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Original article

Impact of School-Based Health Center Use on Academic Outcomes

Sarah Cusworth Walker, Ph.D.[a,*], Suzanne E.U. Kerns, Ph.D.[a], Aaron R. Lyon, Ph.D.[a],
Eric J. Bruns, Ph.D.[a], and T.J. Cosgrove, M.S.W.[b]

[a]*School of Medicine, University of Washington, Seattle, Washington*
[b]*Public Health—Seattle and King County, Seattle, Washington*

Abstract

Purpose: The purpose of this study was twofold: (1) to examine the effects of School-Based Health Center (SBHC) use on academic outcomes for high school students, using a well-controlled, longitudinal model, and (2) to examine whether SBHC medical and mental health service use differentially impacts academic outcomes.

Methods: Analyses used a latent variable growth curve modeling approach to examine longitudinal outcomes over five school semesters for ninth grade SBHC users and nonusers from Fall 2005 to Fall 2007 (n = 2,306). Propensity score analysis was used to control for self-selection factors in the SBHC user and nonuser groups.

Results: Results indicated a significant increase in attendance for SBHC medical users compared to nonusers. Grade point average increases over time were observed for mental health users compared to nonusers. Discipline incidents were not found to be associated with SBHC use.

Conclusions: SBHC use was associated with academic improvements over time for a high-risk group of users. The moderating effect of type of use (medical and mental health) reinforces the importance of looking at subgroups when determining the impact of SBHC use on outcomes. © 2009 Society for Adolescent Medicine. All rights reserved.

Keywords: School-Based Health Center (SBHC); Academic; High risk; Youth; Longitudinal; Mental health; Medical; Attendance; GPA; Discipline; Propensity score

School-based health centers (SBHCs) operate in nearly 2,000 schools in the United States [1]. Typically providing some combination of primary health, immunization, reproductive, and mental health services, SBHCs are intended to improve availability of these services to children and youth who are traditionally underserved within community health and mental health settings [2]. SBHCs have been shown to increase access to care for high-risk groups, such as those living in high-poverty communities, those with no health insurance, and ethnic minority youth [3–9].

In addition to increasing access to health and mental health services, SBHC use is associated with improvements in physical and emotional outcomes including lower Medicaid-funded emergency room expenses [3,10,11].

Longitudinal analyses have established that SBHCs can improve student-reported health-related quality of life, with the highest impact among children with lower socioeconomic status, who might not otherwise receive care [10].

SBHC Impact on Academic Outcomes

The positive impact of SBHC use on important public health-related outcomes is well documented and is an important justification for the continued place of SBHCs within the public health system [3,11–14]. However, the increased political demand for academic accountability in school health services particularly heightens the need for well-controlled, longitudinal studies examining the specific academic impact of SBHC use [15]. Additionally, identifying potential differences in academic outcomes for subgroups of users can provide insight into the mechanisms through which SBHC use may impact academic outcomes.

*Address correspondence to: Sarah Cusworth Walker, Ph.D., Division of Public Behavioral Health & Justice Policy, University of Washington, 2815 Eastlake Avenue, Ste 200, Seattle, WA 98102.
E-mail address: secwalkr@u.washington.edu

The research literature on SBHC use and academic outcomes is currently limited in quality and quantity because of (a) difficulties connecting school data and SBHC databases because of privacy laws, (b) limitations of self-report data for measuring academic outcomes, (c) inability to make conclusive causal statements because of cross-sectional data or limited follow up, and (d) the paucity of research studies that have employed control groups or well-controlled analyses [15]. A few studies have found a positive impact on attendance associated with SBHC use for samples of low-income, elementary age students [12], pregnant teens [16], and youth with psychosocial impairments [17]. In contrast, an early study by McCord, Klein, Foy, and Fothergill [18] found that use of SBHCs without regard to subgroup status had no impact on attendance or school discipline, but did have a positive impact on graduation rates, particularly among African American males.

A few studies have assessed outcomes related to student discipline for youth served by SBHCs. Jennings, Pearson, and Harris [19], in an uncontrolled examination of low-SES students referred to SBHCs for mental health services, found a 95% reduction in disciplinary referrals. Although additional studies of specific behavioral school programs (e.g., violence prevention) have found program use is associated with decreases in discipline-related events [20,21], other studies of less well-defined school-based interventions (e.g., generic "expanded school mental health" services), have found no impact on disciplinary actions [22].

Geierstanger and Amaral [15] have articulated a conceptual framework to explain the impact of SBHC use on educational indicators, including attendance, discipline, and grades. In their model, SBHC use impacts school behaviors and academic outcomes indirectly by influencing student resiliency, health status and health behaviors, and school-level effects. However, as discussed above, there are very few studies testing these assumptions through well-controlled research designs.

Objectives and Hypothesis

The present study examines the relationship between SBHC use and several indicators of academic achievement through a well-controlled, quasi-experimental longitudinal design using administrative data and propensity score matching to control for group differences at baseline. There were two goals for this study. The first goal was to examine SBHC service use as a predictor of academic outcomes, including attendance, discipline referrals, and grade point average (GPA). We hypothesized that use of SBHC services would have a positive impact on each of these outcomes. The second goal was to examine how the effects of SBHC use on academic outcomes vary across different services, specifically medical and mental health. Given the Geierstanger and Amaral [15] model of indirect effects, we hypothesized that medical use would have a positive relationship with

school attendance rates, and mental health use would have a positive relationship with attendance, discipline, and GPA.

Methods

Sample

The present study is a retrospective comparison of SBHC users and nonusers taken from a linked school district and SBHC database for all enrolled youth in the Seattle school district from September 2005 through January of 2008. Our study sample consisted of a cohort of ninth graders who began high school in September 2005 in one of 13 high schools with either an onsite SBHC or, in the case of three alternative high schools, access to a SBHC at a geographically proximal school. The linked school system–SBHC database included a wide array of information on demographics, school performance indicators and SBHC use. We received institutional review board approval for this study through the University of Washington.

Our study focused on ninth graders in order to control for previous SBHC use, as no student was able to access the high school SBHCs prior to the start of their ninth grade year. To select a user group consisting of youth who had same length of follow-up time from the first visit, we selected as users those youth who initiated contact with an SBHC in their first semester of ninth grade (n = 444). This strategy excluded youth who initiated SBHC use subsequent to the first Fall semester (n = 993), and the nonuser group included all youth who did not use during the study period (n = 1,861). Some demographic differences were found between the user, nonuser, and excluded groups. The differences between the user and excluded groups must be considered in generalizing the results of our study to the larger SBHC population. The differences between the user and nonuser groups were controlled through a propensity score (described below). When compared to the excluded group, SBHC users demonstrated significantly lower GPA, lower attendance rates, higher discipline rates, more single parent or other guardianship, greater percentage of African American or Native American race, more likely to be free lunch eligible, and more likely to be female (Table 1).

Procedures

There are 14 SBHCs in Seattle, one in each of the district's 10 high schools and in four middle schools. Students at three of the district's alternative high schools also have access to SBHC services through centers located in nearby high schools. SBHCs in Seattle aim to provide preventive and primary health services with a staffing model that includes a nurse practitioner or physician's assistant, a masters-level mental health counselor, and a patient care coordinator.

Students are identified for mental health and medical services through routine risk assessment performed by healthcare providers, referrals from school intervention teams, targeted screening by school nurses, and self-referral.

Table 1
Descriptive information for SBHC users, nonusers and excluded users

		SBHC users 05		Excluded users		Non users	
		n	%	n	%	n	%
Gender[b]	Female	271	60.9	629	63.3	713	38.3
	Male	174	39.1	364	36.7	1148	61.7
Bhnidty[ab]	Asian	63	14.2	227	22.9	490	26.3
	Black	180	40.4	254	25.6	363	19.5
	Hispanic	49	11	112	11.3	175	9.4
	Native Am	15	3.4	25	2.5	46	2.5
	White	138	31	375	37.8	787	42.3
Free lunch[ab]	No	245	55.1	664	66.9	1337	71.8
	Yes	200	44.9	329	33.1	524	28.2
Living[ab]	Both parents	182	40.9	551	55.5	1158	62.2
	Single parent	226	50.8	393	395	616	33.1
Special Ed[ab]	No	363	81.6	889	89.5	1660	89.2
	Yes	82	18.4	104	10.5	201	10.8
ESL[c]	No	416	93.4	920	92.7	1695	91.1
	Yes	29	6.5	73	7.4	168	8.9
Fall 2005		n	mean ± sd	n	mean ± sd	n	mean ± sd
GPA**		420	2.48 ± 97	961	2.78 ± 94	1683	2.88 ± 1.01
Attendance**		443	89.14 ± 13.42	980	92.63 ± 9.52	1805	90.31 ± 16.96
Discipline*		185	0.26±.56	265	0.13 ± 38	402	0.19±.50

Notes. Significant tests included Pearson Chi-Square and Univariate ANOVA.

[a] User group vs. excluded group, $p<.001$.

[b] User group vs. nonuser group, $p<.001$.

[c] User group vs. excluded group, User group vs. nonuser group, $p<.05$.

* $p<.05$; ** $p<.001$.

The mental health scope of services for individuals can include drop in, crisis intervention, individual counseling, family therapy, and pharmaceutical management. Individual counseling can include a range of therapeutic modalities best fitted to the youth's presenting issue and needs. Given the episodic nature of youth help-seeking in SBHC services, treatment is often crisis-oriented or supportive. During the study period, SBHC counselors received monthly consultation from doctoral-level psychologists, which included information on evidence-based strategies for mental health treatment.

A frequency analysis of the first five diagnoses assigned to the study participants revealed some common categories of treatment. For mental health users (n = 108), the most common reasons for a visit included academic difficulties (n = 30, 27.8%), family problems (n = 24, 22.2%), depressive disorders (n = 14, 13%), and deferred diagnosis (n = 17, 15.7%). Common medical visits (n = 336) included medical exam/health check up (n = 162, 48.2%), contraceptive counseling (n = 39; 12%), respiratory illness (n = 35, 10.4%), vaccinations (n = 23, 6.8%), and dietary/exercise issues (n = 31, 9.2%).

Measures

Apart from the academic outcome variables, all indicator variables were taken from the youth's status in the Fall of 2005. Variables included the youth's eligibility for federal free lunch status as an indicator of income, coded as 0/1.

Gender was coded for females = 1 and males = 2. Whether the youth was enrolled in special education was coded as 0/1. Family living situation was coded as three separate dichotomous variables for living with both parents, living with a single, biological parent, and another living situation. In the analyses, living with both parents is the reference variable and is not included in the regression. Ethnicity was coded into dichotomous variables for African American, Latino, white non-Latino, Native American, and Asian and Other. In the analyses, white, non-Latino is the reference variable and is not included in the regression. Receiving English as Second Language (ESL) services was coded as a 0/1 dichotomous variable.

GPA scores for the five semesters from Fall 2005 to the Fall 2007 were left in the analyses untransformed as the distribution did not exceed standards for normality as indicated by skew [23]. Further, exploratory transformations of the scores did not improve the distribution. Attendance percentage was a ratio of days present/or excused absences over days available. The attendance percentage scores were categorized, for each semester, into 10 equal groups based on percentiles because of negative skew. Discipline incidents was a count of suspensions and expulsions for each semester. This variable was categorized into three groups, 0 = not present, 1 = one incident, 2 = two or more incidents, because of the low frequency of more than two incidents in a semester.

We measured use similarly to an intent to treat analysis in which SBHC use was a dichotomous variable (0/1) based on

initiating treatment with no control for dosage. The modal number for both mental health and medical visits over the study period was 1. The mean number of mental health visits over the five semesters was 9.52 (SD = 12.86), with a range from 1 to 126. The mean number of medical visits was 5.36 (SD = 6.99), with a range from 1 to 73 visits. Mental health and medical service use was determined through the use of practitioner code. Medical services were defined as those services provided by a nurse practitioner, physician's assistant, or medical doctor; mental health services were those provided by a mental health counselor.

Analyses

Analyses used a latent variable curve growth modeling approach, using Mplus 4.2 [24] and full information maximum likelihood to account for missing data. The user and nonuser groups were statistically matched using a propensity score to control for user differences and self-selection factors [25]. The propensity score is sufficient for removing bias because of the observed covariates while controlling for multicollinearity by accounting for all the indicator variables in one score. The growth models included two latent constructs: an intercept variable representing the average academic score at the end of Fall 2005, and a growth (slope) factor representing the change in the academic score over the five semesters. Factor loadings at the intercept were set to 1, and the factor loadings of the semester points were set at 0, 1, 2, 3, and 4 to model a linear pattern, with the exception of the attendance analyses, which were run as a quadratic because of a dip in attendance in Winter 2007 and an increase in model fit with the quadratic factor. Growth models were constructed three times for each academic outcome, testing the differences in outcomes for (a) all SBHC users versus nonusers, (b) mental health SBHC users versus nonusers, and (c) medical SBHC users versus nonusers.

The propensity score used the probability score for each individual resulting from a logistic regression in which free lunch status, gender, special education, living situation, ethnicity, and ESL status were entered as independent variables, with user status in the Fall of 2005 (0/1) as the dependent variable. The probability distribution was categorized into five equal groups based on percentiles. Five groups were created because of general standard practice given Cochran's [26] finding that five groups was sufficient for removing 90% of bias because of a single continuous covariate. To test the validity of the propensity model, we tested each covariate as a dependent in a two-way analysis of variance with user (0/1) and the propensity strata as independent variables [21]. None of the main effects or interaction effects was significant for user groups after the propensity strata were included in the analyses. Given that up to 5% of the tests can be significant and still fall within reasonable limits for accepting the propensity model [27], we conclude that our model adequately controlled for self-selection factors.

Results

Attendance

Overall student attendance remained fairly steady over the five semesters (semester averages = 90.1%, 88.1%, 89.3%, 86.4%, and 89.3%), with a noticeable dip in the fourth semester (Spring 2007). Table 2 describes the parameter estimates and correlations for users and outcomes. We used the quadratic LGM controlling for propensity score to test differences in users and nonusers in baseline and rate and curve of change over time for attendance; the raw scores over the five semesters are illustrated in Figure 1. For all types of SBHC users, users had lower attendance rates than nonusers at Fall 2007 ($\beta = -0.59$, $p < .001$). The slope and quadratic factors are significantly negative and positive, respectively, for use ($\beta = -0.27$, p < .05; $\beta = 0.06$, $p < .05$); this indicates that, initially, attendance rates dropped for SBHC users but over time increased at a greater rate than nonusers (Figure 1)

Table 2
Parameter estimates and correlations for SBHC use type and outcomes

	Intercept			Slope			Quadratic		
	b	stdxy	r	b	stdxy	r	b	stdxy	r
Attendance									
All users	−0.59**	−.09	−.18	−0.27*	−.07	−.04	0.06*	0.08	.06
MH users	1.37***	−.12	−.17	−0.29	−.04	−.02	0.09	0.06	.05
Med users	−0.35*	−.05	−.14	−0.32*	0.08	−.05	0.07*	0.08	.07
GPA									
All users	−0.25***	−.11	−.17	0.03*	0.09	0.08			
MH users	−0.61***	−.14	−.18	0.06*	0.09	0.09			
Med users	−0.15*	−.06	−.13	0.01	0.04	0.03			
Discipline									
All users	0.31**	.14		0.03	0.05				
MH users	0.42*	.01		0.05	0.04				
Med users	0.21*	.09		0.03	0.04				

Notes. b = raw parameter estimate, stdxy = standardized cofficient using latent and observed variable variances in the standardization. Disipline does not have correlation coefficients because the dependent variables wer ategorical rather than continuous. Significance levels based on standard errors of raw parameter estimates.
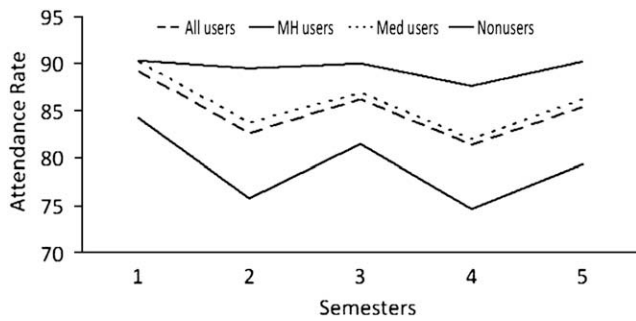
*p <.05; **p <.01; ***p <.001.

Figure 1. Change in attendance rates over five semesters for different user types.

Figure 2. Change in GPA over five semesters for different user types.

(comparable fit index [CFI] = 0.99, root-mean-square error of approximateion [RMSEA] = 0.05, standardized root-mean-square residual [SRMR] = 0.02).

In the mental health user model, the differences in Fall 2007 rates were similar, with mental users having lower attendance rates than nonusers ($\beta = -1.37$, p < .0001); however, although the quadratic trend was also similar, it did not reach significant levels (slope $\beta = -0.29$, ns; quadratic $\beta = 0.09$, ns) (CFI = 0.99, RMSEA = 0.04, SRMR = 0.02). Change was observed most strongly with the medical user group; again, the medical user group started with a lower attendance rate in Fall 2007 ($\beta = -0.35$, p < .05), saw a brief decline in rates compared to the nonuser group ($\beta = -0.32$, p < .05) and then an increase in attendance ($\beta = 0.07$, p < .05) relative to nonusers (CFI = 0.99, RMSEA = 0.5, SRMR = .02).

Discipline

Discipline incidents were low in the overall sample, with only 4.6% of the entire sample having had one or more discipline incidents by the end of the study period. Mean rates of discipline incidents were fairly stable over time, with a sharp increase in the second semester (Spring 2006) and then back to mean levels across the five semesters (0.05, 0.08, 0.05, 0.05, and 0.05). A linear, propensity controlled, LGM analysis for a categorical outcome, using a weighted least square parameter estimate (WLSMV) estimator, for all SBHC users versus nonusers found a significantly higher rate of discipline incidents for users ($\beta = 0.31$, p < .001), but no differences in change over time ($\beta = 0.03$, ns) when compared to nonusers (CFI = 1.00, RMSEA = 0.00, WRMR = 0.56). This relationship also held for mental health users with a higher rate at Fall 2007 ($\beta = 0.42$, p < .05) and no difference in change over time when compared to nonusers ($\beta = 0.05$, ns). The discipline rate for medical users was also higher than nonusers at baseline ($\beta = 0.21$, p < .05) and did not change over time ($\beta = 0.03$, ns).

GPA

Figure 2 summarizes the raw GPA outcomes over time for all users versus nonusers, and illustrates the overall increases in
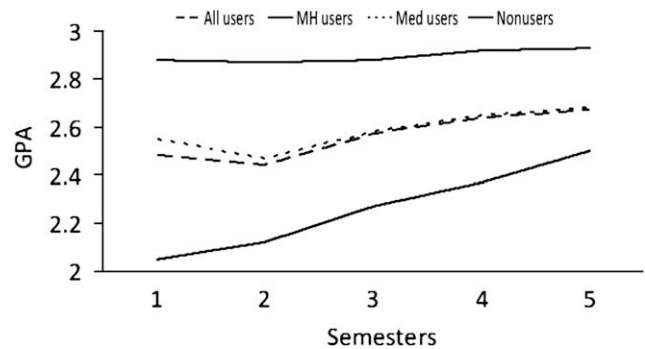
GPA over time for both groups and the more rapid increase for SBHC users. In this model, a linear propensity controlled LGM analysis demonstrated that users had lower GPAs than nonusers in Fall 2005 ($\beta = -0.25$, p < .001), and use was predictive of GPA increases over time ($\beta = 0.03$, p < .05) (CFI = 0.99, RMSEA = 0.05, SRMR = 0.04). This same effect is even stronger when run for mental health users only. SBHC users receiving mental health services had significantly lower GPAs than nonusers at Fall 2005 ($\beta = -0.61$, p < .0001) and a steeper increase in GPA over the five semesters ($\beta = 0.06$, p < .05) (CFI = 0.99, RMSEA = 0.05, SRMR = 0.04). The effect was not observed when examining medical users alone, although the trend remained. Medical users had significantly lower GPAs at Fall 2005 ($\beta = -0.15$, p < .05), and use was not associated with significant increases in GPA over the five semesters when compared to nonusers ($\beta = 0.01$, ns) (CFI = 0.99, RMSEA = 0.05, SRMR = 0.04).

Discussion

One of the primary missions in the SBHC movement is reaching youth who are underserved by public and private healthcare systems, particularly those youth who are at risk for social and educational failures [28]. The purpose of this study was to examine the effects of general and specific SBHC use (medical and mental health use) on educational outcomes for high-risk high school students, using a well-controlled, longitudinal model. The results indicate that, with low to moderate effect sizes, SBHC use is significantly associated with GPA and attendance gains, and that these effects are moderated by type of use. We found medical use was most strongly associated with increases in attendance and mental health use was more strongly associated with increases in GPA.

Although we did not specifically test Geierstanger and Amal's [15] theory of indirect effects, the differential results across user groups indicate that distinct aspects of services provided by SBHCs may directly impact specific outcomes. For example, 10% of medical users in our sample were treated for a respiratory illness which may have otherwise interfered with their school attendance. Further, nearly one half of medical users were seen for general medical exams, which could be providing a preventative benefit in keeping

youth from developing problematic medical issues. This is consistent with previous research that has identified a link between SBHC use and decreased inpatient and emergency services [11,29]. Students who are receiving assistance related to their emotional and behavioral well-being may experience improvements that are directly related to their ability to succeed academically in the classroom (e.g., improved ability to focus, increased positive affect).

Our finding of differential effects for subgroups of SBHC users (medical vs. mental health) is also consistent with other studies [7,12], and lends support to the strategy of testing subgroup differences as a promising model for further SBHC research. For example, Geierstanger and Amaral [15] suggest that significant findings for attendance are often revealed in subgroup analyses, especially among groups with chronic conditions associated with high absenteeism such as asthma, depression and attention deficit hyperactivity disorder.

Contrary to at least one other published study [19], we did not find differences in disciplinary events because of SBHC use; however, our measure of discipline was a count of suspension and/or expulsions over the semester, and was thus not very sensitive to day-to-day referrals or classroom behaviors. Also, as other researchers have argued [22], it may be that discipline-related behaviors are not likely to be impacted by general health and mental health services that are not specifically targeting disruptive behaviors.

Limitations

The current study has several limitations. First, to construct a user group in which all youth had a similar follow up period, we selected youth who used in Fall 2005 and excluded youth who initiated their use after this point. The resulting group of youth was significantly more at risk and had greater academic difficulties as assessed in 2005. This is consistent with other research showing that youth referred to an SBHC early in their high school career tend to have more risk characteristics [29]. Consequently, conclusions drawn from our results should be limited to higher risk youth using SBHC services.

Second, we had no control for SBHC use in middle school or any control for prior and/or concurrent service use through other service providers. Without this control, there is the possibility that youth who were using SBHC services were also using other medical and/or mental health services that accounted for the positive change in academic outcomes. Although nearly half of the user sample was eligible for free lunch and thus likely uninsured, underinsured or publicly funded, we cannot completely rule out this possibility.

Finally, the study did not benefit from detailed information on the types of treatment received in health and mental health sessions. Without knowing what kinds of services were being provided under the rubric of mental health counseling, we are limited in our ability to discuss specific recommendations for SBHC service implementation.

Conclusions

Our study found that SBHC use is significantly associated with increases in attendance rates and GPA over time for a specific cohort of users, and that these effects are moderated by types of services used. These results support the theory that SBHC use indirectly impacts academic performance through improving health and emotional well-being. Additional longitudinal, well-controlled research with an integrated process evaluation on how academic outcomes are impacted by youth receiving assistance for specific concerns, particularly problem areas and diagnoses associated with impaired school performance, will add substantially to the literature.

Acknowledgments

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