A Prescription for Success

How School-Based Health Centers Affect Health Status and Healthcare Use and Cost

by: The Health Foundation of Greater Cincinnati

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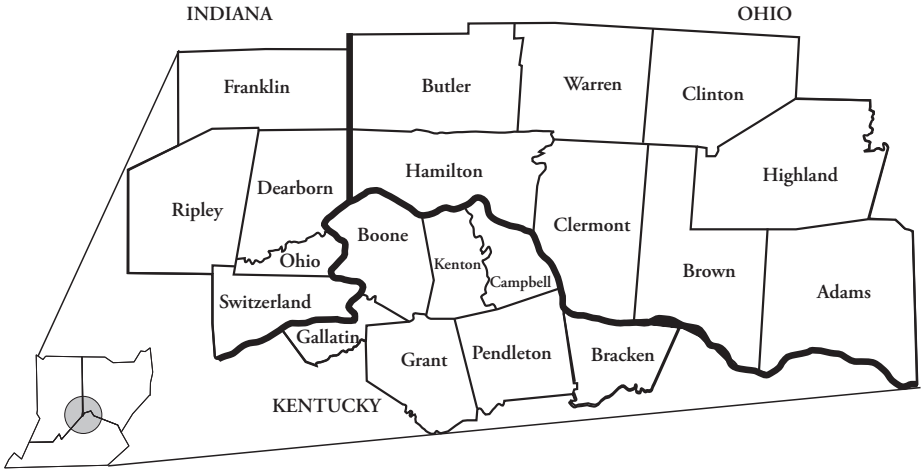
For More Information

In 1997, The Health Foundation of Greater Cincinnati began a multifaceted project to identify the health issues and assess the healthcare needs of the Cincinnati area, encompassing 20 counties in Indiana, Kentucky, and Ohio (see the figure below).



Through this process, the Health Foundation identified four focus areas in which to concentrate its grantmaking efforts:

- Community Primary Care
- School-Aged Children's Healthcare
- Substance Use Disorders
- Severe Mental Illness

This report comes out of our work in the School-Aged Children's Healthcare focus area. For more information about this focus area, please visit our web site at http://www.healthfoundation.org/focus/sach.

Additional copies of this publication as well as the full reports from the two studies summarized in this report are available on our web site at http://www.healthfoundation.org/sbhcstudy, or by calling 513-458-6658 or toll-free 888-310-4904, ext. 6658.

For more information about the Health Foundation, our grantmaking interests, and our other publications, please contact us at 513-458-6600, toll-free at 888-310-4904, or visit our web site at http://www.healthfoundation.org.

Acknowledgements

Health Outcomes Study

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Introduction

School-based health centers (SBHCs) provide healthcare for children and adolescents in schools and eliminate many healthcare access barriers. The Health Foundation of Greater Cincinnati has funded several SBHC programs to increase healthcare access for students. These SBHCs serve children who have difficulty accessing primary health care because of a lack of providers in the community, low income, uninsurance or underinsurance, and other factors.

What is an SBHC?

An SBHC is a partnership between schools and community health organizations to provide healthcare services on-site at the school. Through the SBHC, students can access a wide array of healthcare services—such as primary, dental, and mental and behavioral health care—and receive referrals for other health services. Services are determined locally through parental and community input and vary from SBHC to SBHC. Treatment is given only with a parent's consent.

SBHC staff include: a sponsoring medical organization ("medical partner") to provide physician supervision, medical record services, and the ability to bill insurance while serving the uninsured; a nurse practitioner; and clerical assistance. SBHC staff work in collaboration with school nursers and other service providers in the school and community.

Why We Performed these Studies

To determine how SBHCs influence student health and healthcare access and costs, the Health Foundation commissioned two multi-year studies. The studies involved up to eight SBHCs and the schools using these centers (intervention schools) and a matched group of schools without SBHCs (comparison schools).

The first study, "Evaluation of Health, Access, and Attendance Outcomes of Students Using School-Based Health Centers" (or "the health outcomes study"), was a three-year study that examined how the presence of an SBHC influences students' health-related quality of life, healthcare access and utilization,

health insurance status, and school absences. Data collected included parent, student, and school personnel surveys; SBHC visit encounters; and school student demographic and absence records. The hypotheses for this study were:

- Students in schools with SBHCs will have improved health status compared to students in schools without SBHCs.
- Students in schools with SBHCs will have fewer absences compared to students in schools without SBHCs.
- Students in schools with SBHCs will have improved access to healthcare than students in schools without SBHCs.

In addition, the study looked at SBHC processes, including:

- the types and volume of services provided by the SBHCs,
- perceptions of school personnel and parents about the SBHC and their quality of services, and
- the structural attributes that make up the SBHCs.

The second study, "Evaluation of Healthcare Costs and Utilization among Medicaid Recipients in Schools with School-Based Health Centers" (or "the cost study"), looked specifically at the health economic impact of students enrolled in schools with SBHCs compared to the schools without SBHCs. Specifically, this study looked at students covered by Medicaid who were enrolled in Ohio schools with SBHCs and how healthcare utilization and costs for these students changed after the SBHCs opened. The study looked at data from three years before the SBHCs opened and from the first two-and-a-half years the SBHCs were in operation. The three aims of this study were:

- to evaluate the health costs and utilization of Medicaid-enrolled students in schools with SBHCs compared to students in schools without SBHCs before and after the SBHCs opened,
- to evaluate health costs and utilization of students in schools with SBHCs who have asthma or mental illnesses compared to students in schools without SBHCs before and after the SBHCs opened, and
- to quantify and evaluate health economic costs and benefits of SBHCs.

This report presents a summary of the two studies. For the full reports of either of these studies, which include full methodology and results sections, please visit our web site at http://www.healthfoundation.org/sbhcstudy, or call 513-458-6600 or toll-free 888-310-4904.

Significance of these Studies

Most studies about SBHCs to date were based on either a parent's self-report or a short follow-up period. Such reports are subject to the limitations of incomplete recall, information bias, or short-term effect. There are also few studies on SBHCs that used a comparison group.

The studies summarized in this report used quantitative data over a longer time period and with a comparison group, which provides a better understanding of the impact of SBHCs. The cost study included in this report is the first study that provides a comprehensive look at the economic outcomes of SBHCs.

To earn the support of payers and the community, SBHCs have to show their value. SBHCs should measure their impact on outcomes that are important to these stakeholders, including decreased use of more expensive healthcare (such as emergency rooms for non-emergency situations), increased use of less expensive and preventive healthcare (such as Early Periodic Screening, Diagnosis, and Treatment (EPSDT) visits), increased healthcare access, and improved overall health of students. In other words, SBHCs need to show that their benefits outweigh their costs. The studies summarized in this report provide valuable information about the benefits of SBHCs.

Because the two studies were done simultaneously and on essentially the same group of students, there is great potential for connecting the health outcomes data with the cost data. These analyses were not completed at the time this report was published. Please visit our web site at http://www.healthfoundation.org/sbhcstudy for information on these analyses as they are completed.

Study Populations

Health Outcomes Study

The population for the health outcomes study consisted of eight SBHCs and the schools using these centers, the schools' students in grades K–8, parents, and school personnel. Four of these SBHCs were in Ohio and four were in Kentucky. Four SBHCs were rural and four were urban. This study also included matched schools without SBHCs and their students and parents. The schools without SBHCs were chosen to be similar to the schools

with SBHCs in terms of rural or urban setting, percentage of student body that was non-white, and percentage of students eligible for free or reduced lunch (see Table 1 below).

Table 1: Demographics of students in the health outcomes study

	Year 1		Year 2		Year 3	
	N	**%**	**N**	**%**	**N**	**%**
Total	11,873		16,346		17,137	
Intervention	8,355	70.4%	9,709	59.4%	10,731	62.6%
Comparison	3,518	29.6%	6,637	40.6%	6,406	37.4%
Sex						
Male	6,211	52.3%	8,582	52.5%	9,015	52.6%
Female	5,662	47.7%	7,764	47.5%	8,122	47.4%
Ethnicity						
Black	2,335	19.7%	2,731	16.7%	2,468	14.4%
White	9,100	76.6%	12,982	79.4%	12,925	75.4%
Other	438	3.7%	633	3.9%	1,744	10.2%
Age (mean)[1]	8.3 years		9.6 years		9.6 years	
Income (mean)[2]	6.87		7.76		8.03	
Region						
Urban	5,895	49.7%	7,810	47.8%	8,398	49.0%
Rural	5,978	50.3%	8,536	52.2%	8,739	51.0%
State						
Ohio	7,656	64.5%	9,422	57.6%	9,197	53.7%
Kentucky	4,217	35.5%	6,924	42.4%	7,940	48.3%

Students eligible for free or reduced lunch	
Total school population	
Intervention	50.5%
Comparison	43.2%
Survey schools	
Intervention	49.5%
Comparison	43.2%
Urban schools	
Intervention	60.6%
Comparison	77.4%
Rural schools	
Intervention	40.1%
Comparison	24.2%

[1] Age is based on the students' ages as of September 30, 2000

[2] Income was grouped into 15 categories that indicated ranges of income. Category 6 was a range of $25,000 to $29,999; Category 7, $30,000 to $34,999; and Category 8, $35,000 to $39,999

Four of the eight SBHCs and all schools without SBHCs participated in parent and student surveys. These schools were selected to provide a cross-section of urban and rural schools across both Ohio and Kentucky. Parents and students were randomly selected from these schools to participate in the surveys. There were 1,360 parent-child pairs who participated in the survey in Year 1. By Year 3, however, only 588 of these original pairs participated. The main cause of attrition was student transfers out of the schools. (For more information on the attrition rates and supplemental samples drawn to counter the attrition, please see the full report "Evaluation of Health, Access, and Attendance Outcomes of Students Using School-Based Health Centers," available at http://www.healthfoundation.org/sbhcstudy.)

Cost Study

The population for the cost study consisted of the students who were in the Ohio Medicaid database and who were enrolled in the six Ohio schools in this study, four with SBHCs and two without. A total of 5,069 students were identified in the Ohio Medicaid program and enrolled in one of the six schools from September 2000 to August 2002. Thirteen (13) students who moved either from SBHC to nonSBHC schools or vice versa or who had severe disabilities that would greatly distort results were excluded from the study. Of the 5,056 remaining students:

- 2,153 students were enrolled in Medicaid and the same school for both all of Year 1 (2000–2001 school year) and all of Year 2 (2001–2002 school year),
- 1,153 students were enrolled in Medicaid and the same school for all of Year 1 only, and
- 1,750 students were enrolled in Medicaid and the same school for all of Year 2 only.

The 2,153 students continuously enrolled in Medicaid and the same school for the two school years became our "Medicaid cohort." Of these students, 1,607 were in schools with SBHCs and 546 were in schools without SBHCs.

The cost study population was further broken down into two subgroups, or cohorts:

- Asthma Cohort—This cohort included students with a primary diagnosis of asthma as indicated by the International Classification of Disease, Ninth Revision

(ICD-9) codes 493.xx and at least one prescription of an anti-asthmatic medication.

- Mental Health Cohort—This cohort included students with a primary diagnosis of a mental illness as indicated by ICD-9 codes from 290.xx to 316.xx as well as at least one drug claim for mental health therapy. Mental illnesses among school-age children primarily include depression, attention deficit/hyperactivity disorder (ADHD), substance use disorders, anxiety disorder, and other illnesses.

Cost study researchers identified all disease diagnoses for both cohorts through ICD-9 codes in Medicaid institutional or medical claims and all prescription drugs through National Drug Codes in Medicaid pharmacy claims.

Protection of Human Subjects and Consent for Evaluation

Both studies were reviewed and approved by the Institutional Review Board at the University of Cincinnati.

Parents who participated in the surveys for the health outcomes study provided consent for both themselves and their children each year. If a parent did not consent to his or her child being interviewed, that student did not participate in the survey.

All students enrolled in the SBHCs had parental approval to participate in the studies. Each SBHC kept the written consents for evaluation. If students or their parents did not want to participate, we did not include these students in the study. Consent was not needed for Medicaid students in schools with SBHCs who were not enrolled in the SBHCs or for Medicaid students in schools without SBHCs because the Principal Investigator (PI) in the cost study was also co-PI on a Medicaid utilization review, and consent for that review covered the Medicaid data in the cost study. Also, Health Insurance Portability and Accountability Act (HIPAA) exceptions allow researchers to forgo consent in large studies if it is difficult to get consent from participants on an individual basis.

Due to the nature of retrospective data analysis in these studies, researchers did not modify or alter any medical treatment or services for student participants. There was little risk to study subjects in these studies.

Methodology

This section provides a brief overview of study methodology. For the full reports of either of these studies, which include full descriptions of the methodologies used, please visit our web site at http://www.healthfoundation.org/sbhcstudy, or call 513-458-6600 or toll-free 888-310-4904.

In the health outcomes study, researchers randomly selected a sample of parents and students from certain schools to complete surveys on health status and healthcare utilization and satisfaction. Parents and students completed the surveys each year; however, only 588 parent-student pairs completed the survey in all three years.

Schools submitted demographic and absence data to the health outcomes study team in each of the three years. These files included basic student demographic information, school enrollment and withdrawal dates, dates of absences, and types of absences (i.e., illness, tardy, etc.). The study team verified, cleaned, and coded the data to provide the most accurate summary possible.

Personnel of schools with SBHCs completed a survey each year about their knowledge and perceptions of the SBHCs and services provided by the centers. In Years 2 and 3, the survey was modified to gather additional and specific information about various student health dimensions and referrals of students to the SBHCs.

The cost study was a retrospective quasi-experimental time-series design. Researchers used a number of theoretical models and multivariate statistical techniques to examine total Medicaid expenses, Medicaid expenses per recipient, descriptive time-series trend analyses, inflation-adjusted discount factors, and cost-benefit analyses. Researchers also used information gathered from the health outcomes study surveys of parents and school personnel to determine information about healthcare costs and utilization and SBHC resources.

Due to timing of Medicaid claims extraction, we collected all claims data for students in the study between September 1, 1997, and February 28, 2003. There were three years of claims data before the SBHCs opened (August 1997–August 2000) and two-and-a-half years of claims data after the SBHCs

opened (September 2000–February 2003). Due to the delay for medical claims submissions and processes, and Health Insurance Portability and Accountability Act (HIPAA) and other regulation changes, we were unable to collect and use Medicaid claims data from March 2003 to August 2003.

Datasets

The health outcomes study created four datasets consisting of various data sources for current and future analyses:

- Health survey longitudinal dataset: includes all three years of data from the parent survey, the student survey, school absence data, and SBHC encounter data. The unit of analysis for this dataset is the individual student and includes only those from the schools with SBHCs and the schools without SBHCs who were randomly selected to participate in the survey.
- School longitudinal dataset: includes the school enrollment and absence data for all students in all 12 schools across all three years and the SBHC encounter data for students in schools with SBHCs who were enrolled in the SBHCs across all three years. The unit of analysis is the individual student.
- Health encounter dataset: contains all student demographic data and SBHC enrollment and encounter data for all schools with SBHCs for the three years. The unit of analysis for this data set is the specific health encounter visit.
- Personnel survey dataset: contains the results of the three annual, cross-sectional school personnel surveys completed by teachers and other school staff in schools with SBHCs. The unit of analysis is the individual school staff member.

The cost study created three datasets:

- Full study dataset: includes the Medicaid use and cost information on the 5,056 students in the study.
- Asthma cohort dataset: includes the Medicaid use and cost information on the 273 students identified as having asthma.
- Mental health cohort dataset: includes the Medicaid use and cost information on the 551 students identified as having a mental health disorder.

Due to Medicaid restrictions, the cost study dataset will not be available for public use. The health outcome study dataset will be

available for public use in October 2005. For more information, please visit our web site at http://www.healthfoundation.org/sbhcstudy.

Limitations

This section provides a brief overview of study limitations. For the full reports of either of these studies, which include full descriptions of the limitations and factors affecting results, please visit our web site at http://www.healthfoundation.org/sbhcstudy, or call 513-458-6600 or toll-free 888-310-4904.

Limitations in the health outcomes study:

- Lack of consistency in reporting absence data—Schools defined and reported absences in a variety of ways, with some breaking out the data according to specific code types and others reporting only summary or aggregate data. In addition, some schools combined three tardies as one absence, and researchers were unable to identify when this happened. One school also only released absence data for the students who completed the surveys in Year 1 and not for the whole student body.
- Variations in SBHC enrollment records—Due to the variations in how schools updated yearly student records, it was impossible to determine exactly how many students were enrolled in the SBHCs. Researchers therefore defined a student as being enrolled in an SBHC if that student had data entered in the SBHC enrollment or encounters databases.
- Variations across SBHC services and policies—Each SBHC was structured differently and provided different services onsite based on the needs identified in the specific school.
- Parent and student survey sample attrition—In Year 1, 1,360 parent-student pairs completed the surveys. By Year 3, only 588 of the original pairs completed the survey. Those more likely to drop out were black, went to urban schools, and had a lower household income.
- Limited time period of the study—It is unclear whether three years is long enough to identify significant changes caused by the SBHCs. In addition, some things the researchers looked at may have been influenced by more than just the effect of the SBHCs. For example, the HRQL incorporates several dimensions of a child's life. An intervention such as the SBHCs that are targeted towards

only one or two of these dimensions may not have a pronounced effect over a short period.

- SBHC Start-Up—For a short period of time, the SBHCs were learning how to operate and finding out what services were needed in their specific populations. For some services, it takes years before cost savings are realized because students have been untreated for so long.
- Environmental factors—There were several events external to the SBHCs and schools through this three-year study that also may influence the results:
  - Civil disturbances in Cincinnati—Civil disturbances occurred in Cincinnati during the first year of this project. They were located in inner-city areas of Cincinnati around the locations of at least four of the schools participating in the study.
  - September 11 terrorist attacks—The traumatic events of September 11, 2001, in New York, Washington, and Pennsylvania occurred shortly before the study went into the field for data collection in Year 2. The somberness of most people for some time after these events could also account for decreases in reported health of children from Year 1 to Year 2.
  - Influenza epidemic—In Year 3, an unprecedented epidemic of the flu in Greater Cincinnati resulted in several schools completely closing for a few days. This was the first time in several years that whole schools closed as a result of the flu.
  - Changes in Medicaid policies—During the course of the study, Medicaid changed its application policies and procedures, which made the application process more complicated and more difficult for families.

Limitations for the cost study:

- Theoretical model of cost-benefit analysis—The implementation of detailed cost-benefit analysis (CBA) has been acknowledged to be costly and labor intensive. In the present study, funding levels were modest; consequently, assessments of costs and benefits depart in some respects from the theoretical model. CBA theory also dictates that data collection be initiated from the outset of the intervention and be sustained for each year of the project. Since this cost study was funded and initiated one year after the SBHCs opened, detailed and prospective data collection of operations was not possible. Although less detailed and intensive than the theoretical model,

researchers believe that our approach is logically defensible and adequate to gain a sense of the economic efficiency of the SBHCs. We also departed from the theoretical model by using the Health Foundation's three-year funding totals as a proxy for the detailed direct medical costs of SBHC operations. This provided a minimum value of the economic resources used and was substantiated by data from surveys from each of the schools with SBHCs, which indicated very few "in-kind" resources other than physical space and minor pieces of equipment. This approach also avoided double counting of resources.

- Geographic area—This economic study was limited to children enrolled in schools in the Cincinnati, Ohio, area who were also enrolled in Ohio Medicaid programs. These results may not be generalizable to other students or other state Medicaid populations.
- Student population—Researchers were unable to look at children with other insurance plans or no insurance because the state Medicaid databases only include students who are enrolled in Medicaid. Also, at the time of this report, researchers had not compared data from the two studies to differentiate between students in schools with SBHCs who used the SBHCs and those who did not, or to determine what proportion of students in schools with SBHCs with asthma and mental illnesses received care from the SBHCs.
- Accuracy of encounter data—It was difficult to verify the accuracy of the ICD-9 codes provided in encounter and Medicaid data; therefore, some misclassifications of disease diagnoses may exist. Researchers also did not know specific clinical parameters of asthma or mental health treatment for these cohorts; only that a diagnosis and a prescription for an asthma- or mental health-related medication existed. Both asthma and mental illness severity and student maturation were uncontrolled.

Student Use of the SBHCs

SBHCs funded by The Health Foundation of Greater Cincinnati primarily serve students in grades K–8. All students in the school or schools served by the SBHCs are eligible to enroll in and receive services from the SBHC with parental permission. Over the three years, 12,350 students in the schools with SBHCs in this study were within the age range of 5-15 years, and these were the students we looked at in this study. About half of these students were enrolled in the SBHCs. Of the students enrolled in the SBHCs, about 60% visited an SBHC at least once during the three years. Over the three years of the study, about 30% of the total number of students in schools with SBHCs used the SBHCs (see Table 2 below).

Table 2: Number of students who enrolled in and used SBHCs

	Year 1		Year 2		Year 3	
	N	%	N	%	N	%
Students enrolled in the SBHCs[1]	3,621	43.3%	4,613	47.5%	5,779	53.9%
Students who used the SBHCs[1]	2,200	26.3%	2,836	29.2%	3,289	30.7%

[1] SBHC enrollment and usage percentages are based on the number of students enrolled in schools with SBHCs (8,355 students in Year 1, 9,709 in Year 2, and 10,731 in Year 3).

About the Students Enrolled in the SBHCs

Almost 25% of the students enrolled in the eight SBHCs in this study had public health insurance, just under 40% had private insurance, and about 10% had no insurance. The insurance status of about 25-30% of students was "unknown," meaning either the enrollment form had nothing listed or the insurance information was not entered into the database. In urban SBHCs, a higher proportion of students with public health insurance, no

insurance, or unknown insurance used the SBHCs (see Figure 1 below and Table 10 in Appendix B).

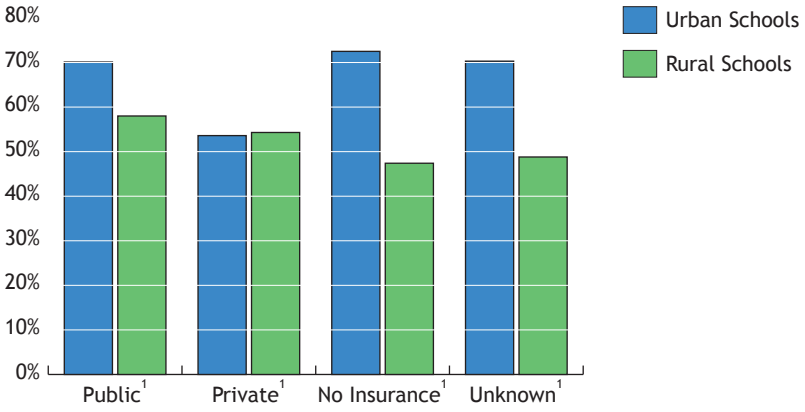


Figure 1: Percentage of students who used the SBHCs, by region and insurance status (N=7,339 students)

[1] *These percentages are based on the number of students who used the SBHCs compared to the number enrolled in the SBHCs for each geographic and insurance group. For example, 860 rural students with private health insurance used the SBHCs. This is 54.3% of the 1,584 rural students with private insurance who were enrolled in the SBHCs.*

Students with Chronic Conditions who Enrolled in the SBHCs

One thing we wanted to look at was the effect of SBHCs on children with chronic health conditions. Chronic conditions such as asthma, diabetes, learning disorders, attention deficit disorder (ADD) or attention deficit/hyperactivity disorder (ADHD), sickle cell, seizure disorders, and others can result in students missing school and parents missing work. Based on SBHC enrollment form data, just under 5% of all students enrolled in

the SBHCs had asthma and just over 2% had ADD or ADHD (see Table 3 below).

Table 3: Students with chronic conditions enrolled in SBHCs

Chronic Condition[1]	N	% of students enrolled in SBHCs
Asthma	355	4.84%
Other	331	4.51%
ADD/ADHD	159	2.17%
Headaches	123	1.68%
Learning disorders	41	0.56%
Seizure disorders/epilepsy	10	0.14%
Diabetes	8	0.11%
Sickle cell	4	0.05%
Mental retardation/developmental disability (MRDD)	0	0%

[1] *One chronic condition is listed for each child; therefore, this table does not include comorbid conditions*

About the Students who Used the SBHCs

Students visited the eight SBHCs a total of 15,141 times for an average rate of 2.06 visits per student enrolled in the SBHCs and 3.38 visits per student who used the SBHCs. Just over half of the visits were by girls (51.9%), although this varied slightly by SBHC. Older students tended to visit the SBHCs more often than younger students. The total number of visits by students of all ages (except age 5) increased over the three years. Children from separated or divorced families also used the SBHCs more often than children from married or never married families.

The ethnicity of students who used the SBHCs was very similar to the demographic characteristics of the respective schools and regions (see Figure 2 on the next page and Table 11 in Appendix B). (Note: the "Other" category included students of

Native American, Asian, or multi-racial descent and students entered into the SBHC database as "other.")

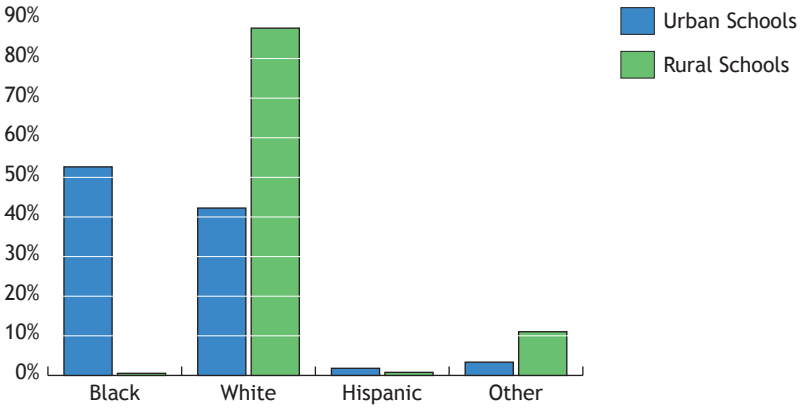


Figure 2: Students who used the SBHCs, by region and ethnicity (N=4,476 students)

A higher proportion of urban students were enrolled in and used the SBHCs compared to rural students. Over 60% of students with an office visit attended urban schools with SBHCs, and almost 60% of all office visits were in urban SBHCs (see Figure 3 below and Table 12 in Appendix B).

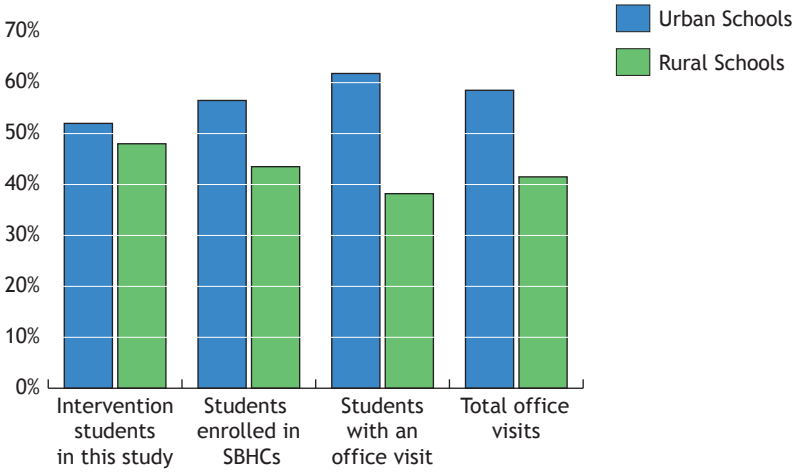


Figure 3: Students who enrolled in and used the SBHCs, by region (N=7,339 enrolled students; 4,476 students who used the centers; 15,141 SBHC visits)

Compared to all SBHC users whose insurance status was known, more students with public insurance had SBHC office visits

across all three years than students with private or no insurance (see Figure 4 below and Table 13 in Appendix B).

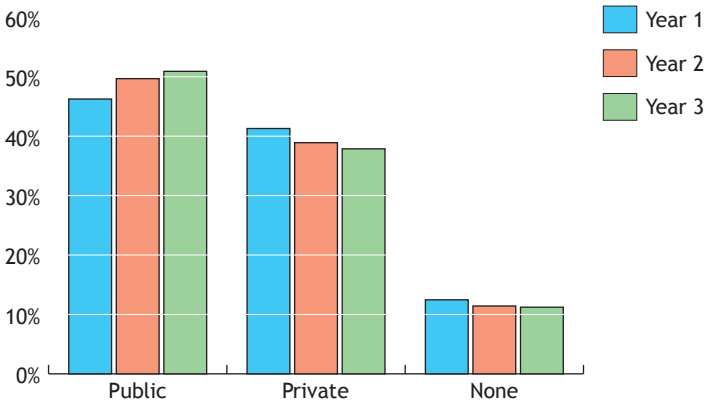


Figure 4: Students with SBHC office visits, by insurance status (N=4,476 students)

Students with Chronic Conditions who Used the SBHCs

Of the students listed in the SBHC enrollment files as having a chronic condition, just under 60% had at least one SBHC visit, compared to 61.4% of students with no chronic condition listed. Almost 4% of all SBHC visits were due to asthma and just over 4% were due to ADD or ADHD. The mean number of visits for SBHC users with a reported chronic condition is 4.22 visits, compared to only 2.95 visits for SBHC users reporting no chronic condition. Most visits by chronically ill children were due to the same diagnoses as their non-chronically ill peers.

How the SBHCs Affected Student Health

To measure the effect the SBHCs had on student health, we measured three areas:

- health-related quality of life,
- absenteeism, and
- student access to healthcare.

Health-Related Quality of Life

We formed a central hypothesis and two comparisons to examine the effect SBHCs had on students' health-related quality of life (HRQL):

Hypothesis 1 Students in schools with SBHCs will have improved health status compared to students in schools without SBHCs.

Hypothesis 1.1 To determine whether the health status of students in schools with SBHCs improves over time.

Hypothesis 1.2 To determine whether the health status of students in schools with SBHCs is significantly better than the health status of students in schools without SBHCs.

The PedsQL™ 4.0 (Varni et al., 2003) provides a measure of students' overall health-related quality of life (HRQL) from 0 (the lowest) to 100 (the highest). Total HRQL can be broken into two dimensions: physical and psychosocial. Varni et al. (2003) reported reference PedsQL™ scores for "healthy" children and for "chronically ill" children from his groups of surveyed children.

We looked at the HRQL of students who participated in all three years of the survey (N=588) and broke them into three groups: SBHC users (students in schools with SBHCs who used SBHC services), SBHC nonusers (students in schools with SBHCs who did not use SBHC services), and comparison students (students in schools without SBHCs).

All students in our study scored themselves lower than the "healthy children" reference group by Varni (see Figure 5 on the next page and Table 14 in Appendix B). However, parents of SBHC nonusers and parents of students in schools without

SBHCs rated their students' health higher than parents in Varni's reference group. Results were consistent for both physical and psychosocial health dimensions.

In all cases, SBHC users in Year 1 rated themselves the lowest of the students in this study (see Figures 5–7 below and Tables 14–16 in Appendix B). For total HRQL, they rated themselves at the level of the chronically ill children in Varni's reference group. By Year 3, SBHC users' total HRQL improved, while the scores of SBHC nonusers and comparison students decreased.

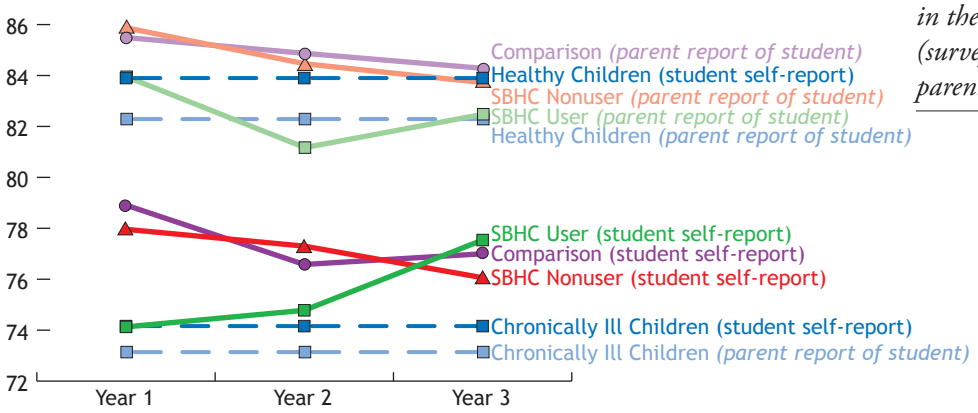


Figure 5: Self-reported and parent-reported total health-related quality of life (HRQL) scores for students in the study with reference scores (survey sample; N=588 student/parent pairs)

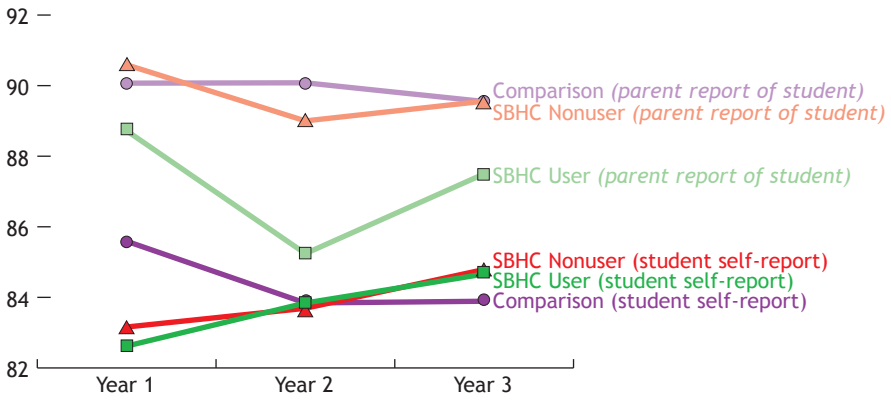


Figure 6: Self-reported and parent-reported physical HRQL scores for students in the study (survey sample; N=588 student/parent pairs)

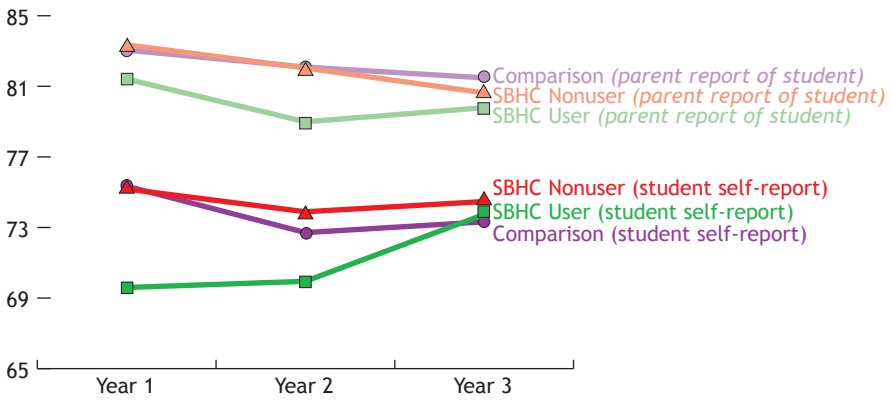


Figure 7: Self-reported and parent-reported psychosocial HRQL scores for students in the study (survey sample; N=588 student/parent pairs)

We also looked at how certain factors—such as student's insurance status, age, sex, family marital status, chronic condition, and geographic region—affected HRQL scores. Comparisons with significant differences are reported below. We did not include family income because the overlapping nature of student insurance status, race, and family income presented multicollinearity problems if we included all three variables simultaneously. Since these variables were so interwoven, the inclusion of all three tended to mask their individual effects, as they shared a substantial proportion of variance. Taking family income into account at the same time as insurance status, for example, eliminated the significance of insurance status on HRQL scores.

Student's Insurance Status and HRQL

- Students with public health insurance (e.g., state Children's Health Insurance Program [CHIP]—referred to as Healthy Start in Ohio and KCHIP in Kentucky—Medicaid, or Medicare) reported significantly lower total and psychosocial HRQL than students with private health insurance.
- Parents whose children had public insurance reported their students' total, physical, and psychosocial HRQL to be significantly lower than parents whose children had private insurance.
- Parents whose children had no insurance reported their students' total and psychosocial HRQL to be significantly lower than parents whose children had private insurance.

Student's Age and HRQL

- Older children reported significantly higher HRQL than younger students.
- Among other variables, with every one-year increase in age, children reported about ½-point higher physical HRQL scores and about ¾-point higher psychosocial HRQL scores.

Student's Sex and HRQL

- Females reported lower total and physical HRQL.
- For females in schools with SBHCs (both SBHC users and nonusers), parents reported higher total and psychosocial

HRQL scores initially, but these scores fell sharply and were equivalent to females in the comparison group—whose average score remained relatively stable—by Year 3.
- Parents of children in rural schools reported the HRQL of female children to be higher than male children.
- Among other variables, parents with children in rural schools reported their children's psychosocial HRQL to be higher on average than other parents with children in urban schools.

Student's Family Marital Status

- SBHC users from separated or divorced and never-married families who had public or no insurance had higher average HRQL scores than SBHC nonusers and students in schools without SBHCs from families with similar marital and insurance status.

Student's Chronic Condition and HRQL

- The presence of a chronic condition was not a predictor of student-reported HRQL but was a predictor of parent-reported HRQL.

Rural Students and HRQL

- Among other variables, parents of children in rural schools reported their children's total, physical, and psychosocial HRQL to be, on average, higher than parents of children in urban schools.
- Rural parents reported the HRQL of their female children to be higher than male children.

Absenteeism

We formed the following hypotheses to examine the effect SBHCs had on student absence rates:

Hypothesis 2 Students in schools with SBHCs will have fewer absences compared to students in schools without SBHCs.

Hypothesis 2.1 The rate of absenteeism declines in schools with SBHCs over time.

Hypothesis 2.2 The rate of absenteeism among students in schools with SBHCs is significantly better than the rate of absenteeism among students in schools without SBHCs.

We looked at two types of absences: partial-day absences (i.e., absences because a child was sent home by the SBHC or after a SBHC visit for illness) and full-day absences.

Partial-Day Absences

After each student visited the SBHCs, SBHC staff entered the outcome of those visits into the database. From this information, we were able to tell whether a child was dismissed or returned to class for each specific visit. As the number of total visits increased from 3,707 in Year 1 to 6,354 in Year 3 (170% increase), the percentage of students returning to class also increased from 81% to 86% (see Figure 8 below and Table 17 in Appendix B). This increase held true even though Year 3 saw a great increase of flu and strep diagnoses that result in dismissal. Some schools closed for one or two days during Year 3 because of the flu.

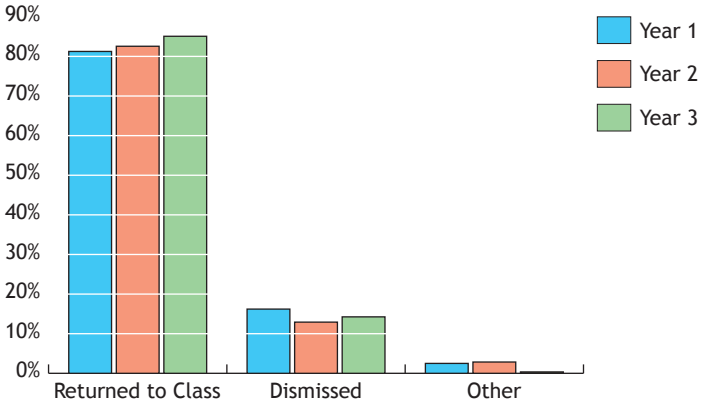


Figure 8: Where students were sent after SBHC visits (N=15,141 visits)

Full-Day Absences

We also looked at the official school absence records that all 12 participating schools sent each year. We cleaned and collapsed these data to provide the total number of full-days absent per student per year for illness and medical issues. Since the school year is approximately 160 days, we deleted the one student with 80 or more absences. We capped absences at 60 per year, and students who had absences ranging from 60 to 80 were recoded

to equal 60 (five students in Year 1, two students in Year 2, and no students in Year 3).

We looked at absence rates of SBHC users, SBHC nonusers, and students in schools without SBHCs (see Figures 9 and 10 below and Tables 18 and 19 in Appendix B). Notwithstanding the apparent effect of the SBHCs keeping students at school by returning them to class after encounters, we did not see any substantial impact on full-day absences overall on either the full school or survey sample populations.

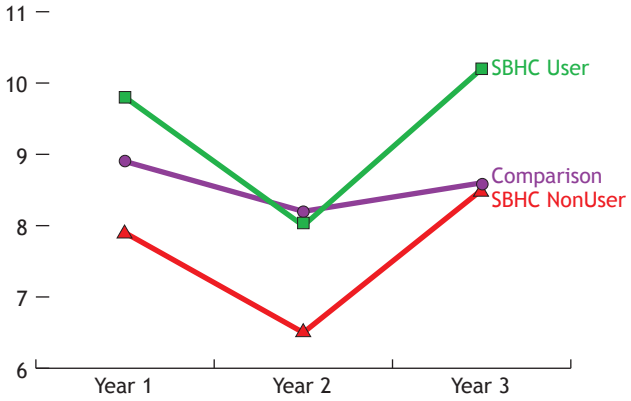


Figure 9: Full-day absences for SBHC users, nonusers, and comparison students (full school population; N=7,784 students)

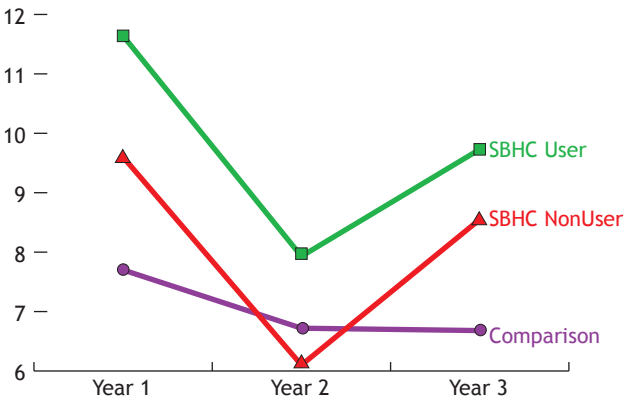


Figure 10: Full-day absences for SBHC users, nonusers, and comparison students (survey sample; N=587 students)

Although the SBHCs did not appear to have an overall affect on full-day absences in the full school or survey sample populations, there was a great deal of variation in the absence rates of students when we looked at breakdowns by ethnicity, geographic region, state, insurance status, and chronic condition.

Full-Day Absences by Ethnicity

Being in a school with an SBHC appeared to have a protective effect among black students over the three years, as illustrated by

the reduction in absences (see Figure 11 below and Table 20 in Appendix B). Absences among black students in schools without SBHCs rose. Absences among white students in schools with SBHCs (both users and nonusers) decreased from Year 1 to Year 2 but increased sharply in Year 3. Absence rates for white students in schools without SBHCs were generally consistent across all three years.

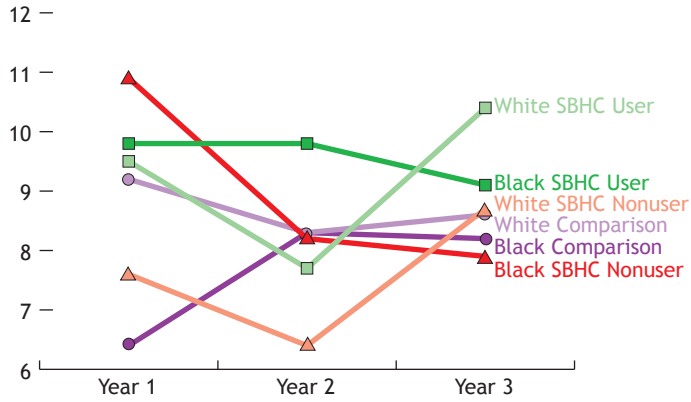


Figure 11: Full-day absences for SBHC users, nonusers, and comparison students, by ethnicity (full school population; N=7,784 students)

Full-Day Absences by Geographic Region

Among other variables, students in rural schools had significantly fewer absences on average. Absences among urban SBHC users declined greatly from Year 1 to Year 2 and increased only slightly in Year 3 (see Figure 12 below and Table 21 in Appendix B). Absences among rural SBHC users showed a steady increase from Year 1 to Year 3.

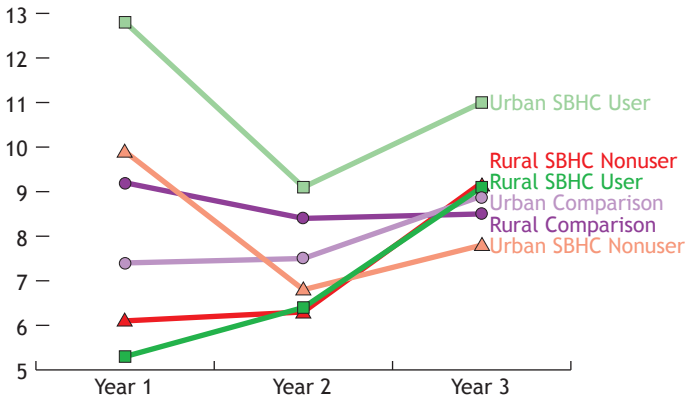


Figure 12: Full-day absences for SBHC users, nonusers, and comparison students, by region (full school population; N=7,784 students)

Full-Day Absences by State

Among other variables, students in Kentucky schools had significantly fewer absences on average. Absences among Ohio SBHC users and nonusers declined slightly from Year 1 to Year 2

but rose greatly in Year 3 (see Figure 13 below and Table 22 in Appendix B). The opposite trend appeared for Kentucky SBHC users and nonusers.

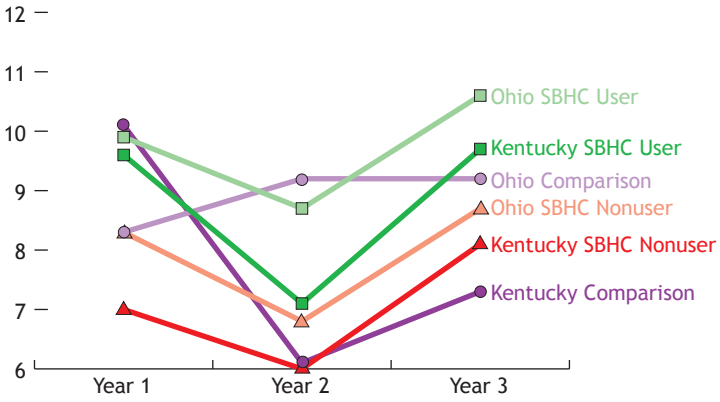


Figure 13: Full-day absences for SBHC users, nonusers, and comparison students, by state (full school population; N=7,784 students)

Full-Day Absences by Insurance Status

Among other variables, students with public health insurance had significantly more absences on average. SBHC users with public or no insurance showed a large decline in absences from Year 1 to Year 2 and a further smaller decline (no insurance) or slight incline (public insurance) in Year 3 (see Figures 14–16 below and on the next page and Table 23 in Appendix B). The absence rate among SBHC nonusers with no insurance increased greatly over the three years, while absence rates for SBHC nonusers with public insurance had a similar pattern to rates of SBHC users with public insurance. SBHC users with private insurance showed a consistent absence rate across the three years.

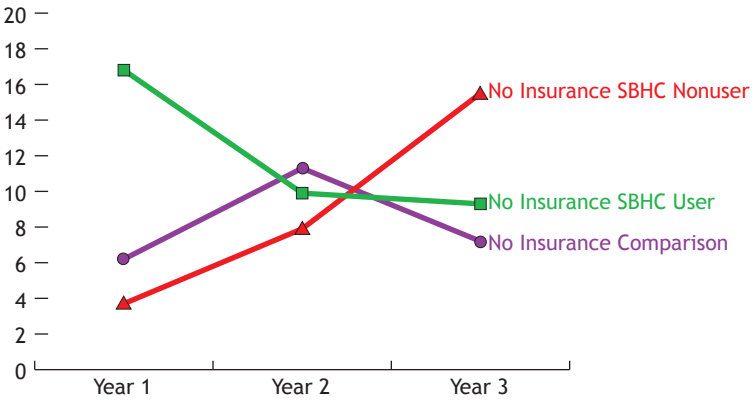


Figure 14: Full-day absences for SBHC users, nonusers, and comparison students with no insurance (survey sample; N=39 students)

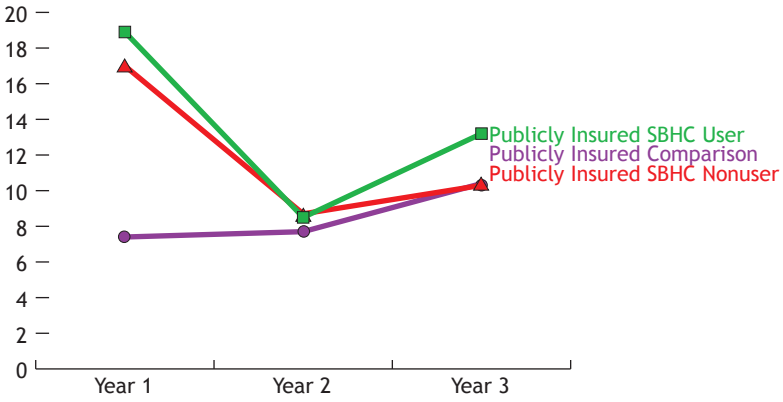


Figure 15: Full-day absences for SBHC users, nonusers, and comparison students with public insurance (survey sample; N=157 students)

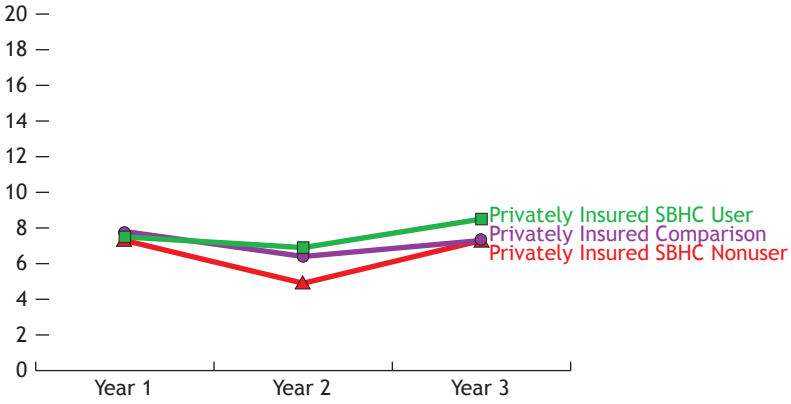


Figure 16: Full-day absences for SBHC users, nonusers, and comparison students with private insurance (survey sample; N=372 students)

Full-Day Absences by Chronic Condition

Students with chronic conditions were identified through the parent surveys. Parents were given a list of chronic conditions and asked if they'd ever been told by a health professional that their children had that chronic condition. Among other variables, students with chronic conditions such as attention deficit/hyperactivity disorder (ADHD), asthma, learning disorders (LD), or other conditions, had significantly more absences on average. Absence rates of SBHC users with LD and ADHD showed a substantial decrease over the three years (see Figures 17 and 18 on the next page and Tables 24 and 25 in Appendix B). Absence rates of SBHC nonusers with LD and ADHD decreased from Year 1 to Year 2 but then increased (ADHD) or leveled out (LD)

in Year 3. Conversely, absences among those in the comparison group remained constant (LD) or increased (ADHD).

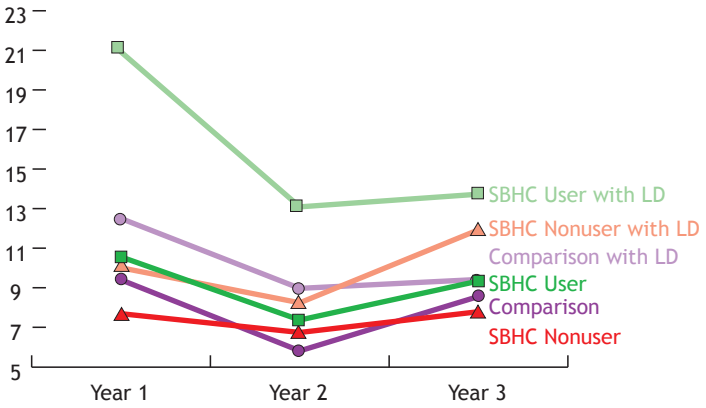


Figure 17: Full-day absences for SBHC users, nonusers, and comparison students with and without learning disorders (survey sample; N=579 students)

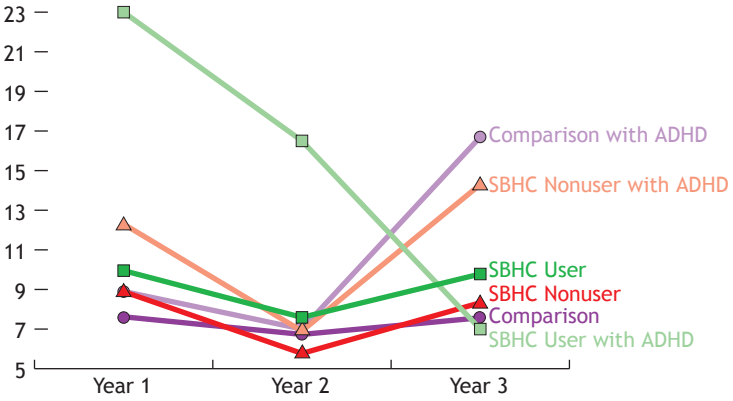


Figure 18: Full-day absences for SBHC users, nonusers, and comparison students with and without ADHD (survey sample; N=579 students)

How the SBHCs Affected Healthcare Access and Utilization

Two key questions we wanted to answer in these studies were how the presence of an SBHC would affect children's access to healthcare and children's use of emergency rooms (ER) and other sources of healthcare. The health outcomes study looked at healthcare access and use through questions included on the parent survey. The cost study looked at hospitalization and emergency room use by students covered by Medicaid.

Access to Healthcare

The final hypotheses of the health outcomes study focused on access to healthcare:

Hypothesis 3 Students in schools with SBHCs will have improved access to healthcare than students in schools without SBHCs.

- Hypothesis 3.1 The percentage of students in schools with SBHCs who have a medical home improves compared to students in schools without SBHCs.
- Hypothesis 3.2 The percentage of students who have had a well-child visit in the prior year increases in schools with SBHCs compared to students in schools without SBHCs.
- Hypothesis 3.3 The percentage of students with health insurance in schools with SBHCs improves compared to students in schools without SBHCs.

We collected all data on the dependent variables from the parent surveys.

In considering overall access to healthcare, we asked parents how many problems they had in getting their children healthcare. Parents of SBHC nonusers and students in schools without

SBHCs initially reported significantly fewer problems getting care (see Figure 19 below and Table 26 in Appendix B). However, over the three years, parents of SBHC users showed a significant improvement in their perception that accessing healthcare was little or no problem compared to parents of children in schools without SBHCs.

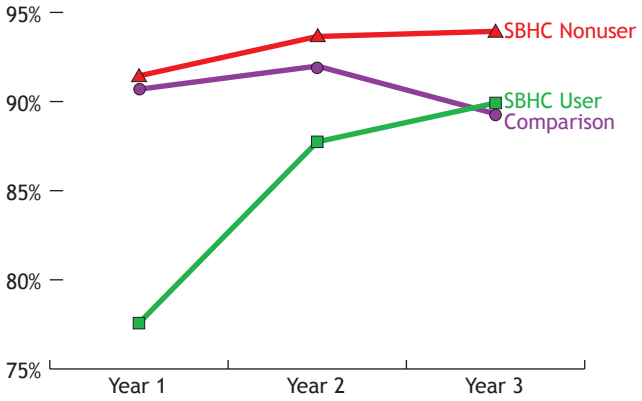


Figure 19: Percentage of parents reporting that accessing healthcare was little or no problem (survey sample; N=581 parents)

Medical Home

We asked parents who they usually took their children to see when their children were sick. In both Years 1 and 2, SBHC users were more likely than other students to have an emergency room (ER) physician listed as their usual source of care or "medical home" (see Table 4 below). In Year 3, this fell to nearly 0 and was below the comparison group rate. Students in schools without SBHCs were more likely to have their usual source of care be a private practice than both SBHC users and nonusers.

Table 4: Parent-reported student medical home (survey sample; N=587 students)

	Year 1			Year 2			Year 3		
Medical Home	User	Nonuser	Comp.	User	Nonuser	Comp.	User	Nonuser	Comp.
Private Practice	64.9%	59.2%	75.4%	46.1%	58.1%	67.7%	55.9%	61.0%	70.5%
Community Health Center	20.6%	31.0%	14.6%	22.6%	30.6%	17.9%	22.8%	28.0%	17.4%
Hospital-Based Clinic	9.3%	8.6%	9.2%	10.8%	6.5%	7.7%	9.4%	6.7%	8.0%
ER Physician	5.2%	1.2%	0.8%	2.9%	2.1%	1.4%	0.8%	0.0%	2.0%
SBHC	0.0%	0.0%	0.0%	13.7%	0.0%	0.4%[1]	9.5%	3.1%[1]	0.4%[1]
Other	0.0%	0.0%	0.0%	3.9%	2.7%	4.9%	1.6%	1.2%	1.7%

[1] *A few parents of SBHC nonusers and students in schools without SBHCs reported the SBHC as their children's medical home. These parents may have been confused by the question, the child could have changed schools, or the parent may have meant the school nurse.*

In Year 1, more urban students listed community health centers and hospital-based clinics as their medical homes, while rural students listed private practices as their medical homes. There was no significant difference between Ohio and Kentucky. Children with no health insurance were significantly more likely to have the ER listed as their medical home, while students with public insurance were more likely to report a community health center or hospital-based clinic. Students with private insurance overwhelmingly reported their medical homes to be private practices. There was no difference in medical home for students with and without a chronic condition.

Well-Child Care

"Well-child" visits are defined as a visit for a routine check-up; Early Periodic Screening, Diagnostic, and Treatment (EPSDT) visit; physical exam; immunizations; screenings; and sports or activity physicals. Over the three years, there was a significant increase in well-child visits for SBHC users and nonusers compared to students in schools without SBHCs (see Figure 20 below and Table 27 in Appendix B). These visits could have taken place at any location, whether it was the SBHC, a community health center, a private practice, or other location.

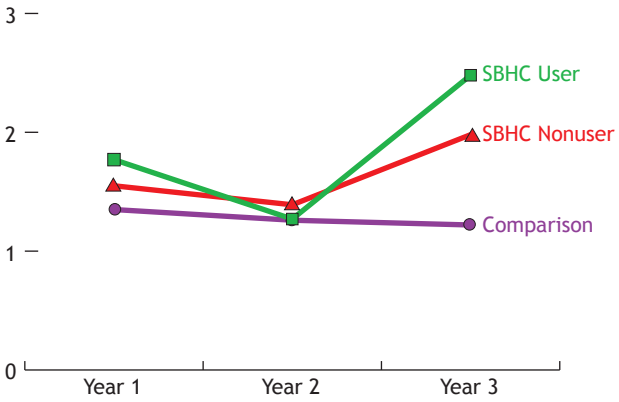


Figure 20: Average number of well-child visits students had per year, from parent report (survey sample; N=587 students)

Students in rural areas were significantly less likely to access well-child care, but this effect was not significant once other factors (insurance status, age, etc.) were accounted for. Students with public health insurance and students with other chronic conditions were significantly more likely to access well-child care, but these effects were also not significant once other factors were accounted for.

Ill-Child Care

All three groups showed a decrease over the three years in ill-child care (see Figure 21 below and Table 28 in Appendix B). These visits could have taken place at any location, whether it was the SBHC, a community health center, a private practice, or other location.

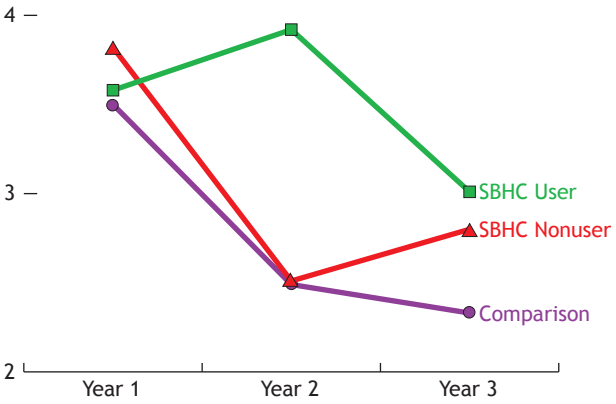


Figure 21: Average number of ill-child visits students had per year, from parent report (survey sample; N=587 students)

Among other variables, older students were less likely to seek ill-child care compared to younger students. Black students were less likely than white students to seek ill-child care. Moreover, students with no health insurance were less likely to seek ill-child care compared to students with private or public health insurance. Students with asthma, ADHD, or other chronic conditions were significantly more likely to seek ill-child care.

In addition to the results from the parent survey, in Year 2 we asked students where they went for care when they were sick. In Year 2, 353 (73.7%) students in schools with SBHCs reported that they used the SBHCs when they were sick. In Year 3, only 213 (62.1%) reported that they used the SBHCs. Older students (grades 5- 7) reported that they were less likely to use the SBHCs compared to younger students. However, among the older students, approximately 66% reported using the SBHCs. Students who self-reported their overall health status was good, fair, or poor were significantly more likely to use the SBHCs compared to students with excellent or very good self-reported overall health.

Health Insurance Status

Children in schools with SBHCs were more likely to have public or no health insurance (see Figure 22 on the next page and

Table 29 in Appendix B). SBHC users were also more likely than nonusers to have public or no health insurance.

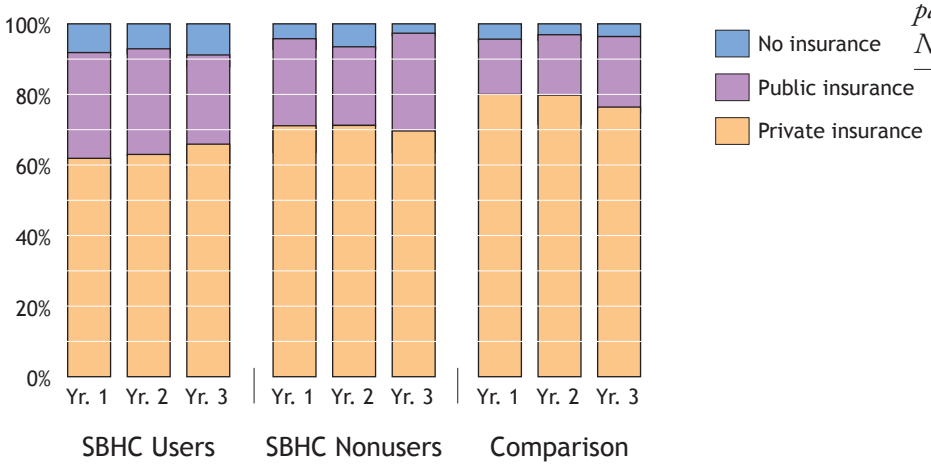


Figure 22: Insurance status of children in the study, from parent report (survey sample; N=576 students)

The percentage of students without health insurance did not decrease for SBHC users as substantially as it decreased for SBHC nonusers and students in schools without SBHCs (see Figure 23 below and Table 29 in Appendix B). Students in schools without SBHCs were more likely to have private health insurance. There was no significant change for any group or between groups over time.

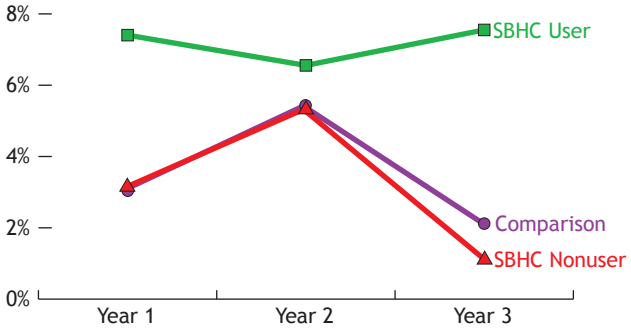


Figure 23: Percentage of children without health insurance, from parent report (survey sample; N=576 students)

Children with a chronic condition were significantly more likely to have public health insurance compared to students without a chronic condition, who were more likely to have private insurance. Among other variables, rural students were more likely to have health insurance compared to urban students, but this effect disappeared when all factors (such as income, age, etc.) were included.

Use of Emergency Rooms, Hospitals, and Mental Health Services

Through the parent surveys, the health outcomes study looked at emergency room (ER) visits by students in schools with and without SBHCs. The cost study looked at hospitalizations, ER visits, and use of mental health treatment by students who were enrolled in schools with and without SBHCs and in Medicaid. The cost study also looked at hospitalizations and ER visits of Medicaid students with asthma who were in schools with and without SBHCs.

Emergency Room Visits

The final hypothesis of the health outcomes study looked specifically at emergency room (ER) visits:

Hypothesis 3.4 The percentage of students in schools with SBHCs with emergency room visits decreases compared to students in schools without SBHCs.

Based on parent responses to a question about whether their children had visited the ER in the last year, the SBHCs did not appear to have any noticeable effect on ER use. There were no significant differences between the three groups, nor were there any significant differences in change over time across the groups (see Figure 24 below and Table 30 in Appendix B).

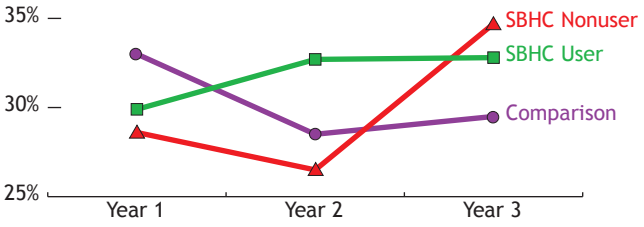


Figure 24: Percentage of students with at least one ER visit, from parent report (survey sample; N=587 students)

Among other variables, males, students with public health insurance, and students with asthma or other chronic conditions were significantly more likely to use the ER.

There were some interesting interactions when we looked at ER use by state. The percentage of Ohio SBHC users with at least one ER visit increased from Year 1 to Year 2 but decreased slightly in Year 3 (see Figure 25 on the next page and Table 31 in Appendix B). Ohio SBHC nonusers showed an opposite pattern.

In Kentucky, SBHC users showed a steady decrease in percentage of students with at least one ER visit, but SBHC nonusers showed a steep increase in percentage of students with at least one ER visit. Within both states, students in schools without SBHCs showed a fairly consistent percentage of students with at least one ER visit.

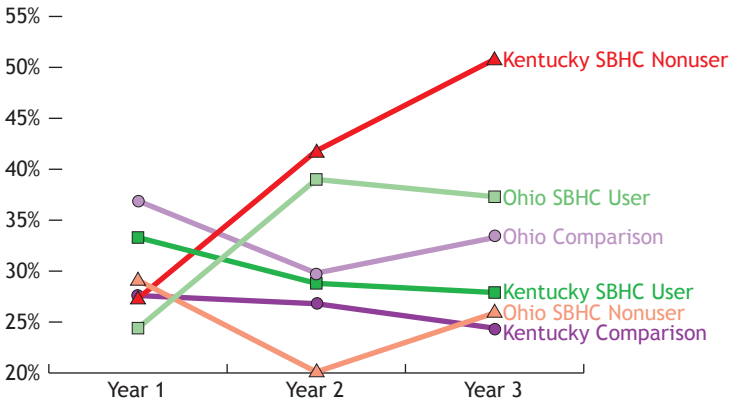


Figure 25: Percentage of students with at least one ER visit, from parent report, by state (survey sample; N=587 students)

Hospitalizations and Emergency Room Visits by Students on Medicaid

The cost study looked at hospitalization and emergency room visits of the 2,153 students who were continuously enrolled in Medicaid and the same schools for at least two academic years. (Note: The cost study did not look at SBHC users vs. nonusers; it only looked at intervention vs. comparison students.) The overall rate of hospitalization per student in the cost study was not significantly different before and after the SBHCs opened.

The rate of ER visits for students in schools without SBHCs was 50% higher than for students in schools with SBHCs. While the rate of ER visits for students in schools without SBHCs increased 20% before and after the SBHCs opened, the rate of ER visits for students in schools with SBHCs was not significantly different before and after the SBHCs opened.

Hospitalizations and ER visits by Medicaid Students with Asthma

The cost study also looked at Medicaid students with asthma (see the section entitled "Study Populations" on pages 3–6 for information about this cohort). Students with asthma in schools with SBHCs had fewer hospitalizations and ER visits after the SBHCs opened compared to before (see Figure 26 on the next

page and Table 32 in Appendix B). Students with asthma in schools without SBHCs had about the same number of ER visits and hospitalizations before and after the SBHCs opened.

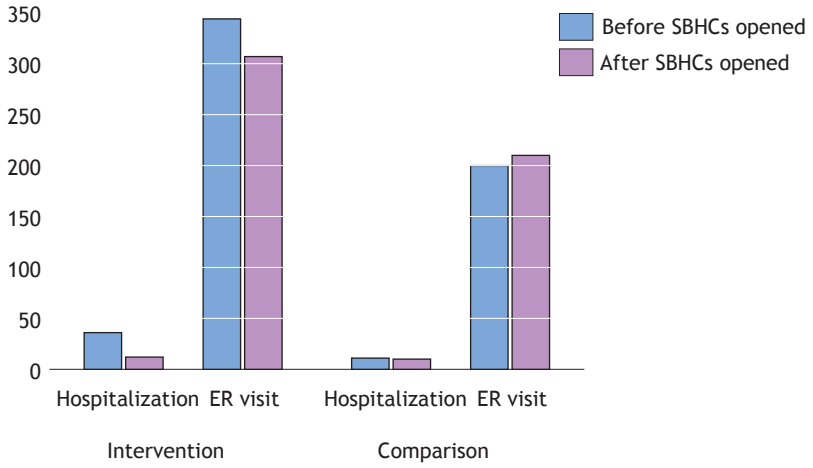


Figure 26: Hospitalizations and ER visits by Medicaid students with asthma (N=273 students)

For students with asthma in schools with SBHCs, the rate of hospitalization decreased 240% and the rate of ER visits decreased 33.5% after the SBHCs opened. In addition, the rate of ER visits for children with asthma enrolled in a Medicaid managed care organization (MCO) and CHIP were 5.7% and 24% lower, respectively, than children with asthma enrolled in other Medicaid programs.

The cost study also looked at the primary diagnoses for hospitalization and ER visits before and after the SBHCs opened. Hospitalizations for asthma, bronchitis, and pneumonia decreased significantly for students with asthma in schools with SBHCs after the SBHCs opened, while those hospitalizations remained at the same level for children with asthma in schools without SBHCs. The decrease in ER visits for otitis media (ear infections) was statistically significant among students in schools with SBHCs after the SBHCs opened, although the differences in ER visits for other specific diagnoses were not significant.

Use of Mental Health Treatment

Because we wanted to see if students in schools with SBHCs received more mental health services regardless of diagnosis of a mental health disorder, the cost study looked at the use of mental health treatment by the 2,153 children who were enrolled in Medicaid and the same school for two years. After the SBHCs opened, 5.1% more students in urban schools with SBHCs and

7.1% more students in rural schools with SBHCs received mental health services than before the SBHCs opened (see Figure 27 below and Table 33 in Appendix B). Only 2.3% more students in urban schools without SBHCs and 1.5% more students in rural schools without SBHCs received mental health services after September 2000 (when the SBHCs opened).

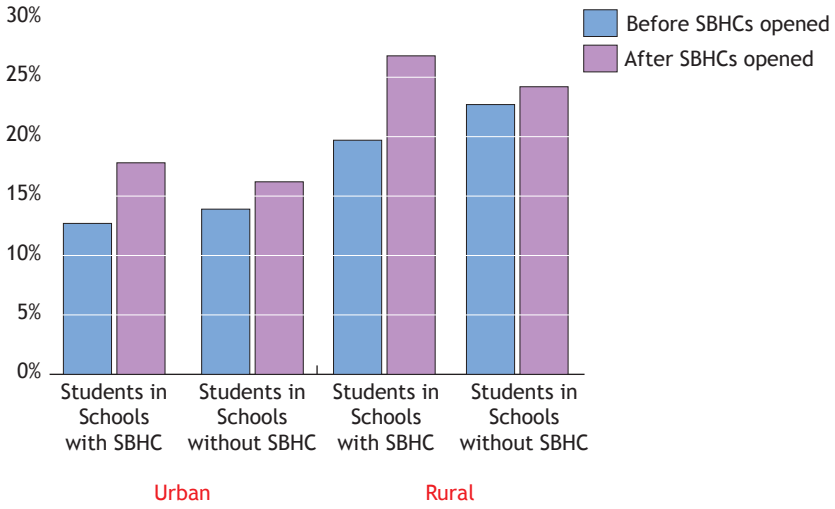


Figure 27: Percentage of Medicaid students who accessed mental health services before and after the SBHCs opened (N=2,153 students)

How the SBHCs Affected Student Healthcare Costs

Total Medicaid Costs

A total of $27.1 million (or $29.8 million in adjusted 2002 value) were spent on the 5,056 Medicaid students enrolled in the Ohio schools from the health outcomes study during the study period (September 1, 1997–February 28, 2003). Mental health services and outpatient care and other medical services made up for almost 55% of the total Medicaid costs (see Figure 28 below). Dental care (4.3%) and EPSDT (1.6%) were relatively small components for the total Medicaid costs.

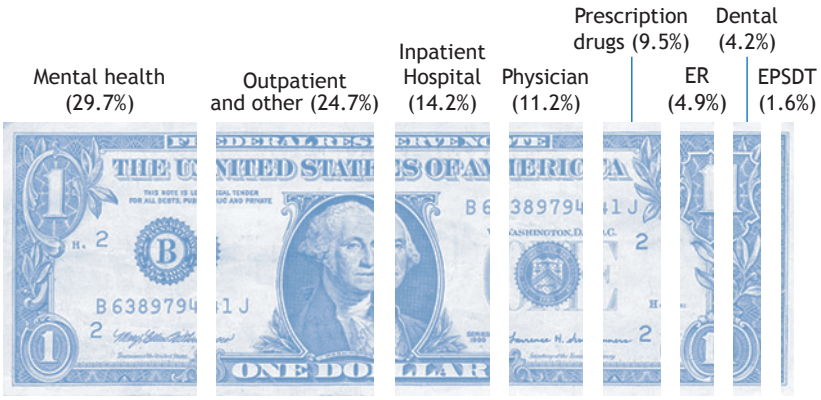


Figure 28: Ohio Medicaid cost components for students in this study

Medicaid Expense Trends

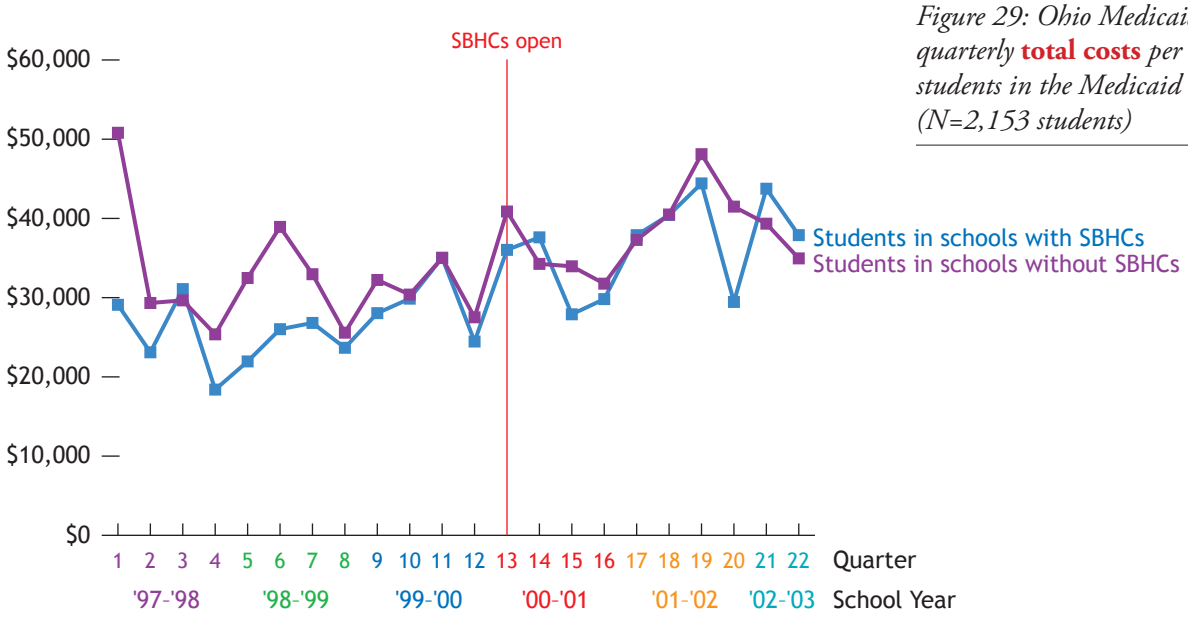
In order to detect seasonal variation, we measured Medicaid expenses per 100 recipients each quarter during the study period. We limited this analysis to the 2,153 students who were continuously enrolled in Medicaid and the same school for the 2000–2001 and 2001–2002 school years. The four seasonal quarters were defined as fall (September-November), winter (December-February), spring (March-May), and summer (June-August). In addition to total Medicaid expenses per 100 recipients, we also looked at Medicaid expenses for the following categories:

- hospitalizations (hospital accommodation, medical therapy services, physician encounters, radiology diagnosis fees);
- physician office encounters (physician diagnosis or consultation fees);

- emergency room visits (emergency room services and associated medical services, including physician encounters);
- outpatient visits and other medical care (laboratory tests, home services, physical or occupational therapy, etc.);
- mental health (inpatient or outpatient mental health services, mental retardation services, mental health support services);
- prescription drugs (prescription drugs, pharmacy dispensing fees);
- dental (dental care and services);
- EPSDT (Early Periodic Screening, Diagnosis, and Treatment services, including well-child check-ups).

Figures 29–37 below and on the next few pages (see also Tables 34–42 in Appendix B) show the average quarterly costs for various categories of Medicaid cost components. Many of the costs for these components showed a seasonal variation for both students in schools with SBHCs and students in schools without SBHCs, with troughs in summer quarters and higher costs in fall, winter, and spring quarters. The difference in average quarterly total costs before and after the SBHCs opened between students in schools with and without SBHCs was not significant, although the intervention students in the Medicaid cohort had slightly higher average quarterly total costs. After the SBHCs opened, students in schools with SBHCs had significantly lower quarterly ER visit costs (Figure 32) and prescription drug costs (Figure 35) but significantly higher dental costs (Figure 36) than students in schools without SBHCs.

Figure 29: Ohio Medicaid quarterly **total costs** *per 100 students in the Medicaid cohort (N=2,153 students)*



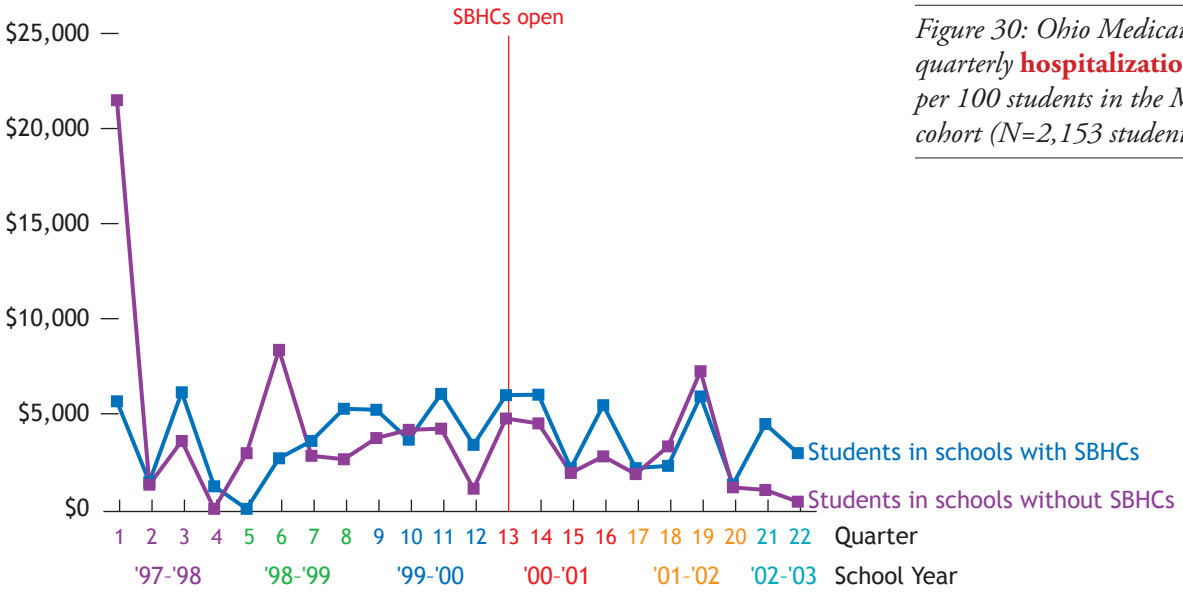


Figure 30: Ohio Medicaid quarterly **hospitalization costs** *per 100 students in the Medicaid cohort (N=2,153 students)*

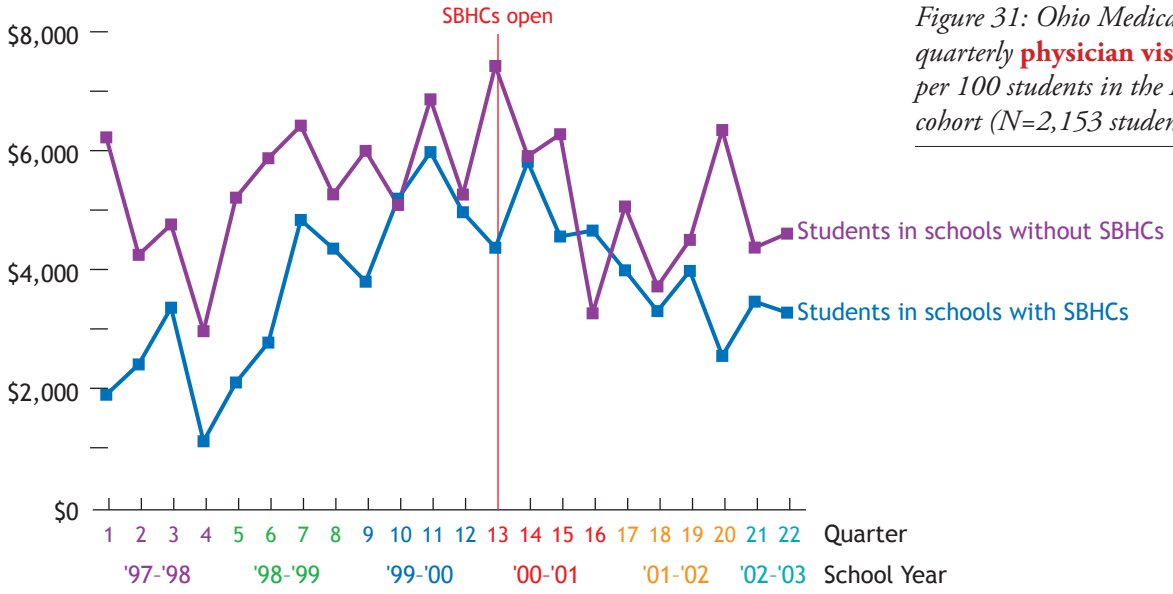


Figure 31: Ohio Medicaid quarterly **physician visit costs** *per 100 students in the Medicaid cohort (N=2,153 students)*

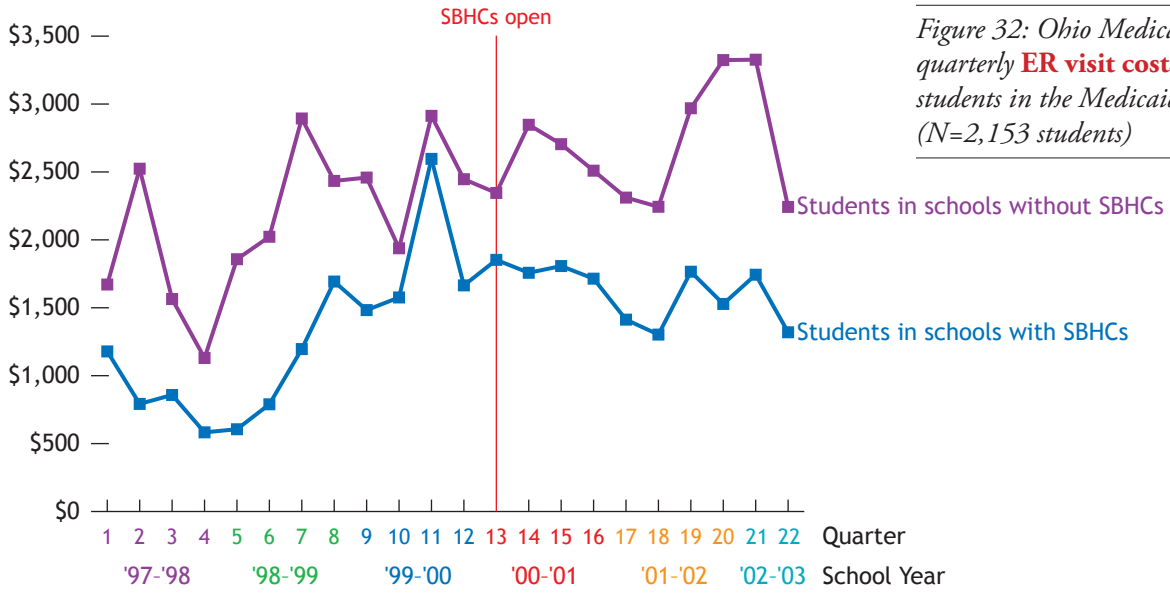


Figure 32: Ohio Medicaid quarterly **ER visit costs** *per 100 students in the Medicaid cohort (N=2,153 students)*

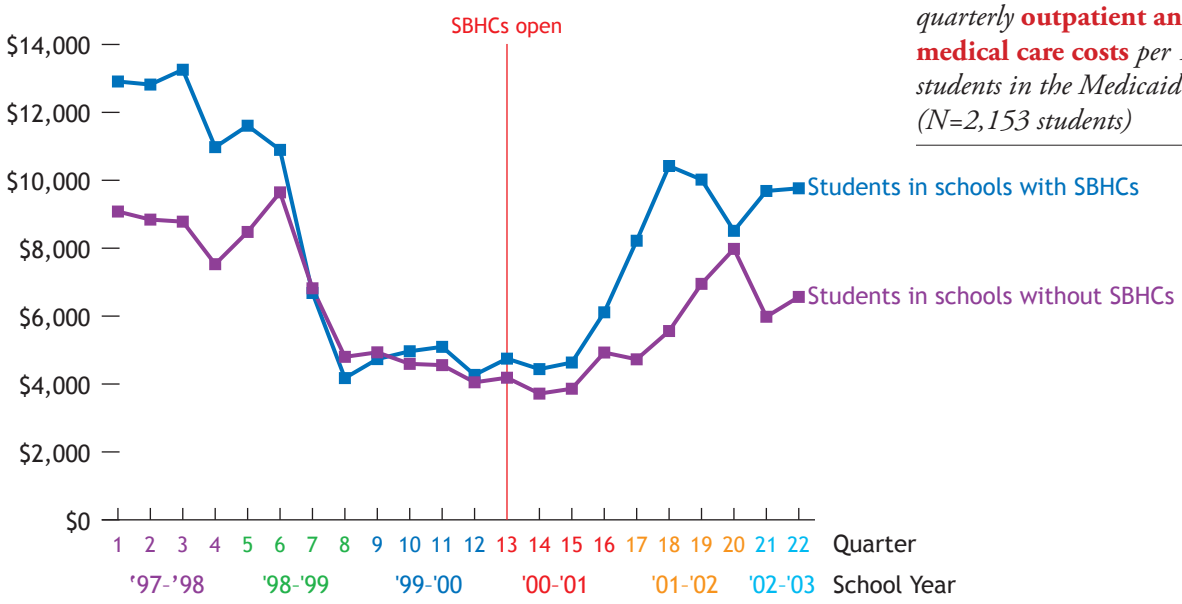


Figure 33: Ohio Medicaid quarterly **outpatient and other medical care costs** *per 100 students in the Medicaid cohort (N=2,153 students)*

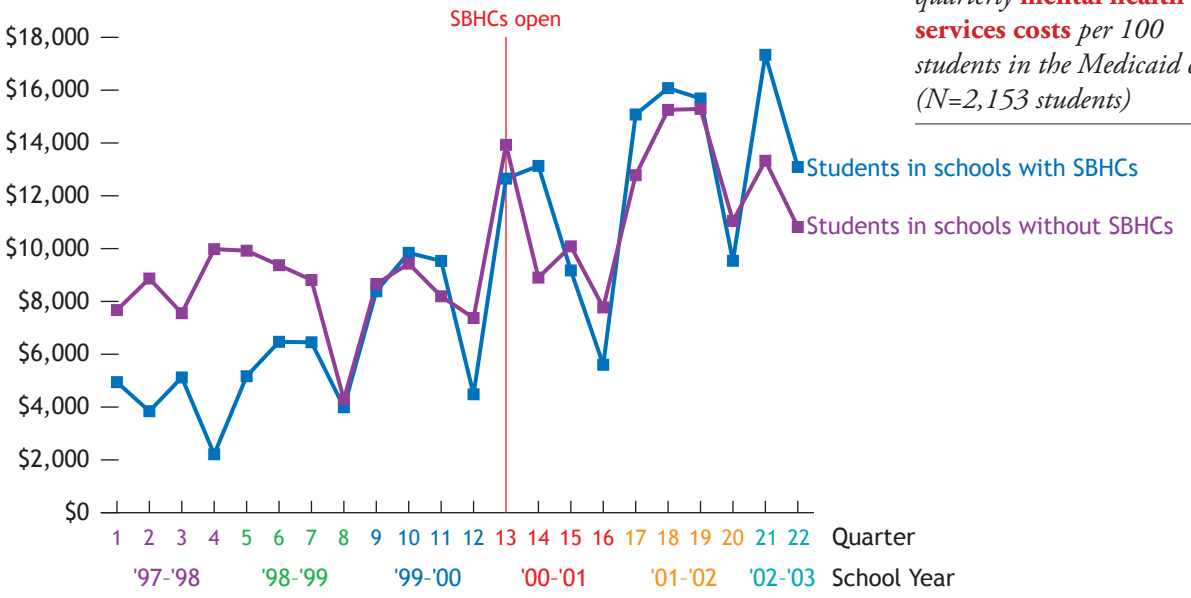


Figure 34: Ohio Medicaid quarterly **mental health services costs** *per 100 students in the Medicaid cohort (N=2,153 students)*

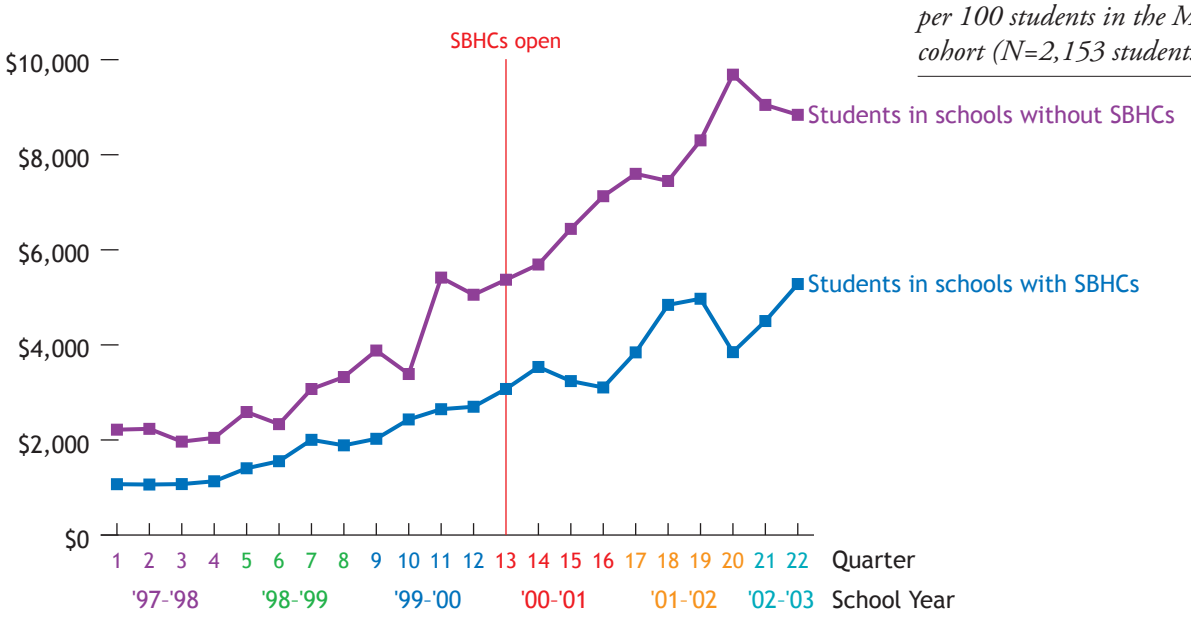


Figure 35: Ohio Medicaid quarterly **prescription drug costs** *per 100 students in the Medicaid cohort (N=2,153 students)*

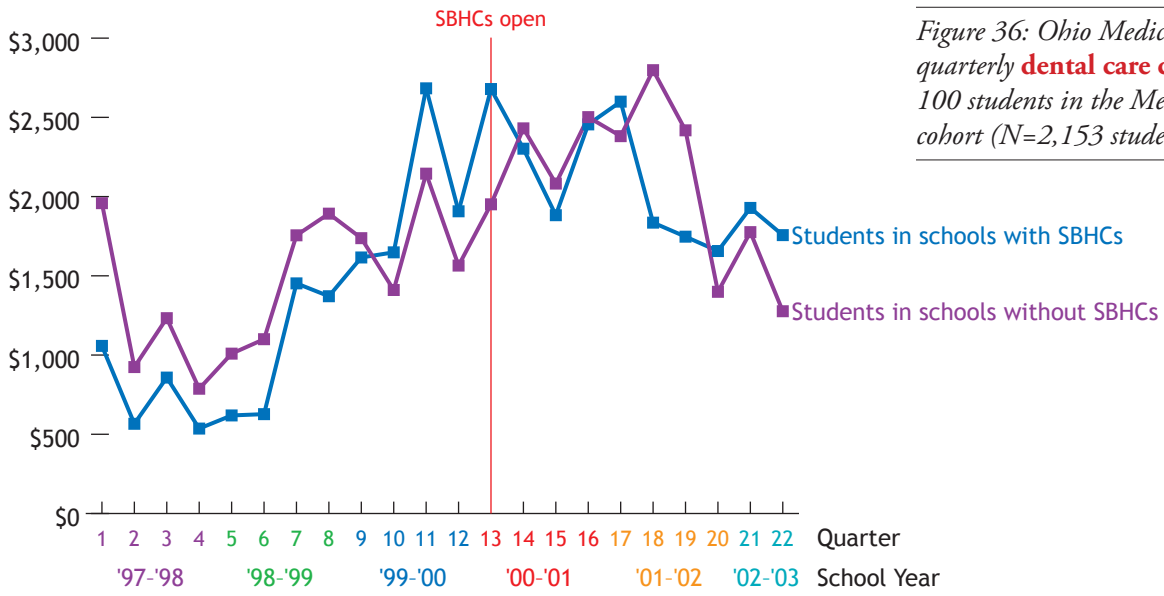


Figure 36: Ohio Medicaid quarterly **dental care costs** *per 100 students in the Medicaid cohort (N=2,153 students)*

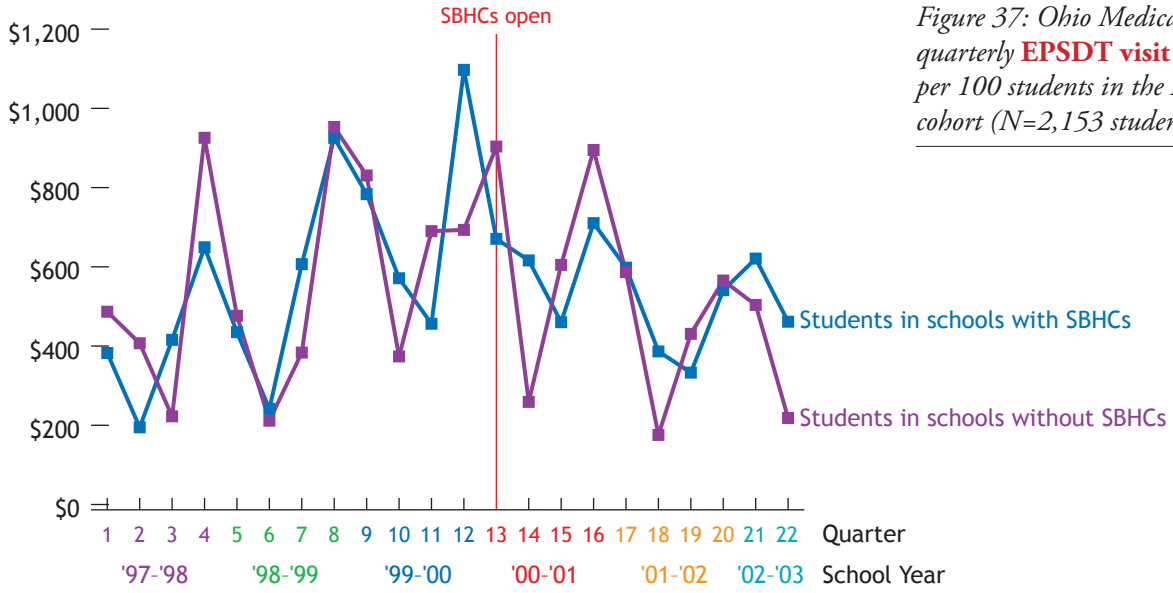


Figure 37: Ohio Medicaid quarterly **EPSDT visit costs** *per 100 students in the Medicaid cohort (N=2,153 students)*

Medicaid Costs in Rural Schools

In addition, we conducted trend analyses for students who were continuously enrolled in Medicaid and the same rural school (N= 725) during the first two academic years the SBHCs were open (2000–2001 and 2001–2002). There was one rural school with an SBHC and one rural school without an SBHC in the cost study. Figures 38–46 on the next few pages (see also Tables 43–51 in Appendix B) show the average quarterly Medicaid costs for various categories for the rural students in this study. After the SBHCs opened, students in the rural school with an SBHC had significantly lower ER costs (Figure 41) and prescription drug costs (Figure 44) than students in the rural school without an

SBHC. Students in the rural school with an SBHC also had lower mental health costs (Figure 43), but this may have been because this SBHC had a social worker on staff who may not have billed for all encounters. Students in the rural school with an SBHC had significantly higher dental costs (Figure 45) than students in the rural schools without an SBHC after the SBHCs opened. This may be because the rural school with an SBHC had a dental hygienist on-site.

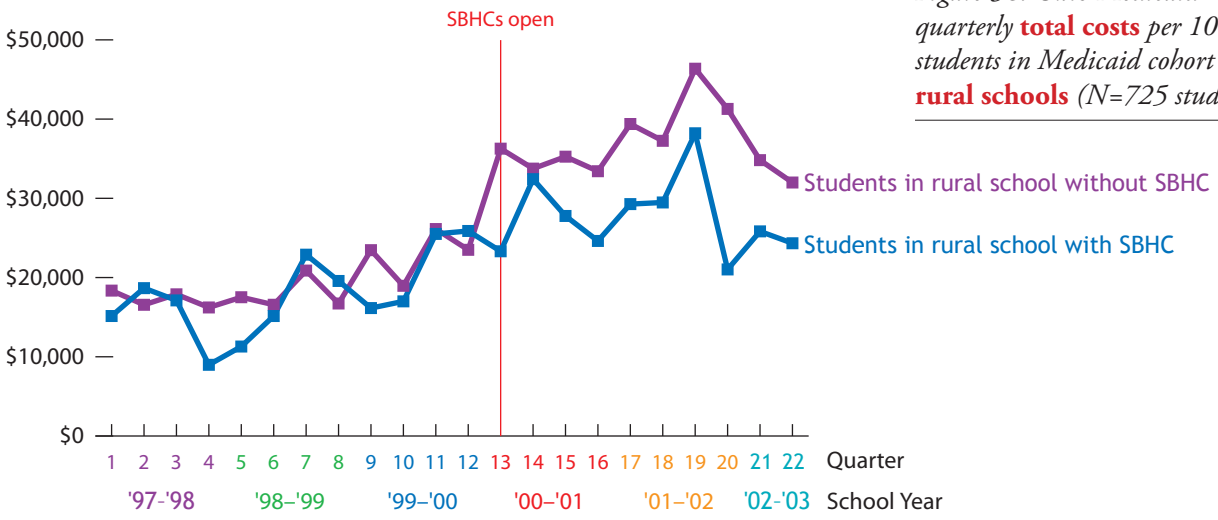


Figure 38: Ohio Medicaid quarterly **total costs** *per 100 students in Medicaid cohort in* **rural schools** *(N=725 students)*

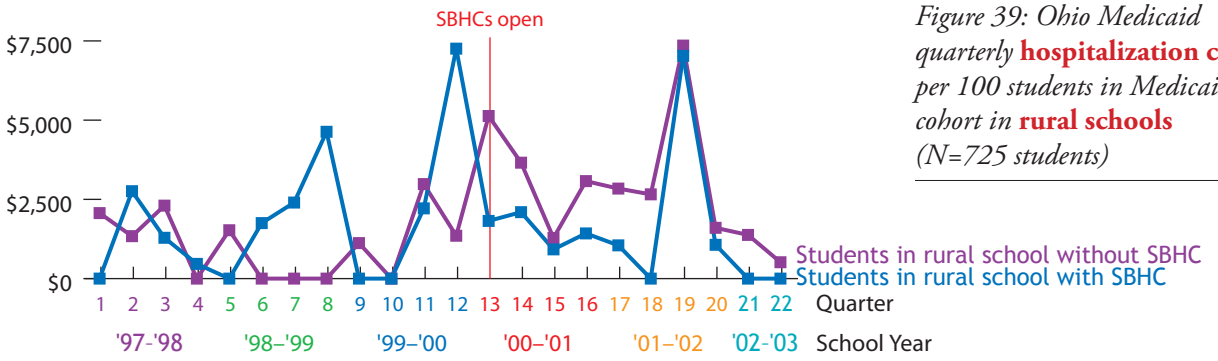


Figure 39: Ohio Medicaid quarterly **hospitalization costs** *per 100 students in Medicaid cohort in* **rural schools** *(N=725 students)*

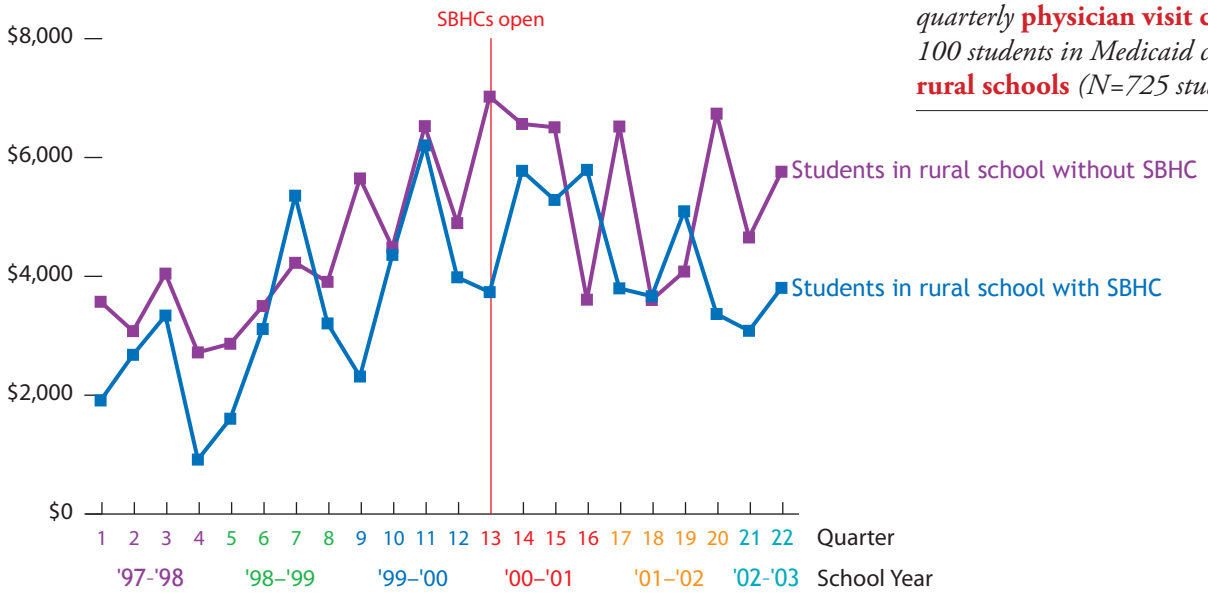


Figure 40: Ohio Medicaid quarterly **physician visit costs** *per 100 students in Medicaid cohort in* **rural schools** *(N=725 students)*

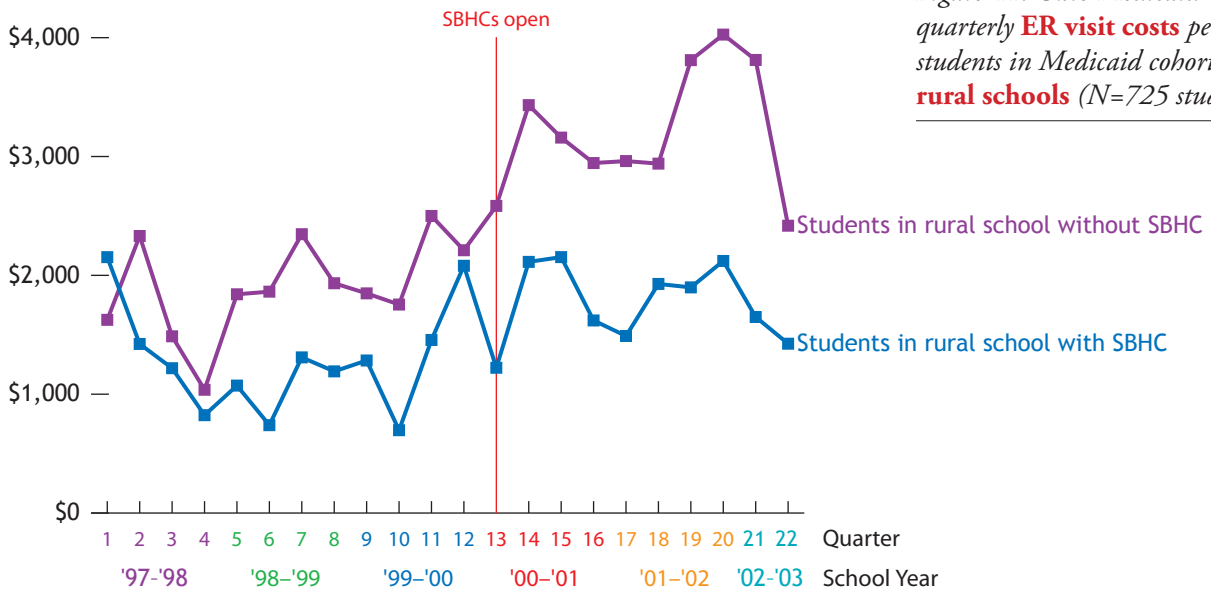


Figure 41: Ohio Medicaid quarterly **ER visit costs** *per 100 students in Medicaid cohort in* **rural schools** *(N=725 students)*

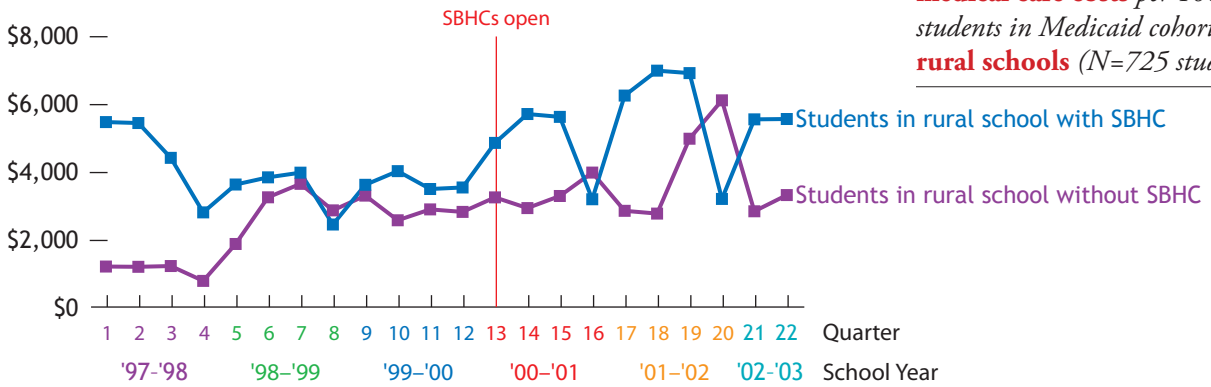


Figure 42: Ohio Medicaid quarterly **outpatient and other medical care costs** *per 100 students in Medicaid cohort in* **rural schools** *(N=725 students)*

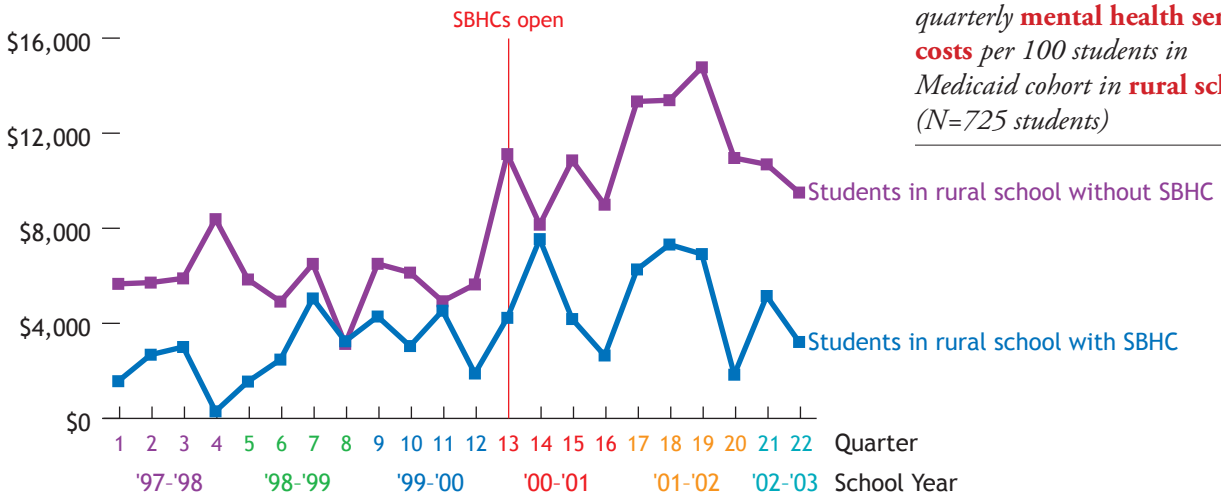


Figure 43: Ohio Medicaid quarterly **mental health services costs** *per 100 students in Medicaid cohort in* **rural schools** *(N=725 students)*

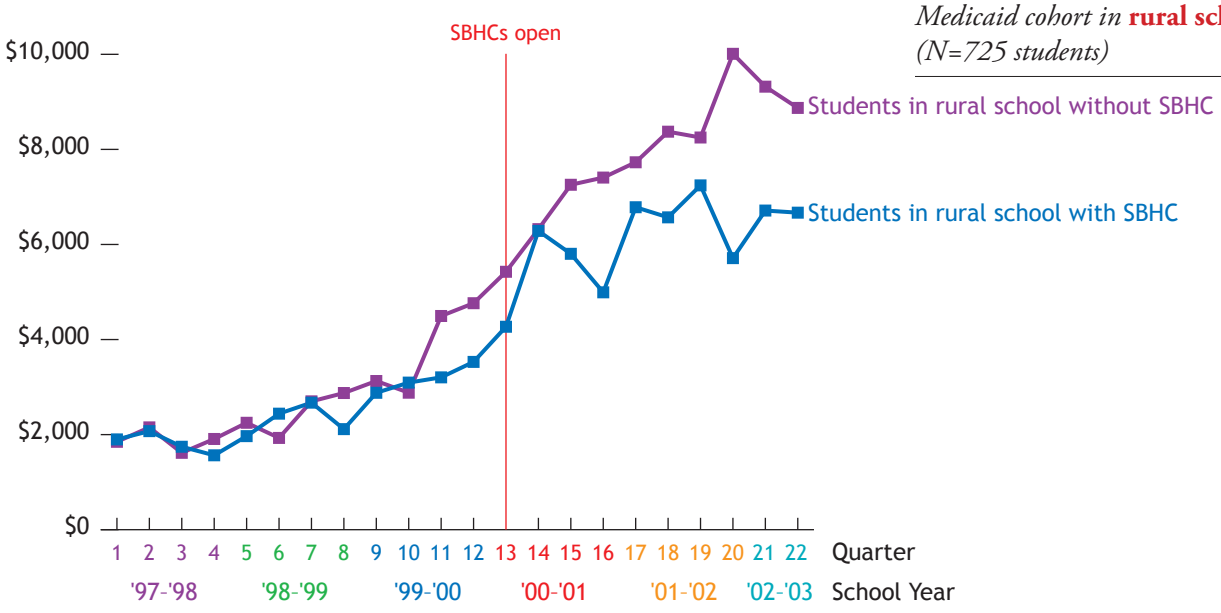


Figure 44: Ohio Medicaid quarterly **prescription drug costs** *per 100 students in Medicaid cohort in* **rural schools** *(N=725 students)*

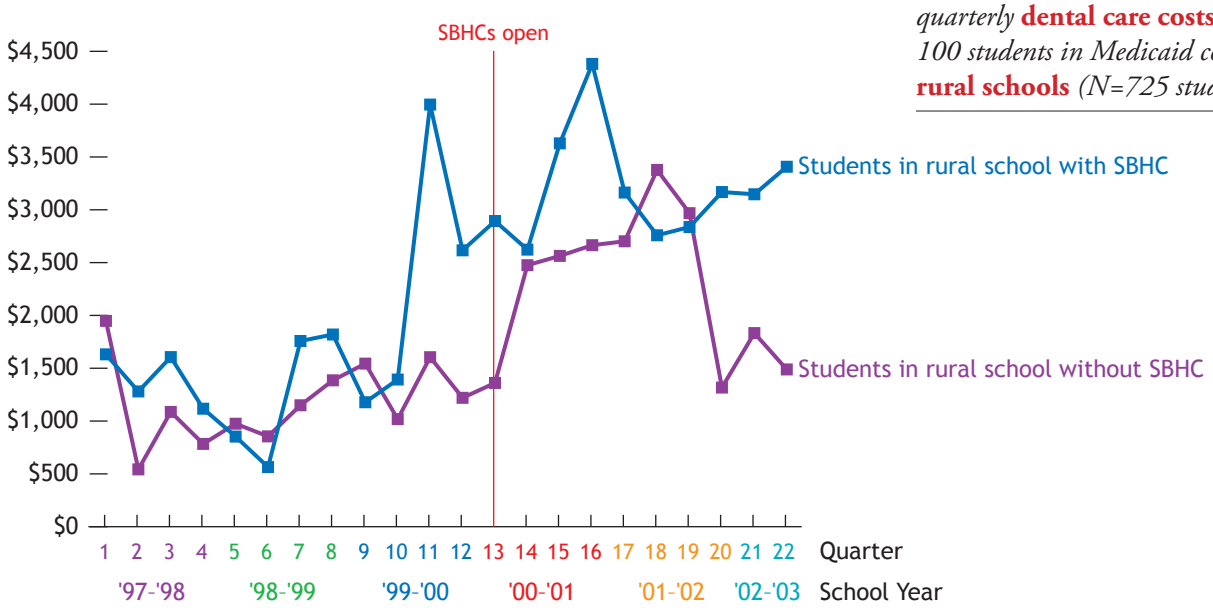


Figure 45: Ohio Medicaid quarterly **dental care costs** *per 100 students in Medicaid cohort in* **rural schools** *(N=725 students)*

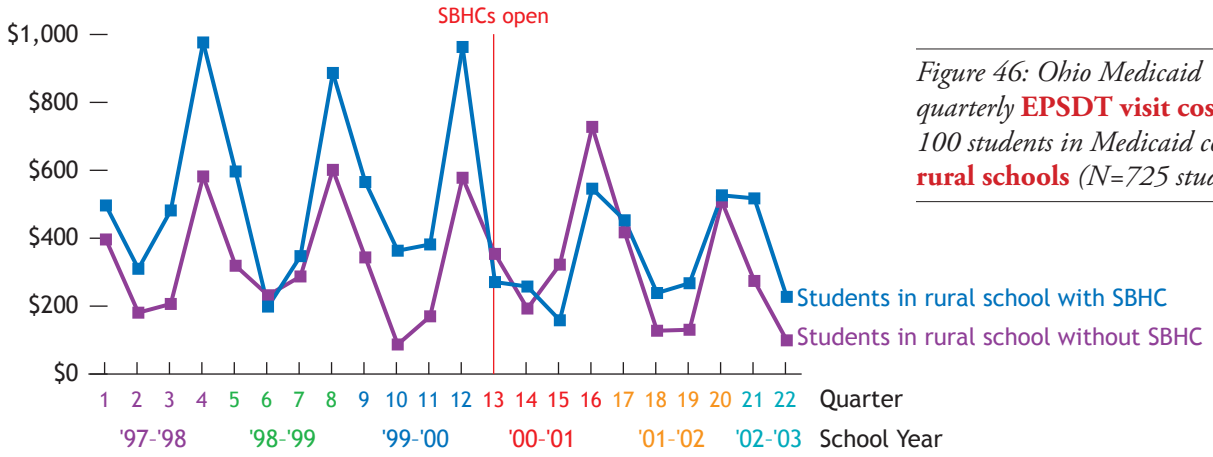


Figure 46: Ohio Medicaid quarterly **EPSDT visit costs** *per 100 students in Medicaid cohort in* **rural schools** *(N=725 students)*

Growth Curve Analysis for Medicaid Costs

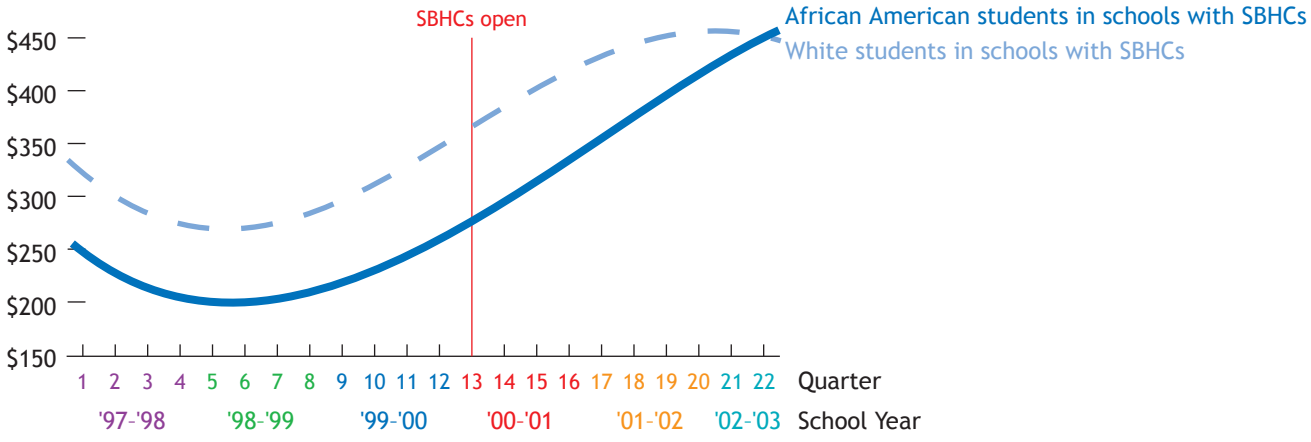
We also looked at the growth curves of Medicaid costs using hierarchical linear/nonlinear modeling (HLM). This demonstrated the effects of race, gender, age, presence of an SBHC, and enrollment in Medicaid programs such as Aged, Blind, or Disabled (ABD), CHIP, or a managed care organization (MCO) on the growth trends of the quarterly total Medicaid costs. Major findings include:

- The average total Medicaid costs at quarter 13 (September–November 2000, when the SBHCs opened) across all students was significantly different from zero.

- The total costs for male students were significantly higher than those for female students at quarter 13.
- There was a significant linear growth trend of total Medicaid costs for older students, implying that the total Medicaid costs increased with age after the SBHCs opened.
- Students enrolled in the Aged, Blind, and Disabled (ABD) Medicaid had significantly higher costs at quarter 13. There was also a significant quadratic negative growth trend of total costs for ABD Medicaid students. This implies that compared with the costs for other students, the quarterly total costs for ABD Medicaid students tended to have significantly faster acceleration in the early quarters of SBHC operations than in the later quarters.

The growth curve analysis also showed a significant difference in the total Medicaid cost at quarter 13 by ethnicity. African American students in schools with SBHCs had the lowest quarterly total costs when the SBHCs opened (see Figure 47 below). By the end of the study period, African American students in schools with SBHCs had total costs equal to white students in schools with SBHCs. This remained true regardless of insurance status. Looking at Medicaid costs by category, African American students in schools with SBHCs had higher mental health, dental, and EPSDT costs than other students but lower hospitalization, ER, and prescription drug costs after the SBHCs opened.

Figure 47: Ohio Medicaid quarterly total costs for students in schools with SBHCs in this study, by ethnicity



Costs for the Asthma Cohort

We looked at the changes in costs for hospitalizations and ER visits for the 273 students who were in our asthma cohort (see the section entitled "Study Populations" on page 3 for more

information about this cohort). For the students in schools with SBHCs, the average costs for hospitalization per child with asthma decreased from $1,150 per child before the SBHCs opened to just $180 per child after the SBHCs opened, after controlling covariates (see Figure 48 below). For students in schools without SBHCs, the cost of hospitalization per child with asthma was relatively unchanged before and after the SBHCs opened. African American children with asthma who were in schools with SBHCs also had significantly decreased costs of hospitalization after the SBHCs opened.

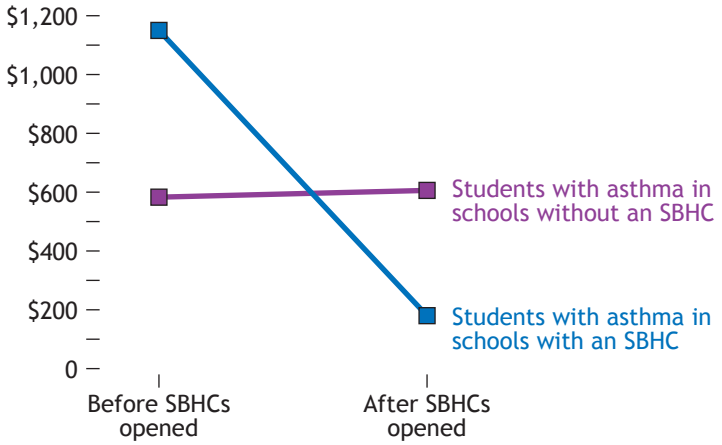


Figure 48: Average costs of hospitalizations per child with asthma before and after SBHCs opened (N=273 students)

Although there was no significant interaction effect on the costs of ER visits for all students before and after the SBHCs opened, the costs of ER visits for children with asthma in schools without SBHCs were significantly higher than for children with asthma in schools with SBHCs after the SBHCs opened. The ER visit cost per child was $303 in both the intervention and comparison groups before the SBHCs opened. It decreased to $275 per child in a school with an SBHC and increased to $331 per child in a school without an SBHC after the SBHCs opened.

Costs for the Mental Health Cohort

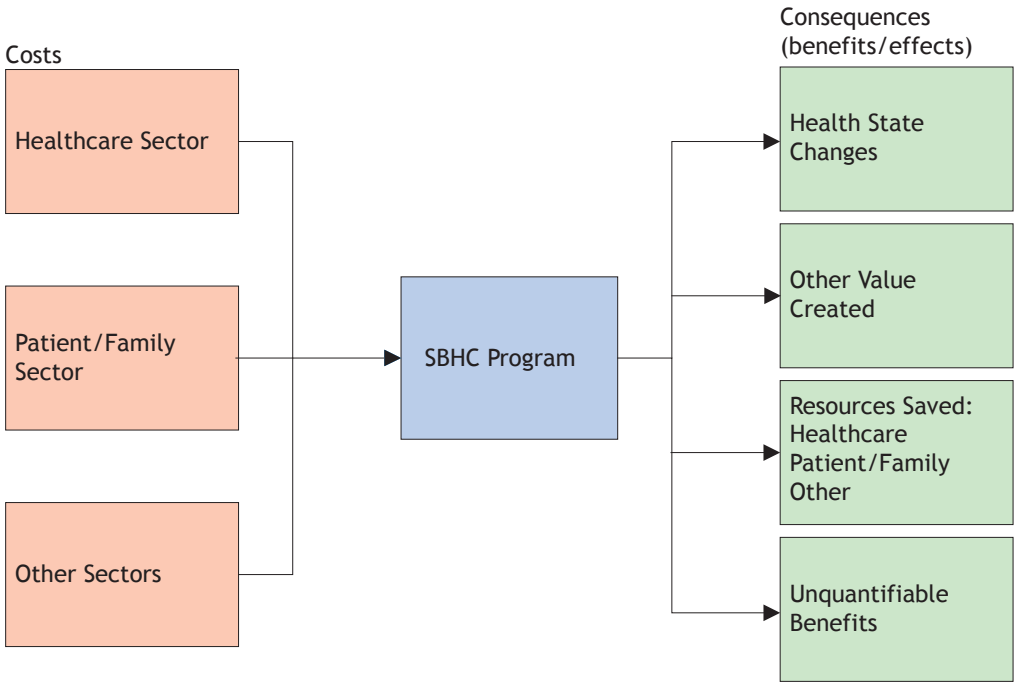
We looked at the changes in costs for the 551 students who were in our mental health cohort (see the section entitled "Study Populations" on page 3 for more information about this cohort). The total costs for students with identified mental illnesses in both groups increased over time. The total cost for a student with mental illness in a school with an SBHC increased more rapidly, going from $4,100 to $7,200 after the SBHCs opened, while the total cost for a student with mental illness in a school without an SBHC increased from $5,000 to $6,500.

Cost-Benefit Analysis for the SBHC Program

The Health Foundation's investment in the four Ohio SBHCs in this study for their first three years of operation was $1,296,943. The critical question is whether this investment enabled the SBHCs to generate benefits that exceeds that investment. The cost-benefit analysis of the SBHCs was based on all students enrolled in each intervention school regardless of type of health insurance or non-insurance.

The cost-benefit analysis is described graphically in Figure 49 below.

Figure 49: Cost-benefit analysis of the SBHCs



The costs of (or resources consumed by) the SBHCs came from three sectors:

- costs from the healthcare sector, such as SBHC operation costs (prescription drugs, medical equipment, physician and nurse hours, etc.) and what insurance companies would have paid for these encounters;
- costs from the patient and family sector, such as out-of-pocket expenses in traveling to get medical care, copayments, lost work-time, and other expenditures; and
- costs from other sectors, such as essential start-up funds (not including SBHC operational costs), costs for school facility use, etc.

We considered certain activities that would not have occurred had the SBHCs not existed to be incremental benefits from the program. These benefits included:

- the students' health status change, which can be measured in terms of equivalent value of clinical effects;
- other value created by the SBHCs, such as support brought into the schools because the centers exist;
- resources saved by the SBHCs, or costs not spent on an alternative, which mirror the costs and were measured according to the three cost sectors:
  - healthcare savings, such as savings due to decreased hospitalizations, ER visits, and prescription drug use;
  - patient and family savings, including otherwise lost family productivity, work-time, transportation, and other savings related to not needing to accompany students to primary care services;
  - other sector savings, including school efficiency related to fewer school absences because of medical care provided in the SBHCs and the community multiplier effect due to Medicaid (Greenbaum, Desai, 2003); and
- unquantifiable benefits, such as healthy students having better attendance and better learning performance, and increased access to care for minorities and children from low-income families.

The following sections summarize the costs and benefits of the SBHCs. For more detail on these estimations, please see the full report entitled "Evaluation of Healthcare Costs and Utilization among Medicaid Recipients in Schools with School-Based Health Centers," available from our web site at http://www.healthfoundation.org/sbhcstudy or by calling 513-458-6600 or toll-free 888-310-4904.

Costs of the SBHCs

Healthcare Sector Costs

- The Health Foundation's funding enabled the schools with SBHCs to initiate and maintain personnel, equipment, and space for SBHC activities that otherwise would not have occurred. In addition, schools received other grants to help with operations during the first three years.

  Total amount of grants..... $1,382,260

- The care provided in the SBHCs has a value equal to the prevailing market of these services, whether or not the services were paid for by public or private insurance or by families. During the study period, the 7,572 SBHC encounters that had a market value between $60.70–80.67, depending on the nature of the visit.

  Estimated value of SBHC office visits $479,929

  Total healthcare sector costs over the three years: $1,862,189

Patient and Family Sector Costs

- The SBHCs charged students a copayment for services. Students enrolled in CHIP, Aid to Families with Dependent Children (AFDC), and the Medicaid Aged, Blind, and Disabled (ABD) program had no copayments for SBHC visits. Students enrolled in Medicaid managed care organizations (MCOs) and students with private insurance had a copayment of $10–15 per visit. Uninsured students who were self pay were charged a sliding-scale fee for visits. SBHCs determined these fees based on family income. Students paid a very small amount if their family incomes were low. Because we did not have a complete record of copayments, we estimated a copayment of $10 per SBHC encounter.

  Total patient and family sector costs: $75,720

Other Sector Costs

- Each school donated space to the SBHCs. We estimated the market value of this space over the three years in the schools with SBHCs.

  Total other sector costs: $60,750

  Total costs $1,998,659

Benefits of the SBHCs

Health State Changes

- Although not all SBHCs offered mental health services, SBHC staff referred students with mental health problems to community providers for care. We based our estimation of the value of mental health services on the cohort of students with mental illnesses (N=551, with 402 in schools with SBHCs). The net difference of total costs between

intervention and comparison students was estimated as $1,600 per student in 2.5 years. The estimated total value of the additional mental health care for Medicaid students with mental illnesses is: [($1,600*402)/2.5]*3 = $771,840 over 3 years.

Estimated value of mental health services $771,840

- Although not all SBHCs offered dental services, SBHC staff referred students with dental problems to community providers for care. We estimated the difference of dental care costs between intervention and comparison students as $20 per student, or $20*1,607 students in schools with SBHCs in the Medicaid cohort = $32,140 during the 2.5 years period. The increased dental care benefit for the Medicaid cohort students was: ($32,140/2.5)*3 = $38,568 over the first 3 years of SBHC operations.

  Estimated value of dental services $38,568

- SBHCs conducted many non-billable healthcare activities. Nurse practitioners spent 30–50% of their time on non-billable services for teachers and staff, student smoking cessation programs, student health status consultations, staff meetings, etc. The value of non-billable healthcare activities was estimated as 30% of SBHC office visits.

  Estimated value of non-billable healthcare activities $143,979

  Total value of health state changes $954,387

Other Value Created

- The Foundation's support of the SBHCs attracted additional funding from other sources.

  Value of funding from other sources $457,598

  Total other value created $457,598

Resources Saved

- Healthcare Sector
  - Potential cost-savings for hospitalization were estimated as $970 per student with asthma. There were 196 Medicaid students with asthma in schools with SBHCs, so savings were $970*196= $190,120 for the Medicaid students with asthma in schools with SBHCs during the 2.5-year period. We estimated the savings from less hospitalization for the three years as: ($190,120/2.5)*3=228,144.

    Estimated savings from less hospitalization for asthma $228,144

- Compared to students in schools without SBHCs, the students in schools with SBHCs used fewer prescription drugs after the SBHCs opened. Potential savings for prescription drugs for the Medicaid cohort were estimated as $230 per student. The total savings for the cohort were estimated as: $230*1,607 students in schools with SBHCs in the Medicaid cohort = $369,610 during the 2.5 years period. We estimated the total savings of less prescription drug use as ($369,610/2.5)*3 = $443,532 for the first 3 years of SBHC operations.

  Estimated savings from less prescription drug use..... $443,532

  Total savings for healthcare sector $671,676

- Patient and Family Sector
  - SBHCs prevented productivity losses by parents who would otherwise have had to take their children to other sources of care. These episodes would involve between four to eight hours of parent time. We estimated the value of the parent's time in the Cincinnati metropolitan region as equal to the blue and white collar combined average hourly rate of $17.92[1]. Over the 7,572 SBHC encounters, the SBHCs saved parents between $542,761 (half-day) and $1,085,522 (full-day).

    Estimated value of saved parent productivity..... $542,761
  - Because students received care in the SBHCs, their parents saved a substantial amount of travel expenses. From parent survey data, the average time to a physician's office was 14 minutes in an urban area (28 minutes round-trip) and 23 minutes in a rural area (46 minutes round-trip). We assumed an average speed of 30 miles per hour, giving round-trip mileages of 14 miles in an urban area and 23 miles in a rural area. Based on a basic rate of $0.35 per mile, we estimated the travel expenses were $0.35*14=$4.90 per visit in an urban area and $0.35*23=$8.05 per visit in a rural area.

    Estimated value of saved travel $42,956

    Total savings for patient and family sector $585,717

- Other Sectors
  - SBHC staff identified and referred students to additional primary care. These referrals have a value equal to the

[1] *As reported on the Compensation Survey September 2002 by the Bureau of Labor Statistics (http://www.bls.gov/ro5news.htm), the average hourly wages were $15.34 for blue-collar and $21.62 for white-collar workers (or $14.80 for blue-collar and $20.50 for white-collar workers in 2000) in the Greater Cincinnati area.*

prevailing market for EPSDT or Medicaid services. The 618 subsequent referral visits to outside sources of care were valued at $69.00 each, based upon EPSDT payment data. Because referrals were not always well documented, this benefit might be underestimated.

Estimated value of referrals to other sources of care $42,642

- We also estimated the community multiplier effect from a societal perspective. Greenbaum and Desai (2003) reported that for every $1.00 Medicaid spent in Ohio, there was a $3.15 multiplier effect for the community due to contributions from health sector employment and other services. About 42.25% of students in schools with SBHCs in this study were on Medicaid. Therefore, Medicaid would have paid $479,929*42.25% = $202,770 for SBHC encounters at the schools with SBHCs during the study. The community multiplier effect was estimated as $202,770*3.15.

  Estimated community multiplier effect $638,726

  Total savings for other sectors $681,368

- The unquantifiable benefits include at least five aspects:
  - SBHCs help minorities and children from low-income families get access to healthcare. For example, African American students in schools with SBHCs received significantly less healthcare before SBHCs opened and the same as other children after (see Figure 42).
  - About 80% of students in schools with SBHCs returned to class after SBHC encounters during the study period. We believe that students with better attendance learn more. However, because this was beyond our study scope, we were unable to quantify this benefit.
  - Increased early mental health services received by students in schools with SBHCs might reduce future costly treatment for those students. Because of the limited time frame of this study, we were unable to quantify this impact.
  - Increased dental care received by students in schools with SBHCs might provide better quality of life for those students and prevent or reduce future costly dental treatment.
  - This study found that students with asthma in schools with SBHCs had a lower risk of hospitalization and ER visits compared to students with asthma in schools without SBHCs. It is possible that students with asthma in schools with SBHCs had better control of medication

and received timely primary care. However, we were unable to quantify the benefit related to qualify of life and future healthcare savings.

Total benefits..... $3,350,746

Net Social Benefit Estimation

Based on the assumptions made and the calculations performed above, we estimated the net social benefit of the SBHCs over the three years to be over $1.3 million. This is a low-end estimation[2].

Total costs of the SBHCs over the first 3 years ..... $-1,998,659
Total benefits of the SBHCs over the first 3 years.....$3,350,746
Net social benefit..... $1,352,087

Benefits to the Medicaid System

Since Medicaid was the primary payer of services to children in the cost study, we also looked at the cost benefits to Ohio Medicaid. As discussed in the findings, there was no significant difference in average quarterly total Medicaid costs between students in the Medicaid cohort in schools with and without SBHCs (N=2,153), although students in schools with SBHCs had slightly higher average total costs. In the rural schools, students in schools with SBHCs had lower average total costs.

However, students in schools with SBHCs used different services after the SBHCs opened, including significantly more dental services and fewer prescription drugs among all students, and significantly more mental health services for students with mental illnesses and fewer hospitalizations for students with asthma. If all 5,056 Ohio Medicaid students in this study had had access to SBHCs, the Medicaid system could have saved money overall on these students.

- The increased cost for dental care was estimated at $20 per student. If all 5,056 students had had access to an SBHC and assuming the same rate of dental care and referrals, the increased cost would be $20*5,056 students=$101,120 for

[2] *For more details, including high-end estimations, please see the full report entitled "Evaluation of Healthcare Costs and Utilization among Medicaid Recipients in Schools with School-Based Health Centers," available from our web site at http://www.healthfoundation.org/sbhcstudy or by calling 513-458-6600 or toll-free 888-310-4904.*

2.5 years. The increased cost for a 3-year period would be ($101,120/2.5)*3.

Estimated cost of increased dental care if all 5,056 Ohio Medicaid students in this study had access to an SBHC..... $121,344

- The savings from prescription drug use were estimated as $230 per student. If all 5,056 students had had access to an SBHC and assuming the same rates of prescription drug use, the savings would be $230*5,056 students=$1,162,880 for 2.5 years. The savings for a 3-year period would be ($1,162,880/2.5)*3.

  Estimated savings from fewer prescription drug use if all 5,056 Ohio Medicaid students in this study had access to an SBHC..... $1,395,456

- The increased cost for mental health services for students in the mental health cohort was $1,600 per student. If all 551 students in the mental health cohort had had access to the SBHCs, and assuming the same rate of mental health care and referrals, the increased cost would be $1,600*551 students=$881,600 for the 2.5 years. The increased cost for a 3-year period would be ($881,600/2.5)*3.

  Estimated increased costs if all 551 Ohio Medicaid students with mental illnesses in this study had access to an SBHC..... $1,057,920

- The savings from hospitalizations for students with asthma were estimated as $970 per student. If all 273 students in the asthma cohort had had access to an SBHC and assuming the same rates of hospitalization, the savings would be $970*273 students=$264,810 for 2.5 years. The savings for a 3-year period would be ($264,810/2.5)*3.

  Estimated savings from fewer hospitalizations if all 273 Ohio Medicaid students with asthma in this study had access to an SBHC..... $317,772

In summary,

Increased dental care $121,344
Increased mental health services for students with mental illnesses $1,057,920
Total 3-year Medicaid increased costs $1,179,264

Savings on prescription drugs $1,395,456
Savings on hospitalization for students with asthma..... $317,772
Total 3-year Medicaid savings $1,713,228

Medicaid savings	**$1,713,228**
Medicaid increased costs	**–$1,179,264**
Net 3-year Medicaid savings	**$533,964**
Net Medicaid savings per year	**$177,988**
Savings per child per year	**$35.20**

In three years, the SBHCs could have saved Medicaid about $35.20 per student. This estimate does not include changes in costs that were not significantly different between intervention and comparison students (such as physician visits, outpatient care, and other types of care). This also does not take into account Medicaid travel savings from parents not having to drive their students to get care (estimated to be $4.90 per visit for a student at an urban SBHC and $8.05 per visit for a student at a rural SBHC).

Looking at overall Medicaid direct costs and savings without separating them into cost components may hide the fact that inappropriate costs (such as ER visits for routine medical care) are decreasing in favor of an increase in appropriate expenditures (such as dental and mental health services or EPSDT visits). It is quite likely that increased EPSDT visits, mental health services, and dental care would benefit Medicaid in the future. Because students received services early on, they may not need more expensive services later.

The unquantifiable benefits of SBHCs may also exceed any extra costs to the Medicaid program. Although we don't know by how much, we still believe it is important for Medicaid to foster improved access to healthcare for minorities and children from low-income families and increase access to children's mental health services, dental care, and other healthcare.

Conclusions

SBHCs appear to have more influence on children who have impeded access to care, such as children in rural areas, children with chronic illnesses, and children with public insurance or no insurance. The Ohio Medicaid program spent a total of $30 million dollars on the 5,506 students in the cost study during the 5½ years. The major cost components for students were mental health services, outpatient care, hospitalization and ER visits, physician encounters, and prescription drugs. There was no significant difference in total Medicaid costs for intervention and comparison students before and after the SBHCs opened.

Looking at total costs alone hides how cost components changed. The cost of some services (such as ER visits and hospitalizations) went down and the cost of more appropriate services (such as EPSDT visits and outpatient care) went up for students in schools with SBHCs. This implies that the SBHCs are helping children get access to more routine, preventive care that is less expensive to the system than emergency care and hospitalization.

The results of these studies suggest three overarching conclusions about SBHCs and their effect on health status and healthcare costs and utilization:

- SBHCs increase access to healthcare
- SBHCs improve the health status of children
- SBHCs increase access to healthcare, provide additional services, and improve health status at no significant additional cost to the Medicaid system.

SBHCs increase access to healthcare.

Students with chronic illnesses in schools with SBHCs have increased access to healthcare.

- Of the 4,587 students enrolled in SBHCs, 866 (18.9%) were listed in the SBHC enrollment files as having a chronic health condition. Almost 80% of students with a chronic condition (674, 77.8%) had at least one SBHC visit. However, most of these visits were due to the same diagnoses as their non-chronically ill peers.

- Students with asthma or ADHD who were enrolled in SBHCs had a higher rate of utilization compared to other students. The rate of visits increased over the three years.
- SBHC users with identified ADHD had a significant reduction in absences over the three years.

SBHCs provide greater access to health services for low-income and uninsured students.

- SBHC users were more likely than SBHC nonusers to have public or no health insurance.
- More students with public health insurance (65.5%) and no insurance (64.9%) used the SBHCs compared to students with private insurance (54.0%). Urban schools (66.7%) had a higher utilization rate than rural schools (53.6%).
- Almost 30% of students enrolled in the SBHCs had public insurance (state Children's Health Insurance Program [referred to as Healthy Start in Ohio and KCHIP in Kentucky], Medicaid, or Medicare).
- Over the three years, parents of SBHC users were more likely to show a significant improvement in their perception of accessing healthcare as little or no problem compared to parents of students in schools without SBHCs.
- We found there is a slightly increased cost of dental care for students in schools with SBHCs compared to students in schools without SBHCs. Given that dental care is the number one unmet healthcare need in Ohio, the SBHCs provided a valuable service for children in low-income families, especially since children throughout the state, regardless of insurance status, received less dental care as the economy contracted during the end of the study period (2000–2003).

African American students in schools with SBHCs have increased access to healthcare.

- Although African American students in schools with SBHCs had significantly lower total costs before the SBHCs opened, they had equal or slightly higher costs than white students in schools with SBHCs by the end of the study period. This indicates that African American students with access to an SBHC used more healthcare services after the SBHCs opened, which may be simply a matter of equity and not excess utilization. This also

indicates that having access to an SBHC can help eliminate access barriers to care and health disparities for vulnerable populations.
- Looking at costs by category, African American students in schools with SBHCs received more of the less costly services (Early Periodic Screening, Diagnosis, and Treatment (EPSDT) visits and dental care) but fewer of the more costly services (hospitalization, ER visits, and prescription drugs). This indicates that SBHCs help students access appropriate care, such as preventive and early treatment.

SBHCs improve health status.

Students who use the SBHCs have improved health status.

- Over three years, the self-rating for SBHC users increased while the self-rating for the SBHC nonusers and the students in schools without SBHCs decreased.
- Well-child visits among SBHC users and nonusers increased compared to students in schools without SBHCs.
- SBHC users had significant improvements in psychosocial HRQL over time. This corresponded with a significant increase in reported psychosocial visits (32 to 1,415) to the SBHCs (see Table 6 in Appendix A), indicating that SBHCs are expanding their roles beyond typical physical health aspects and are addressing students' behavioral health needs.

SBHCs increase access to healthcare, provide additional services, and improve health status at no significant additional cost to the Medicaid system.

Students on Medicaid who use SBHCs use more healthcare services but cost the system the same amount of money.

- Students in schools with SBHCs used significantly more mental health services and dental care, but had significantly lower prescription drug use after the SBHCs opened compared to students in schools without SBHCs. There

was no difference in cost for physician encounters between intervention and comparison students. (Note: SBHC encounters were counted in this category.)
- After the SBHCs opened, 5.1% more students in urban schools with SBHCs and 7.1% more students in rural schools with SBHCs received mental health services.

SBHCs save the Medicaid program money for children in rural schools and for children with asthma.

- Total Medicaid costs for children in rural schools with SBHCs were significantly lower than for children in rural schools without SBHCs.
- During the study period, hospitalization and ER visits decreased for students with asthma in schools with SBHCs. Hospitalization and ER visits are the most costly medical services in Medicaid programs, accounting for 23–30% of the total annual Ohio Medicaid expenditures from 1995 to 2000 (ODJFS, 1996-2002).
- Although we could not control the students' asthma severity, we found that the pattern of hospitalization for students in schools with SBHCs changed after the SBHCs opened. After the SBHCs opened, the rate of hospitalization decreased 240% and the rate of ER visits decreased 34% for students with asthma.
- Children with asthma who have fewer emergencies and hospitalizations are probably controlling their condition better, and will be in better shape to learn.

Policy Implications

The SBHC is a model for providing quality healthcare services for children that eliminates most barriers children face when trying to access healthcare. SBHCs can address problems of transportation, lack of nearby providers, lack of providers accepting public insurance, and parental difficulties getting time away from work to take a child to the doctor. The data from this study highlight the type of students that use and benefit the most. For example, in urban schools, students with public insurance or no insurance tend to use SBHCs more often than students with private insurance, while in rural schools, students use the SBHCs at the same rate regardless of insurance coverage.

We also learned that each SBHC is different. As the centers developed and matured, they learned what services their students needed most and what resources were most necessary. The 15 centers the Health Foundation has helped start do not look the same and do not provide the same services in the same manner. Rather, they look like what each community and school need them to look like. We believe that it is not necessary to create SBHCs that look like exactly the ones in this study to see the same effects on health status and healthcare use and cost as were seen in this study. SBHCs should be targeted at communities with the highest need for health services for children and should be designed to address the specific needs of those children.

While SBHCs provide access to healthcare for children, funding these centers can be challenging for a variety of reasons. Addressing these reasons at a state level can help create an environment in which SBHCs become an integral part of the healthcare system. At the same time, because SBHCs improve children's health status, they support strategies that seek to improve the lives of children.

Issues Concerning SBHC Funding

SBHCs are an effective model to increase access to healthcare services for children, improve the health status of children, and lower some healthcare system costs while increasing other, more appropriate costs. However, funding SBHCs remains a challenge

in Kentucky, Ohio, and many other states for a variety of reasons. Policy changes that make it easier for SBHCs to deliver healthcare will provide continuity and access to services for children who otherwise might not get that care.

Planning and Start-Up Funding

The Health Foundation awarded 6-month planning grants to all SBHCs prior to the award of start-up funding. The planning time gave schools and medical providers the chance to determine whether an SBHC was right for their community. The planning grants also gave the school districts and medical partners time and resources to assess the health needs of the schools, determine initial policies and procedures, and work out the logistics of the SBHCs, such as facility space, staffing, hours of operation, equipment, etc.

Once a plan is in place, SBHCs need about two years of full funding—not including revenue from billing—to help them build their practice. This time allows them to enroll students, provide care to a critical mass of students in the schools, modify services and hours to match the needs of the students, implement a billing system, and build community partnerships for future support.

Where do these planning and start-up funds come from? Ideally, the funding comes from a variety of sources, both public and private. Many states currently use public/private funding partnerships for SBHCs with great success (see section entitled "What States Are Doing" in this chapter for more information). No one system should bear the costs alone. Schools, medical partners, insurance providers, state and local governments, and private funders can share the costs and enable SBHCs to improve health status and access to care for children.

Public and Private Insurance Payment Rates for SBHC Services

Each SBHC includes a medical provider who can provide physician oversight and bill for services. Current billing policies restrict the capacity of medical providers to partner with SBHCs. The medical partners' abilities to bill and the amount of money they receive for services differ depending on the type of insurance a child has and the type of medical provider involved. Changes

in public and private insurance policies could open the doors to more medical providers reaching more children.

For example, with Medicaid, different classes of medical partners have different payment rates for the same service. A federally qualified health center (FQHC) receives a different Medicaid payment rate for services than a hospital or private practice physician. On the private insurance side, many companies will not pay for services unless they are rendered by a patient's primary care provider (PCP) or a network physician. If the SBHC's medical partner is not a particular patient's PCP or is not in a patient's insurance network, the SBHC will either not get paid or will receive a lower payment rate. Some insurance companies do not recognize SBHCs as a separate service, such as urgent care is recognized, and will not pay for out-of-network services rendered by an SBHC.

If payment rates are low, whether from public or private insurance, SBHCs and their medical partners may spend more money to bill for services than they collect. They may choose not to bill at all, forcing them to find other ways to fund their centers. These methods will probably be temporary, inconsistent, and time intensive, such as writing proposals to foundations or holding fundraising events. The Health Foundation anticipates that SBHCs that do not bill for services will have a harder time staying open than those that do.

Payment for Care to Uninsured Children

Most SBHCs are not paid for services provided to uninsured children. SBHCs who have an FQHC as a medical partner are eligible to receive federal funding for uncompensated care. SBHCs that do not have FQHC partners currently do not qualify for this funding. Hospitals that receive federal funding for uncompensated care might also consider partnering with schools to create SBHCs that are outpatient hospital clinics, thereby making the SBHC eligible for uncompensated care funding. However, under current policies, SBHCs without FQHC or hospital partners would not receive payment for services to uninsured children. These SBHCs would have to find other ways to pay for this care.

Payment for Care not Covered by Insurance

SBHCs provide services that are not covered by insurance, either public or private. We found that the nurse practitioners in the SBHCs in the study spent about 30–50% of their time—worth over $140,000 in value—on services that weren't billable, such as patient education, smoking cessation programs, health status consultations, and weight management for children and on services for teachers and school staff. They also provide crisis and emergency care to students and school staff for which they can't bill. These nonbillable services are important for maintaining good health and for preventing health problems in the future, but providing them means SBHCs need to find additional funding from other sources.

What States Are Doing

A number of states across the country have developed policies that encourage and support SBHCs. Most of these policies include a mix of public and private funding.

- **Colorado—**In Colorado, school districts can be designated as providers and SBHCs as essential community partners, making it easier to bill for services. Although Colorado SBHCs rely on Medicaid and SCHIP payments, they also receiving funding from private partnerships with businesses and foundations and from local match contributions.
- **Connecticut—**Connecticut earmarks some of its state budget to SBHCs. Managed care plans are also required to include SBHCs in their networks. About 30–35% of an SBHC's budget comes from local contributions.
- **Illinois—**SBHCs in Illinois are identified as providers and can directly bill Medicaid for services through a carve-out. Illinois also has a line item in its state budget to fund SBHCs.
- **Louisiana—**Like Connecticut, Louisiana includes a line item in its budget for SBHCs. This money, combined with federal block grant allocations and other public funds, makes up 60–65% of an SBHC's budget. Local match contributions make up 30–35% of an SBHC's budget. Medicaid revenue is about 3%. Also, at the time of this report, groups in Louisiana are proposing that the state move all state-funded children's mental health services into schools, which they believe is financially possible and will pay immediate returns.

- **Maryland—**SBHCs in Maryland receive payments from Medicaid fee-for-service and managed care plans for up to four acute care visits per enrolled student per semester.
- **New York—**In New York, SBHCs that meet the state's standards receive state funding as well as Medicaid payments. They are also included in managed care networks.
- **North Carolina—**Agencies in North Carolina came together to develop standards for SBHCs. The centers that meet these standards do not have to receive prior approval to bill Medicaid for services. Private foundations in North Carolina help support SBHCs by providing planning and start-up funding.
- **Oregon—**This state uses a community-designated public/private finance formula to support the SBHCs with a suggested mix of:
  - 30% of an SBHC's operating budget from the state government (public health infrastructure);
  - 30% from all sources of medical reimbursement (i.e., private insurance, Medicaid, copayments);
  - 20% from local and city governments;
  - 10% from the school; and
  - 10% from other sources (local businesses, grants, etc.).
- **Rhode Island—**SBHCs are included in the provider networks of managed care plans in Rhode Island. To address quality-of-care and financial concerns managed care plan providers have, Rhode Island has developed quality standards and a quality improvement program for SBHCs.
- **Vermont—**Although SBHCs in Vermont are not expected to serve as medical homes, they do provide key physical, mental, and preventive health services. Vermont Medicaid pays the schools with SBHCs for providing administrative services on behalf of Medicaid and for providing comprehensive, preventive health services to Medicaid-enrolled students. The schools must also allocate to the SBHCs 40% of the state funds they receive for providing related services to special education students.

Strategies and Policy Agendas SBHCs Can Support

SBHCs support many strategies and policy agendas aimed at improving the lives of children. Agencies pursuing the following

strategies and agendas should consider the SBHC as a model of care that can support their missions.

Quality of Care

SBHCs improve quality of care by providing early intervention and prevention services for children who have difficulty accessing healthcare services. SBHCs can also help states and providers meet quality indicators for immunization rates and EPSDT visits, among others. They can also reduce hospitalizations, decrease prescription costs, reduce ER visits, and improve health status. SBHCs can be an important component of a healthcare system that is dedicated to improving quality of care.

Healthcare Cost Control

The Medicaid data from the cost study indicate that SBHCs save the Medicaid system money by decreasing the use of more costly services, such as hospitalization and ER visits, in favor of less costly, earlier, and more appropriate services, such as well-child visits and early intervention services. In rural areas, the SBHCs saved Medicaid even more. It is likely that SBHCs would also save private insurance companies money. SBHCs could be a critical strategy to help control the rising costs of healthcare.

Health Disparities

As the cost study showed, SBHCs close the health access disparity for African American students. African American students in schools with SBHCs were using less healthcare than white students in schools with SBHCs before the SBHCs opened. After three years of SBHC operations, African American children in schools with SBHCs were using services at the same rates as their white schoolmates. Efforts that target closing this gap should consider SBHCs as a model of care.

Safety Net and Care for the Uninsured

SBHCs provide care for children who otherwise may not have access to care because of insurance status, lack of providers, transportation, and other reasons. Therefore, SBHCs are an important part of the healthcare safety net that supports low-income, underinsured, and uninsured families. Like hospitals, SBHCs do not require that patients have the ability to pay to

receive care. Also like hospitals, SBHCs need funding to cover uncompensated care for patients who cannot pay. SBHCs are a cost-effective solution for providing care to uninsured children and can provide children with a wider array of services and services in a more timely manner than hospitals.

Access to Mental Health Care in Schools

There is growing awareness that the behavioral health needs of adolescents are not being met. In fact, one of the Healthy People 2010 goals is to "increase the proportion of children with mental health problems who receive treatment." As our studies have shown, SBHCs can help identify mental and behavioral health needs and can help provide or connect children with community-based services.

Access to Healthcare in Rural Areas

Rural SBHCs provide access to health services and lower Medicaid costs. Children in rural communities, regardless of their insurance status, have difficulties accessing healthcare, causing many of them to inappropriately use more expensive services, such as ERs, or go without care. SBHCs eliminate the barriers to care for rural children, such as transportation and a lack of providers. As health services are being developed for rural communities, SBHCs should be considered a necessary component of the rural healthcare system.

Education

SBHCs support educational goals by helping kids miss less class time to access needed healthcare. Although the impact of SBHCs on attendance differs from study to study, the studies have shown that SBHCs help reduce partial-day absences that usually result when a child is sick. By providing services on-site, SBHCs help return children to the classroom more quickly, meaning they miss less instruction time. SBHCs also help reduce health-related barriers to learning by addressing the health problems that interfere with a child's ability to pay attention in class, concentrate on work, and learn.

Impact on Highly Mobile Children

In the outcomes study, only 43% of the parent-child pairs completed the survey in Year 1 and Year 3. This attrition was mostly due to children changing schools. Families in transition often have interruptions in insurance, healthcare, and other supports. Studies (Simpson, et al., 1994; Wood, et al., 1993) have shown that children who move more than three times while they are of school-age were more likely to have behavior problems, to repeat a grade, and to be expelled or suspended than students who never moved during their school-age years. Many of these problems could be prevented or lessened by the presence of SBHCs in schools that have high turnover rates, as SBHCs can help provide and link students to needed health services.

Supporting Working Parents

SBHCs support working parents by delivering healthcare in a convenient location and by keeping kids in school. As the cost study showed, parents saved 4–8 hours of work per SBHC encounter because the SBHC could see their sick children. This translated to $542,761–1,085,522 in parent productivity (assuming an average wage of $17.92/hour). If a parent is unable to leave work while his or her child is visiting the SBHC, SBHC staff will still see the child and will discuss treatment options over the phone with the parent. This helps reduce employee absences, which in turn helps parents retain employment and helps employers increase worker productivity.

References

Adams EK, Johnson V. (2000) An elementary school-based health clinic: can it reduce Medicaid costs? Pediatrics; 105:780-788.

Balassone ML, Bell M, Peterfreund N. (1991) A comparison of users and nonusers of a school-based health and mental health clinic. J Adolesc Health; 12:240-246.

Berti LC, Zylbert S, Rolnitzky L. (2001) Comparison of health status of children using a school-based health center for comprehensive care. J Pediatr Health Care. 15(5):244-50.

Briggs AH, Sculpher MJ, Buxton, MJ. (1994) Uncertainty in the economic evaluation of health care technologies: the role of sensitivity analysis. Health Economics; 3:94-104.

Briggs AH, Sculpher MJ. (1995) Sensitivity analysis in economic evaluation: a review of published studies. Health Economics; 4(5): 355-71.

Bureau of Labor Statistics (BLS). Consumer Price Index for all urban consumers. March 2002. Website: http://www.bls.gov/

Bureau of Labor Statistics (BLS). Medical care inflation continues to rise. May 29, 2001. Website: http://www.bls.gov/opub/ted/2001/

Bureau of Primary Health Care (BPHC). Sliding Fee Scales. Office of State and National Partnerships. Health Research and Services Agency (HRSA). Rockville, MD. 2004. http://bphc.hrsa.gov/osnp/feescale.htm.

Cohen J, Cohen P. Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences, 2nd Edition (L Erlbaum: Hillsdale NJ) 1983, p.116-120.

Drummond MF, O'Brien B, Stoddart GL, Torrance GW. (1999) Methods for the economic evaluation of health care programmes. Oxform University Press. New York; pp 6-26, 205-230.

Dryfoos JG. (1998) School-based health centers in the context of education reform. J School Health; 68(10):404-408.

Environmental Protection Agency: Introduction to the Cost of Illness Handbook. July 23rd, 2002: Washington D.C. http://www.epa.gov/oppt/coi/docs/I_1.pdf

Fisher M, Juszczak L, Friedman SB, Schneider M, Chapar G. (1992) School-based adolescent health care: review of a clinical service. Am J Dis Child; 146:615-621.

Goldman L, Genel M, Bezman R, Slanetz P. (1998) Diagnosis and treatment of attention-deficit/hyperactivity disorder in children and adolescents. JAMA; 279:1100-1107.

Government Accounting Office. (1994a) Health Care: School-based health centers can expand access for children. Washington DC: US Government Accounting Office. GAO publication no. GAO/HEHS 95-35.

Government Accounting Office. (1994b) Health Care Reform: School-based health centers can promote access to care. Washington DC: US Government Accounting Office. GAO publication no. GAO/HEHS 94-166.

Gramlich Edward M, A Guide to Benefit-Cost Analysis, 2nd Ed. (Prentice Hall: New Jersey) 1997

Greenbaum R, Desai A. Uneven Burden: Economic Analysis of Medicaid Expenditure Changes in Ohio. [Unpublished final report]. School of Public Policy and Management, The Ohio State University, Columbus, Ohio 43210. April 2003.

Guo JJ, Gibson JT, Gropper DM, Oswald SL, and Barker KN. (1998) "Empiric investigation on direct costs-of-illness and healthcare utilization of Medicaid patients with diabetes mellitus." American J Managed Care; 4(10):1433-1446.

Hacker K. (1996) Integrating school-based health centers into managed care in to managed care in Massachusetts. J School Health; 66(9):317-321.

Hacker K, Drainoni ML. Mental health and illness in Boston's children and adolescents: one city's experience and its implications for mental health policy makers. Public Health Rep. 2001 Jul-Aug; 116(4):317-26.

Health Foundation of Greater Cincinnati, The (2005). Evaluation of Health, Access, and Attendance Outcomes of Students Using School-Based Health Centers. Cincinnati, OH: Author.

Health Foundation of Greater Cincinnati, The (2005). Evaluation of Healthcare Costs and Utilization among Mediciad Recepients in SChools iwth SChool-Based Health CEnters. Cincinnati, OH: AUthor.

Horwitz S, Hoagwood K; NIMH Affective Disorders Workgroup. Children and adolescents. Ment Health Serv Res. 2002 Dec; 4(4):239-43.

Jones D, Dodge KA, Foster EM, Nix R. Conduct Problems Prevention Research Group. Early identification of children at risk for costly mental health service use. Prev Sci. 2002 Dec; 3(4):247-56.

Kaplan DW, Brindis CD, Phibbs SL. (1999) A comparison study of an elementary school-based health center: effects on health care access and use. Arch Pediatr Adolesc Med; 153:235-243.

Kaplan DW, Calonge BN, Guernsey BP, Hanrahan MB. (1998) Managed care and school-based health centers: use of health services. Arch Pediatr Adolesc Med. 152:25-33.

Lear JG. School-Based Health Centers: A long road to travel. Arch Pediatr Adolesc Med. 2003;157:118-119.

LeFever GB, Dawson KV, Morrow AL. (1999) The extent of drug therapy for attention deficit-hyperactivity disorder among children in public schools. Am J Public Health; 89(9): 1359-64.

Leonard M. (1994) GAO: Health reform could help school-based health centers. Nation's Health; 24(6):3.

Meeker RJ, DeAngelis C, Berman B, Freeman HE, Oda D. (1986) A comprehensive school health initiative. Image J Nurs Sch; 18:86-91.

Montgomery L. (1995) Medicaid managed-care organization/school-based health center coordination urged. Health Care Financing Review; 16(4):285.

NIH, (1997) National Heart, Lung, and Blood Institute, National Asthma Education Program, Expert Panel Report 2. Guidelines for the Diagnosis and Management of Asthma. NIH Publication No. 97-4051. Bethesda, MD, May 1997.

NIH (1998) Cost-Benefit Analysis Guide for NIH IT Projects. http://wwwoirm.nih.gov/itmra/cbaguide.html

Office of Management and Budget: Circular A-94: Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs, October 29, 1992. http://www.whitehouse.gov/omb/circulars/a094/print/a094.html

Ohio Department of Jobs and Family Services. Ohio Medicaid Annual Report 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002. Office of Medicaid, Ohio Department of Jobs and Family Services, Columbus, Ohio. http://www.state.oh.us/odjfs.

Oruwariye T, Webber MP, Ozuah P. (2003) Do school-based health centers provide adequate asthma care? J Sch Health. 73(5):186-90.

Pichichero ME. (2000) Recurrent and persistent otitis media. Pediatr Infect Dis J; 19(9):911-6.

Raudenbush S, Bryk T, Conadon R. HLM 5 Hierarchical Linear and Nonlinear Modeling Scientific Software International, Inc. 2000. Web site: www.ssicentral.com.

Richters JE, Arnold LE, Jensen PS, et al. (1995) NIMH collaborative multisite multimodal treatment study of children with ADHD: I. Background and rationale. J Am Acad Child Adolesc Psychiatry; 34:987-1000.

Raudenbush, S. W., & Bryk, A. S. (2002). Hierarchical linear models: Applications and data analysis methods (2nd Ed.). Thousand Oaks, CA: Sage.

Simpson GA, Fowler MG (1994). Geographic mobility and children's emotional/behavioral adjustment and school functioning. Pediatrics, 93(2), 303–309.

Snijders, T., & Bosker, R. (1999). Multilevel analysis. London: Sage

Stevens J. Applied Multivariate Statistics for the Social Sciences, 3rd Edition, (L. Erlbaum: Mahwah NJ) 1996, pp. 468-471.

U.S. Surgeon General. (1999). Mental health: A report of the Surgeon General. Rockville, MD: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Mental Health Services, National Institutes of Health, National Institute of Mental Health. Available from http://www.surgeongeneral.gov/sgoffice.htm

Varni JW, Burwinkle TM, Seid M, Skarr D. (2003) The PedsQL™ 4.0 as a Pediatric population health measure: feasibility, reliability, and validity. Ambulatory Pediatrics; 3(6):329–341.

Waddell C, Offord DR, Shepherd CA, Hua JM, McEwan K. (2002) Child psychiatric epidemiology and Canadian public policy-making: the state of the science and the art of the possible. Can J Psychiatry. Nov; 47(9):825-32.

Warner KE, Luce BR. (1992) Cost-benefit and cost-effectiveness analysis in healthcare. Ann Arbor, MI: health Administration Press.

Webber MP, Carpiniello KE, Oruwariye T, Lo Y, Burton WB, Appel DK Burden of asthma in inner-city elementary schoolchildren: do school-based health centers make a difference? Arch Pediatr Adolesc Med. 2003;157(2):125-9.

Wood D, Halfon N, Scarlata D, Newacheck P, Nessim, S (1993). Impact of family relocation on children's growth, development, school function, and behavior. Journal of the American Medical Association, 270(11), 1334–1338.

Young TL, D'angelo SL, Davis J. (2001) Impact of a school-based health center on emergency department use by elementary school student. J Sch Health; 71(5):196-8.

Appendix A: Services of the SBHCs

Services Provided by the SBHCs

Students visited the SBHCs 15,141 times over the course of the three years of this study. Students generally came to the SBHCs for physical health issues, such as routine or well-child care; medical exams for coughs, sinus problems, injuries, infections, etc.; and procedures (physicals, immunizations, etc.) (see Table 5 below).

Table 5: Top 10 diagnoses during SBHC visits, by year

	Year 1		Year 2		Year 3	
Rank	**Description**	**N**	**Description**	**N**	**Description**	**N**
1	462.00—Acute Pharyngitis	339	V20.2—Well-Child Check	313	V67.9—Follow-Up Examination	358
2	465.90—Acute Upper Respiratory Infection	324	462.00—Acute Pharyngitis	308	314.01—Attention Deficit Disorder with Hyperactivity	334
3	V20.2—Well-Child Check	193	465.90—Acute Upper Respiratory Infection	282	034.00—Streptococcal Sore Throat	312
4	381.00—Acute Non-Supportive Otitis Media	148	079.99—Unspecified Viral Infection	186	312.90—Unspecified Disturbance of Conduct	291
5	V20.1—Routine Child Check	130	959.90—Unspecified Injury	177	V20.2—Well-Child Check	288
6	034.00—Streptococcal Sore Throat	127	784.00—Headache	163	462.00—Acute Pharyngitis	287
7	V67.9—Follow-Up Examination	136	461.90—Acute Sinusitis, Unspecified	152	465.90—Acute Upper Respiratory Infection	244
8	959.90—Unspecified Injury	121	034.00—Streptococcal Sore Throat	147	309.90—Unspecified Adjustment Reaction	217
9	784.00—Headache	103	V20.1—Routine Child Check	126	V70.3—Other Medical Examination for Administrative Purposes	203
10	692.90—Unspecified Dermatitis	94	V67.9—Follow-Up Examination	126	447.90—Unspecified Disorders of Arteries and Arterioles	168

The number of visits for specific, non-routine care issues increased for most types of issues. Between Years 1 and 3, visits to the SBHCs for psychosocial issues increased from 32 to 1,415 (see Table 6 on the next page). This may have been due to increased

efforts to address behavioral health issues or more thorough documentation and recording of psychosocial visits.

Table 6: SBHC visits for specific, non-routine care issues, by year

	Year 1		Year 2		Year 3	
Care Issue	**N**	**%**	**N**	**%**	**N**	**%**
Eye/Ear/Nose/Throat	1,292	34.9%	1,588	31.3%	1,829	28.8%
Other/Miscellaneous	846	22.8%	1,398	27.5%	1,021	16.1%
Respiratory	336	9.1%	317	6.2%	393	6.2%
Dermatological	333	9.0%	373	7.3%	369	5.8%
Musculo/Skeletal	221	6.0%	230	4.5%	307	4.8%
Gastrointestinal	194	5.2%	249	4.9%	223	3.5%
Immune System (Allergy)	139	3.8%	77	1.5%	160	2.5%
Neurological	94	2.5%	237	4.7%	183	2.9%
Psychosocial	32	0.9%	197	3.9%	1,415	22.3%
Parasites/Infections	15	0.4%	23	0.5%	24	0.4%
Endocrine	10	0.3%	16	0.3%	9	0.1%
Communicable Disease	7	0.2%	37	0.7%	98	1.5%
Nutrition/Metabolic	7	0.2%	34	0.7%	66	1.0%
Total	3,526		4,776		6,097	

Visits for Chronic Conditions

Although most visits by chronically ill children were due to the same diagnoses as their non-chronically ill peers, the rate of visits by users with asthma and ADHD was higher than the rate for all users (see Table 7 below).

Table 7: Rate of office visits by students, by reason and year (N=7,339 students who used the SBHCs; N=355 students with asthma; 159 students with ADHD

Office visits per student…	**Year 1**	**Year 2**	**Year 3**
…in schools with SBHCs	1.42	1.95	2.44
…enrolled in SBHC	2.67	3.66	4.57
…with asthma for any reason	6.60	10.17	10.94
…with asthma for asthma	2.63	5.63	4.80
…with ADHD for any reason	4.00	13.31	8.19
…with ADHD for ADHD	0.42	4.62	15.62

The relatively small percentage of SBHC visits for asthma and ADHD suggests that children with these conditions likely have other medical providers that attend to disease maintenance. This is desirable, since SBHCs are generally not open year-round. However, promoting the SBHC as an additional resource for chronic condition maintenance can help decrease absences and time missed from school due to the chronic conditions. This is supported by the increase in the rate of visits over time for both

chronic condition-specific visits as well as general office visits by children with asthma and ADHD. For example, in the Year 2 student survey, students with chronic conditions reported higher use of SBHCs when sick (79.5%) compared to students who do not have chronic conditions (70.1%).

Who Refers the Students to the SBHCs?

Referrals to the SBHCs by parents and families increased both in absolute terms and as a percentage of visits over the three years. Referrals by teachers increased in Year 2 and decreased in Year 3, but declined steadily as a percentage of total referrals. Self-referrals and referrals by nurses increased in absolute numbers but remained constant as a percentage (see Table 8 below).

Table 8: People who referred students to SBHCs

	Year 1		Year 2		Year 3	
Referral Source	**N**	**%**	**N**	**%**	**N**	**%**
Teacher	1,963	53.0%	2,449	48.2%	1,917	30.2%
Nurse	819	22.1%	957	18.8%	1,278	20.1%
Family/Parent	651	17.6%	1,167	23.0%	1,951	30.7%
Self	236	6.4%	334	6.6%	350	5.5%
Other	38	1.0%	173	3.4%	858	13.5%

Linking Students to Other Sources of Care

Referrals to outside sources of care in Years 1 and 2 were primarily directed toward cooperating primary care providers (PCPs), as can be seen in both notifications of illness and injury as well as referrals to the PCP (see Table 9 on the next page). Overall, urban schools had significantly larger numbers of reported referrals out.

This is most likely due to the fact that there are more providers and resources in urban areas than in rural areas. Also, one of the four urban SBHCs used a school-linked model, in which the majority of students are referred out for care.

Table 9: Referrals made by SBHC staff to outside sources of care during the three year of this study

	Total		Rural		Urban	
Type of Referral	**N**	**%**	**N**	**%**	**N**	**%**
Notification of illness	368	28.9%	1	1.7%	367	30.3%
Referral to primary care provider	303	23.8%	22	36.7%	281	23.2%
Referral for dental	107	8.4%	4	6.7%	103	8.5%
Notification of injury	97	7.6%	2	3.3%	95	7.8%
Results of screening	89	7.0%	0	0%	89	7.3%
CHIP referral	61	4.8%	0	0%	61	5.0%
Referral to mental health	58	4.6%	9	15.0%	49	4.0%
Referral for subspecialty	41	3.2%	10	16.7%	31	2.6%
Referral for vision	23	1.8%	0	0%	23	1.9%
Referral to guidance counselor	20	1.6%	0	0%	20	1.7%
Referral for hearing	19	1.5%	2	3.3%	17	1.4%
Referral to social services	10	0.8%	0	0%	10	0.8%
Need for consultation	9	0.7%	0	0%	9	0.7%
Request for medication	8	0.6%	0	0%	8	0.7%
Referral to physical therapy	5	0.4%	0	0%	5	0.4%
Other	54	4.3%	10	16.7%	44	3.7%
Total	1,272		60		1,212	

School Personnel Perceptions of SBHCs

Researchers surveyed teachers and staff of schools with SBHCs in Years 1, 2, and 3 to see how well school personnel knew the SBHCs and what they thought of the centers. Almost 80% of respondents to these surveys were teachers. Overall, staff knowledge of SBHC hours increased from 63% in Year 1 to 71% in Year 3. The majority of respondents rated the services of the SBHCs as "Excellent" or "Very Good."

The majority of respondents reported being very favorable towards having an SBHC in their school. In all three years of the survey, respondents overwhelmingly reported that they liked having an SBHC and that having an SBHC made their jobs easier. Respondents noted many positive aspects of having an SBHC in their school. The most common positive aspects of

having an SBHC in their school as noted by school personnel were:

- convenience,
- increases school attendance,
- SBHC staff is knowledgeable,
- students couldn't get care otherwise, and
- convenient for staff to use.

Other positives listed by staff included special health education (e.g., eyes, dental, mental, preventive, etc.); kids feel safe, trust; provides physical exams; educates parents and students about importance of health maintenance; teachers can be more productive, not playing nurse; and dispensing medications.

When asked about negative aspects of having an SBHC, respondents overwhelmingly (63.2%) wrote in "none." Of the personnel who indicated a negative aspect (36.8%), most indicated:

- kids abuse it (18.6%),
- that the school SBHC needs more services (3.8%),
- that they were not sure what services there are (2.9%),
- that the nurse practitioner or someone should be at school all the time (2.5%), and
- that having an SBHC in the school removes the responsibility of parent to meet medical needs of child (1.5%).

School Personnel Opinions on Student Health

On average, school personnel tended to rate students' health as "Good." This was generally lower than how parents rated their own children (about 80% of parents rated their own child's health as "Excellent" or "Very Good") and lower than how children rated themselves (about 70% rated their own health as "Excellent" or "Very Good"). However, from Year 1 to Year 3, there was a noticeable decrease in the school personnel ratings

of student health as "Fair" or "Poor" (see Figure 50 below and Table 52 in Appendix B).

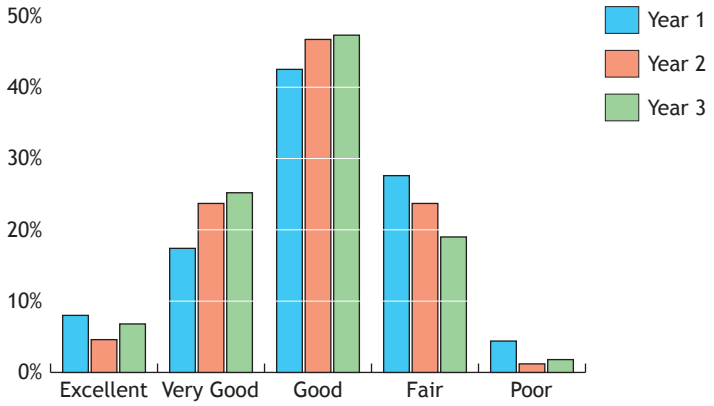


Figure 50: Percentage of school personnel rating student health as excellent, very good, good, fair, or poor (Year 1 N=379, Year 2 N=461, Year 3 N=423)

We also asked school personnel about the importance health plays in student learning, targeting seven different health dimensions. The majority of school personnel reported that they felt that physical health, behavioral problems, mental health, and attentional problems were one of the four most important factors in student learning (see Figure 51 below and Table 53 in Appendix B). Physical health was generally ranked by the largest percentage of respondents as the single most important factor. However, behavioral problems, mental health, and attentional problems were ranked in the top four as often or more often than physical health problems.

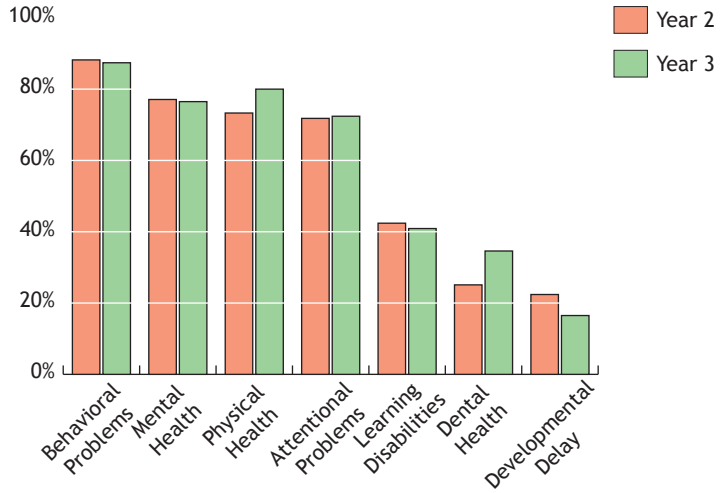


Figure 51: Percentage of school personnel who perceive certain health dimensions to be important to student learning (Year 2 N=461, Year 3 N=423)

School Personnel Opinions on how SBHCs Affect Student Health

In Years 2 and 3, we asked school personnel about their perception of the SBHC's effect on student health status for the seven dimensions. School personnel at all schools consistently rated the SBHCs' effects as "Very Positive" or "Positive" (see Figure 52 below and Table 54 in Appendix B). Respondents indicated that, overall, the SBHCs had the most influence on physical, dental, and mental health. While behavioral health and attentional problems were noted as very important barriers to learning, less than 50% of staff indicated that the SBHCs had a very positive or positive effect on student health in these areas.

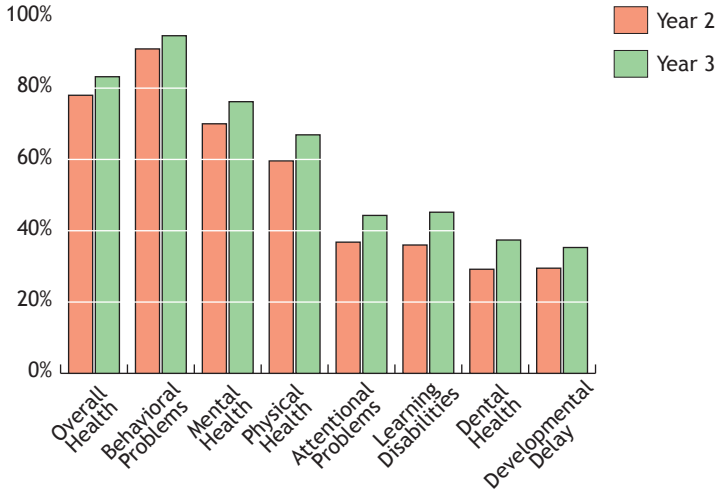


Figure 52: Percentage of school personnel who perceive the SBHCs have "Very Positive" or "Positive" effect on student health status across health dimensions (Year 2 N=461, Year 3 N=423)

School Personnel Referral Patterns

The percentage of school personnel who indicated that they would be very likely or somewhat likely to send a child to the SBHC for physical health problems grew steadily over the three years, from just over 80% in Year 1 to just over 90% in Year 2. The percentage of respondents who reported that they would be very likely or somewhat likely to send a child to the SBHC for a behavioral health problem increased from 18.3% in Year 1 to 28.7% in Year 2 to 32.4% in Year 3.

The remaining health dimensions—mental health, attention problems, dental health, learning disability, and developmental delay—were not included in the Year 1 survey. The results in Years 2 and 3 suggest a varied likelihood of referral patterns across these additional dimensions. Next to physical health, dental and mental health were the most likely reasons for referrals. Staff were

much less likely to refer a student to the SBHCs for behavioral, attentional, or developmental problems.

Personnel may have been less likely to refer students to the SBHCs for some health problems for various reasons. First, each SBHC provides different services on-site depending on the individual school's needs. However, all eight SBHCs provided some mental and behavioral health services or referrals. Only two provided on-site dental services, but all eight had the capacity to refer out for needed dental services. Second, school personnel knowledge about the availability of services may have been limited. How the SBHCs kept school staff educated about services varied considerably among schools, and most SBHCs reported to school personnel on activities that focused on physical health, hygiene, and prevention and may not have mentioned behavioral health and other services.

People Identified as Important to the Success of the SBHC

In Year 1 of the school personnel survey, we asked respondents to list all people (by title or attributes, not name) whom they thought were responsible for the success of the SBHC. The question was open-ended, and respondents could list more than one person. The most common responses were:

- Nurses and Nurse Practitioner 45.6%
- School Staff 14.8%
- Aide 13.7%
- Principal 12.4%
- Superintendent 11.9%
- Teacher 10.0%
- Local Doctor 9.2%
- Counselor 9.0%
- Social Worker 9.0%
- Secretary 7.9%
- SBHC Coordinator 6.9%
- Psychologist or Psychiatrist 6.7%
- No response/don't know 33.0%

Parent and Student Satisfaction

We asked parents a series of eight questions in Years 2 and 3 about the provider they used most often for their children's care. The items tapped two dimensions of satisfaction: access to care

and quality of care. An analysis of differences in satisfaction revealed no significant differences between parents of students in schools with and without SBHCs. Nor were there any significant differences between parents of students in schools with SBHCs who were or were not enrolled in the SBHCs nor parents of students who did nor did not use SBHC services.

In Years 2 and 3, we asked students in schools with SBHCs a series of questions centered on their use of the SBHCs. We asked students who said that they used the SBHCs whether they were comfortable using them and whether they would go back to the SBHC if they were sick again. Among students who reported they used the SBHCs, over 90% reported that they felt comfortable and that they would use the SBHCs again.

Appendix B: Data Tables

Table 10: Percentage and number of students who used the SBHCs, by region and insurance status (from Figure 1)

	# enrolled in the SBHCs			students who used the SBHCs					
				Rural		Urban		Total	
Type of Insurance	Rural N	Urban N	Total N	N	% of enrolled[1]	N	% of	N	% of
Private	1,584	948	2,532	860	54.3%	508	53.6%	1,368	54.0%
Public	766	1,283	2,049	444	58.0%	899	70.1%	1,343	65.5%
No insurance	213	494	707	101	47.4%	358	72.5%	459	64.9%
Unknown/No entry	629	1,422	2,051	307	48.8%	999	70.3%	1,306	63.7%
Total	3,192	4,147	7,339	1,712	53.6%	2,764	66.7%	4,476	61.0%

[1] Among those who used the SBHCs, the "% of enrolled" is based on the total sample size among those enrolled who are in the same geographic category and insurance group. For example, 860 rural students with private health insurance used the SBHCs. This is 54.3% of the 1,584 rural students with private insurance who were enrolled in the SBHCs.

[2] Unknown/No entry are students whose enrollments file did not contain this information.

Table 11: Students who used the SBHCs, by region and ethnicity (N=4,476) (from Figure 2)

	Black	White	Hispanic	Other
Urban schools	52.6%	42.2%	1.8%	3.3%
Rural schools	0.05%	87.7%	0.85%	11.0%

Table 12: Students who enrolled in and used the SBHCs, by region (N=7,339 students enrolled, 4,476 students who used the centers, and 15,141 SBHC visits) (from Figure 3)

	Urban Schools	Rural Schools
% of intervention students in these schools	52.0%	48.0%
% of total students enrolled in these SBHCs	56.5%	43.5%
% of total students with an office visit	61.8%	38.2%
% of total office visits at these SBHCs	58.5%	41.5%

Table 13: Students with SBHC office visits, by insurance status (N=4,476) (from Figure 4)

Type of Insurance	Year 1		Year 2		Year 3	
	N	%	N	%	N	%
Private	1,233	41.29%	1,663	38.90%	1,941	37.87%
Public	1,381	46.25%	2,124	49.68%	2,609	50.91%
None	372	12.46%	488	11.42%	575	11.22%

Table 14: Self-reported and parent-reported total health-related quality of life (HRQL) scores for students in the study with reference scores (survey sample, N=588) (from Figure 5)

	Year 1	Year 2	Year 3
Student self-report			
SBHC user	74.13	74.78	77.54
SBHC nonuser	77.96	77.30	76.06
Comparison	78.91	76.58	77.00
Healthy child	83.90	83.90	83.90
Chronically ill child	74.16	74.16	74.16
Parent Report			
SBHC user	83.95	81.17	82.48
SBHC nonuser	85.87	84.46	83.72
Comparison	85.49	84.87	84.28
Healthy child	82.29	82.29	82.29
Chronically ill child	73.14	73.14	73.14

Table 15: Self-reported and parent-reported physical HRQL scores for students in the study (survey sample, N=588) (from Figure 6)

	Year 1	Year 2	Year 3
Student self-report			
SBHC user	82.62	83.84	84.66
SBHC nonuser	83.16	83.69	84.79
Comparison	85.59	83.84	83.89
Parent Report			
SBHC user	88.72	85.24	87.50
SBHC nonuser	90.59	89.00	89.56
Comparison	90.07	90.08	89.55

Table 16: Self-reported and parent-reported psychosocial HRQL scores for students in the study (survey sample, N=588) (from Figure 7)

	Year 1	Year 2	Year 3
Student self-report			
SBHC user	69.60	69.95	73.74
SBHC nonuser	75.18	73.89	74.47
Comparison	75.34	72.71	73.32
Parent Report			
SBHC user	81.41	78.99	79.79
SBHC nonuser	83.35	82.04	80.63
Comparison	83.05	82.09	81.48

Table 17: Where students were sent after SBHC visits (N=15,141 visits) (from Figure 8)

	Year 1	Year 2	Year 3
Returned to Class	81.25%	82.56%	85.08%
Dismissed	16.21%	12.92%	14.25%
Other	2.50%	2.85%	0.35%

Table 18: Full-day absences for SBHC users, nonusers, and comparison students (full school population, N=7,784 students) (from Figure 9)

	Year 1	Year 2	Year 3
SBHC user	9.8	8.0	10.2
SBHC nonuser	7.9	6.5	8.5
Comparison	8.9	8.2	8.6

Table 19: Full-day absences for SBHC users, nonusers, and comparison students (survey sample, N=587 students) (from Figure 10)

	Year 1	Year 2	Year 3
SBHC user	11.64	7.93	9.73
SBHC nonuser	9.60	6.10	8.55
Comparison	7.70	6.72	6.68

Table 20: Full-day absences for SBHC users, nonusers, and comparison students by ethnicity (full school population, N=7,784 students) (from Figure 11)

		Year 1	Year 2	Year 3
SBHC user	White	9.5	7.7	10.4
	Black	9.8	9.8	9.1
SBHC nonuser	White	7.6	6.4	8.7
	Black	10.9	8.2	7.9
Comparison	White	9.2	8.3	8.6
	Black	6.4	8.3	8.2

Table 21: Full-day absences for SBHC users, nonusers, and comparison students by region (full school population, N=7,784 students) (from Figure 12)

		Year 1	Year 2	Year 3
SBHC user	Urban	12.8	9.1	11.0
	Rural	5.3	6.4	9.1
SBHC nonuser	Urban	9.9	6.8	7.8
	Rural	6.1	6.3	9.2
Comparison	Urban	7.4	7.5	8.9
	Rural	9.2	8.4	8.5

		Year 1	Year 2	Year 3
SBHC user	Ohio	9.9	8.7	10.6
	Kentucky	9.6	7.1	9.7
SBHC nonuser	Ohio	8.3	6.8	8.7
	Kentucky	7.0	6.0	8.1
Comparison	Ohio	8.3	9.2	9.2
	Kentucky	10.1	6.1	7.3

Table 22: Full-day absences for SBHC users, nonusers, and comparison students by state (full school population, N=7,784 students) (from Figure 13)

		Year 1	Year 2	Year 3
SBHC user	Privately insured	7.5	6.9	8.5
	Publicly insured	18.9	8.5	13.2
	Not insured	16.8	9.9	9.3
SBHC nonuser	Privately insured	7.3	4.9	7.3
	Publicly insured	17.0	8.7	10.3
	Not insured	3.7	7.9	15.5
Comparison	Privately insured	7.8	6.4	7.3
	Publicly insured	7.4	7.7	10.4
	Not insured	6.2	11.3	7.2

Table 23: Full-day absences for SBHC users, nonusers, and comparison students by insurance status (survey sample, N=39 students with no insurance, 157 with public insurance, and 372 with private insurance) (from Figures 14–16)

		Year 1	Year 2	Year 3
SBHC user	with LD	20.83	13.00	13.64
	without LD	10.47	7.28	9.25
SBHC nonuser	with LD	9.92	8.15	11.84
	without LD	7.60	6.65	7.70
Comparison	with LD	12.41	8.88	9.33
	without LD	9.31	5.72	8.47

Table 24: Full-day absences for SBHC users, nonusers, and comparison students with and without learning disorders (survey sample, N=579 students) (from Figure 17)

		Year 1	Year 2	Year 3
SBHC user	with ADHD	23.00	12.10	14.70
	without ADHD	10.46	7.49	9.26
SBHC nonuser	with ADHD	8.92	5.35	10.57
	without ADHD	7.64	6.78	7.75
Comparison	with ADHD	12.27	8.05	10.71
	without ADHD	9.31	5.80	8.30

Table 25: Full-day absences for SBHC users, nonusers, and comparison students with and without ADHD (survey sample, N=579 students) (from Figure 18)

	Year 1	Year 2	Year 3
SBHC user	77.57%	87.74%	89.92%
SBHC nonuser	91.44%	93.65%	93.94%
Comparison	90.69%	91.99%	89.31%

Table 26: Percentage of parents reporting that accessing healthcare was little or no problem (survey sample, N=581 parents) (from Figure 19)

Table 27: Average number of well-child visits students had per year, from parent report (survey sample; N=587 students) (from Figure 20)

	Year 1	Year 2	Year 3
SBHC user	1.77	1.27	2.48
SBHC nonuser	1.55	1.39	1.98
Comparison	1.35	1.26	1.22

Table 28: Average number of ill-child visits students had per year, from parent report (survey sample; N=587 students) (from Figure 21)

	Year 1	Year 2	Year 3
SBHC user	3.58	3.92	3.01
SBHC nonuser	3.82	2.51	2.80
Comparison	3.50	2.49	2.33

Table 29: Insurance status of children in the study, from parent report (survey sample; N=576 students) (from Figures 22 and 23)

		Year 1	Year 2	Year 3
SBHC user	Privately insured	62.6%	63.2%	67.2%
	Publicly insured	29.9%	30.2%	25.0%
	Not insured	7.5%	6.6%	7.8%
SBHC nonuser	Privately insured	71.9%	72.3%	70.7%
	Publicly insured	24.9%	22.4%	28.1%
	Not insured	3.2%	5.5%	1.2%
Comparison	Privately insured	81.1%	80.1%	77.4%
	Publicly insured	15.8%	17.6%	20.6%
	Not insured	3.2%	5.5%	2.1%

Table 30: Percentage of students with at least one ER visit, from parent report (survey sample; N=587 students) (from Figure 24)

	Year 1	Year 2	Year 3
SBHC user	29.9%	32.7%	32.8%
SBHC nonuser	28.6%	26.5%	34.7%
Comparison	33.0%	28.5%	29.5%

Table 31: Percentage of students with at least one ER visit, from parent report, by state (survey sample; N=587 students) (from Figure 25)

		Year 1	Year 2	Year 3
SBHC user	Ohio	24.4%	39.0%	37.3%
	Kentucky	33.3%	28.8%	27.9%
SBHC nonuser	Ohio	29.1%	20.1%	25.9%
	Kentucky	27.3%	41.8%	50.8%
Comparison	Ohio	36.9%	29.8%	33.3%
	Kentucky	27.6%	26.8%	24.4%

Table 32: Hospitalizations and ER visits by Medicaid students with asthma (N=273 students) (from Figure 26)

		Before SBHCs opened	After SBHCs opened
Intervention	Hospitalization	36	12
	ER visits	344	307
Comparison	Hospitalization	11	10
	ER visits	200	210

Table 33: Percentage of Medicaid students who accessed mental health services before and after the SBHCs opened (N=2,153 students) (from Figure 27)

		Before SBHCs opened	After SBHCs opened
Intervention	Urban	12.7%	17.8%
	Rural	19.7%	26.8%
Comparison	Urban	13.9%	16.2%
	Rural	22.7%	24.2%

*Table 34: Ohio Medicaid quarterly **total costs** per 100 students in the Medicaid cohort (N=2,153 students) (from Figure 29)*

Quarter	Intervention	Comparison
1	29,099.89	50,810.43
2	23,102.88	29,326.95
3	31,080.09	29,659.25
4	18,394.45	25,370.43
5	21,950.27	32,478.98
6	26,018.48	38,929.24
7	26,809.49	32,958.12
8	23,673.39	25,578.35
9	28,043.48	32,231.69
10	29,874.33	30,387.45
11	35,044.66	35,009.35
12	24,461.60	27,516.92
13	36,031.31	40,875.00
14	37,612.27	34,262.78
15	27,897.30	33,957.51
16	29,816.48	31,766.34
17	37,888.36	37,286.76
18	40,438.07	40,491.84
19	44,418.99	48,109.94
20	29,459.49	41,488.61
21	43,750.28	39,336.08
22	37,890.89	34,955.04

*Table 35: Ohio Medicaid quarterly **hospitalization costs** per 100 students in the Medicaid cohort (N=2,153 students) (from Figure 30)*

Quarter	Intervention	Comparison
1	$5,653.70	$21,488.54
2	$1,410.25	$1,269.76
3	$6,128.24	$3,568.10
4	$1,185.27	$0.00
5	$0.00	$2,926.39
6	$2,657.45	$8,360.41
7	$3,570.70	$2,789.26
8	$5,263.34	$2,606.97
9	$5,209.83	$3,721.14
10	$3,637.64	$4,153.63
11	$6,045.53	$4,216.11
12	$3,365.09	$1,060.01
13	$5,979.22	$4,749.81
14	$6,003.32	$4,494.42
15	$2,134.02	$1,888.41
16	$5,449.97	$2,758.31
17	$2,139.37	$1,827.27
18	$2,261.26	$3,283.95
19	$5,910.11	$7,237.87
20	$1,277.68	$1,129.65
21	$4,460.04	$991.05
22	$2,929.55	$376.93

Table 36: Ohio Medicaid quarterly **physician visit costs** *per 100 students in the Medicaid cohort (N=2,153 students) (from Figure 31)*

Quarter	Intervention	Comparison
1	$1,892.32	$6,223.39
2	$2,402.24	$4,246.34
3	$3,357.36	$4,757.36
4	$1,108.44	$2,961.08
5	$2,097.92	$5,209.11
6	$2,769.67	$5,871.91
7	$4,833.43	$6,420.77
8	$4,351.58	$5,264.29
9	$3,794.61	$5,996.06
10	$5,191.75	$5,085.69
11	$5,975.65	$6,863.50
12	$4,963.41	$5,261.10
13	$4,365.97	$7,425.47
14	$5,813.92	$5,907.80
15	$4,554.99	$6,276.13
16	$4,654.71	$3,262.08
17	$3,985.58	$5,060.11
18	$3,299.62	$3,715.20
19	$3,976.01	$4,498.11
20	$2,545.33	$6,346.56
21	$3,458.60	$4,368.73
22	$3,273.88	$4,603.44

Table 37: Ohio Medicaid quarterly **ER visit costs** *per 100 students in the Medicaid cohort (N=2,153 students) (from Figure 32)*

Quarter	Intervention	Comparison
1	$1,178.65	$1,671.30
2	$792.13	$2,523.90
3	$858.02	$1,564.29
4	$582.82	$1,130.20
5	$605.62	$1,857.37
6	$789.45	$2,022.89
7	$1,196.02	$2,893.56
8	$1,693.07	$2,434.05
9	$1,483.02	$2,458.72
10	$1,575.96	$1,938.06
11	$2,596.32	$2,913.14
12	$1,664.81	$2,446.49
13	$1,852.65	$2,345.38
14	$1,757.53	$2,847.43
15	$1,807.17	$2,704.50
16	$1,714.34	$2,509.38
17	$1,412.64	$2,311.17
18	$1,302.67	$2,243.52
19	$1,765.45	$2,968.97
20	$1,528.10	$3,323.70
21	$1,743.44	$3,326.64
22	$1,319.70	$2,242.52

Table 38: Ohio Medicaid quarterly **outpatient and other medical costs** *per 100 students in the Medicaid cohort (N=2,153 students) (from Figure 33)*

Quarter	Intervention	Comparison
1	$12,909.42	$9,079.56
2	$12,819.23	$8,842.18
3	$13,255.92	$8,781.63
4	$10,976.26	$7,529.04
5	$11,607.47	$8,478.74
6	$10,895.84	$9,644.16
7	$6,681.25	$6,819.33
8	$4,174.52	$4,800.29
9	$4,733.35	$4,933.07
10	$4,964.73	$4,593.56
11	$5,094.47	$4,556.18
12	$4,268.39	$4,050.19
13	$4,747.52	$4,185.55
14	$4,438.90	$3,716.98
15	$4,632.80	$3,861.45
16	$6,111.59	$4,927.05
17	$8,219.96	$4,727.11
18	$10,420.52	$5,560.50
19	$10,019.76	$6,949.91
20	$8,511.65	$7,979.35
21	$9,685.50	$5,980.87
22	$9,763.64	$6,565.32

Table 39: Ohio Medicaid quarterly **mental health services** *costs per 100 students in the Medicaid cohort (N=2,153 students) (from Figure 34)*

Quarter	Intervention	Comparison
1	$4,942.60	$7,672.63
2	$3,842.30	$8,866.30
3	$5,121.75	$7,553.90
4	$2,212.07	$9,979.49
5	$5,167.70	$9,920.86
6	$6,471.17	$9,372.09
7	$6,452.60	$8,810.74
8	$3,993.82	$4,289.96
9	$8,385.38	$8,659.81
10	$9,840.06	$9,431.42
11	$9,532.59	$8,196.50
12	$4,483.37	$7,372.93
13	$12,650.33	$13,929.49
14	$13,131.14	$8,902.37
15	$9,173.64	$10,086.20
16	$5,602.11	$7,772.15
17	$15,077.85	$12,781.47
18	$16,076.80	$15,253.81
19	$15,683.89	$15,290.35
20	$9,538.47	$11,046.50
21	$17,338.25	$13,327.62
22	$13,091.98	$10,818.56

Table 40: Ohio Medicaid quarterly **prescription drug costs** *per 100 students in the Medicaid cohort (N=2,153 students) (from Figure 35)*

Quarter	Intervention	Comparison
1	$1,069.50	$2,216.43
2	$1,062.29	$2,233.84
3	$1,071.94	$1,965.30
4	$1,130.90	$2,044.00
5	$1,404.27	$2,587.80
6	$1,553.17	$2,332.80
7	$2,002.93	$3,071.97
8	$1,886.86	$3,324.09
9	$2,024.57	$3,881.19
10	$2,431.51	$3,387.39
11	$2,647.15	$5,415.57
12	$2,698.66	$5,054.98
13	$3,072.73	$5,370.98
14	$3,535.59	$5,690.65
15	$3,238.46	$6,440.39
16	$3,104.40	$7,127.60
17	$3,842.29	$7,598.18
18	$4,841.73	$7,447.99
19	$4,970.33	$8,302.33
20	$3,847.43	$9,684.93
21	$4,501.73	$9,048.28
22	$5,280.38	$8,839.85

Table 41: Ohio Medicaid quarterly **dental care costs** *per 100 students in the Medicaid cohort (N=2,153 students) (from Figure 36)*

Quarter	Intervention	Comparison
1	$1,057.76	$1,958.52
2	$566.18	$924.07
3	$857.77	$1,232.66
4	$536.00	$787.40
5	$618.89	$1,008.92
6	$627.02	$1,100.03
7	$1,452.34	$1,755.63
8	$1,371.18	$1,892.35
9	$1,615.83	$1,737.60
10	$1,648.15	$1,410.52
11	$2,683.22	$2,144.83
12	$1,907.19	$1,564.57
13	$2,678.80	$1,951.24
14	$2,302.26	$2,430.60
15	$1,882.55	$2,082.14
16	$2,455.65	$2,501.51
17	$2,599.19	$2,381.42
18	$1,835.55	$2,797.80
19	$1,747.07	$2,418.15
20	$1,656.47	$1,399.08
21	$1,928.46	$1,775.72
22	$1,756.87	$1,276.51

Table 42: Ohio Medicaid quarterly **EPSDT visit costs** *per 100 students in the Medicaid cohort (N=2,153 students) (from Figure 37)*

Quarter	Intervention	Comparison
1	$395.93	$500.06
2	$208.26	$420.58
3	$429.11	$236.02
4	$662.69	$939.22
5	$448.41	$489.79
6	$254.72	$224.97
7	$620.22	$396.86
8	$939.03	$966.37
9	$796.89	$844.10
10	$584.53	$387.18
11	$469.73	$703.51
12	$1,110.68	$706.65
13	$684.09	$917.09
14	$629.62	$272.54
15	$473.67	$618.30
16	$723.72	$908.28
17	$611.48	$600.04
18	$399.93	$189.06
19	$346.39	$444.26
20	$554.36	$578.84
21	$634.27	$517.17
22	$474.90	$231.92

Table 43: Ohio Medicaid quarterly **total costs** *per 100 students in the Medicaid cohort in* **rural schools** *(N=725 students) (from Figure 38)*

Quarter	Intervention	Comparison
1	$27,013.39	$32,733.87
2	$34,859.70	$30,878.12
3	$31,821.31	$34,919.42
4	$17,358.03	$30,077.84
5	$21,498.06	$30,910.23
6	$27,889.61	$28,924.24
7	$41,386.43	$34,976.59
8	$33,116.09	$26,920.88
9	$26,205.45	$37,214.46
10	$26,919.20	$29,790.25
11	$37,269.84	$39,183.12
12	$35,658.89	$31,913.24
13	$29,388.00	$45,507.37
14	$37,069.99	$39,215.86
15	$28,883.30	$37,052.51
16	$25,032.55	$34,680.93
17	$30,502.80	$42,468.26
18	$31,328.19	$40,444.50
19	$41,340.01	$51,338.45
20	$23,762.26	$49,183.59
21	$29,611.97	$41,782.15
22	$28,685.26	$38,674.64

Table 44: Ohio Medicaid quarterly **hospitalization costs** *per 100 students in the Medicaid cohort in* **rural schools** *(N=725 students) (from Figure 39)*

Quarter	Intervention	Comparison
1	$0.00	$3,686.67
2	$5,151.59	$2,496.48
3	$2,393.85	$4,495.93
4	$896.75	$0.00
5	$0.00	$2,692.21
6	$3,225.56	$0.00
7	$4,338.80	$0.00
8	$7,840.03	$0.00
9	$0.00	$1,777.90
10	$0.00	$0.00
11	$3,238.36	$4,473.38
12	$10,011.62	$1,836.48
13	$2,302.42	$6,438.01
14	$2,399.04	$4,250.06
15	$961.26	$1,347.26
16	$1,451.38	$3,192.31
17	$1,093.17	$3,063.36
18	$0.00	$2,886.10
19	$7,624.59	$8,142.21
20	$1,213.27	$1,908.58
21	$0.00	$1,654.15
22	$0.00	$624.07

Table 45: Ohio Medicaid quarterly **physician visit costs** *per 100 students in the Medicaid cohort in* **rural schools** *(N=725 students) (from Figure 40)*

Quarter	Intervention	Comparison
1	$1,911.42	$3,572.15
2	$2,679.68	$3,078.16
3	$3,340.07	$4,045.93
4	$916.24	$2,719.96
5	$1,603.99	$2,865.86
6	$3,114.00	$3,499.86
7	$5,357.51	$4,227.83
8	$3,207.78	$3,907.72
9	$2,314.15	$5,647.45
10	$4,361.26	$4,487.64
11	$6,203.36	$6,527.27
12	$3,983.93	$4,896.34
13	$3,734.78	$7,024.37
14	$5,775.82	$6,564.62
15	$5,286.10	$6,508.56
16	$5,791.84	$3,607.62
17	$3,797.86	$6,521.54
18	$3,665.32	$3,602.48
19	$5,094.82	$4,081.05
20	$3,366.32	$6,737.91
21	$3,083.81	$4,654.17
22	$3,805.90	$5,760.82

Table 46: Ohio Medicaid quarterly **ER visit costs** *per 100 students in the Medicaid cohort in* **rural schools** *(N=725 students) (from Figure 41)*

Quarter	Intervention	Comparison
1	$2,153.32	$1,625.58
2	$1,422.60	$2,331.09
3	$1,218.67	$1,487.11
4	$823.40	$1,037.19
5	$1,072.40	$1,840.68
6	$739.40	$1,862.77
7	$1,309.75	$2,346.37
8	$1,192.05	$1,933.53
9	$1,283.56	$1,848.42
10	$697.00	$1,754.45
11	$1,456.41	$2,499.73
12	$2,080.59	$2,211.24
13	$1,222.36	$2,584.31
14	$2,113.47	$3,432.35
15	$2,153.51	$3,159.22
16	$1,620.41	$2,945.01
17	$1,489.81	$2,961.54
18	$1,927.74	$2,940.09
19	$1,898.70	$3,810.79
20	$2,121.05	$4,025.90
21	$1,649.68	$3,812.41
22	$1,424.89	$2,417.72

Table 47: Ohio Medicaid quarterly **outpatient and other medical care costs** *per 100 students in the Medicaid cohort in rural schools (N=725 students) (from Figure 42)*

Quarter	Intervention	Comparison
1	$5,486.37	$1,231.89
2	$5,458.30	$1,223.89
3	$4,432.92	$1,246.65
4	$2,826.90	$809.15
5	$3,647.51	$1,896.29
6	$3,858.87	$3,270.77
7	$3,996.84	$3,667.28
8	$2,469.27	$2,886.34
9	$3,639.17	$3,320.46
10	$4,041.52	$2,594.46
11	$3,515.42	$2,914.79
12	$3,560.28	$2,841.22
13	$4,873.31	$3,268.77
14	$5,723.55	$2,953.36
15	$5,639.69	$3,309.66
16	$3,213.50	$3,999.03
17	$6,267.05	$2,872.89
18	$7,000.84	$2,791.38
19	$6,928.69	$4,996.17
20	$3,222.94	$6,126.95
21	$5,566.71	$2,859.29
22	$5,576.82	$3,336.95

Table 48: Ohio Medicaid quarterly **mental health services costs** *per 100 students in the Medicaid cohort in* **rural schools** *(N=725 students) (from Figure 43)*

Quarter	Intervention	Comparison
1	$1,565.44	$5,660.98
2	$2,680.15	$5,713.98
3	$3,004.53	$5,890.89
4	$296.91	$8,383.38
5	$1,550.22	$5,844.64
6	$2,474.80	$4,914.92
7	$5,046.82	$6,501.72
8	$3,245.25	$3,133.94
9	$4,286.69	$6,504.34
10	$3,044.02	$6,133.58
11	$4,531.72	$4,927.89
12	$1,888.58	$5,636.27
13	$4,231.24	$11,119.58
14	$7,543.00	$8,150.60
15	$4,180.46	$10,855.07
16	$2,647.02	$8,991.78
17	$6,267.24	$13,335.20
18	$7,315.19	$13,388.01
19	$6,913.54	$14,770.69
20	$1,839.01	$10,956.57
21	$5,150.31	$10,687.75
22	$3,216.25	$9,502.29

Table 49: Ohio Medicaid quarterly **prescription drug costs** *per 100 students in the Medicaid cohort in* **rural schools** *(N=725 students) (from Figure 44)*

Quarter	Intervention	Comparison
1	$1,899.18	$1,848.83
2	$2,073.16	$2,152.33
3	$1,744.91	$1,616.95
4	$1,564.73	$1,908.34
5	$1,968.04	$2,248.96
6	$2,440.70	$1,930.35
7	$2,672.40	$2,700.00
8	$2,115.33	$2,875.08
9	$2,879.64	$3,127.67
10	$3,094.18	$2,881.60
11	$3,204.51	$4,495.50
12	$3,529.66	$4,764.32
13	$4,269.12	$5,425.45
14	$6,285.08	$6,322.37
15	$5,803.48	$7,255.92
16	$4,993.25	$7,407.28
17	$6,783.36	$7,728.87
18	$6,570.50	$8,372.58
19	$7,242.98	$8,250.23
20	$5,712.57	$10,010.55
21	$6,713.46	$9,319.48
22	$6,669.03	$8,872.51

Table 50: Ohio Medicaid quarterly **dental care costs** *per 100 students in the Medicaid cohort in* **rural schools** *(N=725 students) (from Figure 45)*

Quarter	Intervention	Comparison
1	$1,631.66	$1,948.30
2	$1,280.46	$542.70
3	$1,605.54	$1,086.57
4	$1,116.95	$783.88
5	$853.17	$974.87
6	$564.39	$855.06
7	$1,757.92	$1,149.40
8	$1,819.44	$1,385.66
9	$1,178.11	$1,543.95
10	$1,393.20	$1,018.69
11	$3,996.11	$1,604.70
12	$2,616.22	$1,219.97
13	$2,893.71	$1,360.76
14	$2,622.79	$2,475.59
15	$3,628.88	$2,563.45
16	$4,380.99	$2,664.99
17	$3,163.22	$2,701.78
18	$2,758.77	$3,377.18
19	$2,836.80	$2,968.17
20	$3,168.07	$1,317.27
21	$3,146.85	$1,832.72
22	$3,407.41	$1,488.72

Table 51: Ohio Medicaid quarterly **EPSDT costs** *per 100 students in the Medicaid cohort in* **rural schools** *(N=725 students) (from Figure 46)*

Quarter	Intervention	Comparison
1	$496.48	$396.29
2	$309.99	$180.74
3	$481.76	$206.41
4	$976.49	$581.92
5	$596.57	$318.91
6	$198.67	$231.97
7	$347.23	$287.36
8	$886.72	$601.30
9	$565.47	$343.48
10	$363.25	$87.01
11	$381.68	$169.95
12	$963.24	$578.08
13	$270.83	$353.86
14	$257.67	$192.90
15	$158.26	$322.21
16	$545.92	$727.86
17	$452.81	$417.27
18	$238.61	$127.54
19	$267.41	$130.42
20	$526.31	$507.21
21	$517.27	$274.19
22	$227.27	$99.19

Table 52: Percentage of school personnel rating student health as excellent, very good, good, fair, or poor (Year 1 N=379, Year 2 N=461, Year 3 N=423) (from Figure 50)

	Year 1	Year 2	Year 3
Excellent	8.0%	4.6%	6.8%
Very Good	17.4%	23.7%	25.2%
Good	42.5%	46.7%	47.3%
Fair	27.6%	23.7%	19.0%
Poor	4.4%	1.2%	1.8%

Table 53: Percentage of school personnel who perceive certain health dimensions to be important to student learning (Year 2 N=461, Year 3 N=423) (from Figure 51)

	Year 2	Year 3
Behavioral Problems	88.2%	87.4%
Mental Health	77.1%	76.5%
Physical Health	73.3%	80.0%
Attentional Problems	71.8%	72.4%
Learning Disorders	42.4%	40.9%
Dental Health	25.1%	34.6%
Developmental Delay	22.4%	16.5%

Table 54: Percentage of school personnel who perceive the SBHCs have "Very Positive" or "Positive" effect on student health status across health dimensions (Year 2 N=461, Year 3 N=423) (from Figure 52)

	Year 2	Year 3
Overall Health	78.0%	83.2%
Behavioral Problems	36.0%	45.2%
Mental Health	59.6%	66.9%
Physical Health	91.0%	94.7%
Attentional Problems	36.8%	44.3%
Learning Disorders	29.5%	35.3%
Dental Health	70.0%	76.2%
Developmental Delay	29.2%	37.4%