The Impact of School-Based Health Centers on the Health Outcomes of Middle School and High School Students

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Objectives. We studied the direct and indirect effects of school-based health centers (SBHCs) on the health and health behaviors of middle and high school students.

Methods. We used a prospective cohort design to measure health outcomes annually over 2 consecutive years by student self-report. Cohorts of middle school and high school students were recruited from matched schools with and without SBHCs. Data were obtained from 744 students in both year 1 and year 2 of the study. We used 2-level hierarchical linear models to estimate the effects of the presence of SBHCs at the school level and of SBHC use at the student level.

Results. At year 2, users of SBHCs experienced greater satisfaction with their health, more physical activity, and greater consumption of healthy food than did nonusers of SBHCs.

Conclusions. Students who used SBHCs were more satisfied with their health and engaged in a greater number of health-promoting behaviors than did students who did not use SBHCs. These findings indicate that SBHCs are achieving their goal of promoting children's health. (*Am J Public Health.* 2010; 100:1604–1610. doi:10.2105/AJPH.2009.183590)

At school-based health centers (SBHCs), multidisciplinary teams of providers, including physicians, nurse practitioners, registered nurses, physician assistants, and social workers provide a comprehensive range of primary care, preventive care, and early intervention services to children from elementary school through high school. SBHCs located in medically underserved areas have helped increase access to and utilization of primary care services among a wide variety of students, including low-income,[1] urban,[1–3] rural,[2,4,5] female,[5] and African American[5] students. SBHC utilization rates are highest among children with public insurance or no insurance.[5] Thus, SBHCs serve as an important health care safety net for disadvantaged and medically underserved youth.

Most students who use SBHCs do so infrequently, averaging slightly more than 1 visit per year. An analysis of the diagnostic categories associated with SBHC visits paints a portrait of the typical SBHC user as a student who occasionally visits the SBHC for the treatment of an acute illness or to receive a physical examination.[6] In addition to providing direct health care services, SBHC staff members engage in a wide range of other activities to promote student health. A recent study found that 20% of all clinical activity in a sample of SBHCs was devoted to patient, classroom, and group education activities and to contacts with parents and school staff.[7] Such activities hold the promise of spreading the effects of SBHCs to students who do not directly receive SBHC health care services.

The strongest evidence for the impact of SBHCs on the health of the children they serve is found among children with chronic diseases. For children with asthma, SBHC use is associated with fewer hospitalizations,[8,9] fewer visits to emergency rooms,[8,10] and better school attendance.[9] The evidence for the health benefits of SBHCs for children in the general population is less compelling. A study sponsored by the Robert Wood Johnson Foundation's School-Based Adolescent Health Care Program[11] compared the health status and health outcomes of 9th- and 10th-grade students in schools with SBHCs to a national random sample of 9th- and 10th-grade students attending schools without SBHCs. The presence of SBHCs in schools had no significant effect on the overall health status or health outcomes of students. A second study,[2,5] funded by the Health Foundation of Greater Cincinnati, compared the health-related quality of life of students in 4 elementary schools with SBHCs to students in 4 comparison schools without SBHCs. SBHC users reported significant improvement in student-reported quality of life over 3 years when compared with students in non-SBHC schools.

It is worth noting that, whereas the Robert Wood Johnson Foundation–funded study compared *all* students in schools with SBHCs to a national random sample of students in schools without SBHCs, the Health Foundation of Greater Cincinnati–funded study involved a comparison among 3 groups of students: students in schools without SBHCs, students in schools with SBHCs who used their school's SBHC, and students in schools with SBHCs who did not use their school's SBHC. Distinguishing between SBHC users and nonusers within the same school is critical because it allows for analysis of the direct effects of SBHC services on users.

The purpose of this study was to extend understanding of the effects of SBHCs on the general population of school-aged children by analyzing the impact of SBHCs on a range of health and health behavior outcomes among middle and high school students over a 2-year period. In particular, we sought to answer the following research questions: (1) What is the direct impact of SBHC use on middle and high school students' health and health behaviors? (2) What is the indirect impact of having an SBHC in a school on the health and health behaviors of students in that school, regardless of whether students use SBHC services? To answer these questions we used multilevel modeling to model school-level (i.e., SBHC status) and individual-level (i.e., student use of SBHCs) predictors of health separately.

METHODS

We used a prospective cohort design, surveying cohorts of middle school and high school students over 2 consecutive school years (2006–2007 and 2007–2008). Seven middle schools and 9 high schools in Michigan were recruited to participate in the study. Five sites contained well-established SBHCs (i.e., centers that had been in operation for at least 6 years at time 1); 6 sites contained newly implemented SBHCs (i.e., centers that had been in operation for less than 1 year at time 1, here called "implementation" sites); and 5 comparison sites did not have SBHCs. Comparison sites were matched with established sites on the basis of the percentage of students receiving free and reduced-price lunches, the racial/ethnic composition of the student body, and school size (implementation sites were not included in the matching process because the original study design did not include data from those sites in the outcomes study). The 16 schools constituted a geographically dispersed sample, varying by region of the state, urban and suburban communities, and predominant race/ethnicity. Whereas the established sites were located in urban settings with large populations of low-income residents, the implementation sites represented a mix of urban and rural settings.

In middle schools, we recruited students in grades 6 or 7, depending on what the first grade of the middle school was. In high schools, we recruited students in grade 9. Parental consent was obtained through a variety of means, including mailings to the homes of all children in grades 6 or 7 (in the selected middle schools) and 9 (in the selected high schools); having research staff attend back-to-school events or parent-teacher conferences; and sponsoring in-school competitions between classrooms for the most returned consent forms, regardless of whether consent to participate was granted.

Sample

In year 1, parental consent was obtained for 1134 students, representing 26% of eligible students across all schools. Of these students, 969 (85%) provided written assent to participate and completed a survey. Of the 969 completed surveys, 959 were usable. In year 2, we surveyed 833 (73%) of the 1134 students who provided assent in year 1: 317 middle school students (38%) and 516 high school students (62%). Only participants who completed surveys in both years were included in our study sample (n=744, 89% of the year 2 participants).

Tests of baseline differences in demographics by SBHC type (Table 1) revealed that middle school students at implementation schools were older than their counterparts at established or comparison schools ($F_{2,\ 282}=8.67$; $P<.01$), which is an expected result given that 1 implementation middle school begins at seventh grade. Implementation schools also had more White students and fewer minority students than established or comparison schools ($\chi^2_6=50.84$; $P<.01$). Given that SBHCs were first established in largely urban, minority communities and that newly implemented SBHCs are more frequently located in rural, predominantly White communities, this finding is not surprising.

Data Collection

Measures. Participants completed the self-administered Child Health and Illness Profile–Adolescent Edition (CHIP-AE) survey annually for both of the 2 study years. The CHIP-AE contains 107 items reflecting 6 domains and 20 subdomains that measure the physical,

TABLE 1—Demographic Characteristics of Students Who Completed Study Questionnaires at Both Time 1 and Time 2: Middle School and High School Students, Michigan, 2006–2008

	Entire Sample: 16 Schools (n = 744), Mean (SD) or %	Comparison Sites: 5 Schools (n = 229), Mean (SD) or %	Established Sites: 5 Schools (n = 267), Mean (SD) or %	Implementation Sites: 6 Schools (n = 248), Mean (SD) or %	Tests of Differences Across School Types	P
Age, y, at time 2						
Middle school	7 schools: 12.8 (0.68)	2 schools: 12.7 (0.62)	2 schools: 12.6 (0.61)	3 schools: 12.9 (0.74)	$F_{2,\ 282}=8.67$	<.01
High school	9 schools: 15.6 (0.65)	3 schools: 15.5 (0.58)	3 schools: 15.6 (0.61)	3 schools: 15.7 (0.61)	$F_{2,\ 456}=2.69$	.07
Gender					$\chi^2_2=2.99$	.22
Male	45%	45%	41%	48%		
Female	55%	55%	59%	52%		
Race/ethnicity					$\chi^2_6=50.84$	<.01
White	45%	41%	35%	59%		
African American	29%	26%	35%	25%		
Hispanic	12%	14%	19%	4%		
Native American	3%	<1%	2%	8%		
Asian/Pacific Islander	2%	3%	1%	1%		
Other[a]	9%	15%	9%	4%		
Free or reduced-cost lunches at time 1	56%	55%	67%	46%	$F_{2,\ 741}=0.07$[b]	.93

[a]Typically self-reported multiracial ethnicity.
[b]Analysis of variance–tested scores on the socioeconomic status scale.

mental, and social aspects of health of youth aged 11–18 years.[12] It has been used and found both valid and reliable with racially and economically diverse middle and high school student samples in urban, rural, clinical, and community settings.[12–14]

Dependent variables. We examined 5 health outcomes: satisfaction with health, physical discomfort, emotional discomfort, physical activity, and nutrition. Nutrition was divided into 2 subscales: healthy eating and unhealthy eating. All scales were constructed following the instructions provided by the measure authors, with higher scores indicating better health. We reverse-scored some scales so that higher scores reflected more of the construct (e.g., higher physical discomfort scores reflected higher levels of discomfort). We computed all scales by taking the average response across scale items; scale characteristics are shown in Table 2.

Independent variables. The focal predictors in this study included 1 student-level variable, SBHC use, and 1 school-level variable, SBHC type. At the student level, participants were asked whether they had ever used the SBHC in their school, where nonusers were coded zero and those who had used the SBHC at least once were coded 1. Analyses focusing on this predictor used only the subsample of students with access to an SBHC. Approximately 72% of participants at implementation sites and 76% of participants at established sites reported that they were SBHC users. At the school level, analyses compared the impact of attending a school with no SBHC, a newly implemented SBHC, or an established SBHC. SBHC type was dummy-coded with comparison sites as the reference group.

Covariates. A single school-level covariate—grade level—was included in all models. Five student-level covariates were included: age, gender, race/ethnicity, socioeconomic status (SES), and the outcome at time 1. Time 1 means and standard deviations for the outcome variables across SBHC types and user statuses are presented in Table 3. We detected significant time 1 differences by SBHC type for healthy eating and by user status for physical discomfort and physical activity. At time 1, students at implementation sites reported eating more healthy food than students at established sites, and SBHC users reported significantly more physical discomfort and physical activity than SBHC nonusers. Race/ethnicity and SES were included as covariates to account for the well-documented health disparities that exist across different social locations.[15–18]

Age and grade level. Age and grade level were entered into all models as separate age-related constructs. Grade level was coded zero for middle school and 1 for high school. Age was group-mean-centered, resulting in a variable that reflected variation from the typical age of one's classmates.

Gender. Participants reported whether they identified as male or female. Male was coded zero; female was coded 1.

Race/ethnicity. Survey instructions allowed participants to select 1 racial/ethnic group: White, African American, Latino, Native American, Asian/Pacific Islander, or "other." Race/ethnicity was dummy-coded, with White participants (the largest racial/ethnic group in the sample) as the reference group. The Native American, Asian/Pacific Islander, and "other" categories were combined into "Other" because of the small number of individuals who endorsed each category. Ultimately, there were 3 dummy categories that permitted comparison of African American students, Latino students, and "other" students to White students.

SES. The composite family SES scale combined measures of financial capital, human capital, and social capital; it was constructed following the CHIP-AE developers' instructions.[19] This mean composite measure included the following items: mother's or female

TABLE 2—Descriptions of Survey Outcome Measures: Middle School and High School Students, Michigan, 2006–2008

Scale	Description	No. of Items	Internal Consistency[a]	Mean (SD)
Satisfaction with health	Measures perceptions of and beliefs about one's health; includes questions about the extent to which one feels full of energy, resists illness well, or is physically fit.	7	0.77	3.12 (0.57)
Physical discomfort	Measures both positive and negative somatic feelings and symptoms, asking individuals to identify how many days in the past 4 weeks they experienced various types of physical discomfort, such as cough, headache, or stomachache.	24	0.85	1.63 (0.42)
Emotional discomfort	Measures both positive and negative emotional feelings and symptoms, asking respondents how many days in the past 4 weeks they experienced various types of emotional discomfort, such as trouble sleeping, feeling depressed, or feeling nervous.	14	0.84	1.72 (0.57)
Physical activity	Measures participation in activities that promote physical fitness, such as walking or running.	5	0.69	3.07 (0.98)
Nutrition: healthy eating	Measures the frequency with which students drink milk and eat healthy foods such as fruits and vegetables.	4	0.64	3.44 (0.83)
Nutrition: unhealthy eating	Measures the frequency with which students eat unhealthy foods, such as fast food, salty foods, and sweets (this scale was reverse-coded so that higher scores reflected better nutrition).	3	0.72	3.38 (0.80)

[a]Calculated using the Cronbach α.

TABLE 3—Time 1 Outcomes Across SBHC Type and User Status: Middle School and High School Students, Michigan, 2006

		Implementation Sites		Established Sites			
	Comparison Sites, Mean (SD)	SBHC User, Mean (SD)	SBHC Nonuser, Mean (SD)	SBHC User, Mean (SD)	SBHC Nonuser, Mean (SD)	ANOVA; P^a	t Test; P^b
Satisfaction with health	3.14 (0.56)	3.12 (0.63)	3.16 (0.62)	3.04 (0.61)	2.99 (0.64)	$F_{2,\ 736}=2.53$; $P=.08$	$t=0.02$; $P=.99$
Physical discomfort	1.65 (0.43)	1.76 (0.51)	1.58 (0.43)	1.69 (0.46)	1.62 (0.39)	$F_{2,\ 728}=1.31$; $P=.27$	$t=-2.78$; $P<.01$
Emotional discomfort	1.75 (0.57)	1.81 (0.63)	1.77 (0.69)	1.83 (0.64)	1.70 (0.71)	$F_{2,\ 728}=0.43$; $P=.65$	$t=-1.27$; $P=.21$
Physical activity	3.09 (0.91)	3.18 (1.00)	2.92 (0.89)	3.02 (0.95)	2.65 (0.88)	$F_{2,\ 725}=2.62$; $P=.07$	$t=-3.07$; $P<.01$
Healthy eating	3.29 (0.85)	3.37 (0.93)	3.42 (0.86)	3.12 (0.92)	3.07 (0.90)	$F_{2,\ 724}=6.35$; $P<.01$	$t=0.18$; $P=.86$
Unhealthy eating	3.27 (0.88)	3.09 (0.93)	3.19 (0.92)	3.23 (0.93)	3.28 (0.89)	$F_{2,\ 726}=2.02$; $P=.13$	$t=0.73$; $P=.47$

Note. ANOVA; analysis of variance; SBHC = school-based health center. Comparison sites did not have SBHCs, implementation sites had SBHCs that had been in operation for less than 1 year at time 1, and established sites had SBHCs that had been in operation for at least 6 years at time 1.
[a]ANOVA compared time 1 means across comparison, implementation, and established sites, with implementation and established means collapsed across SBHC users and SBHC nonusers.
[b]The *t* test compared mean differences across SBHC users and SBHC nonusers, collapsed across site type.

guardian's education level and employment status, father's or male guardian's employment status, family structure, whether the participant or any sibling received a free or reduced-cost lunch at school, and whether the family received food stamps. Father's or male guardian's education level and family welfare status were excluded because much of these data were missing.

Data Analysis

We used 2-level hierarchical linear modeling to account for a design in which students were clustered within schools. This approach also allowed us to separately model the effect of the presence or absence of SBHCs on student health at the school level and the effect of SBHC use or nonuse at the student level. We also examined whether there were differences in the effects of SBHC use at the student level depending on gender (i.e., an SBHC user by gender interaction effect) and type of SBHC (i.e., an SBHC user by SBHC type interaction). All analyses examining SBHC user effects were performed on data from the subsample of participants (n=515) who had access to an SBHC in their schools. We used HLM version 6.0[20] to analyze the data, making use of full information maximization likelihood methods. For each outcome, nested models were built beginning with the covariates, which were entered 1 at a time; nonsignificant covariates were excluded from subsequent models so as to generate the most parsimonious final model possible. Hedge g effect sizes were computed for each significant SBHC-related predictor.[21]

RESULTS

For each section of results below, we report only those covariates that were significantly related to the outcome, followed by our findings regarding the influence of SBHC type and SBHC use on the outcome. Full results from the final models of each outcome, including effect sizes for all significant predictors, are presented in Table 4.

Satisfaction With Health

Being male ($\gamma=-0.27$; $P<.05$), being in middle school ($\gamma=-0.13$; $P<.05$), and having higher satisfaction with health at time 1 ($\gamma=0.47$; $P<.05$) were significantly related to higher levels of satisfaction with health at time 2. No significant differences were found between students at schools with SBHCs and students at schools without SBHCs.

Among students who had access to an SBHC in their school, health center users reported significantly greater satisfaction with health at time 2 than did nonusers ($\gamma=0.12$; $P<.05$). Interaction effects for user by gender and user by SBHC type were not significant, suggesting that gender and SBHC type had no effect on the relationship between being a user and satisfaction with health.

Physical Discomfort

Being female ($\gamma=0.11$; $P<.05$), being White compared with "other" race/ethnicity ($\gamma=-0.10$; $P<.05$), being in high school ($\gamma=0.07$; $P<.05$), and higher levels of physical discomfort at time 1 ($\gamma=0.51$; $P<.05$) were all related to greater physical discomfort at time 2. No significant differences emerged between students at schools with SBHCs and students at schools without SBHCs.

Among students with access to an SBHC in their school, there were no differences in physical discomfort at time 2 between SBHC users and nonusers. However, the gender by user status interaction was significant ($\gamma=-0.14$; $P<.05$). For females, health center users had lower physical discomfort at time 2 than did nonusers ($\gamma=-0.10$; $P<.05$). For health center nonusers, females had significantly higher physical discomfort at time 2 than did males ($\gamma=0.19$; $P<.05$). Finally, we tested whether there was a difference in the user effect depending on the type of SBHC. No significant interaction effect was detected.

Emotional Discomfort

Being female ($\gamma=0.14$; $P<.05$), being in high school ($\gamma=0.17$; $P<.05$), and having higher levels of emotional discomfort at time 1 ($\gamma=0.50$; $P<.05$) were associated with greater emotional discomfort at time 2. Among students with access to an SBHC in their school, tests comparing emotional discomfort levels between SBHC users and nonusers revealed no significant differences. Neither the gender by SBHC user status interaction nor the SBHC type by SBHC user status interaction were significant.

Physical Activity

Being male and having higher levels of physical activity at time 1 were significantly

TABLE 4—Final Model Coefficients, Standard Errors, and Effect Sizes for SBHC-Related Effects for Each Outcome: Middle School and High School Students, Michigan, 2006–2008

	Satisfaction With Health		Physical Discomfort		Emotional Discomfort		Physical Activity		Healthy Eating		Unhealthy Eating[a]	
Variables	b (SE)	ES	b (SE)	ES	b (SE)	ES	b (SE)	ES	b (SE)	ES	b (SE)	ES
Covariates												
Gender[b]	−0.27** (0.03)	...	0.11** (0.03)	...	0.14** (0.03)	...	−0.25** (0.06)	...	...	...	...	...
SES[c]	...	...	...	...	...	...	...	...	...	...	...	...
African American[d]	...	...	−0.06* (0.03)	...	...	...	...	...	−0.23** (0.06)	...	−0.29** (0.06)	...
Latino[d]	...	...	0.06 (0.04)	...	...	...	...	...	−0.03 (0.09)	...	−0.14 (0.09)	...
Other[d]	...	...	−0.10** (0.04)	...	...	...	...	...	−0.04 (0.09)	...	−0.10 (0.08)	...
Age[c]	...	...	...	...	...	...	...	...	...	...	...	...
Middle school or high school[e]	−0.13** (0.05)	...	0.07** (0.03)	...	0.17** (0.03)	...	...	...	...	...	...	...
Time 1 outcome	0.47** (0.03)	...	0.51** (0.03)	...	0.50** (0.03)	...	0.57** (0.03)	...	0.42** (0.03)	...	0.35** (0.03)	...
Predictors												
Implementation SBHC[f]	0.0006 (0.06)	...	−0.02 (0.03)	...	−0.08* (0.04)	−0.13	0.16 (0.12)	...	−0.002 (0.07)	...	−0.07 (0.07)	...
Established SBHC[g]	−0.02 (0.06)	...	−0.05 (0.03)	...	−0.08* (0.04)	−0.14	0.05 (0.12)	...	0.04 (0.07)	...	0.04 (0.06)	...
SBHC user[h]	0.12** (0.05)	0.21	−0.04 (0.03)	...	−0.08* (0.05)	−0.14	0.20** (0.08)	0.20	0.18** (0.07)	0.22	−0.06 (0.07)	...
User × gender interaction	−0.10 (0.09)	...	−0.14** (0.07)	−0.22[i]	−0.15 (0.09)	...	−0.04 (0.16)	...	−0.01 (0.14)	...	0.18 (0.15)	...
User × SBHC type interaction	0.01 (0.09)	...	0.06 (0.07)	...	0.08 (0.09)	...	0.02 (0.16)	...	0.14 (0.14)	...	0.14 (0.15)	...

Note. SBHC = school-based health center; b = parameter estimate; ES = effect size; SES = socioeconomic status. We computed Hedge g effect sizes following the recommendations by the Institute for Educational Sciences (available at http://ies.ed.gov/ncee/wwc/help/idocviewer/Doc.aspx?docId=19&tocId=8#hlm) from the *What Works Clearinghouse Procedures and Standards Handbook*.[21]
[a]Unhealthy eating is reverse-scored; higher scores reflect less unhealthy eating.
[b]Male = 0, female = 1.
[c]Not significant and not computed for the full model.
[d]Compared with White students (reference group).
[e]Middle school = 0, high school = 1.
[f]Implementation sites = 1, comparison sites = 0. Comparison sites did not have SBHCs; implementation sites had SBHCs that had been in operation for less than 1 year at time 1.
[g]established sites = 1, comparison sites = 0. Comparison sites did not have SBHCs; established sites had SBHCs that had been in operation for at least 6 years at time 1.
[h]Nonuser = 0, user = 1. Participants reported lifetime use of the health center.
[i]Given the primary interest in user effects, the effect size was computed comparing female users and nonusers.
*$P < .10$; **$P < .05$.

related to higher levels of physical activity at time 2 ($\gamma = -0.25$; $P < .05$ and $\gamma = 0.57$; $P < .05$, respectively). No significant differences emerged between students at schools with SBHCs and students at schools without SBHCs. Among students with access to an SBHC in their school, health center users reported significantly more physical activity at time 2 than did nonusers ($\gamma = 0.20$; $P < .05$). Neither the gender by user interaction nor the SBHC type by SBHC user interaction were significant, suggesting that the effect of being a health center user on physical activity did not differ by gender or SBHC type.

Nutrition

Being White (compared with being African American; $\gamma = -0.23$; $P < .05$) and eating healthier at time 1 ($\gamma = 0.42$; $P < .05$) were significantly related to higher levels of healthy eating at time 2. No significant differences emerged between students at schools with SBHCs and students at schools without SBHCs. Among students with access to an SBHC in their school, health center users reported eating significantly more healthy food at time 2 than did nonusers ($\gamma = 0.17$; $P < .05$). We found no significant interaction effects for gender by SBHC user status or SBHC type by SBHC user status for healthy eating at time 2.

Being African American ($\gamma = -0.29$; $P < .05$) and reporting more unhealthy eating at time 1 ($\gamma = 0.35$; $P < .05$) were significantly related to higher levels of unhealthy eating at time 2. No significant differences emerged between students at schools with SBHCs and students at schools without SBHCs. Among students with access to an SBHC in their school, there were no significant differences in unhealthy eating between SBHC users and nonusers. Similarly, there was no significant interaction between SBHC use and gender or SBHC use and SBHC type.

DISCUSSION

We studied the impact of SBHCs on the health outcomes of middle and high school students. Using multilevel modeling, we analyzed both the school-level effect of SBHC type (comparison, implementation, established) and the individual-level effect of user status (user vs nonuser) on health outcomes.

School-Based Health Center Type

Despite the involvement of SBHCs in schoolwide activities such as health education campaigns, we found no school-level effects of SBHC type on student health outcomes. There were no significant differences in health outcomes among students who attended schools with no SBHCs, newly implemented SBHCs, or established SBHCs.

User Status

Although the mere presence or absence of SBHCs did not have schoolwide effects on student health, health outcomes did differ at schools with SBHCs, depending on whether students used the SBHC. Consistent with the work of Wade et al.[5]—but inconsistent with the work of Kisker, Brown, and Hill[11]—SBHC use was associated with an improved subjective sense of overall health. This inconsistency in results may be attributable to differences in study design. Whereas our study and the study conducted by Wade et al. differentiated between users and nonusers in schools with SBHCs, the Kisker, Brown, and Hill study did not; thus, the absence of benefits for nonusers may have masked the health benefits for users.

Because SBHC use is associated with greater satisfaction with health, one would expect that SBHC use would also be associated with fewer symptoms of physical discomfort. Although SBHC users in general did not experience significantly fewer physical symptoms compared with nonusers, female SBHC users experienced significantly fewer symptoms of physical discomfort at time 2 than did female nonusers. Given the greater satisfaction with health reported by SBHC users at time 2, one might also expect that SBHC users would be more likely to engage in the kinds of health behaviors that contribute to better health. As expected, health center users reported engaging in more physical activity and eating more healthy food at time 2 than did nonusers. These user effects were not dependent on how long the SBHC had been in operation, as shown by the nonsignificant findings for all of the SBHC type by SBHC use interactions.

The association of SBHC use with increased physical activity and increased consumption of healthy foods is noteworthy, given recent concerns about the epidemic of obesity among youths in the United States.[22–24] Our results indicate that SBHC use is associated with a behavior that counteracts a primary contributing factor to obesity among children and adolescents: physical inactivity.[25–28] The fact that SBHC use appears to be a component of a healthy lifestyle that includes more physical activity and greater consumption of healthy foods suggests that SBHCs might play a significant role in reducing obesity among children and adolescents. These findings highlight the importance of efforts to promote parental awareness of SBHCs and student use of SBHCs as ways to enhance these potential benefits.

Although our analyses found that SBHC use had statistically significant associations with a variety of positive self-reported health-related behaviors and health outcomes, it is worth noting that the effect sizes, which ranged from 0.20 to 0.22, were at the low end of the small-to-medium effect-size range (0.20–0.50), according to the conventions established by Cohen.[29]

Limitations

Because students were not randomly assigned to groups, selection bias resulting from unmeasured preexisting differences among students attending the 3 types of schools is a potential threat to the internal validity of this study. We attempted to address this limitation by reducing selection bias at the school level through careful matching of established and comparison sites. However, the overall impact of matching is limited by the inclusion of the implementation sites in the analyses, which were not matched to comparison sites. By controlling for time 1 outcomes and for race, gender, and SES, we sought to further reduce any preexisting differences across groups.

Conclusions

We examined the health-related impact of SBHCs and distinguished between the direct effects of SHBCs on students who used their services and indirect effects on all students in schools with SBHCs, including health center nonusers. Our findings support other studies' findings that SBHC use was associated with self-reported positive health outcomes for middle and high school students, including overall sense of health and health-promoting behaviors. Further research is needed to delineate the causal mechanisms mediating the relationship between the use of SBHCs and health outcomes. Such studies would employ more refined measures that quantify the frequency of SBHC use, the types of services used, and their relationship to both self-reported and documented health outcomes. ■

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Contributors

M.A. McNall and B. Mavis conceptualized and designed the study. L.F. Lichty analyzed the data. M.A. McNall and L.F. Lichty wrote the first draft of the article. All authors participated in revising the article and approving the final version.

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Human Participant Protection

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