between SBHC presence and graduation rate ($B = -.06$, $p < .01$) and meeting state graduation requirements ($B = -.08$, $p < .01$) (see Table 2). Adjusted models which included the ELL covariate suggest that SBHC presence at a high school is positively associated with the college preparation outcomes: ACT ($B = 4.49$, $p < .01$), AP ($B = 5.65$, $p < .01$), and SAT ($B = 7.35$, $p < .01$) participation rates (Table 2). For example, in regression models controlling for ELL, the presence of an SBHC was associated with a 7.35 percentage point increase in the proportion of youth who participated in the SAT test. No significant association emerged between SBHC presence and the two academic achievement outcomes, graduation rates or meeting state university graduation requirements. In general, percent of ELL students was negatively associated all outcomes, except ACT participation.

Discussion

The analyses yielded mixed findings: SBHC presence was positively associated with efforts towards college preparation but not with academic achievement (graduation rates or meeting graduation requirements). These results are consistent with a recent systematic review of college preparedness (Royster, Gross, & Hochbein, 2015). Test-taking and enrollment in college preparatory courses are indicative of active engagement in processes occurring in high school, while graduation rates reflect long trajectories of academic achievement. Our findings are therefore also consistent with previous literature suggesting that SBHCs have an impact on students' perceived high expectations by adults (Stone et al., 2013) and commitment to an educational future (Strolin-Goltzman et al., 2014). With regards to mechanisms of action, SBHCs may contribute to students' connectedness to school which has been linked to higher levels of school attendance, higher grades, test scores, and staying in school longer (Centers for Disease Control and Prevention, 2009). Alternatively, school culture that leads to the establishment and maintenance of an SBHC may also provide (1) the necessary infrastructure to assist youth with obtaining financial waivers for College

Board exams and (2) skilled staff that can support and motivate students to participate in college preparation tasks.

Further research should attempt to replicate findings in other states and explore potential pathways of impact such as school connectedness and engagement. It is also important to examine whether the heterogeneity of services, which exist across SBHCs, may contribute to specific outcomes. For example, in California 87% of SBHCs provide medical services, 64% provide mental health services, and 23% provide dental treatment (California School-Based Health Alliance, 2016). Additionally, the cumulative impacts of SBHC access across the lifespan (including elementary and middle school) may also contribute to differential health and academic outcomes.

Limitations of the study include a focus on traditional high schools, limited access to robust measures of confounding factors, and the inability to confirm mechanisms of action. Nonetheless, findings from this study are the first to establish that the presence of SBHCs in high schools is positively associated with efforts towards college preparation at the population level suggesting that SBHCs may be well positioned to support college preparatory efforts. This finding also serves to highlight that SBHCs may not only mitigate health disparities but also serve to support learning, achievement, and college preparation. These results have implications for the coordination of activities and efforts between school health service and academic staff. Through integrated work with college counselors, educators, and other school staff, school nurses may be able to provide care and services, including referrals to guidance counselors that support college preparation, especially among students with health challenges.

Acknowledgments

This study was supported by Grant Number 1R01HD073386-01A1 from the National Institute of Child Health and Human Development (NICHD). The contents of this paper are solely the responsibility of the authors and do not necessarily represent official views of NICHD or NIH. The authors wish to thank Xiaoyu Song, PhD, for her technical advice on statistical analysis.

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Table 1

School-level variables for schools with and without an SBHC, mean (sd)

	SBHC intervention schools n = 99 mean (sd)	Propensity Score Matched-comparison schools n = 197 mean (sd)	Non-SBHC schools (matched and non- matched) n = 711 mean (sd)
Receiving free or reduced- price lunch (FRL), %	53.78 (17.04)	55.93 (17.80)	45.12 (23.03) ***
English-language learners (ELL), %	17.59 (8.97)	12.67 (.08) ***	10.47 (8.20) ***
School size (number of students enrolled)	1727.98 (853.27)	1843.37 (790.66)	1992.17 (853.28) ***

Note. Statistical t-test of means, comparing each set of control schools to SBHC intervention schools.

***p

p < .01

Table 2

Linear regression models, predicting college preparedness outcomes (academic achievement and college preparation efforts) at school level, among SBHC schools and propensity score-matched control schools

Outcome	Unadjusted ^a		Adjusted ^b	
	B	95% CI	B	95% CI
<u>Academic Achievement</u>				
<u>Graduation Rate</u>				
SBHC presence	-.06**	(-.07, -.04)	-.02	(-.04,.01)
% ELL			-.40	(-.51, -.29)
<u>Met state graduation requirements</u>				
SBHC presence	-.08**	(-.12, -.04)	.01	(-.04, .05)
% ELL			-.60	(-.83, -.38)
<u>College Preparation</u>				
<u>ACT participation</u>				
SBHC presence	2.87*	(.27, 5.48)	4.49**	(1.51, 7.47)
% ELL			3.59	(-12.38, 19.56)
<u>AP participation</u>				
SBHC presence	-.01	(-.05, .03)	5.65**	(1.58, 9.72)
% ELL			-44.73	(-66.51, -22.95)
<u>SAT participation</u>				
SBHC presence	.05	(-3.40, 3.49)	7.35**	(3.5, 11.15)
% ELL			-46.11	(-66.47, -25.75)

^a Analyses conducted among full sample (n = 810)

^b Analyses conducted among SBHC intervention schools (n=99) and propensity score matched-comparison schools (n = 197)

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p < .01