

PUBLIC SURVEY REPORT

Evaluation of Health Outcomes of Students Using School-Based Health Centers

SUBMITTED TO

THE HEALTH FOUNDATION OF GREATER CINCINNATI

by

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Description: To evaluate how SBHCs contribute to health related quality of life, absenteeism and access to healthcare among elementary-aged students

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Table of Contents

Executive Summary	4
Introduction.....	10
Process and Outcome Evaluation Grid	11
SAMPLE AND DATA COLLECTION.....	16
PARENT AND STUDENT SURVEYS.....	16
Study Sample Populations.....	16
Data Collection.....	16
Longitudinal Sample Attrition Analysis (Year1-Year 2).....	17
SBHC STUDENT MEDICAL ENCOUNTERS	19
Study Sample Population.....	19
Data Collection.....	20
SCHOOL ABSENCE DATA	22
Study Sample Population.....	22
Data Collection.....	22
SCHOOL PERSONNEL SURVEY	23
Study Sample Population.....	23
Data Collection and Sample	23
Summary of Data Sources and Constructed Data Sets	24
RESULTS	26
OUTCOME EVALUATION RESULTS	26
1.0 Health-Related Quality of Life	26
2.0 Absenteeism	43
3.0 Access to Healthcare	48
PROCESS EVALUATION RESULTS.....	63
1.0 Type and Volume of Services Provided	63
1.1 Student Demographics	63
1.2 General Education Information.....	64
1.3 Reasons for Student Visit.....	64
1.4 Diagnosis made during Visit.....	65
1.5 Identification of Students with Chronic conditions	65
1.6 Diagnoses of Students with Chronic conditions	67
1.7 Referrals.....	69
1.8 Type/Name of Medications for Students with Chronic condition	70
1.9 Notification/Disposition.....	71
1.10 Family Contact Information.....	71
1.11 Number of Students Enrolled.....	72
1.12 Number of Student Health Encounters	72
1.13 Number of Students Seen.....	75
1.14 Insurance Status of Students Using SBHC	76
2.0 School Personnel and Parent Rating of Quality of Services	77
2.1 Knowledge of Hours & Perception of Programs Offered by SBHC	78
2.2 Positive and/or Negative Aspects of having an SBHC in School.....	80
2.3 School Personnel’s Opinion on how SBHCs Impact Student Health.....	82
2.4 School Personnel Referral Patterns.....	84

2.5 People Identified as Important to the Success of the SBHC.....	90
2.6 Parent and Student Satisfaction with SBHC.....	90
Parents.....	90
Students.....	91
3.0 Structural Attributes of School Based Health Centers	92
CONCLUSIONS.....	98
LESSONS LEARNED.....	101

APPENDICES

Appendix A: Parent Interview

Appendix B: Student Interview

Appendix C: School Personnel Survey

School-Based Health Centers (SBHC) Evaluation Project The Health Foundation of Greater Cincinnati

Executive Summary

As an opportunity to improve children's health, we developed this study to evaluate the effects of the first cycle of eight school-based health centers (SBHCs) funded by The Health Foundation of Greater Cincinnati on student health-related quality of life, healthcare access and utilization, child health insurance status, and school absenteeism.

STUDY GOALS

The objective of this extensive 3-year longitudinal outcome and process evaluation study, which began school year 2000-2001, is to examine how the presence of an SBHC influences student health-related quality of life, healthcare access and utilization, child health insurance status, and school absence.

Outcome Evaluation

Hypothesis 1) Students in intervention schools will have improved health status (as measured using the PedsQL)

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

Hypothesis 1.2) To determine whether the health status of students in intervention schools is significantly better than the health status of students in comparison schools.

Hypothesis 2) Students in intervention schools will have fewer absences compared to students in comparison schools.

Hypothesis 2.1) The rate of absenteeism declines in the intervention schools over time.

Hypothesis 2.2) The rate of absenteeism among students in intervention schools is significantly better than the rate of absenteeism among students in comparison schools.

Hypothesis 3) Students in intervention schools will have better access to healthcare than students in comparison schools.

Hypothesis 3.1) The percentage of students in the intervention schools who have a medical home improves compared to students in the comparison schools

Hypothesis 3.2) The percentage of students who have had a well-child visit in the prior year increases in the intervention schools compared to students in the comparison schools.

Hypothesis 3.3) The percentage of students with health insurance in intervention schools improves compared to students in comparison schools.

Hypothesis 3.4) The percentage of students in intervention schools with emergency department visits decreases compared to students in comparison schools.

Process Evaluation

In addition to examining the influence an SBHC has on health-related issues, this project also collected information to evaluate SBHC processes including:

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

STUDY POPULATION

The intervention population consisted of all students enrolled at eight selected public schools with SBHCs, their parents, and school staff. In addition, four matched comparison schools without SBHCs were chosen based on rural/urban setting, percentage of student body that was non-white, and percentage of students eligible for free or reduced lunch.

8 Intervention Schools

- 4 Rural, 4 Urban
- 4 Ohio, 4 Kentucky

4 Matched Comparison Schools

- 2 Rural, 2 Urban
- 2 Ohio, 2 Kentucky

In Year 1 (2000-2001), we selected a proportionate random sample of 678 students in grades K-6 and their parents from four of the eight intervention schools. From the comparison schools, we randomly selected an additional 682 students in grades K-6 and their parents. A total of 1,362 children in grades K-6 completed the age appropriate version of the PedsQL4.0 health-related quality of life survey, and 1,360 parents¹ completed the parent version of the PedsQL4.0. We therefore had a final total sample of 1,360 parent-child matched pairs or dyads.

In Year 2 (2001-2002), we were able to re-interview 803 parent-student dyads, for a follow-up response rate of 59.0% for the total longitudinal sample. A longitudinal sample attrition analysis (Year1-Year 2) found the attrition rate among urban schools (49.8%) to be significantly higher than rural schools (33.1%) ($\chi^2 = 39.2, p < .001$). There was not a significant difference in attrition rates between intervention schools (43.4%) and comparison schools (38.6%), or between Ohio schools (39.8%) and Kentucky schools (42.5%). We conducted a supplemental sample for the two urban Ohio schools, increasing the overall response rate for the Year 2 cross-sectional sample size to 975.

In the final year (2002-2003), we successfully re-interviewed 588 of the original Year 1 parent-student dyads for a response rate of 43% of the original Year 1 sample and 73% of the original Year 2 sample. An attrition analysis from Year 2 to Year 3 revealed no significant differences among those we successfully followed up with and those we did not. Including the supplemental interviews from Year 2, the Year 3 cross-sectional sample was 673 parent-student dyads for a response of 69% of the total Year 2 sample.

STUDY DATA

Data Collection

- Parent Phone Interview – We conducted a parent interview by phone every spring to gather health information about the parent and student from the parents’ perspective (including the parent version of the PedsQL4.0) and to request parental consent to interview the child.
- Student Interview – We administered the age appropriate PedsQL4.0 and supplemental questions each spring. SBHC Evaluation Project Staff visited each school to conduct face-to-face interviews with students.
- School Absence Data – At the conclusion of each school year, the eight intervention schools and four comparison schools provided electronic data on both student enrollment and absences for all students. Data files include information on basic student demographics, enrollment and withdrawal dates, dates of absences, and the type of absence (i.e., illness, tardy, etc.). Appropriate full-day absences were coded for analysis. Acquisition of these data from schools in Year 1 caused significant delays in analysis.
- SBHC Student Encounter Data – The eight SBHCs were required to load all student SBHC enrollment forms and health encounters into a web-based healthcare system, known as Welligent, for all students in grades K-8. This database contains student demographics, chronic conditions, referral sources, presenting health problems, visit diagnoses, medications, visit outcomes, and referral information.
- School Personnel Survey – In Year 1, SBHC personnel administered school personnel surveys to school staff who had contact with children in grades K-8 in their schools. Due to an extremely poor response rate, SBHC

¹ We were unable to match two students with parent data due to ID numbering problems.

Evaluation Project Staff assumed this role. We distributed surveys directly to teachers and school staff and response rates were greatly improved. The surveys addressed services offered by the SBHCs, overall perceptions of student health, and the SBHCs' roles in meeting the needs of both the staff and students.

STUDY RESULTS: Outcome Evaluation

Health-Related Quality of Life (HRQL) (as measured by the PedsQL4.0 scale: 0=lowest, to 100=highest)

Student Self-Reported Health –

Intervention and comparison students scored lower than the “healthy children” reference group observed by Dr. James Varni (2001, 2003).

Over three years, the self-rating for SBHC users (i.e., students in the intervention schools who used SBHC services) increased while the self-rating for the SBHC nonusers (i.e., students in the intervention schools who did not use SBHC services) and the comparison students decreased.

Older students reported significantly higher total HRQL than younger students. With every 1-year increase in age, children reported about ½-point higher physical HRQL scores and about ¾-point higher psychosocial HRQLs.

Female students and students with public health insurance reported lower total HRQL scores.

Parent Perception of Students' Health –

Parents rated students healthier than students rated themselves across all three years on both the physical and psychosocial scales.

Parents' reported student HRQL significantly decreased over time for all groups.

Parents in rural schools reported their children's total HRQL higher than parents in urban schools.

Parent perception of student overall health and SBHC services offered steadily increased every year.

Parents reported higher HRQL scores for their female children than male children.

Parents with children with public or no health insurance reported their students' total HRQL to be significantly lower than parents whose children had private medical insurance.

Parents with children who had chronic conditions reported their students' total HRQL to be significantly lower than parents with children with no chronic conditions.

In addition, when parents were asked to rate the overall health of their children, parents of SBHC users rated their children's health significantly lower than parents of both SBHC nonusers and comparison students.

Absenteeism

Cross-sectional yearly school data analysis of the absence rate among schools

SBHC nonusers had significantly fewer full-day absences than SBHC users and this difference stayed consistent across the three years.

In Year 3, SBHC users had significantly higher absence rates than students in comparison schools.

Students in rural schools and in Kentucky schools had significantly fewer absences on average.

Older students had significantly more absences than younger students.

The number of SBHC users who returned to class after an SBHC visit steadily increased, but the SBHCs had no substantial impact on full-day absences. This may suggest that SBHCs have a greater impact on keeping kids in school once they are already there by returning them to class than on reducing full-day absenteeism due to more severe illnesses. Alternatively, the convergence among schools may be pointing towards “regression towards the mean” with random yearly variation across schools. Having only three years of data makes this difficult to assess.

Longitudinal sample of students who attended the schools over Years 1, 2 and 3 (N = 7,813)

SBHC users had significantly more full-day absences overall compared to comparison students, but not more than SBHC nonusers, across the three years.

SBHC users with public insurance or no insurance, or have asthma or ADHD, showed a steady decline in absences over the three years.

Students in urban and in Ohio schools, students with public health insurance, and students with asthma had significantly more absences on average.

Students in rural schools and in Kentucky schools had significantly fewer absences on average than urban or Ohio students.

Older students had significantly more absences than younger students.

Female students had significantly fewer absences than male students.

Access to Healthcare

Well-Child, Sick-child and ED Services

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 comparison students.

Well-child visits among SBHC users and nonusers increased compared to comparison students.

Students in Kentucky and in urban schools were significantly more likely to have had well-child visits.

All three groups (SBHC users and nonusers and comparison students) showed a significant decline in visits for sick-child care over the three years.

Students with asthma, ADHD, or other chronic conditions perceived greater problems accessing care. They were also significantly more likely to seek sick-child care.

Older students compared to younger, and Blacks compared to Whites, were less likely to seek sick-child care.

Hospital emergency department (ED) utilization over time showed no significant differences between the three groups.

Male students, students with public health insurance, and students with asthma, ADHD, or other chronic conditions were significantly more likely to use the ED.

Medical Home and Insurance Status

In Year 3, SBHC users were less likely than the comparison group to list an ED physician as their medical home.

The majority of students who listed an SBHC as their medical home had no insurance, public or private.

There was no difference in medical provider for students with and without a chronic condition.

SBHC users and comparison students did not differ based on insurance coverage. However, SBHC users were more likely than SBHC nonusers to have public or no health insurance.

Students with no health insurance were significantly more likely to list the ED as their source of medical care.

Students with no health insurance were less likely to seek sick-child care compared to those with private health insurance or public health insurance.

Rural students were more likely to have insurance coverage compared to urban students.

STUDY RESULTS: Process Evaluation

Student Health Encounters, Welligent Data

Enrollment, Utilization, and Insurance Status

About 60% of the total number of students enrolled in the eight intervention schools were enrolled in an SBHC.

The total number of student visits to the SBHCs steadily increased across the three years (3,707 to 5,080 to 6,354).

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 from Year 1 to Years 2 and 3.

Older students and females had more SBHC visits.

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).

Among students with no health insurance, the percentage of visits decreased slightly over the three years.

Presenting health problem and Referrals

Students generally presented for physical health issues such as routine/well-child care, medical exams (sinus, rashes, injuries), and procedures (physicals, immunizations).

Family and parent referrals to the SBHCs increased both in absolute terms and as a percentage of visits over the three years, from 18% in Year 1 to 31% in Year 3, suggesting higher parental knowledge of SBHC services.

Referrals by teachers declined steadily over the three years as a percentage of total referrals (53% in Year 1 to 30% in Year 3).

Top Diagnoses and Chronic Health Condition Data

The top International Classification of Disease, Ninth Revision (ICD-9) diagnoses in Year 3 were follow-up exams (V67.9), ADHD (314.01), strep (034.00), unspecified disturbance of conduct (312.90), and well-child checks (V20.2). The most prevalent ICD-9 diagnostic categories were Health Supervision, Mental Disorder, and Respiratory.

Over the three years of the study, students generally presented for physical health issues. However, there was a significant increase in reported psychosocial visits (32 to 1,415) indicating SBHCs may be starting to expand their roles beyond the typical physical health aspects associated with SBHCs in elementary and middle schools.

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 made up 3.65% and students with ADHD made up 4.28% of SBHC medical encounters.

Notification/Disposition of SBHC Encounters

Almost 75% of all student SBHC encounters resulted in the student being returned to class. This rate steadily increased over the three years, even considering Year 3 saw a great increase of student flu and strep diagnoses that generally require student dismissal.

For students not seen for a health check-up, there was an increase from 79.4% to 83% in the number of students returned to class after an SBHC visit.

Parent and Student Surveys

An analysis of differences in satisfaction with the child's primary care provider revealed no significant differences between parents of students in intervention schools and comparison schools. Nor were there any differences between parents of students in intervention schools who were not enrolled in, enrolled in, or who used the SBHCs.

Among children using the SBHCs, around 90% reported feeling comfortable and most reported that they would use it again if they were sick.

School Personnel Survey

In the first year, SBHC personnel distributed and collected the school personnel surveys. However, due to an extremely poor response rate, SBHC Evaluation Project Staff assumed this role with a more direct approach that greatly improved the response rates. The Year 3 sample size was 423 surveys for a return rate of 78.3%.

Across all three years, over 94% of teachers reported that they liked having an SBHC and 86% reported that an SBHC made their jobs easier.

School personnel perceptions of student overall health and services offered by the SBHCs steadily increased every year. Personnel consistently rated programs and services as "Excellent" or "Very Good."

Over the last year, the percentage of staff knowing their SBHC hours increased from 63% to 71%. The most positive aspects of having an SBHC as reported by the staff were increased attendance, convenience for students and staff, teachers can be more productive not playing nurse, and students can receive screenings, immunizations, and well-child checks.

School personnel consistently rated the SBHCs' effect on student health status as very positive or positive. They also indicated the most influence to be on physical, dental, and mental health.

Physical health problems remained the most likely reason personnel sent a child to the SBHC (90%), with personnel referring an average of four children per week to the centers for a physical health problem. All other health problems were referred less than once per week.

CONCLUSIONS

While the overall strength of most of the relationships was modest and many were not significant, the findings were generally in the direction we hypothesized. The collective interpretation of the overall trending of several outcomes does provide some evidence that SBHCs do appear to be having some influence on student health, absence rates, and access to healthcare. Moreover, SBHCs appear to have more influence on those children who can most benefit from it—those that generally have impeded access to care. This includes two central groups: students that are socio-economically disadvantaged and have no or public health insurance and students in rural schools. For example, urban students with public or no insurance used the SBHCs at a rate of about 70%, compared to only 53% of students with private health insurance (e.g., Table 24). Interestingly, we did not see a difference in health insurance status and utilization in rural schools due, we surmise, to an overall limit in accessibility to health services in rural areas.

School-Based Health Centers Evaluation Project

INTRODUCTION

School-Based Health Centers (SBHCs) provide an opportunity to improve children's health and a possible solution to problems of access to primary care for school-aged children. The Health Foundation of Greater Cincinnati funded eight SBHCs in seven different school districts in its first funding cycle for SBHCs.

The objective of this study was to examine how the presence of an SBHC in these eight schools influenced student health-related quality of life, healthcare access and utilization, child health insurance status, and school absences. We collected five data sources in this study across the three years to examine the effect of SBHCs on these health issues. These data sources included:

- Parent survey
- Child survey
- SBHC visit encounters
- School student demographic and absence records
- School personnel survey

SAMPLE AND DATA COLLECTION

PARENT AND STUDENT SURVEYS

STUDY SAMPLE POPULATIONS

The study population consisted of all students enrolled at eight selected public schools, their parents, and school staff. We calculated the sample size for the first year for both intervention and comparison groups based on an annual estimated rate of attrition of 30% over the three-year project to maintain sufficient statistical power to assess differences. We calculated the starting sample size for each group as $N = 675$, which was weighted by size of the intervention schools.

In Year 1 (2000-2001), we selected a proportionate random sample of 678 students in grades K-6 and their parents from four of the eight intervention schools (i.e., schools with an SBHC). We selected the four intervention schools to provide a cross-section of urban and rural schools across both Ohio and Kentucky.

We chose four matched comparison schools (i.e., schools without an SBHC) based on rural or urban setting, percentage of non-white student body, and percentage of students eligible for free or reduced lunch. We randomly selected another 682 students in grades K-6 and their parents from these comparison schools.

DATA COLLECTION

Once we compiled the sample frame of eligible students for each school, we randomly selected parents in Year 1. The Institute for Policy Research at the University of Cincinnati (see Appendix A) pre-tested and administered the parent survey by telephone. The number of parents per school was stratified based on the relative number of students in each school. For Year 1, a total of 1,599 parents completed an interview. Among these, 164 legal guardians did not grant us permission to interview their children. In addition, someone other than the child's legal guardian completed 25 surveys; we were unable to interview 47 children whose parents had given permission because of withdrawal, suspensions, repeated absences, etc.; and one survey was lost.

We administered the age appropriate version of the PedsQL4.0 to assess health-related quality of life to the 1,362 students who were available and whose parents consented to their children being interviewed. The 23-item PedsQL 4.0 is a field-tested tool designed specifically for use with community and school populations (www.pedsql.org). It uses multidimensional generic core scales to provide a quick health-related quality of life measurement. The SBHC Evaluation Project Staff administered the student surveys (see Appendix B) in the schools, yielding a final total sample of 1,360 parent-child matched pairs or dyads.

In Year 2 (2001-2002), we were able to re-interview 803 parent-student dyads for a follow up response rate for the total longitudinal sample of 59.0% (see Table 1). We conducted a supplemental sample for each urban Ohio school to increase the overall response for the Year 2 cross-sectional sample size to 975. In the final year (2002-2003), we successfully re-interviewed 588 of the original Year 1 parent-student dyads for a response rate of 43% of the original Year 1 sample and 73% of the Year 2 original sample. Therefore, the 588 students constitute the longitudinal study sample. When discussing results from individual questions on the parent and child surveys, this N may change because some respondents may not have answered all questions.

Table 1: Number of Students Interviewed in Year 1, Year 2, and Year 3 by School

Intervention Schools	Students	Comparison Schools	Students
Year 1 Total	678 (49.9%)		682 (50.1%)
Year 2 Total Longitudinal Sample	384 (48%)		418 (52%)
Supplement	95	Supplement	78
Year 2 Total Sample	479 (49.1%)		496 (50.9%)
Year 3 Total Longitudinal Sample	296 (50.3%)		292 (49.7%)
Supplement	47	Supplement	38
Year 3 Total Sample	343 (51%)		330 (49%)

LONGITUDINAL SAMPLE ATTRITION ANALYSIS

We conducted attrition analyses between the intervention and comparison groups and within each of the eight survey schools to assess whether the follow-up sample differed in any way from those that were not followed up in the second year. The differential attrition between schools was significant, with urban schools having the highest attrition rates. Rural schools had the lowest attrition rates.

Table 2 presents the socio-demographic characteristics for the full survey sample across all three years. The attrition in follow-up from Year 1 to Year 2 resulted in a significant loss of Black students, attributable mainly to the loss of students in two inner-city schools, one intervention and one comparison. An additional consequence of this loss was a significant attrition in lower-income respondents. To partially address this large loss in these two schools, we re-sampled the schools in Year 2 to add a supplementary sample for Years 2 and 3, which boosted both the percentage of Black respondents and lowered the overall income range. Although we estimated the size of the initial sample based on power analyses that assumed a 30% yearly reduction in the sample, the attrition rate was much higher.

Table 2: Survey Sample Socio-Demographic Characteristics

	Original Sample Data Set			Original Sample Plus Supplementary Sample Data Set	
	Year 1	Year 2	Year 3	Year 2	Year 3
SURVEY Group N	1359	801	588	973	672
Intervention N	678(49.9%)	384(47.9%)	*296(50.3%)	478(49.1%)	342(50.9%)
Comparison N	681(50.1%)	417(52.1%)	*302(51.4%)	495(50.9%)	330(49.1%)
Gender:			*		*
Male	726(53.4%)	429(53.6%)	302(51.4%)	536(55.1%)	353(52.5%)
Female	633(46.6%)	372(46.4%)	286(48.6%)	437(44.9%)	319(47.5%)
Race:		*	*		*
Black	249(18.3%)	117(14.6%)	73(12.4%)	281(28.9%)	155(23.1%)
White	1059(77.9%)	663(82.8%)	500(85.0%)	665(68.4%)	500(74.4%)
Other	51(3.8%)	21(2.6%)	15(2.6%)	27(2.7%)	17(2.5%)
Age: mean(sd)	8.41(2.23)	9.41(2.18)	10.4(2.22)	9.45(2.17)	10.42(2.20)
Income: mean(sd)¹	6.87(3.80)	*7.76(3.93)	*8.03(3.92)	7.26(3.96)	7.66(3.99)
Region:					
Urban	642(47.2%)	322(40.2%)	225(38.3%)	494(50.8%)	309(46.0%)
Rural	717(52.8%)	479(59.8%)	363(61.7%)	479(49.2%)	363(54.0%)
State:					
Ohio	761(56.0%)	457(57.1%)	343(58.3%)	629(64.7%)	427(63.5%)
Kentucky	598(44.0%)	344(42.9%)	245(41.7%)	344(35.3%)	245(36.5%)
Absences: mean(sd)	10.01(10.44)	7.08(7.46)	8.54(8.18)	7.52(7.93)	8.49(8.10)
SBHC Enrollment²	425/678(62.7%)	251/384(65.4%)	215/296(72.6%)	298/478(62.3%)	257/342(75.2%)
SBHC Utilized²	248/678(36.6%)	132/384(34.4%)	129/296(43.6%)	166/478(34.7%)	159/342(46.5%)
SBHC Utilization Rate^{2,3}	1.54(1.20)	1.83(1.54)	2.12(2.63)	1.88(1.55)	2.50(3.34)
Chronic condition⁴					
Asthma	213(15.7%)	127(15.9%)	97(16.5%)	X	X
ADHD/ADD	124(9.1%)	72(9.0%)	43(7.3%)	X	X
Learning Disability	112(8.2%)	63(7.9%)	43(7.1%)	X	X
Other⁵	146(10.7%)	79(9.9%)	55(9.4%)	X	X
Insurance Status:					
Public	392(28.8%)	184(23.0%)	138(23.5%)	281(28.9%)	187(27.8%)
Private	868(63.9%)	568(70.9%)	432(73.5)	633(65.1%)	464(69.1%)
None	88(6.5%)	45(5.6%)	18(3.0%)	55(5.6%)	21(3.1%)
Unknown	11(0.8%)	4(0.5%)	0	4(0.4%)	0

* Statistically significant difference in attrition between waves.

¹ The income variable was a 15-category variable to indicate 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.

² Enrollment and utilization numbers are based on the total population of students from Intervention school districts only.

³ SBHC utilization rate is the number of visits per student who used SBHC services.

⁴ Presence of a chronic condition is based on the Year 1 survey only, which asked about lifetime prevalence. The surveys from Years 2 and 3 focused on previous 12-month incidence and are not reported in this table.

⁵ Other chronic conditions include developmental delay or mental retardation, sickle cell, seizure disorders or epilepsy, headaches, and diabetes.

From Year 1 to Year 2, there was no significant difference in attrition rates between intervention schools (43.4%) and comparison schools (38.6%), nor was there was any difference in attrition rates between Ohio (39.8%) and Kentucky (42.5%). The attrition rate among urban schools (49.8%) was significantly higher than rural schools (33.1%) ($x^2 = 39.2, p < .001$). From Year 2 to Year 3, the attrition rate between the intervention schools (22.9%) and comparison schools (30.0%) was significant ($x^2 = 5.20, p = 0.02$). There was no significant difference between rural (24.2%) and urban (30.0%) or between Ohio (24.9%) and Kentucky (28.8%).

The attrition rate between boys (40.9% between Years 1 and 2 and 29.6% between Years 2 and 3) and girls (41.0%; 23.3%) was nonsignificant between Years 1 and 2 but was significant between Years 2 and 3. Differential attrition was significant across race due to the higher rates in the two urban schools whose students are mainly Black for both Year 1 to Year 2 and Year 2 to Year 3 (Year 1: $\chi^2 = 30.4$, $p < .001$; Year 2: $\chi^2 = 17.33$, $p = 0.008$).

From Year 1 to Year 2, the attrition rate did not differ across working status of parents. However, parent-child dyads were significantly more likely be followed up if parents were married compared to other family forms ($\chi^2 = 48.9$, $p < .001$), if they had higher levels of education ($\chi^2 = 21.5$, $p < .001$) and if they had higher household income ($\chi^2 = 77.1$, $p < .001$). From Year 2 to Year 3, there were no significant differences across any parental characteristics except income ($\chi^2 = 25.9$, $p = 0.03$).

Within each school, there were very few significant differences between those that were successfully followed up versus those that were not. Among schools with the highest rates of attrition, the only significant difference was for household income for School C ($\chi^2 = 25.1$, $p < .05$).

Finally, we examined whether there was differential attrition across the dependent variables of the study. Comparing intervention to comparison schools, there were no significant differences in health status between those who were successfully followed up in Year 2 or 3 to those who were not re-interviewed. This null finding was also consistent across Ohio and Kentucky across all three years. Across urban and rural schools, all differences were nonsignificant except parent physical health rating of their child between Years 1 and 2. For this specific rating, students successfully followed up in rural schools were rated higher by their parents than students in urban schools.

These results provide no evidence of substantial differences between the sample that was successfully followed up compared to the sample that was not on the outcome variables of interest. As such, we did not correct for any selection bias due to differential attrition rates in the analysis.

SBHC Student Medical Encounters

STUDY SAMPLE POPULATION

The target population for this component of the analysis includes all students in grades K-8 at all eight intervention schools. All SBHCs were required to track all medical encounters using an electronic, web-linked tracking system called Welligent, a program developed and maintained by the health informatics researchers at the Center for Pediatric Research in Norfolk, Virginia. This system tracks a variety of aspects of the student population, medical encounters, diagnoses, referral data, etc. On June 17, 2002, Welligent released version 4.0, a completely revamped version of their web-linked tracking system. All Year 3 health encounter data were collected using the new version.

There are two units of analysis possible using Welligent data. First, analyses can be conducted at the individual level to assess, for example, insurance status, chronic health conditions, and annual number of SBHC visits for a student. Second, each medical encounter can also be examined to assess patterns of use, referrals, and outcomes at the visit level.

DATA COLLECTION

SBHCs in the eight intervention schools collected student health encounter data (e.g., diagnosis, outcome, referral information). The intervention schools' technology departments were required to send yearly demographic information to Welligent on the student population. SBHC staff entered health encounter data for students who visited the SBHCs on a daily or weekly batching basis. Evaluation Project staff could then extract data from the central Welligent repository.

We set the parameters set on this study at grades K-8, so the final, cleaned student health encounter data set includes only students aged 5-15. This removes all high school and preschool students who may have had access to the SBHCs in some schools. It may also inadvertently remove a small number of children who may be severely delayed in their schooling.

Over the first two years of operation, there were five issues that delayed analysis of student health encounter data:

- 1) The SBHC Evaluation Project staff underestimated the length of time it would take the schools and medical partners to complete their contracts with Welligent. No school was permitted to load encounter data on the Welligent server until its specific contract was signed. This problem was not within the direct control of the Evaluation Project staff, although we made many attempts to facilitate the process. We had initially anticipated the SBHCs would begin submitting Welligent data in August 2000, with the first quarterly report being submitted in January 2001. The last school district to finalize its Welligent contract did so in April 2002, almost two years after the SBHC there opened. As such, this SBHC was not able to load encounter data until after April 2002. All previous encounters were back entered for the complete three-year data set.
- 2) There were several data entry errors that required cleaning². The Evaluation Project staff were not authorized to make corrections to on-line individual student records due to confidentiality concerns of the SBHCs. Therefore, we audited data for Years 1 and 2 in aggregate form. We then notified each SBHC of the corrections it was required to make to individual records in their existing databases. The SBHC Evaluation Project staff cleaned data and corrected errors on the Year 2 and Year 3 extracts for analysis purposes. These corrections are available in the datasets in the Health Data Archive and on OASIS. However, we did not transfer these corrections to the web-based Welligent datasets.
- 3) Compliance by school districts' Information Technology departments around sending yearly demographic information varied considerably. For Year 2, only four of the eight intervention schools updated their demographic files. This prevents any analysis across grade because demographic information was not current for Year 2.
- 4) Data entry compliance also greatly varied across schools. Several schools were severely behind on data entry. The Health Foundation addressed this problem in January 2002. The Health Foundation informed noncompliant SBHCs that any additional Health Foundation funding (i.e., challenge grants) was contingent upon full compliance with student encounter data entry by June 30, 2002 (end of Year 2). By that deadline, all eight intervention schools were compliant and up-to-date with Welligent data entry for the first two years. We cleaned data through all of July and most of August, making corrections to miss-entered ICD-9 codes, etc. In Year 3, to ensure that all schools remained compliant and current in their data entry, we required the SBHCs to generate a monthly student health encounter report from Welligent and fax it to the Evaluation Project staff on the first Friday of the following month.
- 5) Throughout Years 1 and 2, SBHC personnel were confused about what types of data to enter, where data should be entered (i.e., in what Welligent module), and how data should be entered. The SBHC Evaluation Project personnel did continuous training, including creating training and data entry manuals to assist (see Appendices D and E). This confusion meant the Evaluation Project staff had to do further

² Cleaning included recategorization, data verification, checking of individual records and health encounters, classifying illnesses into ICD-9 categories, etc.

extensive cleaning beyond that identified in #2 above in the Welligent data downloads to prepare for analysis. We rigorously cleaned and verified the data received from all SBHCs to ensure that all encounters were categorized appropriately and to ensure consistency across both year and school district, resulting in a complete and clean data set for analysis. These corrections are available in the datasets in the Health Data Archive and on OASIS. We did not send these changes back to SBHCs for updating their online files, and as a result the web-based datasets do not include these changes.

The new version of Welligent added a specific field to indicate those students enrolled in the SBHC. In Year 3, we gave detailed instructions of how to use this field. Once the updated school enrollment files were uploaded to Welligent, the schools were to update this field for all three years.

Due to the varied compliance of the various school Information Technology departments in updating yearly student records, it is impossible to determine how many students were enrolled in the SBHCs. The initial numbers provided by the SBHCs only represented the number of consent forms received at the start of each year. This underestimated the total because children enrolled with both written and verbal consent of their parents throughout the year on a post hoc basis. The Welligent database includes all students from both Years 1 and 2, retaining the number of children who left the schools in Year 2 and also adding the number of new students who enrolled in Year 2 but who were not enrolled in Year 1. In an attempt to estimate the number of those enrolled in the SBHC, we counted the number of children who had office visits. Then, we added the number of additional children who had insurance information entered into Welligent but who had no office visit. We used other variables, which were only entered in the Welligent database if the child was enrolled in the SBHC, in the event that insurance information was missing to increase the estimate in the same way (including physician ID, chronic conditions, medications, etc.). Each successive addition yielded diminishing increases in the total number enrolled. The result of this iterative process is the probable loss of some children who were enrolled and who lacked entries in any of these fields; however, the number missing is likely to be small. Therefore, we define a student as being enrolled in the SBHC if he or she had data entered in any of the enrollment related variables.

School Absence Data

STUDY SAMPLE POPULATION

The target population for this component of the analysis included all students in grades K-8 enrolled in the eight intervention schools and the four comparison schools.

In addition to looking at the total student body at each of these 12 schools, we were able to link individual student absence data to the parent and student surveys. This permits a more detailed comparison of outcomes between intervention and comparison schools over time.

DATA COLLECTION

At the conclusion of each school year, schools were asked to provide electronic data on both student enrollment and absences. Initial requests included basic student demographics, school enrollment and withdrawal dates, dates of absences, and types of absences (i.e., illness, tardy, etc.).

In the first year, we included students in grades K-6 in the data request. Collection of these data was challenging in ways that threaten their validity. First, not all schools could provide electronic files, making data collection and entry very time consuming and tedious. Second, 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. We verified, cleaned, and coded data in order to provide the most accurate summary of the total student body for all 12 schools. We verified data directly with the school whenever possible. One comparison school district was at odds with the agreed upon contract and refused to provide data on the entire student body. Instead, the school would only release data for those students who had been directly surveyed by the SBHC Evaluation staff. This created a problem with the conformity of the absence data for analysis and comparisons.

In Year 2, we collected data for grades K-8 for all schools. To avoid many of the data problems in the first year, we requested raw absence files to allow us to code and collapse data to ensure greater consistency across schools as well as to attempt to maintain consistency from Year 1. The delays for receipt of the data for Year 2 were much shorter than Year 1. Moreover, all schools submitted electronic files in Year 2; however, data accuracy and formatting were still issues. Accuracy of absence data from schools was still somewhat problematic because some schools combine three tardies to equal one absence on the official school record. We were unable to identify these cases. Second, some schools provided a code for unverified absences, which were difficult to categorize. Third, one school initially sent an incomplete file adding to delays in cleaning, merging, and analysis. We had to subsequently obtain this file from the archives.

In Years 2 and 3, we were able to obtain the complete data sets (K-8) from all 12 school districts. Our enrollment numbers increased and this also permitted more accurate comparisons.

In both Years 2 and 3, student identification numbers from some schools changed. This created problems in linking data over years and linking school absence data to the parent and student surveys. In both Years 2 and 3, we conducted a thorough inspection of all Year 1, 2, and 3 student identification numbers across all absence records and recoded when necessary for consistency. Any changes in the student identification numbers were verified that it was in fact the same student using a variety of techniques including matching birth dates, gender, etc. Any changes in the student absence data set also required us to make changes in all source data files including Year 1, 2, and 3 parent and student surveys and Welligent data files to ensure data integrity when data sets were merged for future analysis.

School Personnel Survey

STUDY SAMPLE POPULATION

The target population of teachers and staff in this analysis included all teachers and school staff in the eight intervention schools who had contact with children in grades K-8.

DATA COLLECTION AND SAMPLE

The school personnel survey included questions that addressed services offered by the SBHCs as well as questions related to overall perception of student health and the SBHCs role in meeting the needs of both the staff and students (see Appendix C). The Year 3 survey was identical to the Year 2 survey, which was revised and shortened from the Year 1 survey in an effort to improve teacher response rates (see Table 3) and gather additional and more specific information about various student health dimensions and teacher referrals to the SBHCs. Year 2 and 3 surveys also included a set of additional questions that asked teachers about their perceptions of the level of student connectedness to their schools.

Table 3: A Comparison of Year 1, 2, and 3 Personnel Survey Response Rates by School

	Year 1 ¹		Year 2 ²		Year 3	
	Number Returned	Response Rate (%)	Number Returned	Response Rate (%)	Number Returned	Response Rate*
School A	17	27.0	37	92.5	23	59.0
School B	39	41.0	80	66.7	99	82.5
School C	50	87.7	47	94.0	42	84.0
School D	48	53.9	44	58.7	29	87.9
School E	29	70.7	23	100.0	23	92.0
School F	125	69.4	125	69.1	115	71.9
School G	29	78.4	35	87.5	37	92.5
School H	42	64.6	70	95.9	55	75.3
Total	379	64.7%	461	76.6%	423	78.3%

¹ We based the Year 1 response rate on the final estimated response rate in Year 1. We based the denominator used to calculate this response rate on a complex set of assumptions due to administration difficulties. In fact, we presented a series of possible response rates based upon various assumptions. One way to test the validity of these various assumptions used in the Year 1 calculation was to use the Year 2 denominator to recalculate the Year 1 response rate. The Year 2 denominator provided a more accurate reflection of the total possible number of teachers and staff eligible to complete the surveys because the SBHC Evaluation Project staff maintained a high degree of control during the Year 2 survey. Using this denominator gives a response rate of 63.0%, which is very consistent with the imputed response rate originally calculated.

² In Year 2, we sent five surveys did not contain the first two pages of the survey, effectively reducing the total Year 2 sample size to 456.

Table 4 presents the characteristics of school personnel who responded to the survey in each of the three years. Teachers comprised 80% (N = 305), 79% (N = 358), and 75% (318) of all respondents to the survey in Years 1, 2, and 3 respectively. Teachers who responded in Years 2 and 3 reported fewer years of teaching overall and fewer years working at the specific school compared to teachers responding in Year 1. Other staff (instructional aides, secretary or office staff, counselor, etc.) who responded in Years 2 and 3 also reported being in their current staff position and at the specific school for a shorter period compared to those in Year 1.

Table 4: School Personnel Survey Characteristics

	Year 1	Year 2	Year 3
N (Response rate)	379(64.7%)	461(76.6%)	423(78.3%)
Region:			
Urban	221(58%)	232(50%)	203(48%)
Rural	158(42%)	229(50%)	220(52%)
State:			
Ohio	210(55%)	265(57%)	260(61%)
Kentucky	169(45%)	196(43%)	163(39%)
Position Type:			
Teacher	305(80%)	358(78%)	318(75%)
Instructional Aide	17(4%)	23(5%)	24(6%)
Secretary or Office Staff	14(4%)	21(5%)	18(4%)
Counselor	9(2%)	8(2%)	12(3%)
Other	33(9%)	43(9%)	43(10%)
Average Years in Position:			
Teacher	13.7	10.4	11.0
Non-Teacher	7.2	6.0	6.0
Average Years at Current School:			
	9.8	7.7	7.9
Grade Taught:			
Preschool-2 nd	220(58%)	120(26%)	93(22%)
3 rd -5 th	218(58%)	103(22%)	96(23%)
6 th -8 th	199(53%)	88(19%)	93(22%)
9 th -12 th	73(19%)	9(2%)	0(0%)

Summary of Data Sources and Constructed Data Sets

We constructed four datasets that linked various data sources for current and future analyses (see Table 5):

Health survey dataset: includes all three years of data from the parent survey, the student survey, school absence data, and SBHC Welligent encounter data. The unit of analysis for this dataset is the individual student³ and includes only those from the four intervention schools and four comparison schools who were randomly selected to participate in the survey.

School 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 the intervention schools who were enrolled in the SBHCs across all three years. The unit of analysis is the individual student.⁴

Health encounter dataset: contains all student demographic data and SBHC enrollment and encounter data for all eight intervention schools 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. The unit of analysis is the individual school staff member.

Table 5: Data Set Construction: Population, Unit of Analysis, and Data Source Linkages

Data Source	Population			Constructed Data Sets [Unit of Analysis]			
	Intervention User	Non	Comparison	Health Survey [Individual]	School [Individual]	Health Encounter [Visit]	Personnel Survey [Individual]
Three-Year Longitudinal Parent Survey	X	X	X	X			
Three-Year Longitudinal Student Survey	X	X	X	X			
Annual Student Absence Records	X	X	X	X	X		
SBHC Student Health Encounters	X			X	X	X	
School Personnel Surveys	X	X					X
	Year 1: n=			1,359	11,873	3,707	379
	Year 2: n=			801 (973) ¹	16,346	5,080	461
	Year 3: n=			588 (672)	17,137	6,354	423
	Longitudinal Yrs 1-3:n=			588 (672)	7,813	NA	NA

¹ The number in parentheses is the N of the supplemental sample drawn in Years 2 and 3.

³ Since the unit of analysis for the health survey and school datasets was the individual, it was necessary to collapse individual Welligent encounters into aggregate total numbers per individual per year as well as into groups of health problems for each individual (e.g., upper respiratory, otitis media, gastro-intestinal complaints, etc.).

⁴ Since the unit of analysis for the health survey and school datasets was the individual, it was necessary to collapse individual *Welligent* encounters into aggregate total numbers per individual per year as well as into groups of health problems for each individual (e.g., upper respiratory, otitis media, gastro-intestinal complaints, etc.).

RESULTS

Outcome Evaluation Results

HEALTH-RELATED QUALITY OF LIFE

Hypothesis 1) Students in intervention schools will have improved health status (as measured using the PedsQL)

The first central hypothesis that the SBHC Evaluation Project evaluated was the effect of the presence of an SBHC on the health-related quality of life (HRQL) of students. We made two comparisons to examine this question:

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

Hypothesis 1.2) To determine whether the health status of students in intervention schools is significantly better than the health status of students in comparison schools.

The PedsQL4.0 (Varni, 2003) provides a measure of students' overall health-related quality of life (HRQL) from 0 (being the lowest) to 100 (being the highest). Total HRQL in the PedsQL can be decomposed into two dimensions: physical and psychosocial. Psychosocial can be further decomposed into three sub-dimensions: emotion, social, and school. Excellent internal consistency reliability exists for the full 23-item scale, with $\alpha = 0.88$ for child self-report and $\alpha = 0.90$ for the parent proxy-report (www.pedsq.org). As a reference, Varni (2003) reported for his groups of surveyed children a total PedsQL score of 83.91 (child report) and 82.29 (parent report) for "healthy children," and a score of 74.16 (child report) and 73.14 (parent report) for "chronically ill children." In Year 1, we found that the reliability coefficients for the scales for both students and parents were quite high and consistent with Varni (2003), ranging from $\alpha = .72$ (physical scale of the child report) to $\alpha = .88$ (total scale for both the student and parent reports).

With respect to clinical significance, Varni (2003) indicates that a difference in score for child and parent reports was 4.4 points and 4.5 points respectively.

Table 6: Student and Parent Report of Student Health-Related Quality of Life (PedsQL Scores) for Years 1, 2, and 3¹.

Health Dimension	Year 1		Year 2		Year 3	
	Intervention ²	Comparison ³	Intervention ²	Comparison ³	Intervention ²	Comparison ³
<u>Student Self Report</u>						
Physical	82.1***	84.9	83.2	83.4	84.7	83.9
Psychosocial	72.0***	74.6	71.7	71.9	73.9	73.3
Total HRQL	75.5***	78.2	75.7	75.8	77.7	77.0
<u>Parent Report</u>						
Physical	89.9	90.0	88.5	89.5	88.6	89.4
Psychosocial	82.6	81.7	81.2	80.8	80.2	81.4
Total HRQL	85.2	84.6	83.8	83.8	83.1	84.2

¹ Data are from parent and student surveys. Analysis was done on longitudinal sample.

² Intervention schools sample size: Year 1 N = 296, Year 2 N = 296, Year 3 N = 296

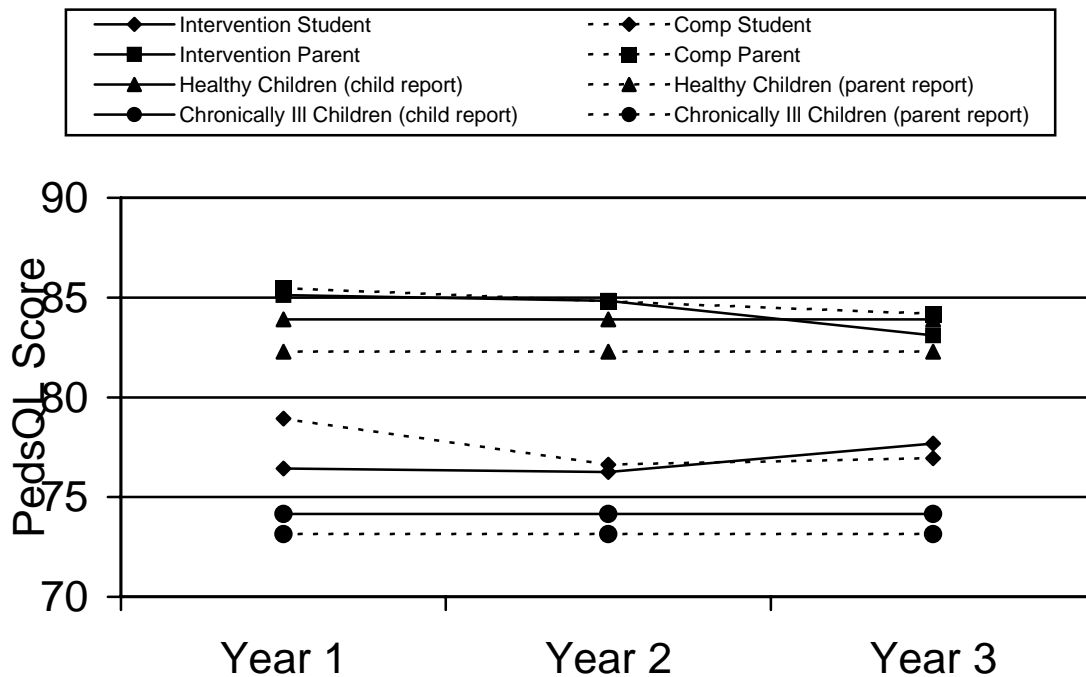
³ Comparison schools sample size: Year 1 N = 291, Year 2 N = 291, Year 3 N = 291

*** p < .001.

As Table 6 indicates, student-reported PedsQL scores among intervention schools increased slightly, indicating a slight improvement in overall student health, while student-reported scores among comparison schools decreased. Results were consistent for both physical and psychosocial health dimensions.

Figure 1 shows these results graphically. Results were consistent for both physical and psychosocial health dimensions. Interestingly, the large decrease in the comparison group was after the catastrophic events of September 11, 2001. This decline was also present among parents' reports for their children in both the intervention and comparison groups. Finally, comparison and intervention students scored lower than the "healthy children" reference group by Varni. Perhaps this is due to lower socioeconomic resources among many students and families in these schools. However, comparison and intervention parents rated their students' health higher than parents in Varni's reference group.

Figure 1. Total PedsQL HRQL: Years 1-3 (N=588)



Pursuant to the above hypotheses, we also looked at whether there was a difference between intervention students who used the SBHCs versus intervention students who did not. Table 7 reports the mean PedsQL scores for SBHC users and nonusers. These are also presented graphically in Figures 2-7.

Table 7: Student Report of Student Health-Related Quality of Life (PedsQL Scores) for Years 1- 3¹.

Health Dimension	Year 1		Year 2		Year 3	
	User ²	Nonuser ³	User ²	Nonuser ³	User ²	Nonuser ³
<u>Student Self Report</u>						
Physical	82.62	83.16	83.84	83.69	84.66	84.79
Psychosocial	69.60	75.18	69.95	73.89	73.74	74.47
Total HRQL	74.13	77.96	74.78	77.30	77.54	76.06
<u>Parent Report</u>						
Physical	88.72	90.59	85.24	89.00	87.50	89.56
Psychosocial	81.41	83.35	78.99	82.04	79.79	80.63
Total HRQL	83.95	85.87	81.17	84.46	82.48	83.72

¹ Data are from parent survey. Analysis was done on longitudinal sample.

² SBHC user sample size: Year 1 N = 107, Year 2 N = 107, Year 3 N = 129

³ SBHC nonuser sample size: Year 1 N = 189, Year 2 N = 189, Year 3 N = 167

Figure 2. Student-reported total PedsQL scores among SBHC users, nonusers, and comparison students (N=588)

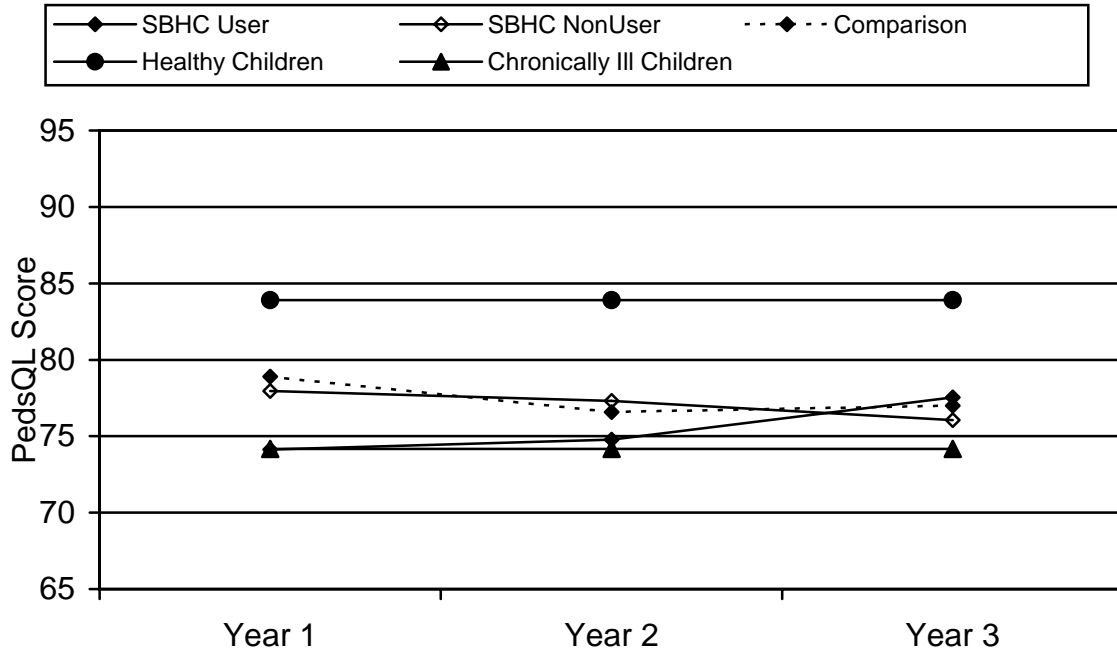


Figure 3. Parent-reported total PedsQL scores among SBHC users, nonusers, and comparison students (N=588)

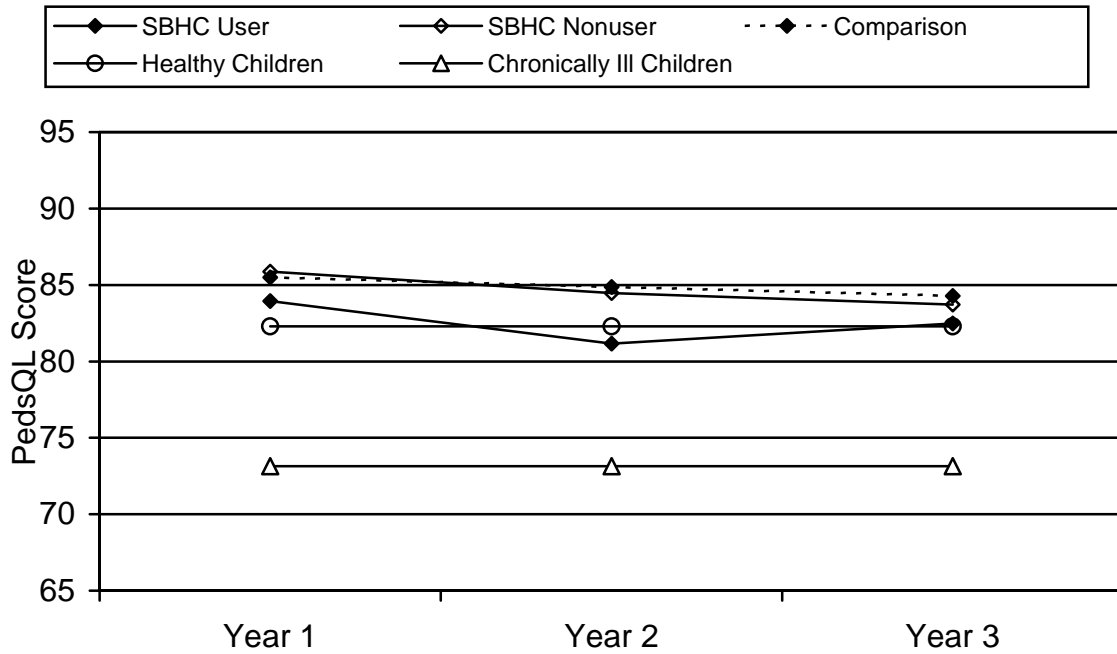


Figure 4. Student-reported physical PedsQL scores among SBHC users, nonusers, and comparison students (N=588)

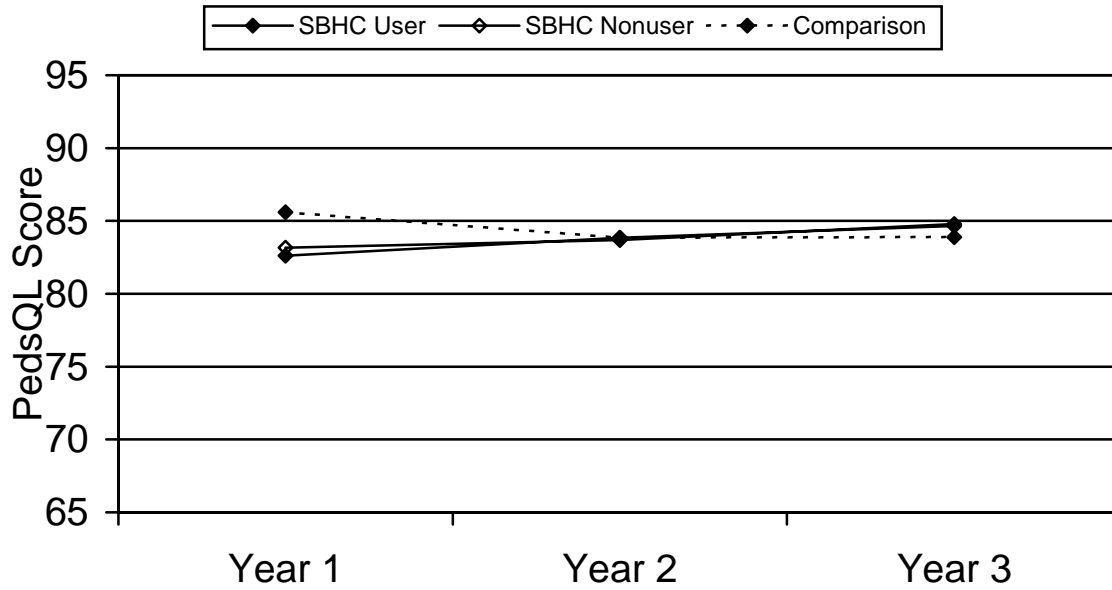


Figure 5. Parent-reported physical PedsQL scores among SBHC users, nonusers, and comparison students (N=588)

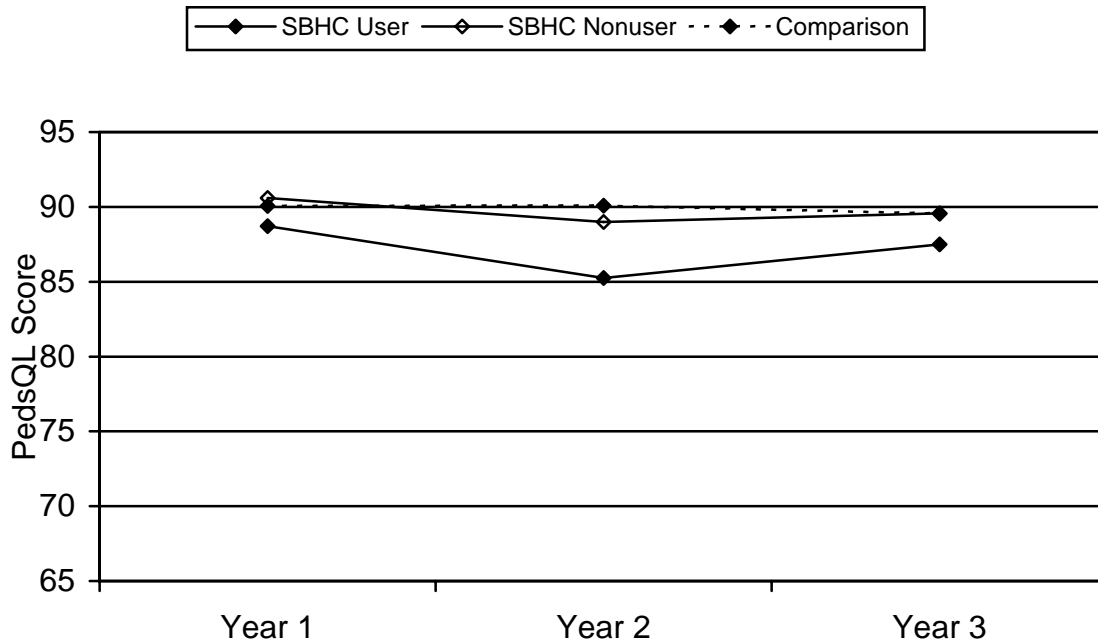


Figure 6. Student-reported psychosocial PedsQL scores among SBHC users, nonusers, and comparison students (N=588)

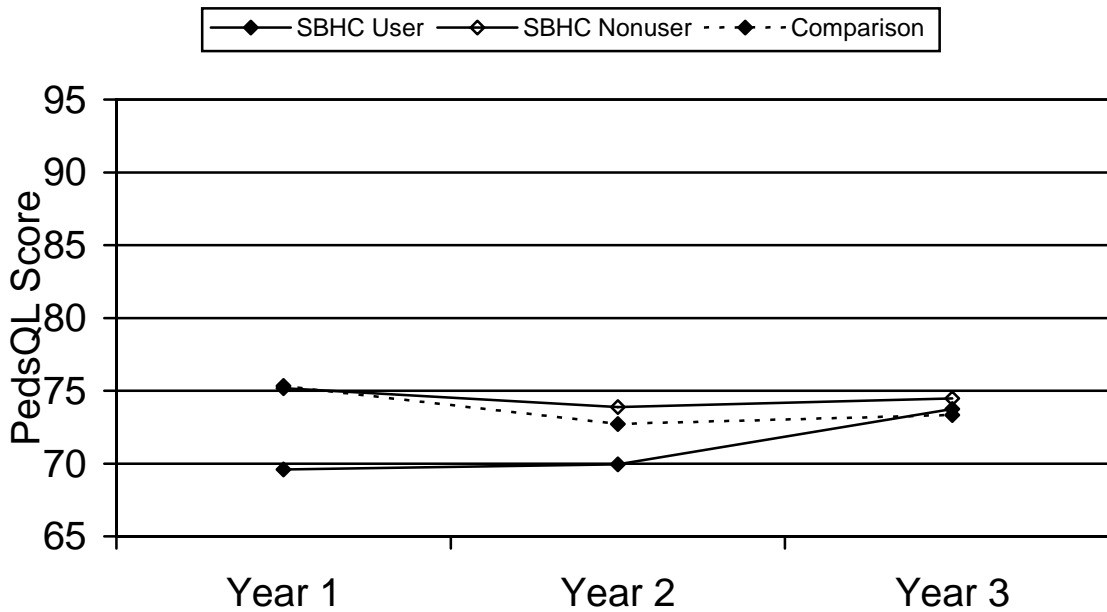
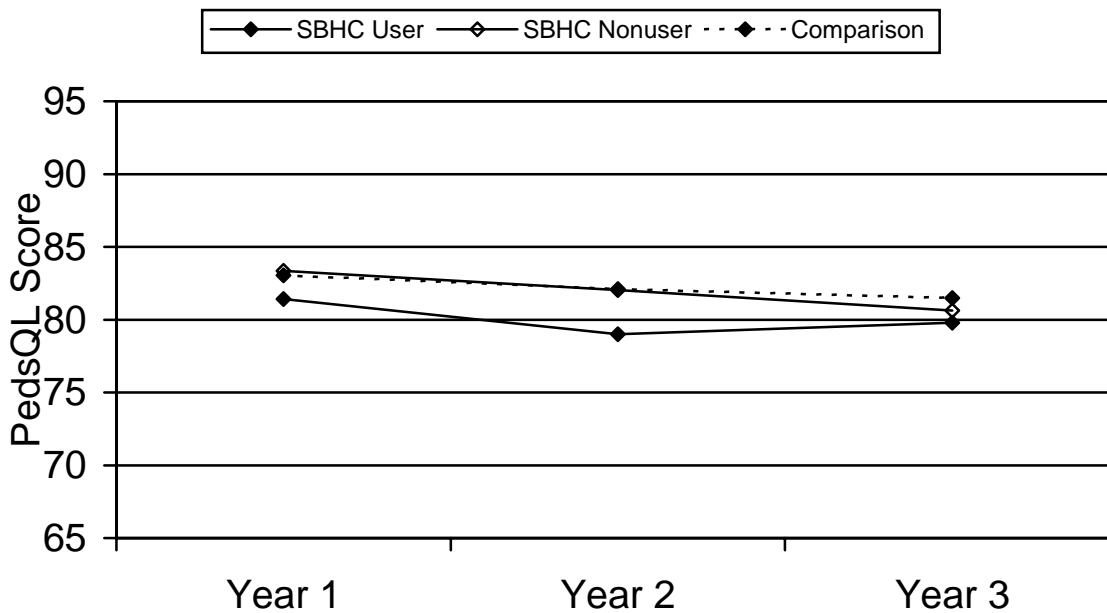


Figure 7. Parent-reported psychosocial PedsQL scores among SBHC users, nonusers, and comparison students (N=588)



We used preliminary mixed model regression analyses to see whether differences in utilization were associated with differences in HRQL scores. Results indicated that there was no significant association between frequency of utilization (i.e. high users versus low users) and HRQL (not shown). As such, all subsequent regression analyses will be based on the examination of the three groups presented above—
 School-Based Health Center Public Survey 24

students who attended an intervention school and used SBHC services at least once in the three years (SBHC users); students who attended an intervention school but did not use SBHC services within the three years (SBHC nonusers); and students who attended a comparison school (comparison).

The following regression analyses examine this hypothesis in greater detail. We present a series of models for each outcome to examine:

- 1) the unadjusted effect of the intervention (SBHC users vs. SBHC nonusers vs. Comparison) on HRQL (Model 1), and
- 2) the effect of SBHC utilization over time on HRQL adjusting for:
 - a. school-level factors (Model 2),
 - b. individual student-level factors (Model 3),
 - c. presence of chronic health conditions (Model 4), and
 - d. all factors (Model 5).

To assess the SBHC Utilization x Time effect on the outcome, we used the following equation:

$$\text{HRQL} = a_i + b_1(\text{SBHC nonuser}) + b_2(\text{comparison}) + b_3(\text{Time}) \\ + b_4(\text{SBHC nonuser} \times \text{Time}) + b_5(\text{comparison} \times \text{time})$$

where,

a_i is the intercept,

SBHC nonuser equals 1 for students in intervention school who did not use the SBHC,

comparison equals 1 for those in comparison schools, and

Time equals 1 for Year 1, 2 for Year 2, and 3 for Year 3.

Note that this coding is set up so that the SBHC user equals 0 for both b_1 and b_2 . This defaults the intervention group as the reference category for all subsequent interpretations of regression coefficients.

In addition to the main effects models presented, (Models 2-4), we analyzed all possible three-way interactions individually in additional regression equations to assess whether the relationship between SBHC and Time (b_4 and b_5) were conditional across various groups (e.g., region, age, etc.). In Model 5, we examined the main effects model as well as additional models individually to include any three-way interactions that were significant in the previous models. This allowed us to further investigate any potential conditional nature of the SBHC x Time relationship on HRQL.

We present six different sets of regressions, three for students' self reports and three for parents' reports of students for total HRQL, physical HRQL, and psychosocial HRQL. The regression equations use OLS regression based on the continuous nature of the PedsQL scale.

In all regression equations, we examined only individuals who participated in all three waves of the longitudinal survey; that is, the four selected intervention schools and the four comparison schools. Note that we did not include income in the models presented here for two reasons. First, the inclusion of income would result in a substantial loss of dyads (44 in this case) due to people's reluctance to answer this question. Second, the overlapping nature of insurance status, race, and income presented multicollinearity problems if we included all three variables simultaneously. A simple multivariate regression of income on both race and insurance status accounted for more than 35% of the explained variance. 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. We recomputed all analyses including income (not shown) and the effects are briefly discussed below to illustrate how income affected the relationship between insurance status and the various outcomes.

Table 8 presents the OLS regression results for the total HRQL reported by the student.

SBHC users initially reported a significantly lower overall total HRQL compared to students in the comparison schools. They also reported a lower total HRQL than SBHC nonusers but this difference was nonsignificant. This gap narrowed significantly over time as illustrated by the significant Comparison x Time interaction.

Adjusting for other factors did not significantly mediate the effect of SBHC over time on total HRQL. The effect of SBHC x Time was independent of all other variables.

Among other variables in the final model, older children reported significantly higher HRQL than younger students and females report lower scores. Students with public health insurance reported significantly lower total HRQL than students with private health insurance (note, however, that the inclusion of income [not shown] in this model eliminated the significance of public health insurance). The presence of a chronic condition had no significant effect on students' self-report of HRQL.

Table 8: Student Total HRQL Score Panel Regression on School- and Individual-Level Factors (N=579)

	Model 1	Model 2	Model 3	Model 4	Model 5
Intervention¹					
SBHC nonuser	4.3225	3.1616	3.9490	4.2996	3.1068
Comparison	6.5851**	5.9019*	6.6540**	6.1820**	5.9309*
Time	1.5061	1.3345	1.4067	1.5999	1.3677
SBHC nonuser x Time				-1.3156	
Comparison x Time	-2.4324**	-2.2908*	-2.4238**	-2.4020**	-2.2699**
School-Level Factors					
State					
Ohio		-			-
Kentucky		-1.6556			-2.3144
Region					
Rural		2.285*			0.1757
Urban		-			-
Individual-Level Factors					
Age			0.6678**		0.7274***
Gender					
Male			-		-
Female			-1.7332		-2.0606*
Race					
Black			-1.6168		-1.6294
White			-		-
Other			-2.2662		-1.3292
Health Insurance					
Private			-		-
Public			-3.0291**		-2.1475*
None			-2.1064		-1.7981
Chronic condition					
Asthma				-0.6278	-0.2355
ADHD				-2.9267	-2.8986
Learning Disability				-2.6839	-2.6690
Other				-0.5136	-0.2199

* p<.05; ** p<.01; *** p<.001.

¹ Reported coefficients are Intervention x Time interactions with 1 df. SBHC user is the reference category.

Table 9 presents the OLS regression results for physical HRQL reported by the student.

SBHC users initially reported a significantly lower overall physical HRQL compared to comparison students but a slightly lower score than SBHC nonusers.

Adjusting for other factors reduced the effect of SBHC x Time interaction to nonsignificance on physical HRQL.

The effect of SBHC x Time was independent of all other variables (no statistically significant three-way interactions).

Among other variables in the final model, with every one-year increase in age, children reported about ½-point higher physical HRQL score. Female students reported significantly lower physical HRQL.

Table 9: Student Physical HRQL Score Panel Regression on School- and Individual-Level Factors (N=579)

	Model 1	Model 2	Model 3	Model 4	Model 5
Intervention¹					
SBHC nonuser	-0.2794	-1.1619	-0.7301	-0.2574	-1.3666
Comparison	3.9756	3.4473	3.9683	3.6155	3.2825
Time	0.9933	0.8634	0.9332	1.1090	0.9558
SBHC nonuser x Time	-0.2253	-0.0384	-0.1552	-0.2303	-0.0355
Comparison x Time	-1.8450*	-1.715	-1.8649*	-1.8082*	-1.7442*
School-Level Factors					
State					
Ohio		-			-
Kentucky		-1.5469			-2.3858
Region					
Rural		1.2135			-0.7581
Urban		-			-
Individual-Level Factors					
Age			0.1856**		0.5257**
Gender					
Male			-		-
Female			-3.7025***		-3.9986***
Race					
Black			-1.4556		-1.7767
White			-		-
Other			-1.1468		-0.4073
Health Insurance					
Private			-		-
Public			-1.7447		-1.0176
None			-2.0625		-1.8350
Chronic condition					
Asthma				-1.3782	-1.1850
ADHD				-0.7828	-1.1879
Learning Disability				-3.2578	-3.7590
Other				-0.7127	-0.4169

* p<.05; ** p<.01; *** p<.001.

¹ Reported coefficients are intervention x time interactions with 1 df. SBHC user is the reference category.

Table 10 presents the OLS regression results for psychosocial HRQL reported by the student.

SBHC users initially reported a significantly lower overall psychosocial HRQL compared to both SBHC nonusers and comparison students.

Adjusting for other factors significantly mediated the effect of SBHC over time on psychosocial HRQL (see Model 5).

The effect of SBHC x Time was independent of all other variables (no statistically significant three-way interactions).

Among other variables, with every one-year increase in age, children report about ¼-point higher psychosocial HRQL. Students with public health insurance reported significantly lower psychosocial HRQL than students with private health insurance (note, however, that the inclusion of income [not shown] in this model eliminated the significance of public health insurance). Chronic conditions did not have any significant independent influence on students' self-reported psychosocial HRQL with the exception of ADHD.

Table 10: Student Psychosocial HRQL Score Panel Regression on School- and Individual-Level Factors (N=579)

	Model 1	Model 2	Model 3	Model 4	Model 5
Intervention¹					
SBHC nonuser	6.9741*	5.6108	6.6144*	6.9285*	5.6410
Comparison	8.0909**	7.2901**	8.1397**	7.6613**	7.3868**
Time	1.8123	1.6111	1.6869	1.8989	1.6151
SBHC nonuser x Time	-2.0056	-1.7160	-1.8071	-1.9492	-1.5718
Comparison x Time	-2.8232**	-2.6219*	-2.7424**	-2.7510*	-2.5697*
School-Level Factors					
State					
Ohio		-			-
Kentucky		-1.7060			-2.2629
Region					
Rural		2.8528*			0.6370
Urban		-			-
Individual-Level Factors					
Age			0.7776***		0.8376***
Gender					
Male			-		-
Female			-0.7043		-1.0463
Race					
Black			-1.6205		-1.5081
White			-		-
Other			-2.7650		-1.7440
Health Insurance					
Private			-		-
Public			-3.9286***		-2.9175*
None			-2.3803		-2.0282
Chronic condition					
Asthma				-0.3079	0.1995
ADHD				-4.0890*	-3.8061*
Learning Disability				-2.3035	1.9990
Other				-0.4769	-0.1771

* p<.05; ** p<.01; *** p<.001.

¹ Reported coefficients are intervention x time interactions with 1 df. SBHC user is the reference category.

Table 11 presents the OLS regression results for student total HRQL reported by the parents or guardians.

There was no significant difference in reported student total HRQL by parents across the three groups. However, there was a significant decrease in parents' reported student HRQL over time for all groups. Adjusting for other factors did not significantly mediate the effect of SBHC over time on parents' reports of total student HRQL but appeared to exacerbate it.

The effect of SBHC x Time was independent of all other variables (no statistically significant three-way interactions) with the exception of gender. For females in the intervention schools (both users and nonusers), parents reported higher total 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.

Among other variables, parents in rural schools reported their children's total HRQL to be, on average, 4½ points higher than parents in urban schools in the final model. Rural parents also reported the HRQL of their female children to be higher than male children. Parents whose children had public or no health insurance reported their students' total HRQL to be significantly lower than parents whose children had private medical insurance (note, however, that the inclusion of income [not shown] in this model eliminated the significance of public health insurance). Among children with reported asthma, ADHD, and other chronic conditions, parents reported significantly lower total student HRQL compared to parents of students without the specific chronic conditions.

Table 11: Parent Report of Total Student HRQL Score Panel Regression on School- and Individual-Level Factors (N=579)

	Model 1	Model 2	Model 3	Model 4	Model 5
Intervention¹					
SBHC nonuser	1.5464	0.8611	1.1402	1.9323	1.3856
Comparison	1.0782	0.7709	0.1569	0.0012	-0.4810
Time	-0.8433	-0.9492	-0.9509	-0.2500	-0.4085
SBHC nonuser x Time	-0.1819	-0.0273	-0.0243	-0.1748	0.0138
Comparison x Time	0.2414	0.3474	0.4342	0.2975	0.4579
School-Level Factors					
State					
Ohio		-			-
Kentucky		1.8274			1.5207
Region					
Rural		6.3336***			4.0178**
Urban		-			-
Individual-Level Factors					
Age			-0.2469		0.0087
Gender					
Male			-		-
Female			2.0598*		1.0196
Race					
Black			-2.8086		0.1984
White			-		-
Other			-3.2666		0.5584
Health Insurance					
Private			-		-
Public			-4.0420***		-2.4979**
None			-2.9657*		-1.9908
Chronic condition					
Asthma				-3.9880***	-3.4292***

ADHD	-11.0060***	-10.6702***
Learning Disability	-4.0655*	-2.9759
Other	-6.4480***	-6.3954***

* p<.05; ** p<.01; *** p<.001.

¹ Reported coefficients are intervention x time interactions with 1 df. SBHC user is the reference category.

Table 12 presents the OLS regression results for student physical HRQL reported by the parents or guardians.

There was no significant difference in reported student physical HRQL by parents in the intervention and comparison groups. There was also no significant change over time in the unadjusted model. Once all other covariates were included, there was a significant decrease in parents' reported student physical HRQL over time, which was consistent across all three groups (no group x time interaction).

Adjusting for other factors did not significantly change the effect of SBHC over time on parents' reports of student physical HRQL.

The effect of SBHC x Time was independent of all other variables (no statistically significant three-way interactions).

Among other variables, parents in rural schools reported their children's physical HRQL to be higher on average than parents in urban schools. Parents whose children had public health insurance reported their students' physical HRQL to be significantly lower than parents whose children had private medical insurance (note, however, that the inclusion of income [not shown] in this model eliminated the significance of public health insurance). Among children with reported asthma, ADHD, or other chronic conditions, parents reported significantly lower student physical HRQL compared to parents of students without the specific chronic conditions.

Table 12: Parent Report of Student Physical HRQL Score Panel Regression on School- and Individual-Level Factors (N=579)

	Model 1	Model 2	Model 3	Model 4	Model 5
Intervention¹					
SBHC nonuser	1.6731	0.8679	1.2266	2.0303	1.4186
Comparison	1.3044	0.8983	0.4279	0.5843	0.0767
Time	-0.5077	-0.6355	-0.6053	0.0159	-0.1222
SBHC nonuser x Time	-0.1079	0.0803	0.0424	-0.1289	0.0604
Comparison x Time	0.2440	0.3719	0.4269	0.2408	0.3967
School-Level Factors					
State					
Ohio		-			-
Kentucky		1.1137			1.2720
Region					
Rural		5.0304***			3.8601**
Urban		-			-
Individual-Level Factors					
Age			-0.1599		0.0240
Gender					
Male			-		-
Female			-0.0601		-0.6696
Race					
Black			-1.9118		0.8155
White			-		-
Other			-0.1557		3.1082
Health Insurance					
Private			-		-
Public			-3.8172***		-2.1417*

None	-0.7366	0.3935
Chronic condition		
Asthma	-4.6691***	-4.2382***
ADHD	-6.6287***	-6.2890***
Learning Disability	-0.9984	-0.1766
Other	-6.5796***	-6.7359***

* p<.05; ** p<.01; *** p<.001.

¹ Reported coefficients are intervention x time interactions with 1 df. SBHC user is the reference category.

Table 13 presents the OLS regression results for student psychosocial HRQL reported by the parents or guardians.

There was no significant difference in reported student psychosocial HRQL by parents across all three groups. There was a significant reduction over time, but the lack of a significant SBHC x Time interaction indicated it was consistent across all groups.

The addition of other factors into the regression model (Models 2-5) did not significantly change the effect of SBHC over time on parents' reports of student psychosocial HRQL.

The effect of SBHC x Time was independent of all other variables (no statistically significant three-way interactions) with the exception of gender. For females in the intervention schools, parents reported a higher 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.

Among other variables, parents with children in rural schools and parents of boys reported their children's psychosocial HRQL to be higher on average than other parents. Parents whose children had public or no health insurance reported their students' psychosocial HRQL to be lower than parents whose children had private insurance (note, however, that the inclusion of income [not shown] in this model eliminated the significance of public health insurance). Among children with any of the identified chronic conditions, parents reported lower student psychosocial HRQL.

Table 13: Parent Report of Student Psychosocial HRQL Score Panel Regression on School- and Individual-Level Factors (N=579)

	Model 1	Model 2	Model 3	Model 4	Model 5
Intervention¹					
SBHC nonuser	1.8093	1.1025	1.3314	2.0706	1.5005
Comparison	1.2571	0.9443	0.2069	-0.1398	-0.6521
Time	-1.0081	-1.1158	-1.1325	-0.3894	-0.5692
SBHC nonuser x Time	-0.2197	-0.0631	-0.0429	-0.1789	0.0208
Comparison x Time	0.2206	0.3283	0.4358	0.3269	0.4979
School-Level Factors					
State					
Ohio		-			-
Kentucky		2.2393			1.6360
Region					
Rural		6.9914***			3.9847**
Urban		-			-
Individual-Level Factors					
Age			-0.2908		0.0068
Gender					
Male			-		-
Female			3.2238***		1.9285*
Race					
Black			-3.1988		-0.1526
White			-		-
Other			-4.9125*		-0.8186

Health Insurance		
Private	-	-
Public	-4.449***	-2.7978**
None	-4.1905**	-3.2526*
Chronic condition		
Asthma		-3.5879**
ADHD		-13.3568***
Learning Disability		-6.1222**
Other		-6.3462***

* p<.05; ** p<.01; *** p<.001.

¹ Reported coefficients are intervention x time interactions with 1 df. SBHC user is the reference category.

In addition to the PedsQL, parents were asked to rate the overall health of their children on a single question, “In general, how would you rate (CHILD’S NAME)’s health...excellent, very good, good, fair, or poor?” Over time, the change for each group individually was nonsignificant. However, in Year 1, parents of SBHC users rated their children’s health significantly lower than parents in the comparison schools (see Table 14). In Years 2 and 3, parents of SBHC users rated their children’s health significantly lower than parents of both SBHC nonusers and comparison children.

Table 14: Parent Report of Student Overall Health Status for Years 1, 2, and 3¹

	Year 1			Year 2			Year 3		
	User ²	Non ³	Comp ⁴	User ²	Non ³	Comp ⁴	User ²	Non ³	Comp ⁴
Overall Health									
Excellent	35.5%	46.3%	52.6%	37.4%	45.5%	49.8%	39.5%	46.7%	49.1%
Very Good	38.8%	30.3%	32.0%	29.9%	37.0%	31.3%	32.6%	37.1%	34.7%
Good	20.6%	20.7%	12.4%	27.1%	11.1%	16.5%	21.7%	15.0%	14.8%
Fair/Poor	5.6%	2.6%	3.1%	5.6%	6.4%	2.4%	6.2%	1.2%	1.4%

¹ Data are from parent survey. Analysis was done on longitudinal sample.

² SBHC user sample size: Year 1 N = 107, Year 2 N = 107, Year 3 N = 129

³ SBHC nonuser sample size: Year 1 N = 189, Year 2 N = 189, Year 3 N = 167

⁴ Comparison schools sample size: Year 1 N = 291, Year 2 N = 291, Year 3 N = 291

ABSENTEEISM

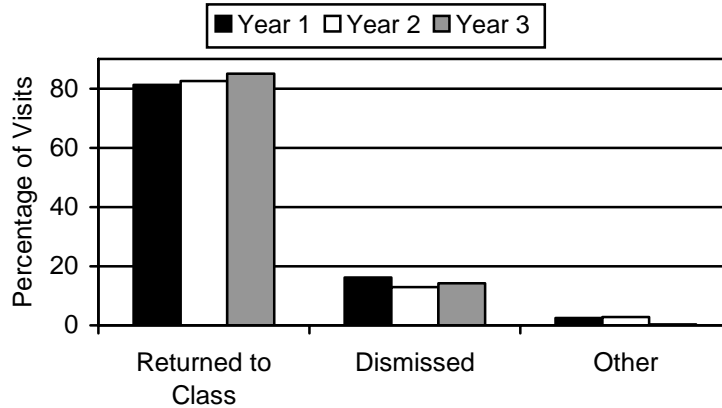
Hypothesis 2.0) Students in intervention schools will have fewer absences compared to students in comparison schools.

Hypothesis 2.1) The rate of absenteeism declines in the intervention schools over time.

Hypothesis 2.2) The rate of absenteeism among students in intervention schools is significantly better than the rate of absenteeism among students in comparison schools.

The second hypothesis examined the effect of SBHCs on student absence rates. We collected absence data in two ways. First, from the SBHC encounter data, we looked at the visit outcome, which indicated whether the child was sent home or returned to class for each specific visit. While 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 15). 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 this year because of the flu.

Figure 15: SBHC Visit Outcomes



Second, we looked at official school absence records, which were sent to us on a yearly basis by all 12 schools. 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).

Table 15: Aggregate Average Number of Days Absent per Student by School for Years 1, 2, and 3^{1,2}

Intervention Schools	Mean Absences				Comparison Schools	Mean Absences			
	1999 ³	Year 1	Year 2	Year 3		1999 ³	Year 1	Year 2	Year 3
School A	17.5	6.43	8.14	10.47	School I	14.7	3.85	7.67	8.93
School B	8.26	8.57	5.45	8.44	School J	10.06	8.43	8.94	8.71
School C	11.83	14.43	6.58	7.49	School K ⁴	13.06	8.37	6.59	10.70
School D	6.63	5.56	6.30	6.80	School L	7.33	11.46	6.47	6.44
School E	14.88	4.54	7.15	8.97	-	-	-	-	-
School F	8.65	8.48	7.58	9.95	-	-	-	-	-
School G	9.40	7.34	5.58	8.01	-	-	-	-	-
School H	13.09	2.04	7.78	12.09	-	-	-	-	-
Total Mean	11.28	8.16	6.81	8.94	Total Mean	11.29	8.14	7.57	8.76

¹ Data are from cross-sectional school absence records.

² This table excludes students with reported absences greater than 80 days across the school year.

³ Average absent days based on 1999 Attendance Rates from the Department of Education for Ohio and Kentucky. Calculated using the required 175 days of instruction. Absence rates are inflated because their data were not capped, recoded, or limited to illness and medical absences.

⁴ In Year 1, this school included only those students who participated in the student surveys (N=236).

Table 16: Average Number of Days Absent by School for Students Participating in the Student Surveys in Years 1, 2, and 3¹

Intervention Schools	Mean Absences			Comparison Schools	Mean Absences		
	Year 1	Year 2	Year 3		Year 1	Year 2	Year 3
School A	11.9	9.9	9.3	School I	7.0	9.1	8.1
School B	8.1	6.1	8.9	School J	8.5	9.3	9.3
School C	14.7	6.5	7.9	School K	7.9	5.9	10.4
School D	5.5	4.9	6.0	School L	10.7	6.1	6.4
Total Mean	8.5	7.0	9.2	Total Mean	8.9	8.2	8.6

¹ Data are from school absence records. Analysis was done on longitudinal sample minus one student with more than 80 absences in one year (N = 587). After excluding the student with reported absences greater than 80 days in one year, total absences were capped at 60.

Pursuant to the above hypotheses on absences, we also looked at whether there was a difference between students who used the SBHCs versus students who attended intervention schools but did not use the SBHCs. Figures 16-17 compare yearly absence rates among SBHC users, nonusers, and comparison students for both the longitudinal full school population and survey sample.

The difference between SBHC users and nonusers was significant and consistent across all three years, even accounting for the dip in Year 2. The change over time was significant for nonusers but nonsignificant for SBHC users and comparison students. Finally, the difference in mean absences across all groups was significant for every year except Year 3 for nonusers and comparison students. Among the survey sample, a similar pattern emerged. However, absences in Year 3 for the SBHC users and nonusers did not increase above those in Year 1. Again, the comparison group showed a slight and steady decline.

We used the following regression equation to employ a generalized estimation technique assuming a Poisson distribution (negatively skewed binomial distribution) for the dependent variable, yearly count of days absent. Similar to hypothesis 1 above, we present a series of models to examine:

- 1) the unadjusted effect of the intervention (SBHC user vs. nonuser vs. comparison) over time on absences, and
- 2) the effect of the intervention (SBHC user vs. nonuser vs. comparison) over time on absences adjusting for:
 - a. school level factors;
 - b. individual student level factors,
 - c. chronic conditions, and
 - d. all factors.

To assess the SBHC x Time effect on absences, we used the following equation:

$$\text{Absences} = a_i + b_1(\text{SBHC Nonuser}) + b_2(\text{Comparison}) + b_3(\text{Time}) \\ + b_4(\text{SBHC Nonuser} \times \text{Time}) + b_5(\text{Comparison} \times \text{Time})$$

where:

- a_i is the intercept,
- SBHC nonuser equals 1 for students in intervention schools who did not use SBHCs,
- Comparison equals 1 for students in comparison schools, and
- Time equals 1 for Year 1, 2 for Year 2, and 3 for Year 3.

Note that this coding is set up so that the SBHC user equals 0 for both b_1 and b_2 . This defaults the intervention group as the reference category for all subsequent interpretations of regression coefficients.

In addition to the main effects models presented (Models 2-4), we analyzed all possible three-way interactions individually in additional regression equations to assess if the relationship between SBHC and Time were conditional across various groups (e.g., region, age, etc.). In Model 5, we examined the main effects model as well as additional models individually to include any three-way interactions that were significant in the previous models. This allowed us to further investigate any potential conditional nature of the SBHC x Time relationship on absences.

We present two sets of regression models. The first is the total school population across all 12 schools. In this first set, we were not able to examine the effect of insurance status or chronic condition because we only had these data for intervention students who were enrolled in the SBHC. In the second set of regression models, we examined the survey data of the eight participating schools. In this second set, we were able to include insurance status and chronic condition, which were included in the data from the parents' surveys.

Figure 16. Average total absences per student among SBHC users, nonusers, and comparison students (Longitudinal School Population, N=7,784)

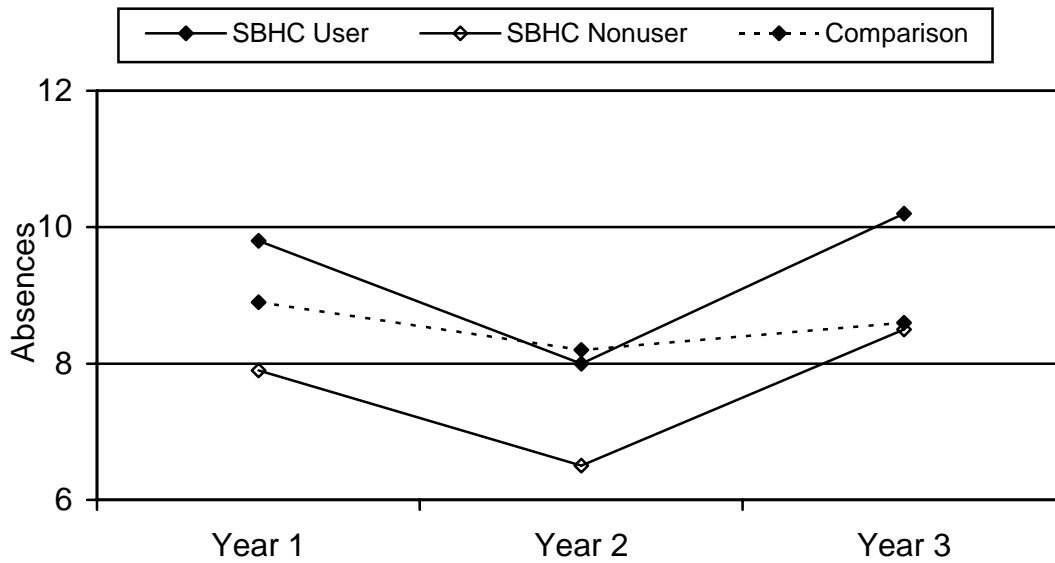
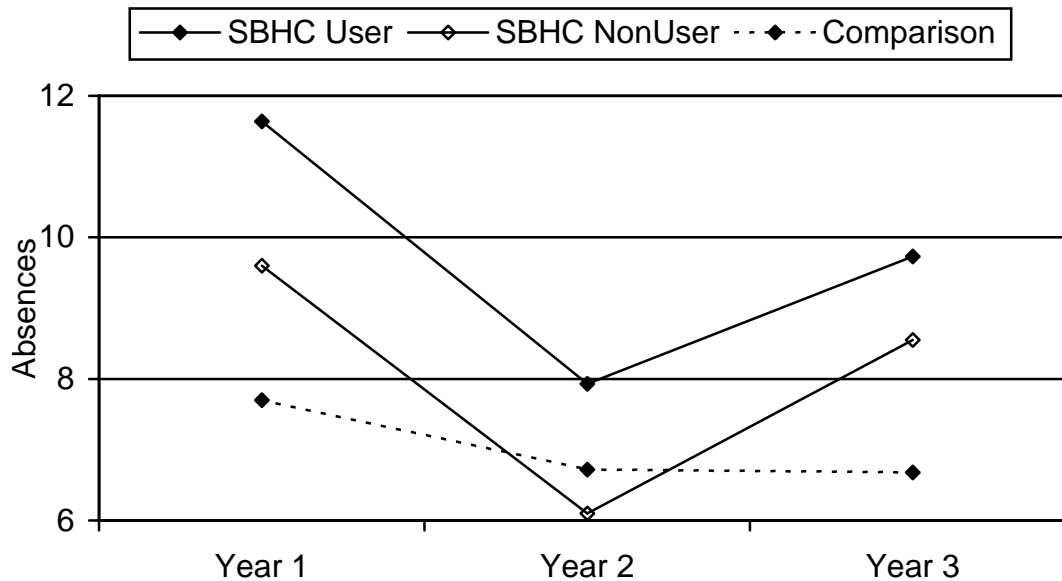


Figure 17. Average total absences per student among SBHC users, nonusers, and comparison students (Longitudinal Survey Sample, N=587)



Notwithstanding the apparent effect of the SBHCs keeping students at school, we did not see any substantial impact on full-day absences overall. However, there was a great deal of variation between urban and rural as well as Ohio and Kentucky student absent rates across time. The SBHCs appeared to have some effect on absence rates of students with public or no insurance compared to students with private insurance. Moreover, the SBHCs appeared to have a large effect on reducing absences among students with asthma and ADHD, but not on absences among students with other chronic conditions, including developmental delay or mental

retardation, sickle cell, seizure disorders or epilepsy, headaches, and diabetes. We discuss each of these variations below.

Table 17 presents the Poisson regression results for the absences for the total school populations.

SBHC nonusers had significantly fewer full-day absences than SBHC users, and this difference stayed consistent across the three years (no time x intervention interaction). However, the difference between SBHC users and comparison students had a significant time x intervention interaction. Specifically, in Years 1 and 2, there was no significant difference. In Year 3, SBHC users had significantly higher absence rates than students in comparison schools.

Adjusting for other factors did not significantly mediate the effect of SBHCs over time on full-day absences.

The effect of SBHC x Time changed significantly across region, state, age, and race (statistically significant three-way interactions). For state and region, urban and Kentucky intervention schools had a significantly large reduction in absence rates from Year 1 to 2 but a subsequent increase in Year 3. For race, absences among Blacks and students of other races in intervention schools fell from Year 1 to Year 3, but absences among Whites fell in Year 1 to Year 2 and increased significantly from Year 2 to Year 3 (see Figures 18-20)

Among other variables, students in rural and Kentucky schools had significantly fewer absences on average. Older students had significantly more absences than younger students. However, these associations were not independent of SBHCs and must be interpreted in relation to both time and SBHC. In this dataset, we were unable to examine chronic conditions and insurance status, because these data were only available for students who were in the survey sample and students in the intervention schools who enrolled in the SBHC.

Table 17: Yearly Absence Panel Regression on School- and Individual-Level Factors (N=7,784)

	Model 1	Model 2	Model 3	Model 4
Intervention¹				
SBHC nonuser	-0.2347***	-0.2324***	-0.2210***	-0.2281***
Comparison	-0.0197	0.0457	-0.0170	0.0571
Time	0.0242	0.0241	-0.0247	0.0245
SBHC nonuser x Time	0.0158	0.0161	0.0159	0.0158
Comparison x Time	-0.0423*	-0.0422*	-0.0428*	-0.0425*
School-Level Factors				
State				
Ohio		-		-
Kentucky		-0.0939***		-0.1121***
Region				
Rural		-0.1784***		-0.2126***
Urban		-		-
Individual-Level Factors				
Age			0.0371***	0.0368***
Gender				
Male			-	-
Female			0.0059	0.0097
Race				
Black			0.0109	-0.1326***
White			-	-
Other			0.0142	-0.0618

* p<.05; ** p< .01; *** p< .001.

¹ Reported coefficients are intervention x time interactions with 1 df. SBHC user is the reference category.

Figures 18-20 provide a graphic representation of the significant three-way interactions with intervention and time across location, state, and race using the full longitudinal study population (N=7,784). The patterns in these figures are difficult to ascertain. With respect to state, with the exception of the Ohio comparison group, absences for all groups go down from Year 1 to Year 2 and then rise again in Year 3. Absences among urban SBHC users declined greatly from Year 1 to Year 2 and increased only slightly in Year 3. Absences among rural SBHC users showed a steady increase from Year 1 to Year 3. Being in an intervention school appeared to have a protective effect among Blacks over the three years, as illustrated by the reduction in absences. Absences among Black comparison students rose. For Whites, absences among students in an intervention school (both users and nonusers) decreased from Year 1 to Year 2 but increased sharply in Year 3. Absence rates for Whites in comparison schools were generally consistent across all three years.

Figure 18. Yearly absences per student among SBHC users, nonusers, and comparison students, by state (N=7,784)

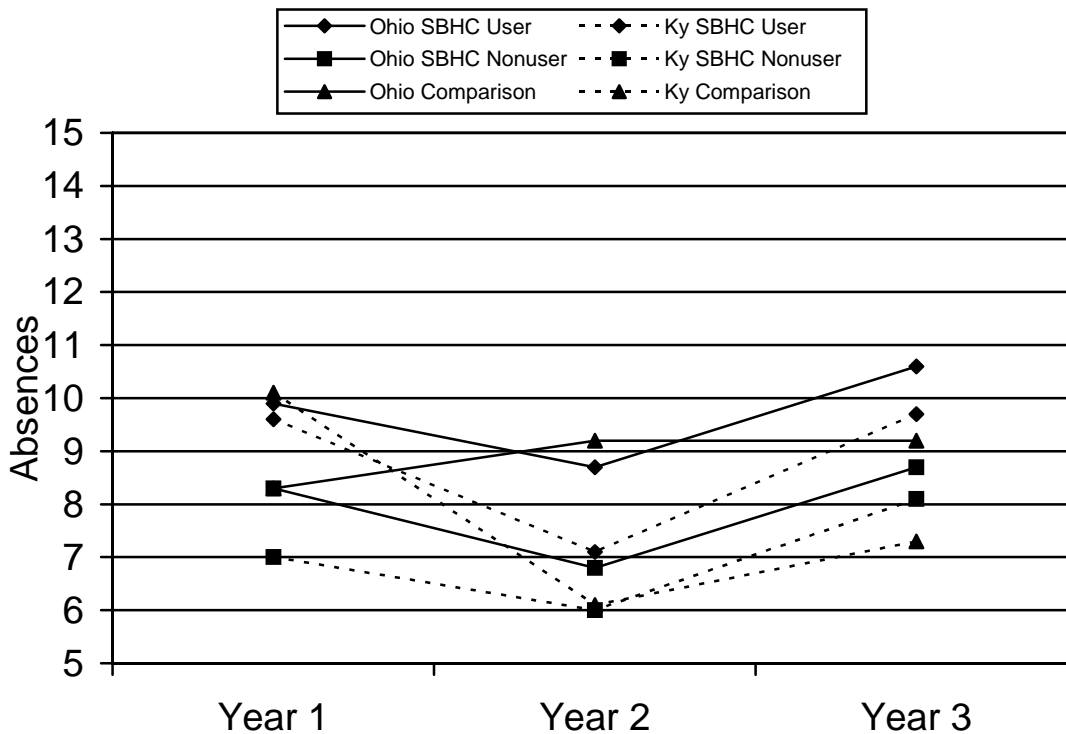


Figure 19. Yearly absences among SBHC users, nonusers, and comparison students, by location (N=7,784)

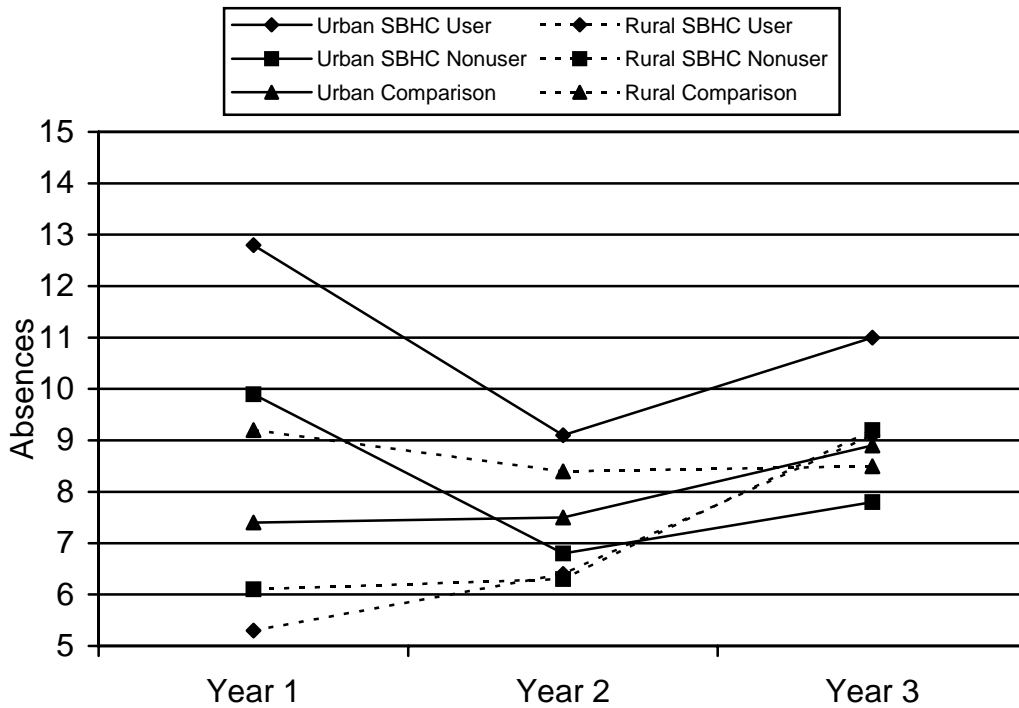


Figure 20. Yearly absences among SBHC users, nonusers, and comparison students, by ethnicity (N=7,784)

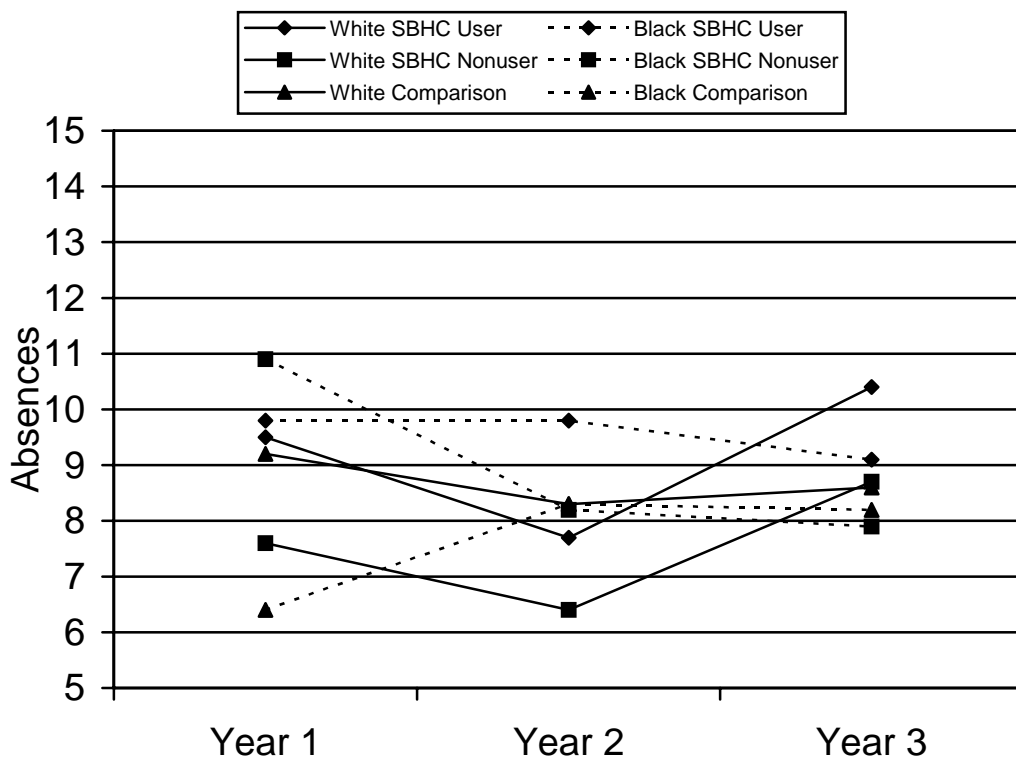


Table 18 presents the Poisson regression results for full-day absences for the survey sample.

In the unadjusted model (Model 1), SBHC users had significantly more full-day absences overall compared to the comparison group but not more than SBHC nonusers. This significant difference in absences was independent of time, indicating that it persisted across the three years.

Adjusting for other factors did not significantly mediate the effect of SBHC over time on full-day absences.

The effect of SBHC x Time changed significantly across region, state, insurance status, and chronic conditions (statistically significant three-way interactions) (see Figures 21-26). Urban and Kentucky SBHC users had a large reduction in absences from Year 1 to Year 2 and only a slight increase in Year 3. Absence rates for SBHC users with public or no insurance decreased substantially from Year 1 to Year 2 with only a slight increase in Year 3.

Among other variables, students in urban schools and Ohio, students with public health insurance, and students with other chronic conditions had significantly more absences on average. Female students had significantly fewer absences than male students. However, with the exception of gender, these associations were not independent of SBHC on absences and must be interpreted in relation to both time and SBHC.

Table 18: Yearly Absence Panel Regression on School- and Individual-Level Factors (N=579)

	Model 1	Model 2	Model 3	Model 4	Model 5
Intervention¹					
SBHC nonuser	-0.2648	-0.2518	-0.2250	-0.2642	-0.2631
Comparison	-0.5243***	-0.5210***	-0.4240**	-0.4788***	-0.4344***
Time	-0.0906	-0.0884	-0.0812	-0.0908	-0.0856
SBHC nonuser x Time	0.0129	0.0097	0.0001	0.0135	0.0062
Comparison x Time	0.1031	0.1009	0.0849	0.1033	0.0913
School-Level Factors					
State					
Ohio		-			-
Kentucky		-0.2029**			-0.3266***
Region					
Rural		-0.3167***			-0.3904***
Urban		-			-
Individual-Level Factors					
Age			0.0221		0.0137
Gender					
Male			-		-
Female			-0.1431*		-0.1164
Race					
Black			-0.1244		-0.4138***
White			-		-
Other			0.2196		0.1272
Health Insurance					
Private			-		-
Public			0.3637***		0.2892***
None			0.1620		0.1355
Chronic condition					
Asthma				0.1775*	0.1472
ADHD				0.2319	0.1446
Learning Disability				0.2817	0.1596
Other				0.0021	0.0035

* p<.05; ** p<.01; *** p<.001.

¹ Reported coefficients are intervention x time interactions with 1 df. SBHC user is the reference category.

Figures 21-26 provide a graphic representation of the significant three-way interactions with intervention and time across location, state, insurance status, and ADHD using the survey sample. The patterns in these figures are difficult to ascertain. With respect to state, absences among Ohio SBHC users and nonusers declined slightly from Year 1 to Year 2 but rose greatly in Year 3. The opposite trend appeared for Kentucky SBHC users and nonusers, whose absences decreased greatly from Year 1 to Year 2 and rose only slightly in Year 3. Absence rates among urban SBHC users and nonusers declined greatly from Year 1 to Year 2 and increased only slightly in Year 3. Among rural SBHC users, absences rates showed a steady increase from Year 1 to Year 3, consistent with the above results on the full school population.

With respect to health insurance coverage, 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. 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.

Absence rates of SBHC users with ADHD and learning disabilities showed a substantial decrease over the three years. Absence rates of SBHC nonusers with ADHD and LD 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 or increased.

Figure 21. Yearly absences among SBHC users, nonusers, and comparison students, by state (N=579)

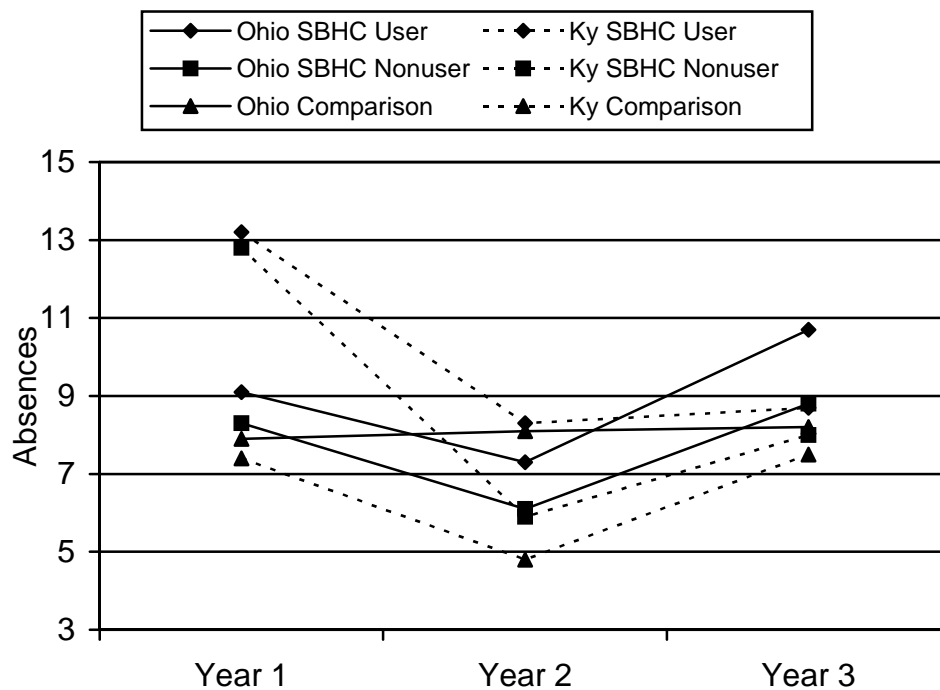


Figure 22. Yearly absences among SBHC users, nonusers, and comparison students, by location (N=579)

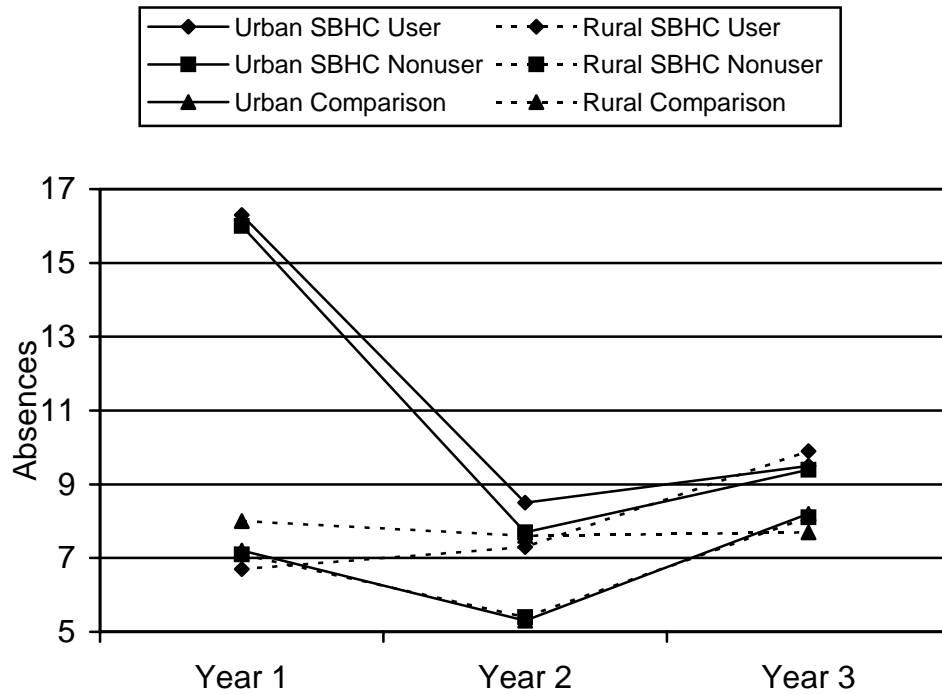


Figure 23. Yearly absences among SBHC users, nonusers, and comparison students, by insurance status (N=579)

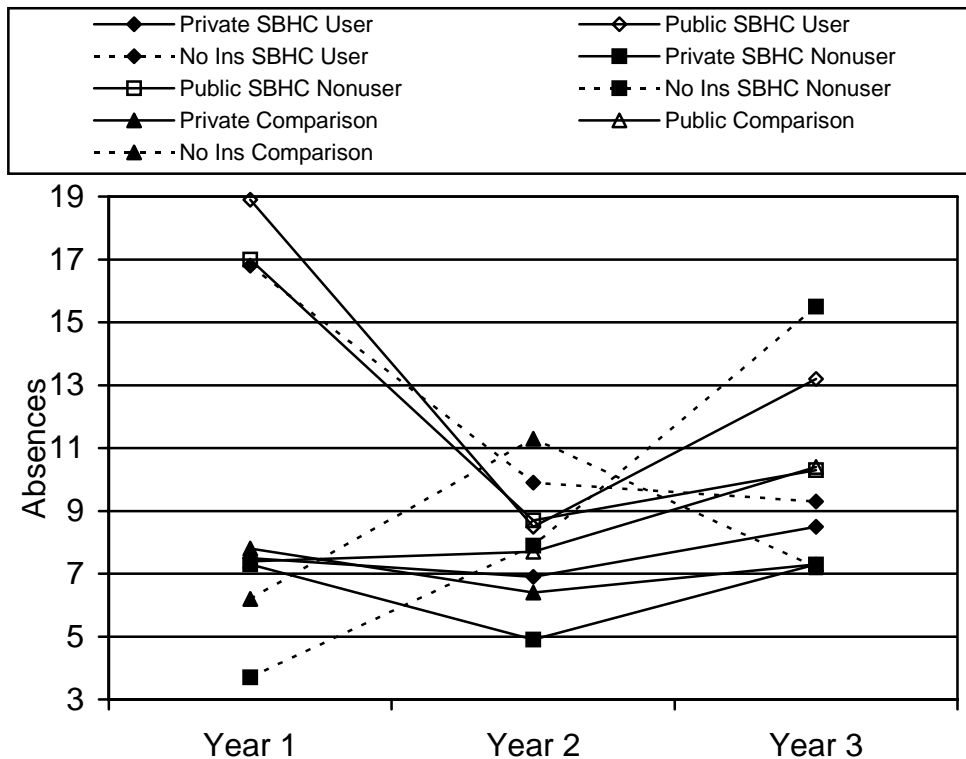


Figure 25. Yearly absences among SBHC users, nonusers, and comparison students, by reported ADHD (N=579)

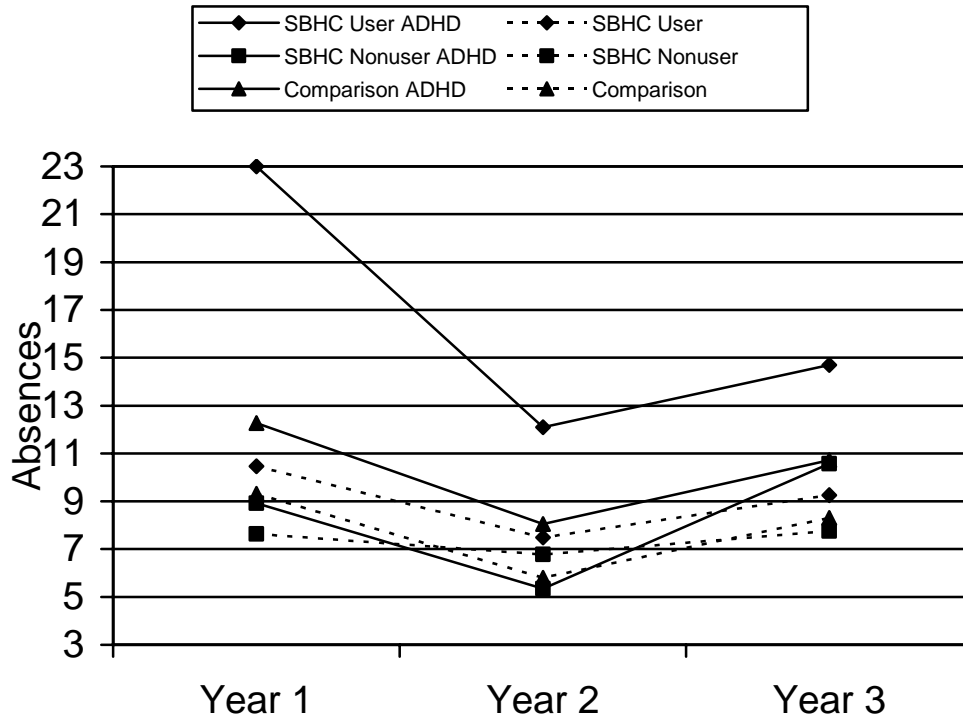
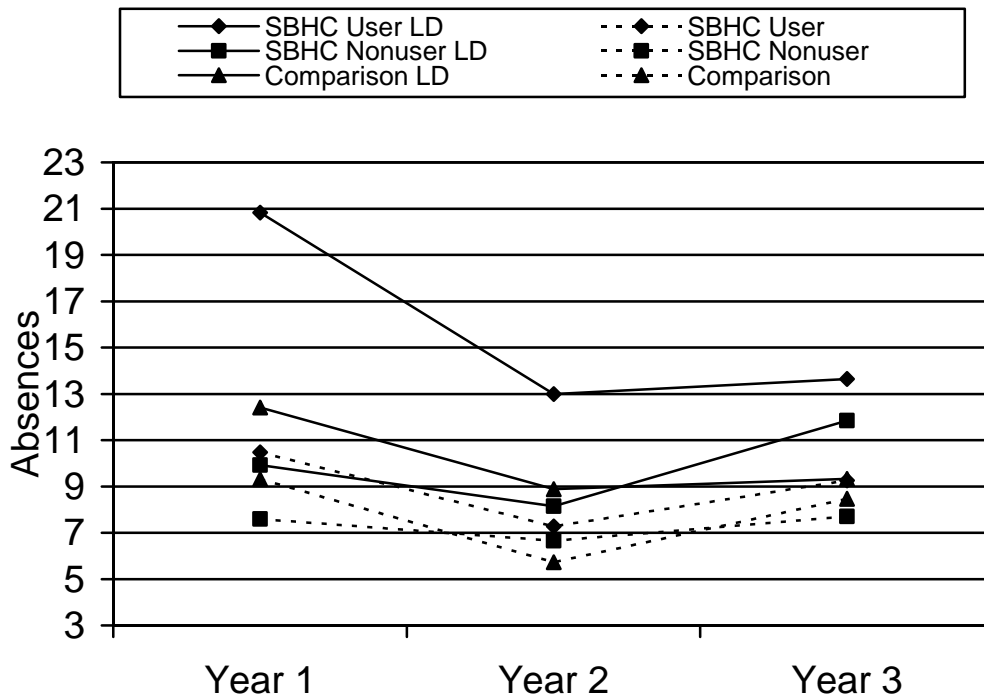


Figure 26. Yearly absences among SBHC users, nonusers, and comparison students, by reported Learning Disabilities (N=579)



ACCESS TO HEALTHCARE

Hypothesis 3.0) Students in intervention schools will have better access to healthcare than in students comparison schools.

The final outcomes hypothesis focused on access to healthcare for students attending intervention schools. We examined five outcomes in relation to healthcare utilization and accessibility, including perceived access to healthcare and presence of a medical home, well-child care, sick-child care, insurance status, and emergency department (ED) utilization. We collected all data on the dependent variables from the parent surveys. Figures 27-31 present the three-year trends for each group (SBHC users, nonusers, and comparison students) for all outcomes.

These figures show that the effect of the SBHC varied across different outcomes. First, the SBHCs did not appear to have any noticeable effect on ED utilization. However, parents of SBHC users reported a decrease in difficulty in getting healthcare from Year 1 to Year 3. There was also an increase in well-child visits for SBHC users and nonusers compared to comparison students. All three groups showed a decrease the over three years in ill-child care. Finally, the percentage of students without health insurance was higher among SBHC users and did not decrease for this group as substantially as it decreased for SBHC nonusers and comparison students.

Figure 27. Percent of students with no ED visits (N=587)

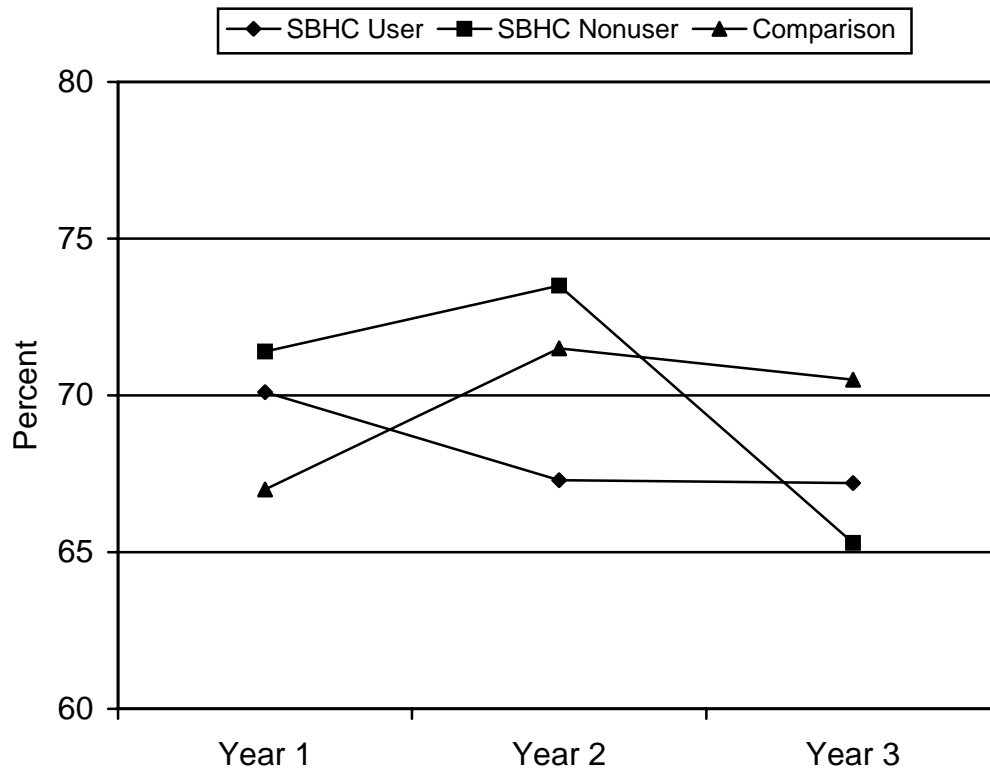


Figure 28. Percent of parents reporting no perceived problems getting healthcare (N=581)

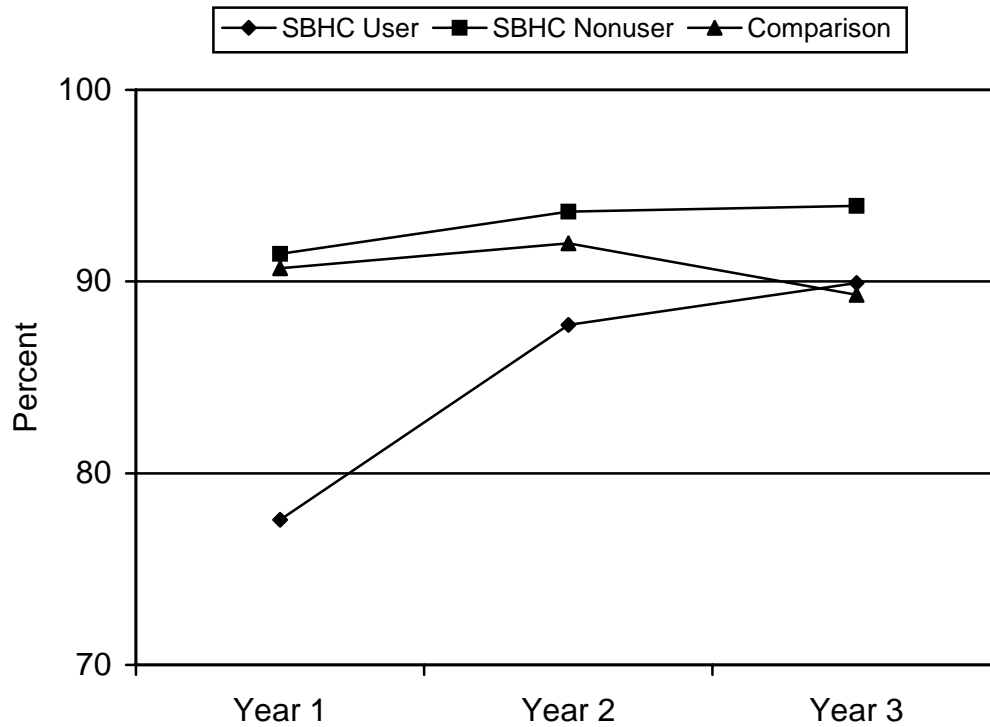


Figure 29. Average reported yearly visits for well-child care (N=587)

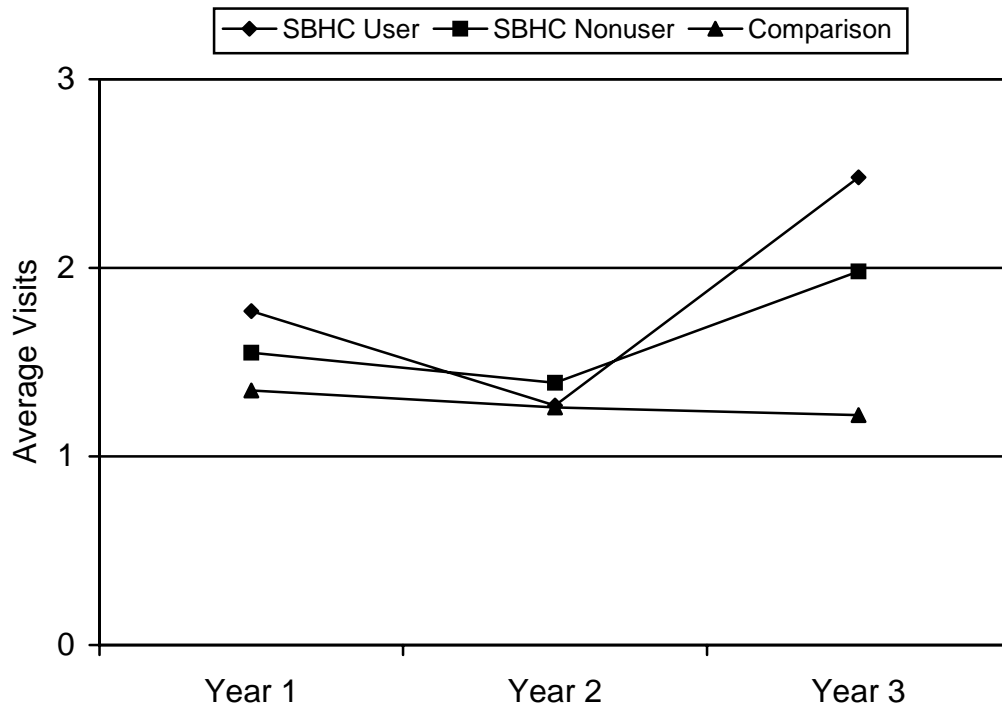


Figure 30. Average reported yearly visits for ill-child care (N=587)

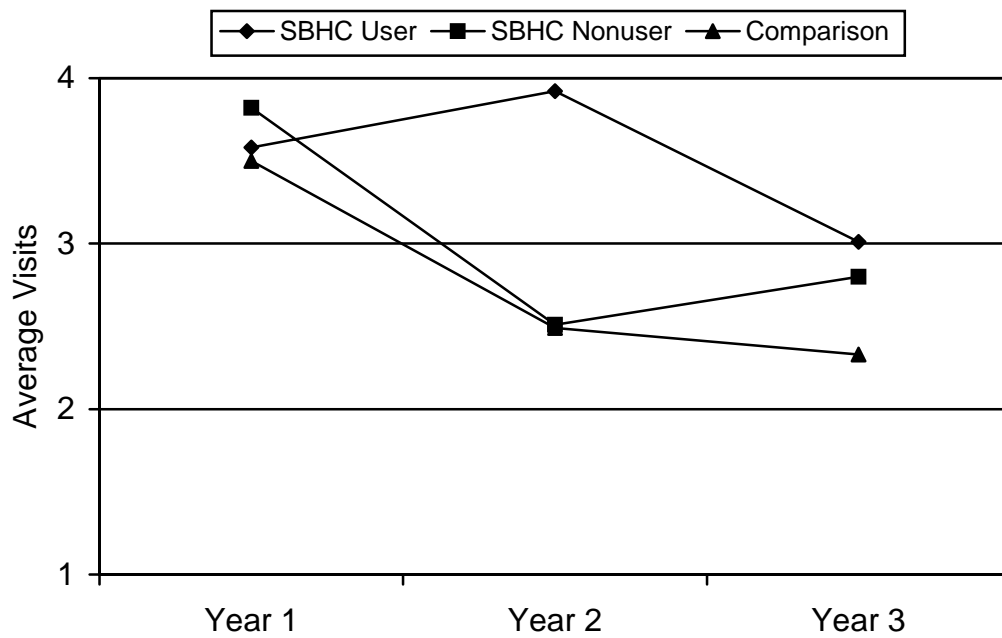
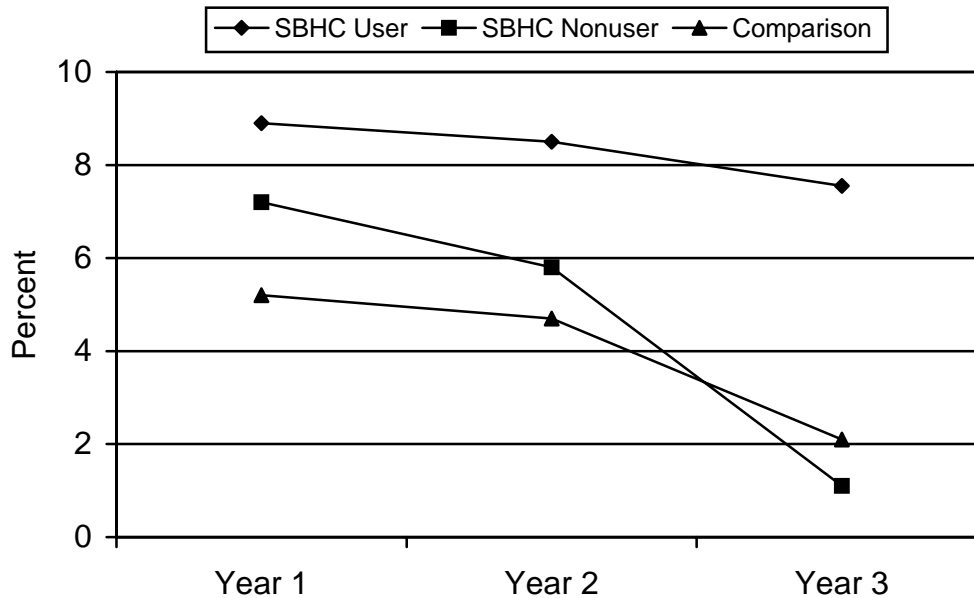


Figure 31. Percentage of parents reporting no health insurance for student (N=568)



In the following regression models, we examined these various outcomes more closely. We followed the same pattern of regression models as above to present a series of models to examine:

- 1) the unadjusted effect of the intervention (SBHC user vs. nonuser vs. comparison) over time on health utilization and access, and
- 2) the effect of SBHCs (SBHC user vs. nonuser vs. comparison) over time on absences adjusting for:
 - a. school-level factors,
 - b. individual-level factors,
 - c. chronic condition, and
 - d. all factors.

To assess the SBHC x Time effect on utilization and access, we used the following equation:

$$\text{Utilization/Access/Insurance Status} = a_i + b_1(\text{SBHC nonuser}) + b_2(\text{Comparison}) + b_3(\text{Time}) + b_4(\text{SBHC nonuser} \times \text{Time}) + b_5(\text{Comparison} \times \text{Time})$$

where:

- a_i is the intercept,
- SBHC nonuser equals 1 for students in intervention schools who did not use SBHCs,
- Comparison equals 1 for students in comparison schools, and
- Time equals 1 for Year 1, 2 for Year 2, and 3 for Year 3.

Note that this coding is set up so that the SBHC user equals 0 for both b_1 and b_2 . This defaults the intervention group as the reference category for all subsequent interpretations of regression coefficients.

In addition to the main effects models presented (Models 2-4), we analyzed all possible three-way interactions individually in additional regression equations to assess if the relationship between SBHC and Time were conditional across various groups (e.g., region, age, etc.). In Model 5, we examined the main effects model as well as additional models individually to include any three-way interactions that were significant in the previous models.

Based upon the characteristics of the dependent variables, the following regression equations employed various regression techniques (see each individual table). In all regression equations, we examined only the students who participated in the survey.

Table 19 presents the ordinal logistic regression results for perceived problems getting health services among the survey sample. Note that the ordinal regression equation models the likelihood of the ‘null’ event, in this case, fewer problems.

Parents of SBHC nonusers and comparison students reported significantly fewer problems getting care. All three groups showed an increase in perceptions of accessing care. Over the three years, parents of SBHC users showed a significant improvement in their perception of accessing healthcare as little or no problem compared to parents of children in the comparison schools.

Adjusting for other factors did not mediate the SBHC x Time interaction on perception of access to care. The effect of SBHC x Time was independent of all other variables (no statistically significant three-way interactions).

Among other variables, students with public or no health insurance reported perceiving more problems receiving care. Parents whose student had asthma or ADHD perceived greater problems accessing care.

Table 19: Perceived Problems Receiving Care¹ over Time on School- and Individual-Level Factors (N=581)

	Model 1	Model 2	Model 3	Model 4	Model 5
Intervention²					
SBHC nonuser	1.4170***	1.3708**	1.3893**	1.4534**	1.4389**
Comparison	1.6323**	1.6157***	1.5355***	1.6089***	1.5705**
Time	0.4965**	0.4912**	0.5392**	0.5075**	0.5529**
SBHC nonuser x Time	-0.3000	-0.2895	-0.3375	-0.3030	-0.3426
Comparison x Time	-0.5718**	-0.5677**	-0.6125**	-0.5838**	-0.6355**
School-Level Factors					
State					
Ohio		-			-
Kentucky		0.2112			0.2392
Region					
Rural		0.4576*			0.2603
Urban		-			-
Individual-Level Factors					
Age			0.0107		0.0162
Gender					
Male			-		-
Female			0.0520		-0.0396
Race					
Black			-0.1464		-0.0179
White			-		-
Other			0.9831		1.1908
Health Insurance					
Private			-		-
Public			-0.7003**		-0.5568*
None			-1.6116***		-1.6088***
Chronic condition					
Asthma				-0.5490*	-0.4662
ADHD				-1.1036***	-1.1784***
Learning Disability				0.5388	0.8629
Other				-0.1243	-0.2659

* p<.05; ** p<.01; *** p<.001.

¹ The ordinal regression model models the likelihood of no perceived problems accessing care. A positive coefficient would mean a greater likelihood of no perceived problem accessing care. A negative coefficient would mean lower likelihood for no perceived problem accessing care.

² Reported coefficients are intervention x time interactions with 1 df. SBHC user is the reference category.

Hypothesis 3.1) The percentage of students in the intervention schools who have a medical home improves compared to students in the comparison schools

In both Years 1 and 2, SBHC users were more likely than other students to have an ED physician as their primary care provider or “medical home” (see Table 20). But in Year 3, this fell to nearly 0 and was below the comparison group rate. Students in comparison schools were more likely to have their medical home in a private practice than both SBHC users and nonusers. 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 ED 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. In Years 2 and 3, 13.7% and 9.5% of SBHC users respectively had the SBHC listed as their medical home, and the majority of these students had no insurance, public or private.

Table 20: Parent-Reported Student Medical Home¹

	Year 1			Year 2			Year 3		
	User ²	Nonuser ³	Comp ⁴	User ²	Nonuser ³	Comp ⁴	User ²	Nonuser ³	Comp ⁴
<u>Medical Home</u>	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Private Practice	64.9	59.2	75.4	46.1	58.1	67.7	55.9	61.0	70.5
CHC	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
ED Physician									
SBHC ⁵	5.2	1.2	0.8	2.9	2.1	1.4	0.8	0.0	2.0
Other	-	-	-	13.7	0.0	0.4	9.5	3.1	0.4
				3.9	2.7	4.9	1.6	1.2	1.7

¹ Data are from parent survey. Analysis was done on longitudinal sample

² SBHC user sample size: Year 1 N = 107, Year 2 N = 107, Year 3 N = 129

³ SBHC nonuser sample size: Year 1 N = 189, Year 2 N = 189, Year 3 N = 167

⁴ Comparison schools sample size: Year 1 N = 291, Year 2 N = 291, Year 3 N = 291

⁵ A few parents of SBHC nonusers and comparison students 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 could have meant the school nurse.

In addition to the results from the parent survey, in Year 2 we asked students where they went for care when they were sick (see Table 21). In Year 2, 353 (73.7%) students in intervention schools reported that they used the SBHCs while 126 (26.3%) reported they did not use the SBHCs. In Year 3, only 213 (62.1%) reported that they used the SBHCs.

There was no difference across gender in SBHC utilization but 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 ($\chi^2 = 4.54$; $p = 0.03$). Both students’ and parents’ ratings across the various dimensions of the PedsQL were not significantly associated with the likelihood of SBHC use.

Students in the intervention schools reported far less use of medical providers other than the SBHCs when sick. SBHC nonusers also reported significantly different provider use (lower ED and doctor utilization and higher nurse and other provider utilization) compared to students in the comparison schools (see Table 21).

Table 21: Student self-report of medical provider use when sick among those not using SBHC¹

Medical Home	Year 2		Year 3	
	NonUser ²	Comparison ³	NonUser ²	Comparison ³
Doctor	81 (65.3%)	376 (75.8%)	86 (66.2%)	239(72.6%)
Nurse	12 (9.7%)	29 (5.9%)	15 (11.5%)	14 (4.3%)
Hospital ED	7 (5.7%)	44 (8.9%)	6 (4.6%)	30 (9.1%)
Other	15 (12.1%)	18 (3.6%)	4 (3.1%)	6 (1.8%)
Nowhere	9 (7.3%)	29 (5.9%)	19 (14.6%)	41 (12.2%)

¹ Data are from student survey. Analysis was done on cross-sectional surveys.

² SBHC nonuser sample size: Year 2 N = 124, Year 3 N = 130.

³ Comparison schools sample size: Year 2 N = 496, Year 3 N =330

* p < .05; ** p < .01; *** p < .001.

Hypothesis 3.2) The percentage of students who have had a well-child visit in the prior year increases in the intervention schools compared to students in the comparison schools.

Table 22 presents the Poisson regression results for well-child care utilization for the survey sample.

SBHC users did not differ from either SBHC nonusers or comparison students in well-child care utilization in the unadjusted model.

Adjusting for other factors did not significantly mediate the effect of the SBHCs over time on well-child care.

The effect of SBHC x Time was independent of all other variables (no statistically significant three-way interactions).

Among other variables, students in rural areas were significantly less likely to access well-child care, but this effect was no longer significant in the full regression model. 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 no longer significant in the full regression model.

Table 22. Well-Child Care over Time on School- and Individual-Level Factors-Survey Sample (N=587)

	Model 1	Model 2	Model 3	Model 4	Model 5
Intervention¹					
SBHC nonuser	0.0386	0.1986	0.0702	-0.0068	0.1147
Comparison	0.1518	0.2340	0.2016	0.2429	0.2949
Time	0.2128	0.2335	0.2224	0.2183	0.2434
SBHC nonuser x Time	-0.0823	-0.1174	-0.1032	-0.0729	-0.1165
Comparison x Time	-0.2595	-0.2801	-0.2779	-0.2618	-0.2888
School-Level Factors					
State					
Ohio		-			-
Kentucky		0.1940			0.1983
Region					
Rural		-0.2996**			-0.1457
Urban		-			-
Individual-Level Factors					
Age			-0.0081		-0.0273
Gender					
Male					-
Female			-0.1059		-0.0738
Race					
Black			-0.0187		-0.0898
White					-
Other			0.9067		0.6899
Health Insurance					
Private					-
Public			0.3399**		0.1523
None			-0.3052		-0.3602
Chronic condition					
Asthma				0.0955	0.0930
ADHD				0.3824	0.3157
Learning Disability				0.4825	0.4788
Other				0.4193	0.2997

* p<.05; ** p<.01; *** p<.001.

¹ Reported coefficients are intervention x time interactions with 1 df. SBHC user is the reference category.

Table 23 presents the Poisson regression results for ill-child care utilization for the survey sample.

Intervention students and comparison students did not differ based on ill-child care.

Adjusting for other factors did not mediate the effect of time on ill-child care.

The effect of SBHC x Time was independent of all other variables (no statistically significant three-way interactions).

Among other variables, older students were less likely to seek ill-child care compared to younger students. Blacks were less likely than Whites 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.

Table 23. Ill-child Care over Time on School- and Individual-Level Factors-Survey Sample (N=587)

	Model 1	Model 2	Model 3	Model 4	Model 5
Intervention¹					
SBHC nonuser	0.0476	0.1293	0.0404	0.0199	0.0985
Comparison	0.0180	0.0645	-0.0175	0.0538	0.0424
Time	-0.0818	-0.0713	-0.0695	-0.0882*	-0.0614
SBHC nonuser x Time	-0.0867	-0.1024	-0.1072	-0.0939*	-0.1292
Comparison x Time	-0.1222	-0.1317	-0.1354	-0.1243**	-0.1413
School-Level Factors					
State					
Ohio		-			-
Kentucky		0.2262**			0.0699
Region					
Rural		0.0308			-0.1896
Urban		-			-
Individual-Level Factors					
Age			-0.0576***		-0.0710***
Gender					
Male					-
Female			-0.0050		0.0306
Race					
Black			-0.4018**		-0.5383***
White					-
Other			-0.1483		-0.3606
Health Insurance					
Private					-
Public			0.1637		-0.0226
None			-0.6515*		-0.7124*
Chronic condition					
Asthma				0.4750***	0.5323***
ADHD				0.3371***	0.3551*
Learning Disability				0.0662	0.1528
Other				0.2482***	0.2699

* p<.05; ** p<.01; *** p<.001.

¹ Reported coefficients are intervention x time interactions with 1 df. SBHC user is the reference category.

Hypothesis 3.3) The percentage of students with health insurance in intervention schools improves compared to students in comparison schools.

Children in the intervention schools were more likely to have public or no health insurance (see Table 24). SBHC users were also more likely than nonusers to have public or no health insurance. Students in comparison schools were more likely to have private health insurance. There was no significant change for any group or between groups over time. 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.

Table 24: Parent Report of Health Insurance Status for Students¹

Health Insurance	Year 1			Year 2			Year 3		
	User ²	Nonuser ³	Comp ⁴	User ²	Nonuser ³	Comp ⁴	User ²	Nonuser ³	Comp ⁴
Private	49.8%	63.56%	70.2%	50.9%	62.9%	71.5%	59.1%	63.6%	74.9%
Public									
Medicaid/Medicare	21.1%	16.8%	16.5%	24.9%	21.0%	15.6%	17.6%	18.5%	13.9%
Healthy Start/ KCHIP ⁵	20.2%	12.4%	8.2%	15.8%	11.1%	8.3%	10.7%	13.0%	9.1%
None	8.9%	7.2%	5.2%	8.5%	5.8%	4.7%	7.55%	1.1%	2.1%

¹ Data are from parent survey. Analysis was done on cross-sectional sample.

² SBHC user sample size: Year 1 N = 247, Year 2 N = 165, Year 3 N = 159

³ SBHC nonuser sample size: Year 1 N = 428, Year 2 N = 310, Year 3 N = 184

⁴ Comparison sample size: Year 1 N = 674, Year 2 N = 495, Year 3 N = 330

⁵ Healthy Start and KCHIP are Ohio and Kentucky's respective state Children's Health Insurance Programs (CHIP).

Table 25 presents the logistic regression results for health insurance status for the survey sample.

SBHC users and comparison students did not differ based on insurance coverage. There was also no significant change over time.

The effect of SBHC x Time was independent of all other variables (no statistically significant three-way interactions).

Among other variables, rural students were more likely to have health insurance compared to urban students, but this effect disappeared in the full model. Income was the only significant predictor for insurance coverage in the full model.

Table 25. Insurance Coverage over Time on School- and Individual-Level Factors (N=568)

	Model 1	Model 2	Model 3	Model 4	Model 5
Intervention¹					
SBHC nonuser	0.4179	0.2199	0.2405	0.4298	0.1645
Comparison	0.6916	0.5816	0.2462	0.7432	0.2930
Time	0.0289	-0.0032	-0.0582	0.0528	-0.0409
SBHC nonuser x Time	0.1939	0.2380	0.4155	0.1717	0.4304
Comparison x Time	0.1858	0.2185	0.2473	0.1626	0.2330
School-Level Factors					
State					
Ohio		-			-
Kentucky		0.0903			0.1767
Region					
Rural		0.7703*			0.5208
Urban		-			-
Individual-Level Factors					
Age			-0.1580		-0.1541
Gender					
Male			-		-
Female			-0.3875		-0.3376
Race					
Black			-0.0167		0.2449
White			-		-
Other			0.5991		0.6663
Income			0.1533***		0.1479***
Chronic condition					
Asthma				-0.0158	-0.2177
ADHD				0.9229	0.9577
Learning Disability				0.1022	0.5054
Other				0.0115	0.3533

* p<.05; ** p<.01; *** p<.001.

¹ Reported coefficients are intervention x time interactions with 1 df. SBHC user is the reference category.

Hypothesis 3.4) The percentage of students in intervention schools with emergency department visits decreases compared to students in comparison schools.

Overall, both SBHC users and comparison students did not have any noticeable change in emergency department (ED) utilization over time (refer to Figure 27 above). However, SBHC nonusers appeared to have a slight increase in ED use from Year 1 to Year 3, but this change was nonsignificant (see Table 26).

Table 26: Parent Report of Student ED Visits¹

ED Visits	Year 1			Year 2			Year 3		
	User ²	Nonuser ³	Comp ⁴	User ²	Nonuser ³	Comp ⁴	User ²	Nonuser ³	Comp ⁴
0	70.1	71.4	67.0	67.3	73.5	71.5	67.2	65.3	70.5
1	18.7	16.9	19.9	18.7	15.9	19.2	18.8	19.2	19.6
2-3	6.5	9.5	11.0	11.2	8.5	7.2	10.9	10.8	7.6
4+	4.7	2.1	2.1	2.8	2.1	2.1	3.3	4.8	2.4

¹ Data are from parent survey. Analysis was done on longitudinal sample.

² SBHC user sample size: Year 1 N = 107, Year 2 N = 107, Year 3 N = 129

³ SBHC nonuser sample size: Year 1 N = 189, Year 2 N = 189, Year 3 N = 167

⁴ Comparison schools sample size: Year 1 N = 291, Year 2 N = 291, Year 3 N = 291

Table 27 presents the ordinal regression results of ED utilization for the survey sample. Note that the ordinal regression equation models the likelihood of fewer visits. Thus, a positive coefficient means greater likelihood for fewer or no ED visits, and a negative coefficient means lower likelihood for no ED visits.

There were no significant differences between the three groups, nor were there any significant differences in change over time across the groups.

Adjusting for other factors did not significantly mediate the effect of SBHC over time on ED utilization but exacerbated this effect. Individual-level factors, including chronic condition, accounted for this increase.

The effect of SBHC x Time was independent of all other variables (no statistically significant three-way interactions) with the exception of state of residence.

Among other variables, males, students with public health insurance, and students with asthma, ADHD or other chronic conditions were significantly more likely to use the ED (less likely to have fewer visits).

Table 27. ED Utilization over Time¹ on School- and Individual-Level Factors (N=587)

	Model 1	Model 2	Model 3	Model 4	Model 5
Intervention²					
SBHC nonuser	0.2595	0.2002	0.1292	0.2530	0.1993
Comparison	-0.2204	-0.2591	-0.4167	-0.3677	-0.4592
Time	-0.0692	-0.0852	-0.1061	-0.0734	-0.0973
SBHC nonuser x Time	-0.0850	-0.0679	-0.0404	-0.0784	-0.0526
Comparison x Time	-0.1572	0.1775	0.2150	0.1718	0.2065
School-Level Factors					
State					
Ohio		-			-
Kentucky		0.2784			0.2158
Region					
Rural		0.9434**			0.2409
Urban					-
Individual-Level Factors					
Age			-0.0070		0.0146
Gender					
Male			-		-
Female			0.2847*		0.2300
Race					
Black			-0.2265		-0.0455
White			-		-
Other			-0.1790		0.1557
Health Insurance					
Private			-		-
Public			-0.7399***		-0.5450***
None			-0.3099		-0.2946
Chronic condition					
Asthma				-0.6171***	-0.5061**
ADHD				-0.8127**	-0.7478**
Learning Disability				-0.3948	-0.1863
Other				-0.6711***	-0.7506***

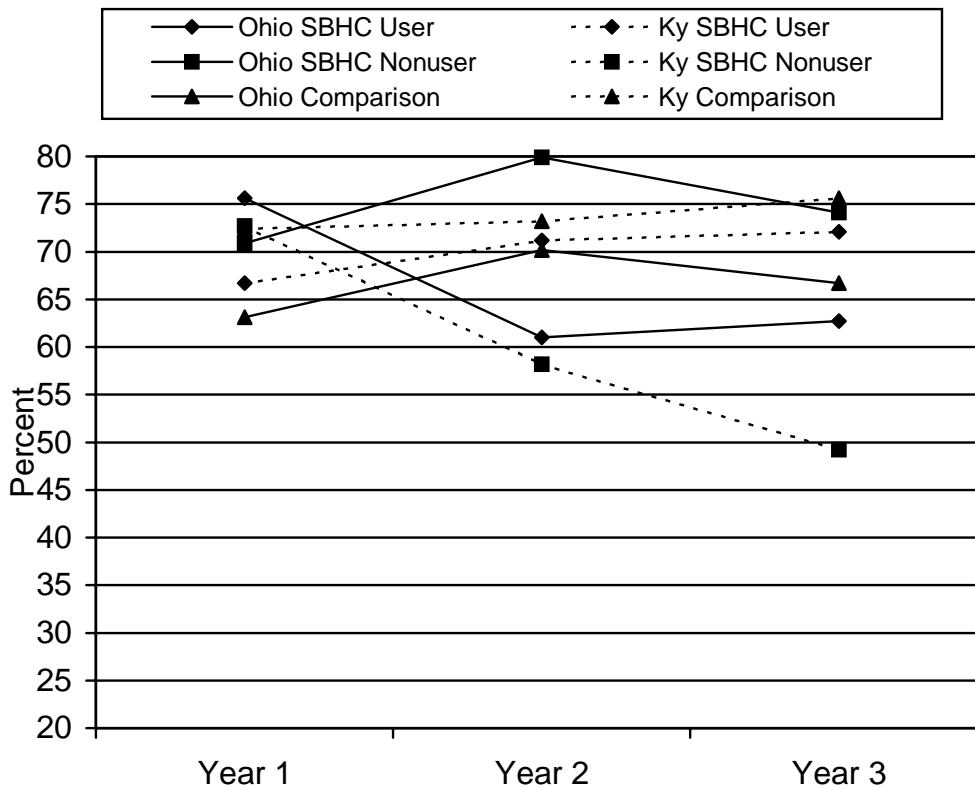
* p<.05; ** p<.01; *** p<.001.

¹ The ordinal regression equation models the likelihood of fewer visits. Thus, a positive coefficient means greater likelihood for fewer or no ED visits. A negative coefficient would mean lower likelihood for fewer or no ED visits.

² Reported coefficients are intervention x time interactions with 1 df. SBHC user is the reference category.

Figure 32 provides a graphic representation of the significant three-way interactions with intervention and time across state. The pattern with respect to the three-way interaction between state, intervention, and time was difficult to ascertain. The number of Ohio SBHC users with no ED visits declined from Year 1 to Year 2 but rose slightly in Year 3. Ohio SBHC nonusers showed an opposite pattern, with an increase in the percentage of students with no ED visits in Year 2 and a decrease in Year 3. In Kentucky, SBHC users showed a steady increase in percentage of students with no ED visits, but nonusers showed a steep decline in percentage of students with no ED visits. In both states, students in comparison schools showed a fairly consistent trend in percentage of students with no ED visits over the three years, with those in Ohio having a slightly lower percentage.

Figure 32. Percent of students with no ED visits among SBHC users, nonusers, and comparison students, by state (N=587)



Process Evaluation Results

1.0 TYPE AND VOLUME OF SERVICES PROVIDED

1.1 Student Demographics

The following table presents basic cross-sectional and longitudinal population and sample characteristics on the total school samples supplied by the schools and student SBHC enrollment forms.

Table 28. School Population Socio-Demographic Characteristics

	Cross-Sectional Data Set			Longitudinal Data Set			
	Year 1	Year 2	Year 3	Years 1-3	Year 1	Year 2	Year 3
Total N	11,873	16,346	17,137	7813			
Intervention N	8,355(70.4%)	9,709(59.4%)	10,731(62.6%)	5,392(69.0%)			
Comparison N	3,518(29.6%)	6,637(40.6%)	6,406(37.4%)	2,421(31.0%)			
Gender:							
Male	6,211(52.3%)	8,582(52.5%)	9,015(52.6%)	4,081(52.2%)			
Female	5,662(47.7%)	7,764(47.5%)	8,122(47.4%)	3,732(47.8%)			
Race:							
Black	2,335(19.7%)	2,731(16.7%)	2,468(14.4%)	821(10.5%)			
White	9,100(76.6%)	12,982(79.4)	12,925(75.4%)	6,088(77.9%)			
Other	438(3.7%)	633(3.9%)	1,744(10.2%)	904(11.6%)			
Age mean(sd)	8.39(2.21)	9.68(2.77)	9.62(2.76)		8.46(2.19)	9.46(2.19)	10.45(2.19)
Region:							
Urban	5,895(49.7%)	7,810(47.8%)	8,398(49.0%)		3,138(40.2%)	3,134(40.1%)	3,137(40.2%)
Rural	5,978(50.3%)	8,536(52.2%)	8,739(51.0%)		4,675(59.8%)	4,679(59.9%)	4,676(59.8%)
State:							
Ohio	7,656(64.5%)	9,422(57.6%)	9,197(53.7%)		5,108(65.4%)	5,108(65.4%)	5,107(65.4%)
Kentucky	4,217(35.5%)	6,924(42.4%)	7,940(48.3%)		2,705(34.6%)	2,705(34.6%)	2,706(34.6%)
Average Absences:							
SBHC Enrollment¹	8.31(9.90)	7.11(8.14)	8.70(8.98)		8.67(9.21)	7.45(7.79)	9.03(9.10)
SBHC Utilized¹	3,621/8,355(43.3%)	4,613/9,709(47.5%)	5,779/10,731(53.9%)		3,023/5,392(56.1%)	3,023/5,392(56.1%)	3,518/5,392(65.2%)
SBHC Utilization Rate¹ mean(sd)	2,200/8,355(26.3%)	2,836/9,709(29.2%)	3,289/10,731(30.7%)		1,771/5,392(32.8%)	1,771/5,392(32.8%)	2,184/5,392(40.5%)
mean(sd)	1.67(1.40)	1.70(1.63)	1.99(2.73)		1.64(1.39)	1.72(1.69)	1.90(2.59)
Insurance Status:²							
Public	867/3,621(23.9%)	1,147/4,613(24.9%)	1,435/5,779(24.8%)		672/3,023(22.2%)	672/3,023(22.2%)	823/3,518(23.4%)
Private	1,455/3,621(40.2%)	1,774/4,613(38.5%)	2,120/5,779(36.7%)		1,302/3,023(43.1%)	1,302/3,023(43.1%)	1,524/3,518(43.3%)
None	396/3,621(10.9%)	527/4,613(11.4%)	548/5,779(9.5%)		324/3,023(10.7%)	324/3,023(10.7%)	314/3,518(8.9%)
Unknown	903/3,621(25.0%)	1,165/4,613(25.2%)	1,676/5,779(29.0%)		725/3,023(24.0%)	725/3,023(24.0%)	857/3,518(24.4%)

¹ Enrollment and utilization numbers are based on the total population of students from intervention schools only.

² **Insurance status is based on students enrolled in the SBHCs.**

1.2 General Information

Table 29: School and School Enrollment Totals

School	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
	School K-8 Enrollment ^{1,2}	School K-8 Enrollment ^{1,2}	School K-8 Enrollment ¹	SBHC K-8 Enrollment ³	SBHC K-8 Enrollment ³	SBHC K-8 Enrollment ³
School A	507 [489]	855 [507]	1018	443	476	455
School B	2414 [2393]	2489 [2384]	3338	670	843	1,120
School C	1098 [1090]	1563 [1082]	2157	835	1057	910
School D	474 [621]	614 [565]	789	420	550	531
School E	382 [363]	537 [340]	648	211	230	173
School F	2128 [2109]	2336 [2009]	2604	811	689	220
School G	181 [183]	215 [178]	234	171	174	176
School H	1061 [1150]	1199 [1092]	1562	558	450	444

¹ School total enrollment from school files. Numbers inflated because they include withdrawn students.

² [#] represents total school enrollment as reported by the National Center for Educational Statistics website each year in the 2000-01 school year (Year 1) and 2001-02 school year (Year 2).

³ SBHC enrollment was based on single yearly estimates provided by the SBHCs at the beginning of the school year.

1.3 Reasons for Student Visit

Students generally presented to the SBHC for physical health issues such as routine or well-child care, medical exams (coughs, sinus, rashes, injuries, infections, etc.), and procedures (physicals, immunizations, etc.). Between Years 1 and 3, however, reported psychosocial visits increased from 32 to 1,415. This may be due to increased efforts to attend to behavioral health issues or more thorough documentation and recording of psychosocial visits. The table below provides the presenting health problems as reported in Welligent.

Table 30. Student-Presented Health Problems for SBHC Visits by Year

Presenting Health Problem	Year 1		Year 2		Year 3	
	N	%	N	%	N	%
Eye/Ear/Nose/Throat	1,292	34.85%	1,588	31.26%	1,829	28.79%
Other/Miscellaneous	846	22.82%	1,398	27.52%	1,021	16.07%
Respiratory	336	9.06%	317	6.24%	393	6.19%
Dermatological	333	8.98%	373	7.34%	369	5.81%
Musculo/Skeletal	221	5.96%	230	4.53%	307	4.83%
Gastrointestinal	194	5.23%	249	4.90%	223	3.51%
Immune System (Allergy)	139	3.75%	77	1.52%	160	2.52%
Neurological	94	2.54%	237	4.67%	183	2.88%
Psycho/Social	32	0.86%	197	3.88%	1,415	22.27%
Parasites/Infections	15	0.40%	23	0.45%	24	0.38%
Endocrine	10	0.27%	16	0.31%	9	0.14%
Communicable Disease	7	0.19%	37	0.73%	98	1.54%
Nutrition/Metabolic	7	0.19%	34	0.67%	66	1.04%
Total Visits	3,526		4,776		6,097	

1.4 Diagnoses Made During Visit

The top 10 most frequent diagnoses for all SBHC health encounters as reported in Welligent for each year are:

Table 31. Top 10 SBHC Student ICD-9 Diagnoses: Years 1-3

Rank	Year 1 (Total Visits=3703)	Year 2 (Total Visits=5080)	Year 3 (Total Visits=6354)
1	462.00 Acute Pharyngitis (N=339)	V20.2 Well-Child Check (N=313)	V67.9 Follow-up Examination (N=358)
2	465.90 Acute Upper Respiratory Infection (N=324)	462.00 Acute Pharyngitis (N=308)	314.01 Attention Deficit Disorder with Hyperactivity (N=334)
3	V20.2 Well-Child Check (N=193)	465.90 Acute Upper Respiratory Infection (N=282)	034.00 Streptococcal Sore Throat (N=312)
4	381.00 Acute Non-Supportive Otitis Media (N=148)	079.99 Unspecified Viral Infection (N=186)	312.90 Unspecified Disturbance of Conduct (N=291)
5	V20.1 Routine Child Check (N=130)	959.90 Unspecified Injury (N=177)	V20.2 Well-Child Check (N=288)
6	034.00 Streptococcal Sore Throat (N=127)	784.00 Headache (N=163)	462.00 Acute Pharyngitis (N=287)
7	V67.9 Follow-up Examination (N=126)	461.90 Acute Sinusitis, Unspecified (N=152)	465.90 Acute Upper Respiratory Infection (N=244)
8	959.90 Unspecified Injury (N=121)	034.00 Streptococcal Sore Throat (N=147)	309.90 Unspecified Adjustment Reaction (N=217)
9	784.00 Headache (N=103)	V20.1 Routine Child Check (N=126)	V70.3 Other Medical Examination for Administrative Purposes (N=203)
10	692.90 Unspecified Dermatitis (N=94)	V67.9 Follow-up Examination (N=126)	447.90 Unspecified Disorders of Arteries and Arterioles (N=168)

The most prevalent ICD-9 diagnostic categories derived by collapsing the individual ICD-9 codes are presented in Table 32, including the absolute number of visits and the percentage of total SBHC visits for that year.

Table 32: Most Frequent ICD-9 Diagnostic Categories for Students Presenting to SBHC ¹

Rank	Year 1		Year 2		Year 3	
	ICD-9 Category (N)	%	ICD-9 Category (N)	%	ICD-9 Category (N)	%
1	Respiratory (974)	26.3	Respiratory (1,178)	23.2	Health Supervision (1,408)	22.2
2	Health Supervision (727)	19.6	Health Supervision (1,079)	21.2	Mental Disorder (1,348)	21.2
3	Nervous System/ Sense Organs (464)	12.5	Injury/Poison (529)	10.4	Respiratory (1149)	18.1
4	Injury/Poison (445)	12.0	Nervous System/ Sense Organs (479)	9.4	Nervous System/ Sense Organs (516)	8.1
5	Symptoms (296)	8.0	Infections (458)	9.0	Infections (513)	8.1

¹ Data from SBHC student health encounter records (Welligent).

1.5 Identification of Students with Chronic Conditions

One of the primary aims of this evaluation was to examine how SBHCs impact health and health access among students with chronic conditions. We identified children with chronic conditions in two ways. In the first-year interview, we asked parents whether their child had a chronic condition. Second, on SBHC enrollment forms asked parents to identify any and all chronic conditions their child had.

From the results of the parent survey, we estimated that approximately 20% of students had a chronic condition. In Year 2, we asked parents whether they were told within the last 12 months that their child had a chronic condition. Table 33 presents the reported prevalence of students with various chronic conditions as

indicated by the parent surveys and the number of new onset cases between Years 1 and 2, determined by the number of parents reporting they had been told in the last 12 months that their child had a chronic condition.

Table 33: Parental Report of Prevalence and Incidence of Specific Chronic Conditions among Students¹

Diagnoses	Year 1		Year 2
	Prevalence ²	12-Month Incidence ²	Prevalence ^{2,3}
Asthma (N = 798)	15.9%	3.1%	19.0%
Attention Deficit Disorder (ADD) or ADHD (N = 792)	9.1%	2.2%	11.2%
Learning Disability (N = 793)	7.9%	1.8%	9.7%
Headaches (N = 801)	6.2%	5.1%	11.4%
Developmental Delay (N = 800)	3.1%	<1.0%	3.8%
Sickle Cell Anemia (N = 797)	<1.0%	<1.0%	<1.0%
Seizure Disorder (N = 800)	<1.0%	<1.0%	<1.0%
Diabetes (N = 801)	<1.0%	<1.0%	<1.0%

¹ Data are from parent survey. Analysis was done on longitudinal sample.

² Chronic conditions are not mutually exclusive, as students may have more than one chronic condition.

Of special interest is the effect of SBHCs on children with chronic health conditions. Chronic conditions such as asthma, diabetes, learning disabilities, ADHD, sickle cell, seizure disorders, and others can result in students missing school and parents missing work. Of the 4,587 children enrolled in SBHCs at the beginning of Year 3, 866 (18.9%) had chronic health conditions according to the SBHC enrollment forms as reported in the Welligent data records (see Table 34).

Table 34: Prevalence of Specific Chronic conditions as Indicated on SBHC Enrollment Forms in Years 1, 2, and 3¹

Chronic conditions (ICD-9 Codes):	Years 1 – 3 Combined		N of Office Visits		
	N	% of Total Enrolled	Year 1	Year 2	Year 3
Asthma (493.xx)	355	4.84	231	356	383
Other	331	4.51	260	426	355
ADD/ADHD (314.xx)	159	2.17	104	346	213
Headaches (346.xx, 784.00)	123	1.68	38	67	51
Learning Disorders (315.xx)	41	0.56	18	17	8
Seizure Disorders/Epilepsy (345.xx, 780.3x)	10	0.14	10	2	36
Diabetes (250.xx)	8	0.11	38	14	31
Sickle Cell (282.5-282.6x)	4	0.05	1	13	18
MRDD (317-319)	0	-	-	-	-

¹ Data from SBHC student health encounter records (Welligent). One chronic condition is listed for each child; therefore, this does not include comorbid conditions.

1.6 Diagnoses of Students with Chronic Conditions

Of the 1,148 students listed in the SBHC enrollment files as having a chronic condition, 674 (58.7%) had at least one SBHC visit, compared to 3,802 (61.4%) of the 6,191 children with no chronic condition listed. However, 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 ($t = 10.116, p < .001$). Most visits by chronically ill children were due to the same diagnoses as their non-chronically ill peers.

The Health Foundation was particularly interested in SBHC users with asthma and ADD/ADHD. Almost 4% (N=457) of all student medical visits were due to asthma, while 4.28% (N=357) of all visits were due to

ADD/ADHD. This varied across years, with a large increase in visits due to ADD/ADHD from Year 1 to Year 3 (see Figure 34). This also varied greatly across the eight intervention schools (see Figure 35).

Figure 34. Visits by SBHC users for Asthma and ADD/ADHD, as a Percentage of Total SBHC Visits

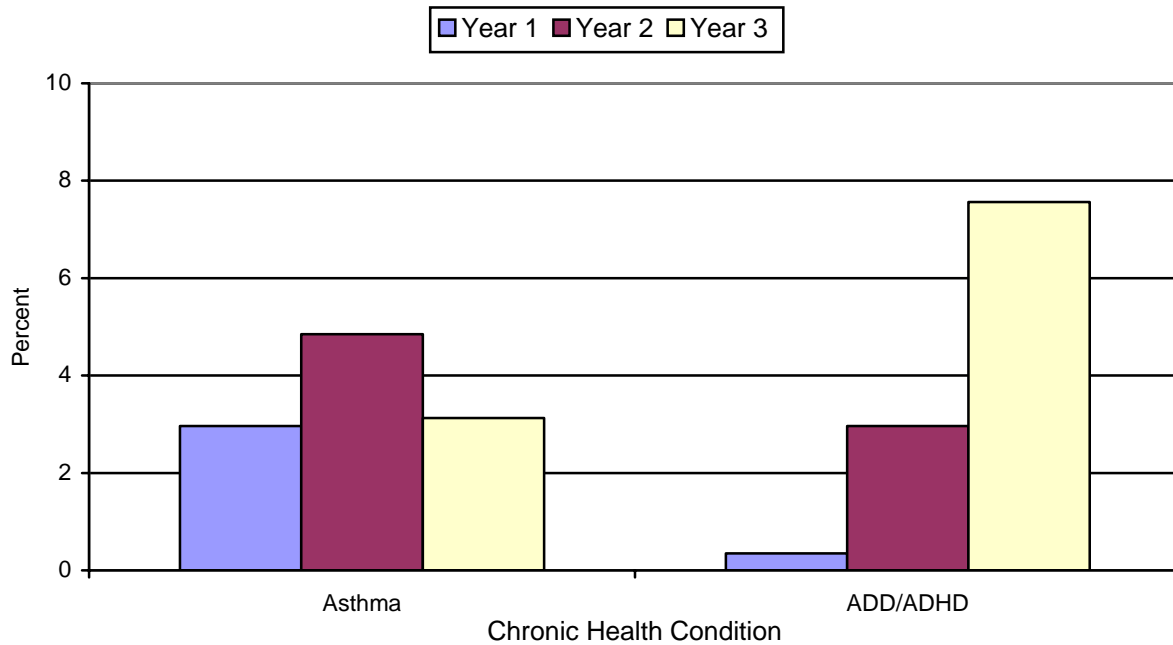


Figure 35. Visits for Asthma and ADD/ADHD as a Percentage of Total SBHC Visits by School

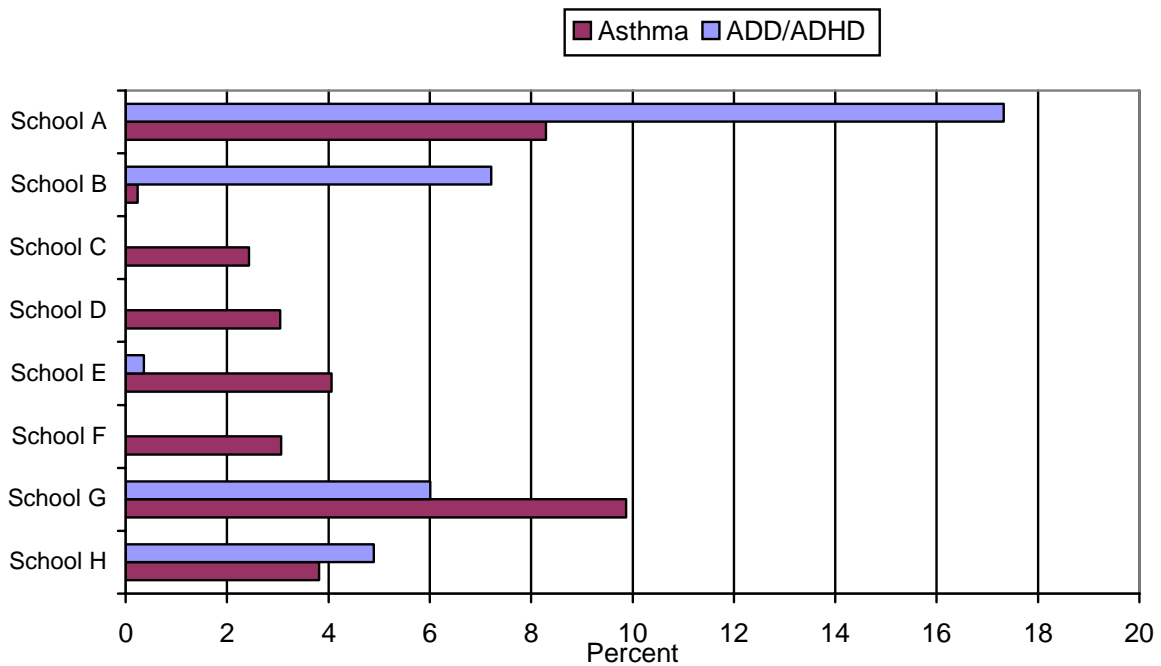


Table 35 shows the rate of SBHC visits by users with asthma and ADHD for both general office and condition-specific visits. The rate of visits for students with either condition is higher than the rate for all users.

Table 35. SBHC Enrollment, Utilization, and Yearly Rate of Utilization for Total Population, Students with Asthma, and Students with ADHD

	N	% of total	Rate of Office Visits		
			Year 1	Year 2	Year 3
Number of students in intervention schools	12,350				
Number of students enrolled in SBHC	7,339	59.43%			
Number of students with SBHC visit	4,476	36.24%			
Office visits per student in school			1.42	1.95	2.44
Office visits per student enrolled in SBHC			2.67	3.66	4.57
Number of students with reported asthma	355	4.84% ¹			
Rate of office visits by students with asthma for any reason			6.60	10.17	10.94
Rate of office visits for asthma			2.63	5.63	4.80
Number of kids with Reported ADHD	159	2.17% ¹			
Rate of office visits by students with ADHD for any reason			4.00	13.31	8.19
Rate of office visits for ADHD			0.42	4.62	15.62

¹ % of students enrolled in SBHC

The relatively small percentage of SBHC visits for chronic health conditions suggests that children with these conditions likely have other medical providers that attend to disease maintenance. Some SBHC Nurse Practitioners have indicated that this is desirable, since SBHCs are generally not open year-round. However, they also indicated that promoting the SBHC as an additional resource for chronic condition maintenance helps 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 a higher utilization of SBHCs when sick (79.5%) compared to students who do not have chronic conditions (70.1%) ($\chi^2 = 5.17, p = 0.02$).

1.7 Referrals

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 36).

Table 36. SBHC Student Referrals by Year

Referral Source	Year 1		Year 2		Year 3	
	N	%	N	%	N	%
Teacher	1,963	52.95%	2,449	48.21%	1,917	30.17%
Nurse	819	22.09%	957	18.84%	1,278	20.11%
Family/Parent	651	17.56%	1,167	22.97%	1,951	30.71%
Self	236	6.37%	334	6.57%	350	5.51%
Other	38	1.03%	173	3.41%	858	13.50%

Referrals to outside sources of care 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. We only present referrals out for Years 1 and 2 due to the differences in reporting across various SBHCs. As such, these findings must be taken with caution.

Overall, urban schools had significantly larger numbers of reported referrals out (see Table 37). Two urban schools accounted for 88.0% of the total number of referrals. This is even more pronounced given that these schools accounted for 26.8% percent of the total office visits and have 31.4% percent of the total number of kids enrolled in the eight SBHCs.

Table 37: Reported Referrals out of the SBHCs in Years 1 and 2¹

Referrals Out	Rural		Urban		Total	
	N	%	N	%	N	%
Notification of Illness	1	1.67	367	30.28	368	28.93
Referral to PCP	22	36.67	281	23.18	303	23.82
Referral for Dental	4	6.67	103	8.50	107	8.41
Notification of Injury	2	3.33	95	7.84	97	7.63
Results of Screening	0	0	89	7.34	89	7.00
CHIP Referral	0	0	61	5.03	61	4.80
Referral to Mental Health	9	15.00	49	4.04	58	4.56
Other	8	13.33	36	2.97	44	3.46
Referral for Subspecialty	10	16.67	31	2.56	41	3.22
Referral for Vision	0	0	23	1.90	23	1.81
Referral to Guidance Counselor	0	0	20	1.65	20	1.57
Referral for Hearing	2	3.33	17	1.40	19	1.49
Referral to Social Services	0	0	10	0.83	10	0.79
Need for Consultation	0	0	9	0.74	9	0.71
Request for Medication	0	0	8	0.66	8	0.63
Referral to Physical Therapy	0	0	5	0.41	5	0.39
Notice of Referral	1	1.67	1	0.08	2	0.16
Referral to Abuse Registry	0	0	2	0.17	2	0.16
Referral to Speech Therapy	0	0	1	0.08	1	0.08
Referral for Scoliosis	1	1.67	0	0	1	0.08
Referral To School Nurse	0	0	1	0.08	1	0.08
Request for Forms	0	0	1	0.08	1	0.08
Referral to Healthy Start	0	0	1	0.08	1	0.08
Referral to Special Education Eligibility	0	0	1	0.08	1	0.08
Total	60		1,212		1,272	

¹ Data from SBHC student health encounter records (Welligent).

1.8 Medications for Students with Chronic Conditions

Table 38: Most Frequent Medications Prescribed or Administered to Students, by Chronic Condition as Reported on SBHC Enrollment Forms¹ (N = 7,339)

Primary Chronic Condition ²	1	2	3	4	5
No chronic condition reported (N)	Amoxicillin (264)	Loratidine (95)	Methylphenidate (50)	Fexophenadine (48)	Amphetamine/ Dextroamphetamine (44)
ADHD (N)	Methylphenidate (50)	Amphetamine/ Dextroamphetamine (19)	Amoxicillin (11)	Albuterol (7)	Loratidine (5)
Asthma (N)	Albuterol (81)	Cetirizine (20)	Montelukast (13)	Loratidine (12)	Methylphenidate (10)
LD/MR (N) ³	Albuterol (1)	Amoxicillin (1)	Cetirizine (1)	Methylphenidate (1)	
Sickle Cell (N)	Acetaminophen (1)	Cetirizine (1)	Fluticasone (1)	Methylphenidate (1)	
Seizure Disorder (N)	Carbamazepine (1)	Divalproex Sodium (1)	Bupropion (1)	Levetiracetam (1)	Methylphenidate (1) Phenytoin (1)
Headache (N)	Amoxicillin (11)	Loratidine (6)	Ceterizine (4)	Montelukast (3)	
Diabetes (N)	Insulin (4)	Montelukast (2)			
Other (N)	Albuterol (18)	Methylphenidate (11)	Loratidine (11)	Amoxicillin (7)	Montelukast (6)

¹ Data from SBHC student health encounter records (Welligent).

² Primary chronic condition is the first condition identified on student SBHC enrollment forms. For the 273 children with at least two chronic health conditions, the medications taken for their other conditions are listed under their primary chronic condition.

³ Learning Disability/Mental Retardation

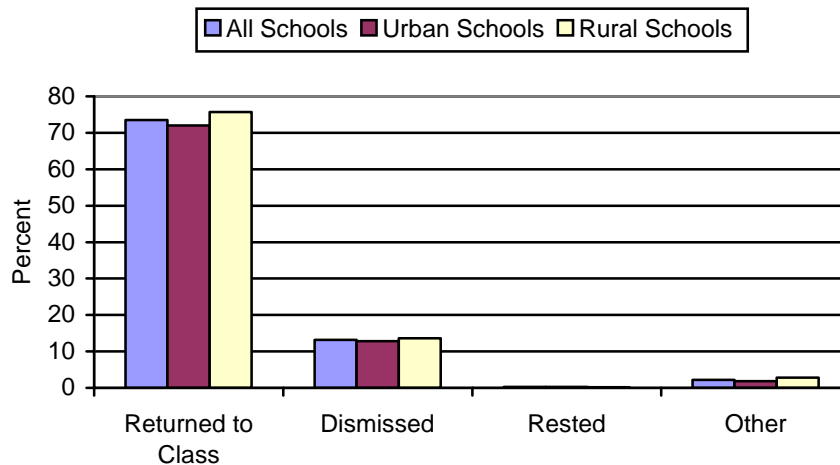
It is worthy to note that many students who did not have a chronic condition listed on their enrollment forms were taking medications that would indicate conditions such as asthma (e.g., Loratidine) and ADD/ADHD (e.g., methylphenidates or amphetamines/dextroamphetamines).

1.9 Notification/Disposition

In almost 75% of all student encounters to the SBHC, the student returned to class (see Figure 36). Less than 15% of all encounters resulted in a student being dismissed from school due to illness. In less than 1% of encounters, the student was provided an opportunity to rest. For over 10% (850), there was no recorded outcome listed for the student encounter.

Even more impressive was when we looked at only those encounters that were not for a health check-up (i.e., well-child care, immunization, follow-up). For these encounters, we also saw an increase in the return-to-class rate, going from 79.4% in Year 1 to 83.0% Year 3.

**Figure 36
SBHC Student Visit Outcomes**



1.10 Family Contact Information

We originally received family contact information from the schools to use for initial contact and for follow-up for the parent survey process. The data entered into the Welligent system was not detailed enough to provide adequate information to report on this field. Schools may have used other means to manage and store family contact information, such as enrollment forms or student files in the front office.

1.11 Number of Students Enrolled

Over the three years, there were 12,350 students in the eight intervention schools who were within the age range of this study. Of these, 7,339 students (59.4%) were enrolled in the SBHCs. Of the 7,339 enrolled students, 4,476 (61.0%) used the SBHCs at least once. There were a total of 15,141 visits over the three years.

Table 39 presents the percentage of the total school enrollment, percentage of all students enrolled in the SBHCs, percentage of total students with at least one office visit, and percentage of total office visits for each school and across urban and rural schools. Overall, urban schools comprised just slightly over half of all students. However, urban schools had a much higher proportion of the total number of students enrolled in the SBHCs (56.5% versus 43.5%). Urban schools also had a higher proportion of students with an office visit and of total SBHC visits.

Table 39: SBHC Enrollment and Visits from each School and Region as a Percentage of the Total in this Study¹ (N = 12,350 students, 15,141 office visits)

	School A	School C	School E	School F	Urban Schools Total	School B	School D	School G	School H	Rural Schools Total
% of total students in this school	8.2	17.5	5.3	21.1	52.0	27.0	6.4	1.9	12.7	48.0
% of total students enrolled in this SBHC	8.9	21.8	6.9	18.9	56.5	21.7	9.0	3.1	9.6	43.5
% of total students with an office visit	10.3	23.8	9.2	18.5	61.8	13.7	8.3	3.4	12.8	38.2
% of total office visits at this SBHC	13.0	20.8	12.9	11.9	58.5	12.3	8.6	3.7	16.9	41.5

¹ Data from SBHC student health encounter records (Welligent).

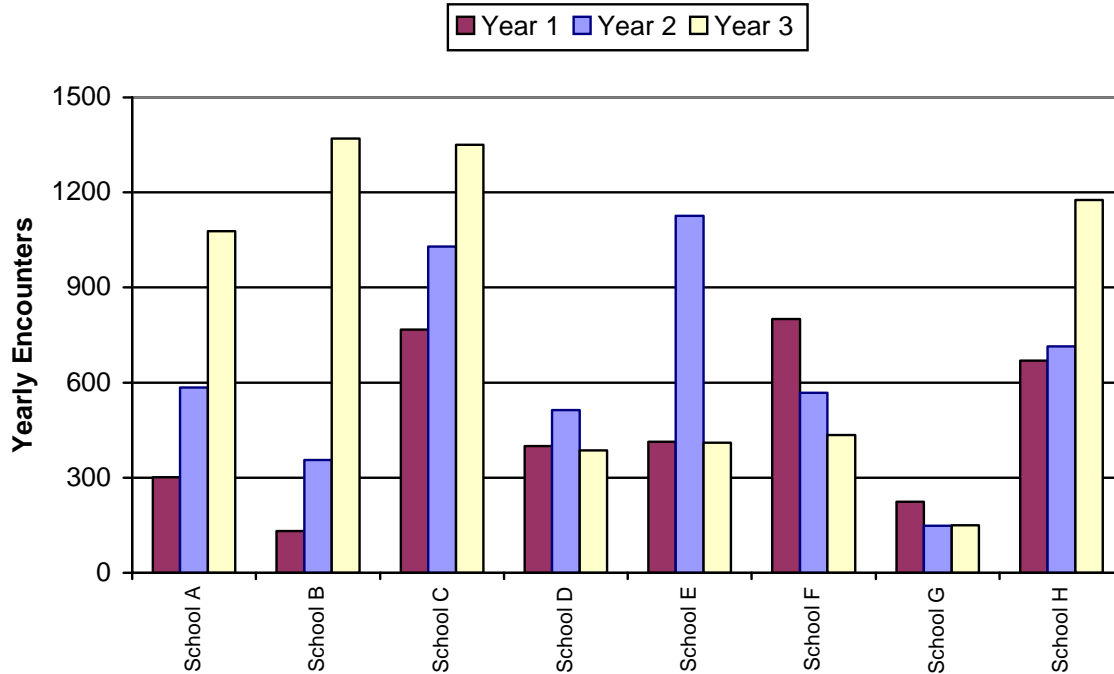
1.12 Number of Student Health Encounters

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. Of the total visits, 6,279 were in rural schools and 8,862 were in urban schools. Figure 37 shows the total number of student medical health encounters for each school district for each of the three years.

School F had a continuous decline in visits from Year 1 to Year 3. This may be due to the fact that this SBHC was a school-linked health center, with a primary goal to link students with PCPs within the community. The reduction in services may be an indication of their success in meeting this goal.

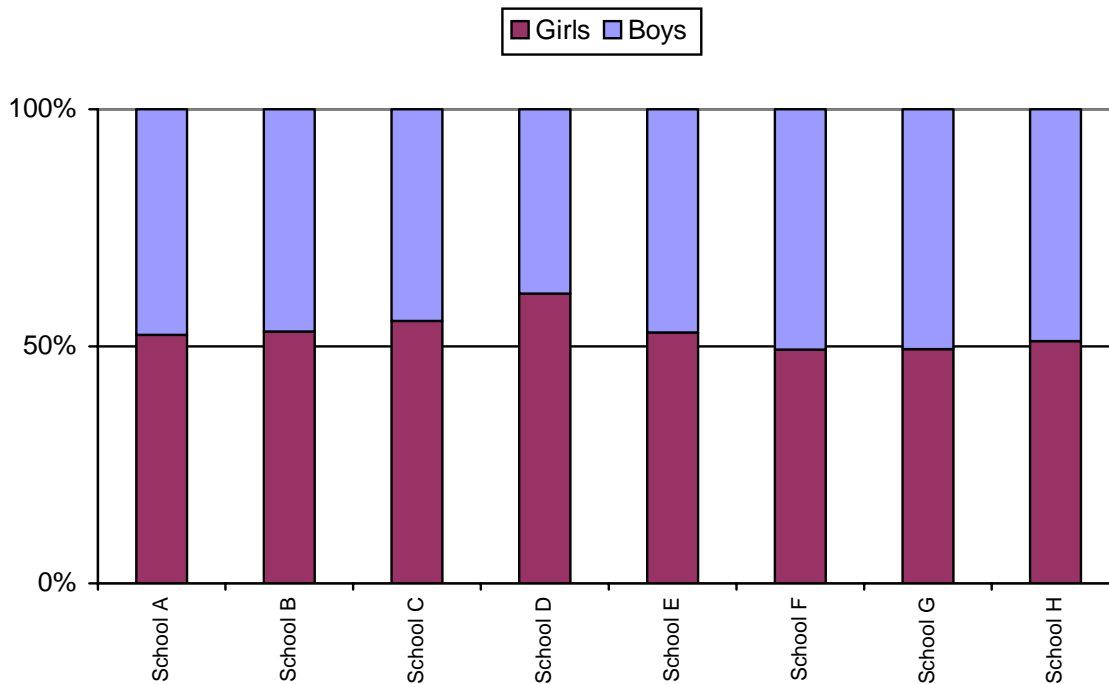
In Year 3, there was a substantial reduction in the number of SBHC encounters at one SBHC. During this period, there was a change and some political upheaval in the leadership of the medical partner. A new principal also started at the school in Year 3. These changes may be factors in this decrease in encounters.

Figure 37
Distribution of Student SBHC Health Encounters by Year



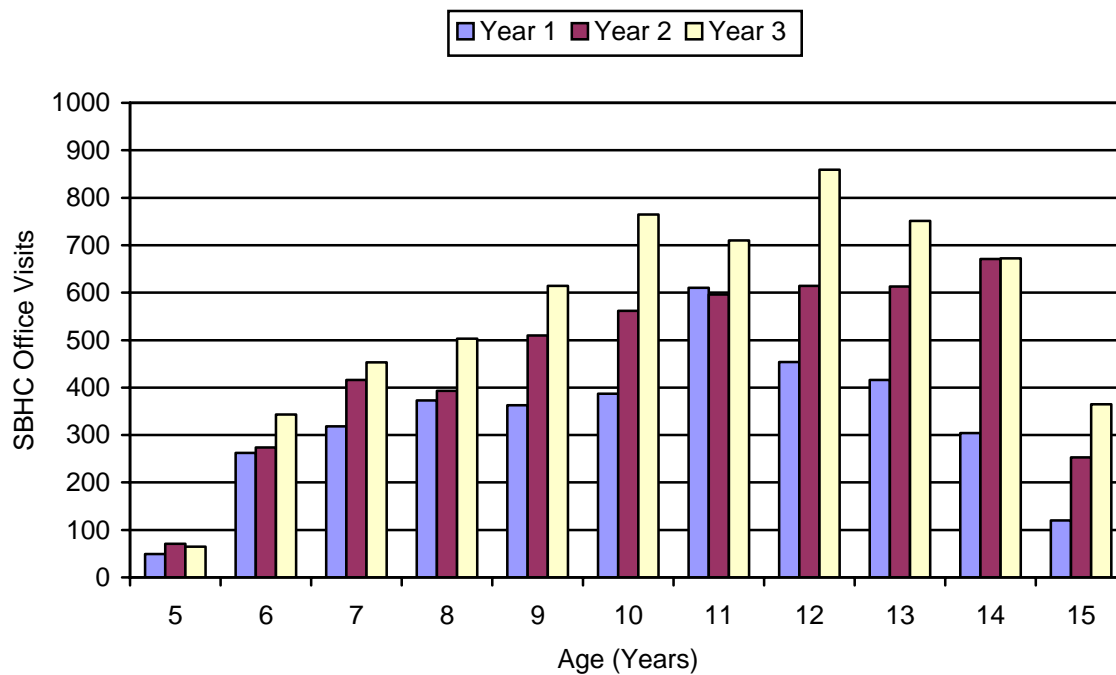
Overall, 4,170 (53.4%) of SBHC visits were by girls while 3,641 (46.6%) were by boys. This difference was slightly larger for rural schools (girls = 56.1%) compared to urban schools (girls = 51.6%). However, this varied across schools (see Figure 38).

Figure 38
Distribution of Student SBHC Medical Encounters by Gender



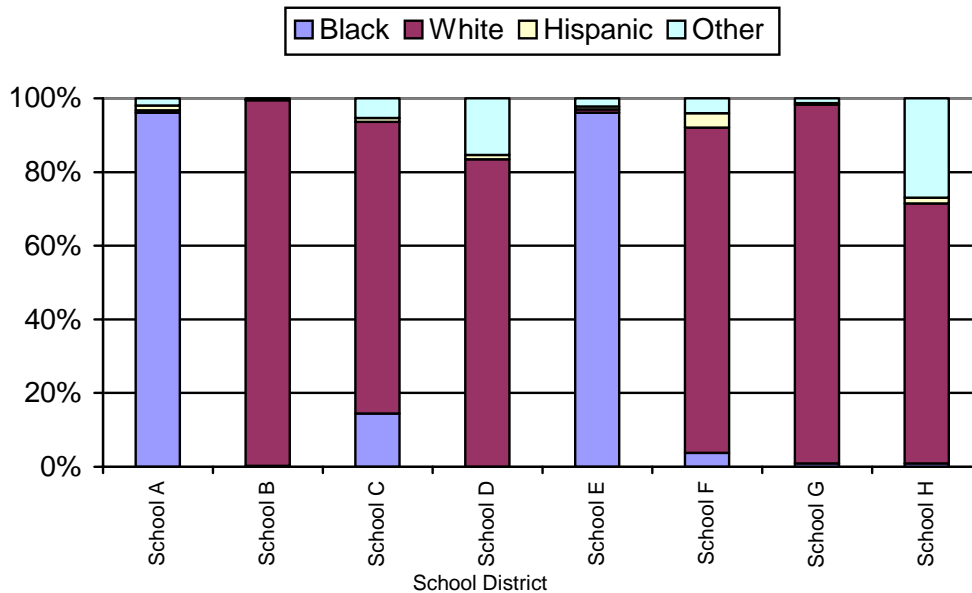
As discussed in the methods section, we were unable to examine student encounters by grade because some schools did not update Year 2 Welligent files. However, we were able to look at encounters by age. As this study only looked at grades K-8, we limited all student health encounter data to include only students aged 5-15. This removed high school and preschool students who may have had access to some SBHCs. An examination of the distribution of medical encounters by age shows that among all ages except 5, there was an increase in the absolute number of visits across the three years (see Figure 39).

Figure 39
Distribution of Student SBHC Medical Encounters by Age and Year



As expected, the racial breakdown of SBHC medical encounters was very similar to the demographic characteristics of the respective schools (see Figure 40). The two inner-city Ohio schools were overwhelmingly Black, while the other six schools are overwhelmingly White-NonHispanic. (Note: the “Other” category included students of Native American, Asian, or multi-racial descent and students entered into Welligent as “other.”)

Figure 40
Distribution of Student SBHC Medical Encounters by Race



1.13 Number of Students Seen

Over the three years, 12,350 students in the eight intervention schools were within the age range (5-15 years) of this study. Almost 60% of these students (7,339, 59.4%) were enrolled in the SBHCs. Of the total enrolled, 4,476 (61.0%) visited an SBHC at least once during the three years. The total number of student visits went from 3,707 in the first year to 5,080 in Year 2 and 6,354 in Year 3. Generally, older students and females had more SBHC visits. The number of visits increased over the three years among all students.

1.14 Insurance Status of Students Using SBHCs

Over the three years, the number of students with an SBHC visit increased for all insurance groups (see Table 40). However, as a percentage of total visits, visits by students with public insurance increased and visits by students with private or no insurance decreased.

Table 40. SBHC Student Visits by Year and Insurance Status

Type of Insurance	Year 1		Year 2		Year 3	
	N	Valid %	N	Valid %	N	Valid %
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%
Unknown/No Entry ³	721		366		1,229	

³ Unknown/No Entry are students whose enrollments file did not contain this information.

The distribution of medical insurance coverage among students enrolled in and students using the SBHCs is presented in Table 41. Among enrolled students, 34.5% had private insurance. Urban students (18.4% of the total or 28.8% of those whose insurance status is known) had substantially lower rates of private insurance than rural students (50.2% of the total or 61.2% of those whose insurance status was known). Almost 30% of students (27.9% of total or 38.7% of those whose insurance status was known) had public insurance. Again, this was much higher among urban students (32.5% of the total or 50.9% of those whose insurance status was known). The percentage of urban students with no insurance was close to twice that of rural students. Children whose insurance status was unknown comprised about 21.0% of the total number of students enrolled in the SBHCs.

Over 60% of students with public insurance (65.5%), no insurance (64.9%), and unknown insurance (63.7%) used the SBHCs, compared to the 54.0% of students with private insurance. Urban students (66.7%) had a higher overall utilization rate than rural students (53.6%). However, this aggregate comparison masks the fact that urban SBHCs served a higher proportion of students with public health insurance, no insurance, or unknown insurance, while rural schools served a slightly higher proportion of students with private insurance.

Table 41. Distribution of Health Insurance Coverage among Students who Enrolled and Used the SBHCs in Year 1 and Year 2¹

Type of Insurance	# enrolled in SBHCs			# who used the SBHCs					
	Rural N	Urban N	Total N	Rural		Urban		Total	
				N	% of Enrolled ²	N	% of Enrolled ²	N	% of Enrolled ²
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 ³	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 Data from SBHC student health encounter records (Welligent).

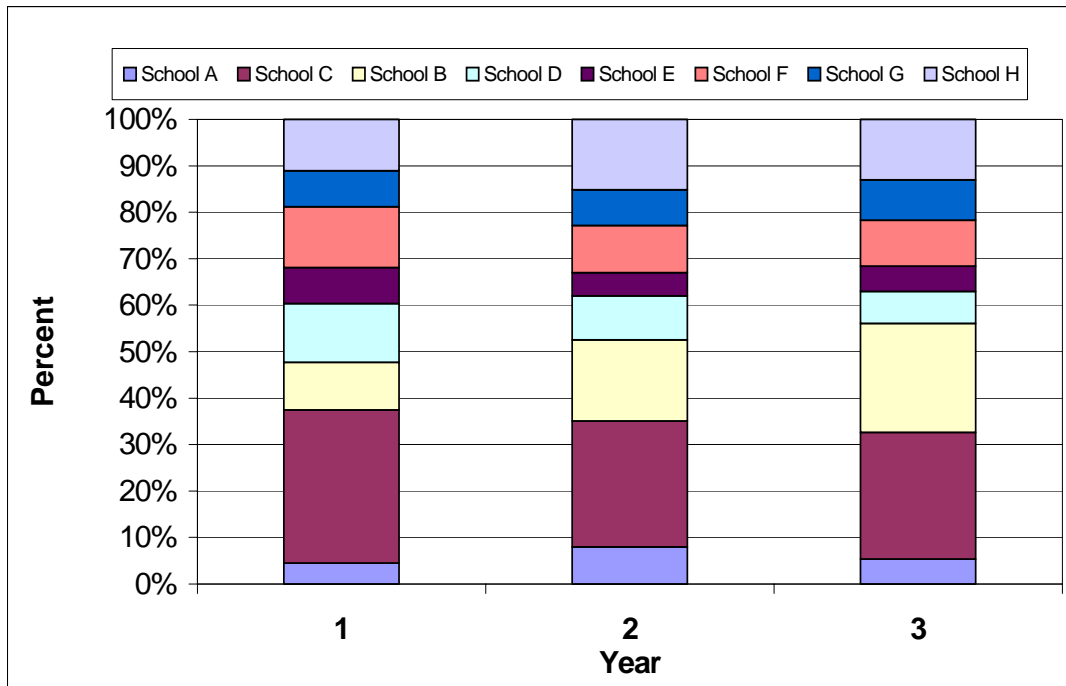
² Among those who used the SBHCs, the “% of enrolled” is based on the total sample size among those enrolled who are in the same geographic category and insurance group. For example, 860 rural students with private health insurance used the SBHCs. This is 54.3% of the 1,584 rural students with private insurance who were enrolled in the SBHCs.

³ Unknown/No Entry are students whose enrollments file did not contain this information.

2.0 SCHOOL PERSONNEL AND PARENT RATING OF QUALITY OF SERVICES

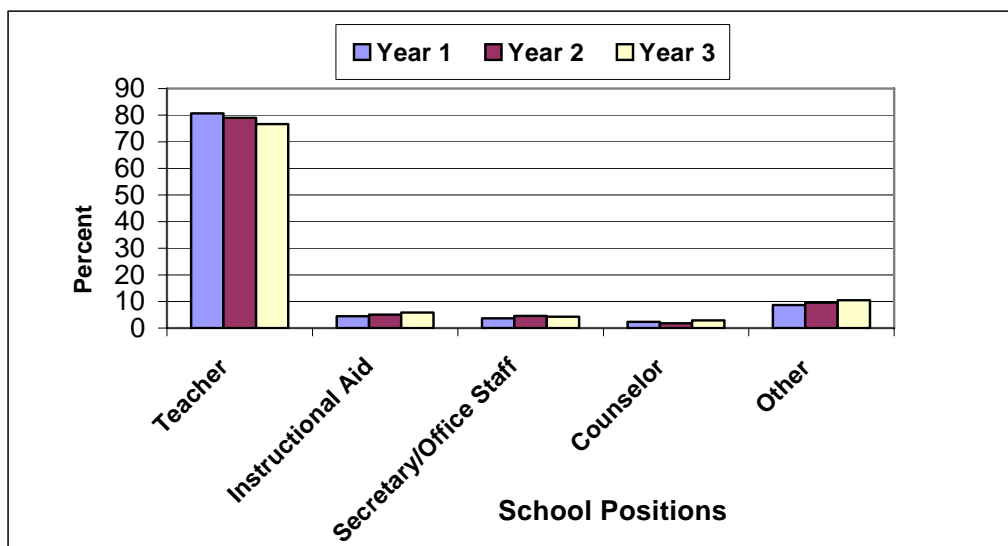
We surveyed teachers and staff of intervention schools in Years 1, 2, and 3. Figure 41 shows the percentage of respondents from each school compared to the total number of respondents.

Figure 41
Percent of Respondents from each Intervention School: Years 1-3



Respondents worked in various positions throughout the schools. Figure 42 shows the different positions held by respondents in Years 1-3. Almost 80% of respondents were teachers.

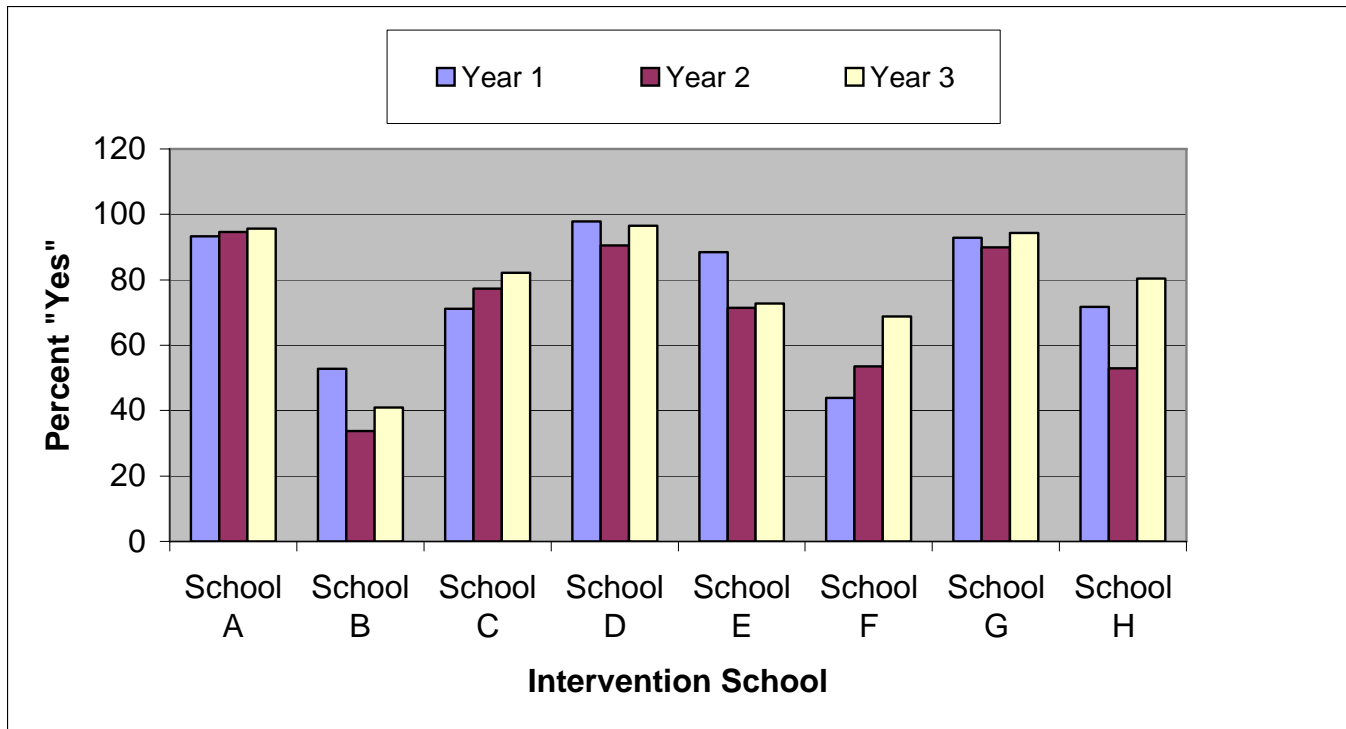
Figure 42
Percentage of Respondents by School Personnel Position: Years 1-3



2.1 Knowledge of Hours and Perception of Programs Offered by SBHC

We asked teachers and staff about their knowledge of the hours of operation of the SBHCs as well as their perception of the programs and services offered (see Figure 43). Overall, staff knowledge of SBHC hours increased from 63% in Year 1 to 71% in Year 3. Only in two schools was there a noticeable decrease from Year 1 to Year 3. Part of the decrease for one school may be due to the fact that a new principal joined the school before Year 3.

**Figure 43
Staff Knowledge of Hours of SBHC Operation: Years 1-3**



When asked about their perception of the programs and services offered by the SBHCs in their schools, the majority of respondents rated the services as “Excellent” or “Very Good.” With the exception of one school, the overall ratings generally increased over the three-year period (see Figure 44). Ratings for the individual services for each school for Year 2 and Year 3 are provided in Figures 45 and 46 below.

In Year 3, there was a substantial reduction in perception of programs and services among school personnel at one school. During this period, there was a change and political upheaval in the leadership of the medical partner. A new principal also started at the school in Year 3. These changes may be factors in this decrease.

Figure 44. School Personnel Perception of Programs/Services Offered at SBHCs as Excellent or Very Good: Years 1-3

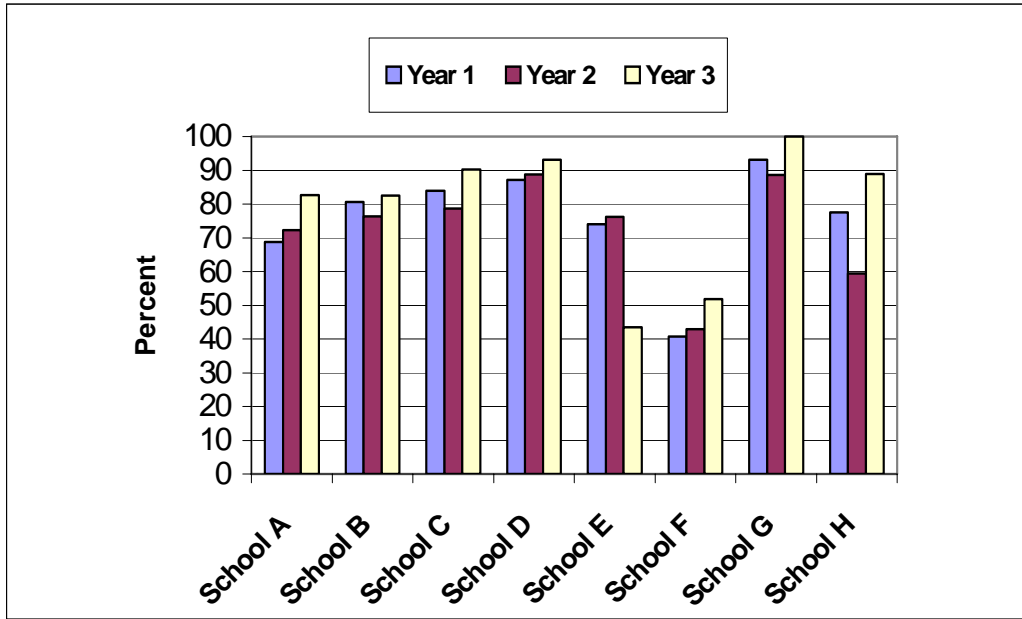


Figure 45. School Personnel Rating of Various Programs and Services Offered by SBHCs, Year 2

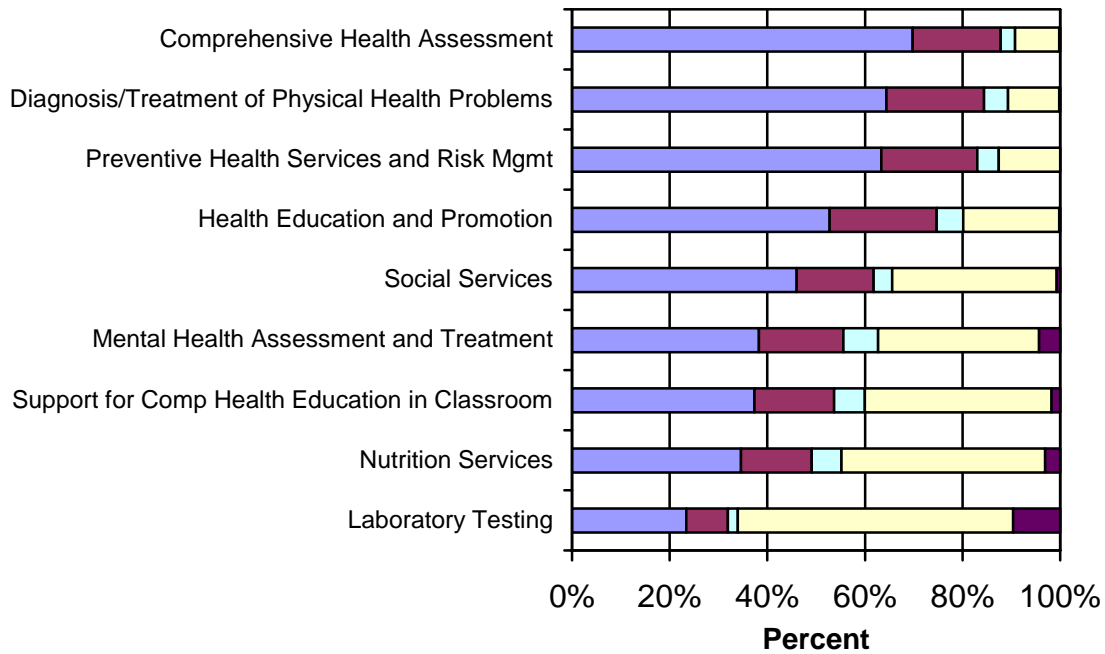
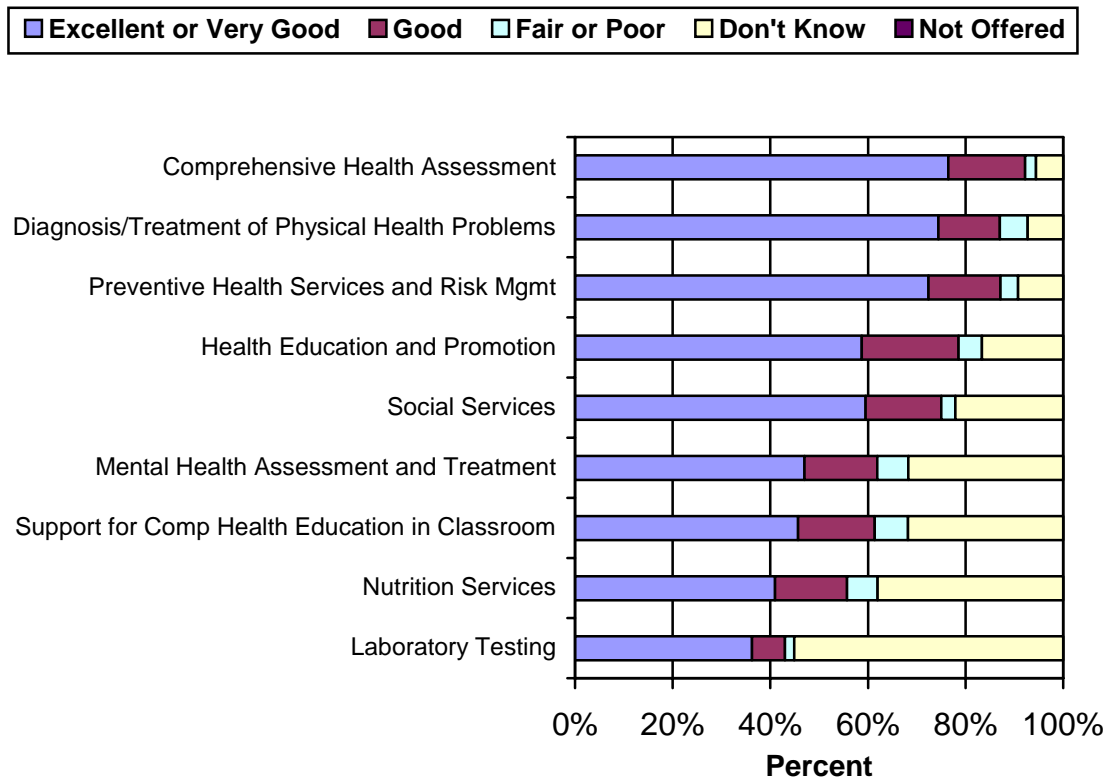


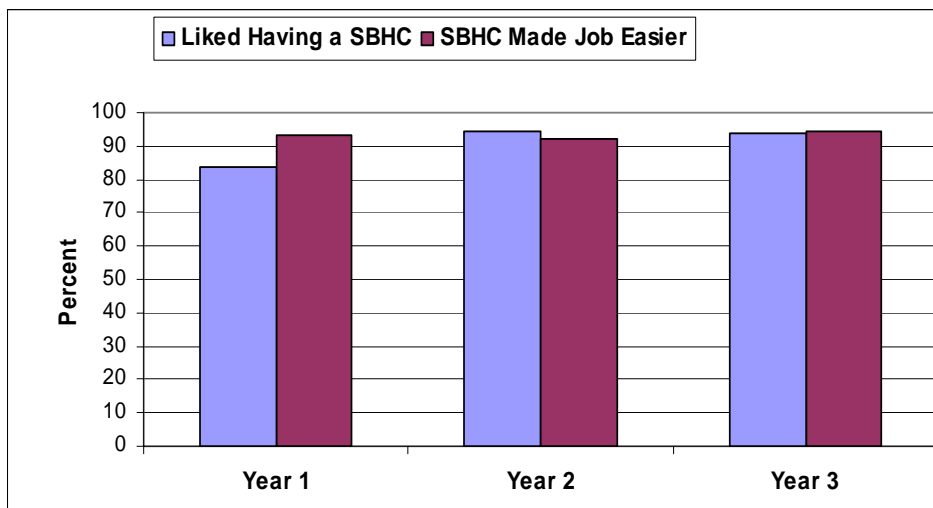
Figure 46. School Personnel Rating of Various Programs and Services Offered by SBHC, Year 3



2.2 Positive and Negative Aspects of Having an SBHC in School

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 (see Figure 47).

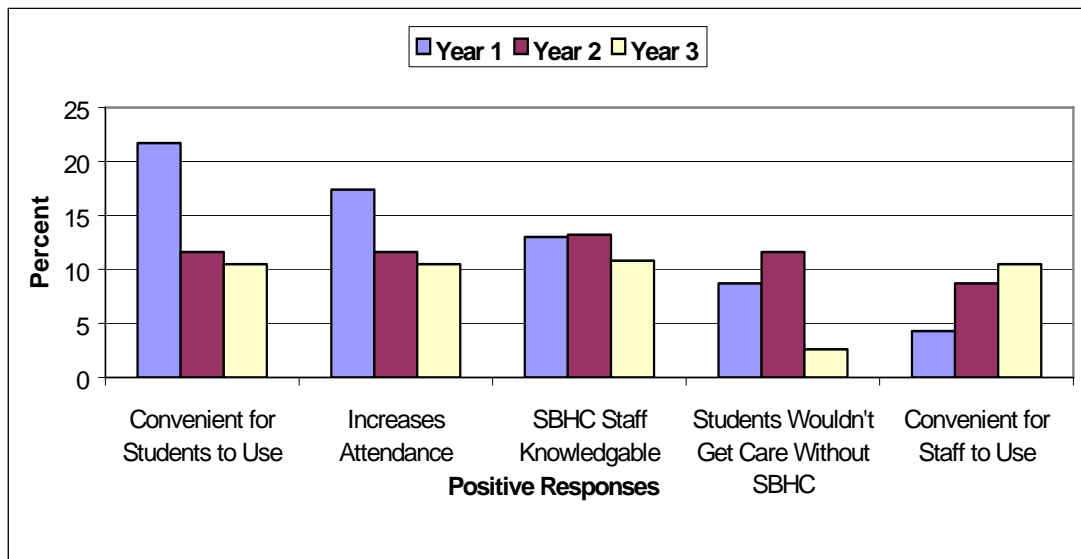
Figure 47. Percent of Respondents that Like Having an SBHC and Feel an SBHC Makes Their Job Easier



Respondents noted many positive aspects of having an SBHC in their school. The most common were “convenience,” “increases school attendance,” “SBHC staff is knowledgeable,” “students couldn’t get care otherwise,” and “convenient for staff to use” (see Figure 48). Other positives listed by staff included:

- “special health education (e.g., eyes, dental, mental, preventive, etc.)” (6.2%),
- “kids feel safe, trust” (4.6%),
- “provides physical exams” (4.6%),
- “educates parents and students about importance of health maintenance” (4.6%),
- “teachers can be more productive, not playing nurse” (3.8%), and
- “dispensing medications” (3.1%).

Figure 48. Percent of Respondents Mentioning Specific Positive Aspects of SBHCs



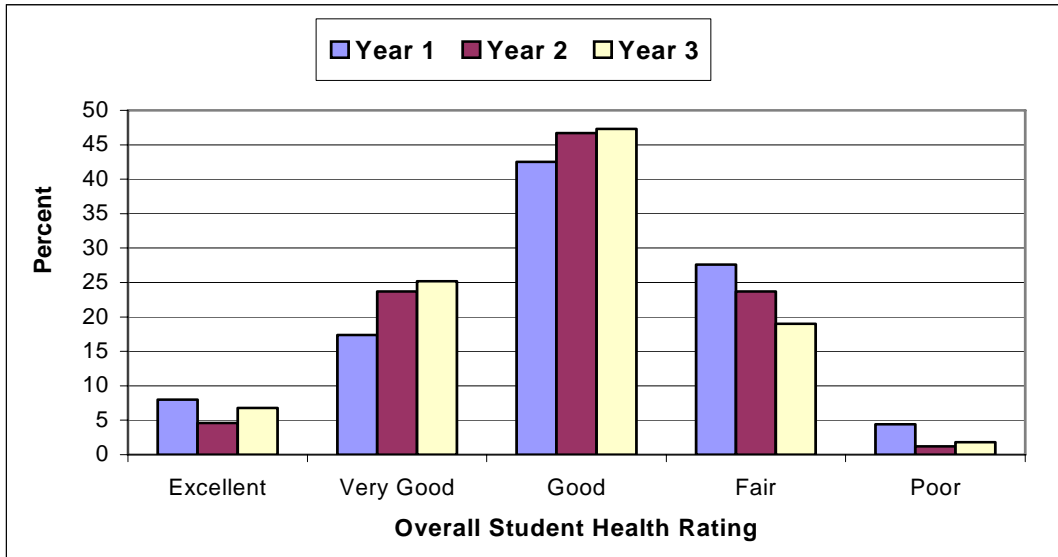
When asked about negative aspects of having an SBHC, respondents overwhelmingly (63.2%) wrote in “none.” Of the personnel who indicated a negative aspect, most indicated:

- “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%).

2.3 School Personnel’s Opinion on how SBHCs Effect Student Health

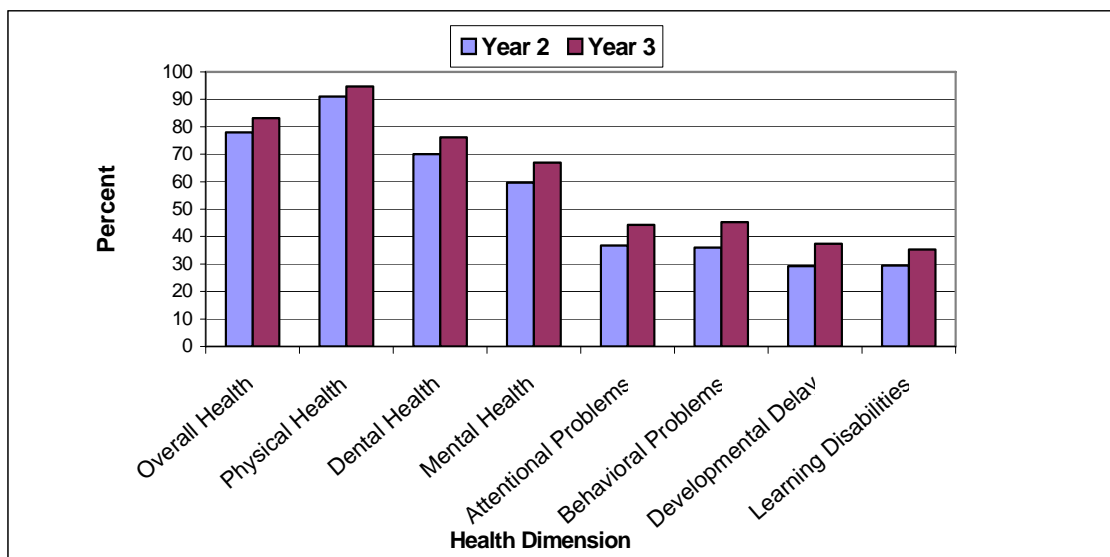
On average, school personnel tended to rate their students’ health as “Good.” This was generally lower than how parents rated their own children (about 80% of parents rated their own child’s health as “Excellent” or “Very Good”) and lower than how children rated themselves (about 70% rate their own health 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 49).

Figure 49. Rating of Student Overall Health Status over Time: Years 1-3



In Years 2 and 3, we expanded the section of the survey on student health status to include seven different dimensions in an attempt to better understand the perceptions of school personnel about student health. We also asked respondents about their perception of the SBHC’s effect on student health status for the seven dimensions. School personnel at all schools consistently rated the SBHC’s effect as “Very Positive” or “Positive” (see Figure 50).

Figure 50. Percentage of School Personnel Positively Rating the Effect of SBHCs on various Student Health Dimensions: Years 2-3



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.

2.4 School Personnel Referral Patterns

In Year 2, almost 90% of school personnel indicated that they would be likely to send a child to the SBHC for physical health problems. This was slightly higher than in Year 1, when just over 80% reported they would send a child to the SBHC for a physical health problem. This increased in Year 3 to over 90%.

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. This in part supports the large increase in the number of behavioral health visits described above (see Section 1.3).

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 (see Figures 51-52).

Figure 51. Likelihood of Sending a Child to the SBHC for Various Medical Situations in Year 2

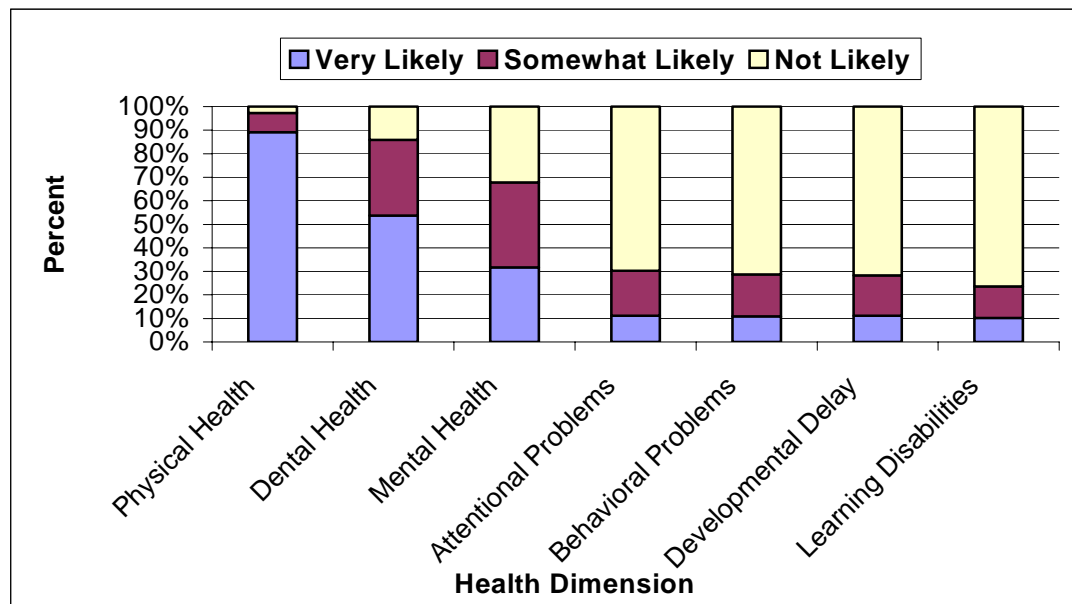
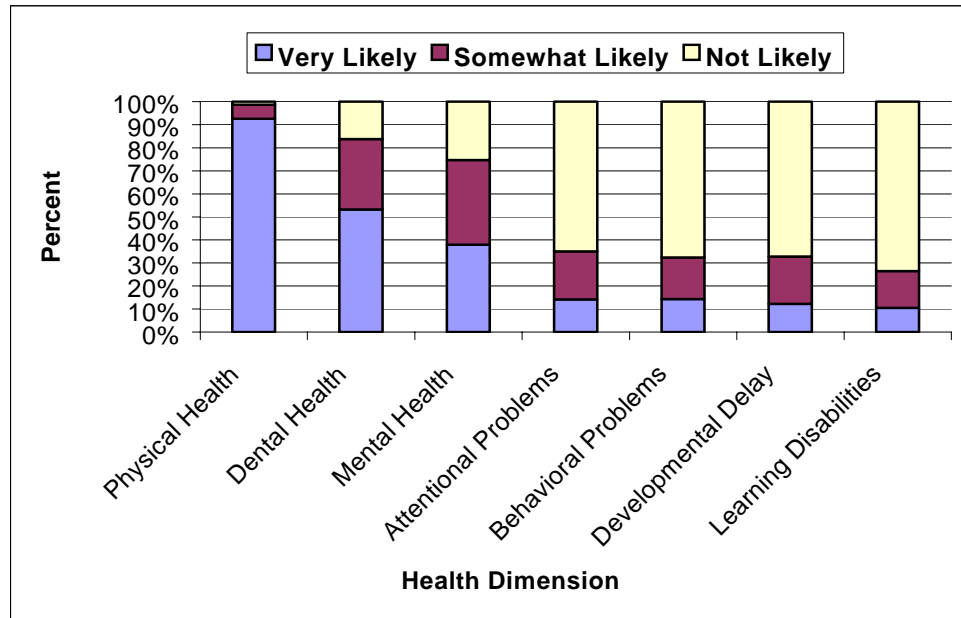


Figure 52. Likelihood of Sending a Child to the SBHC for Various Medical Situations In Year 3

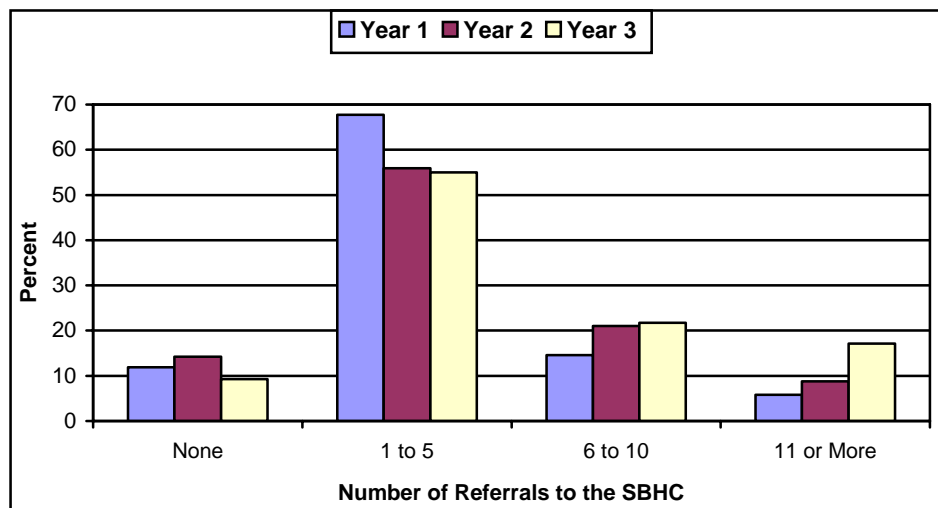


These differences in the reason for referrals may be due to various reasons. First, there was variation with respect to the services provided by the individual SBHCs (See Section 3 – Structural Attributes). However, all eight SBHCs provided some mental and behavioral health services and referrals. Only 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 on activities that focused on physical health, hygiene, and prevention.

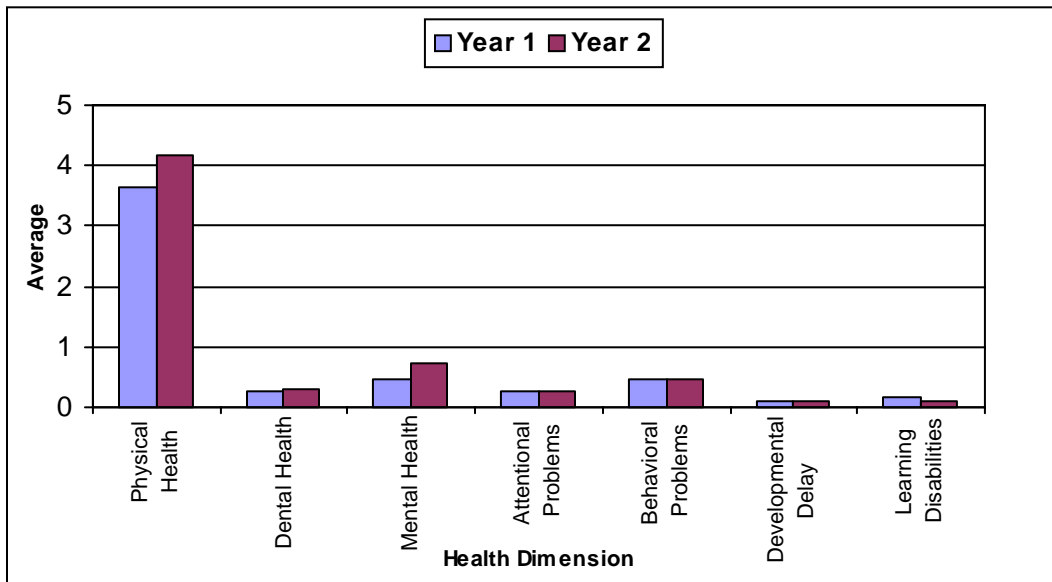
The reported likelihood of referrals by personnel followed very closely with the actual referral patterns indicated. Specifically, the majority of respondents referred one to five students to the SBHCs per week (see Figure 53). There was a noticeable increase in the number of personnel who made a higher number of referrals per week from Year 1 to Year 3.

Figure 53. Number of Reported Total Referrals per Week to the SBHCs



This referral rate varied considerably across various health dimensions. On average, respondents reported sending about four kids per week to the SBHC for physical health problems (see Figure 54). For all other health problems, they referred less than one child per week. While all SBHCs reported the in-house capacity to address mental and behavioral health problems or the ability to refer students to outside providers for these services, a lower referral rate for these problems is intuitive since these are typically chronic problems and a single referral would suffice to identify them.

Figure 54. Average Number of Student Referrals to the SBHCs, by Health Dimension, Years 2 and 3



The differences in referral rates were not related to the reported comfort level in dealing with various health dimensions (see Figure 55). Specifically, personnel reported a high degree of comfort dealing with physical health, behavioral, and attentional problems in both Years 2 and 3. Personnel reported a decline in comfort dealing with developmental delays and mental and dental health problems.

Figure 55. Reported Comfort Level in Role in Dealing with Various Student Health Problems, Year 2

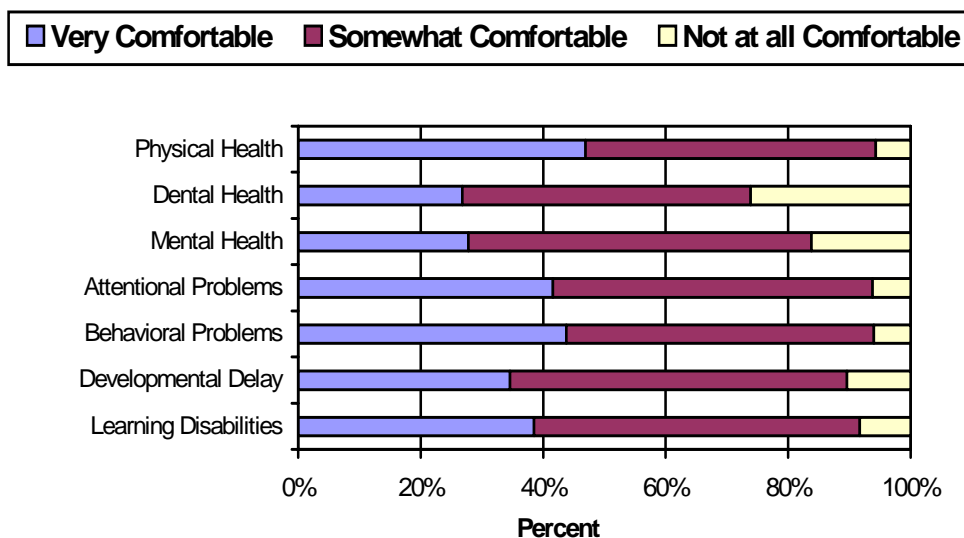
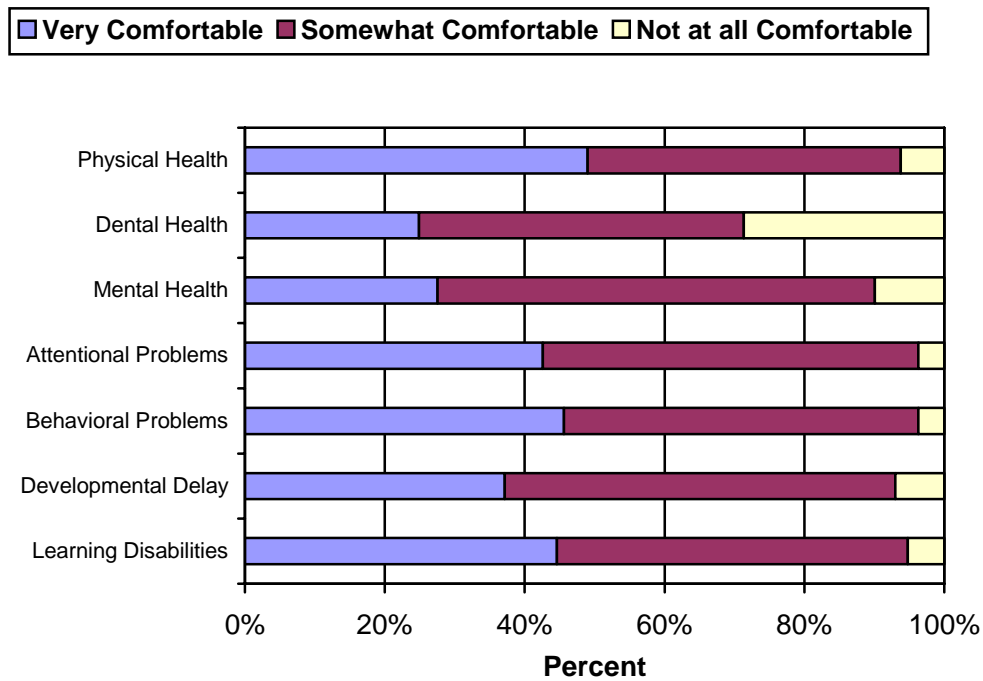


Figure 56. Reported Comfort Level in Role in Dealing with Various Student Health Problems, Year 3



These differences did not appear to be a function of the importance placed upon specific health dimensions and student learning. Physical health was generally ranked by the largest percentage of respondents as the most important. When we examined the ranked importance of the various health dimensions by school personnel, we noticed that behavioral problems, mental health, and attentional problems were ranked in the top 4 as often or more often than physical health problems.

Figure 57. School Personnel Ranked Importance of Various Health Dimensions on Student Learning, Year 2

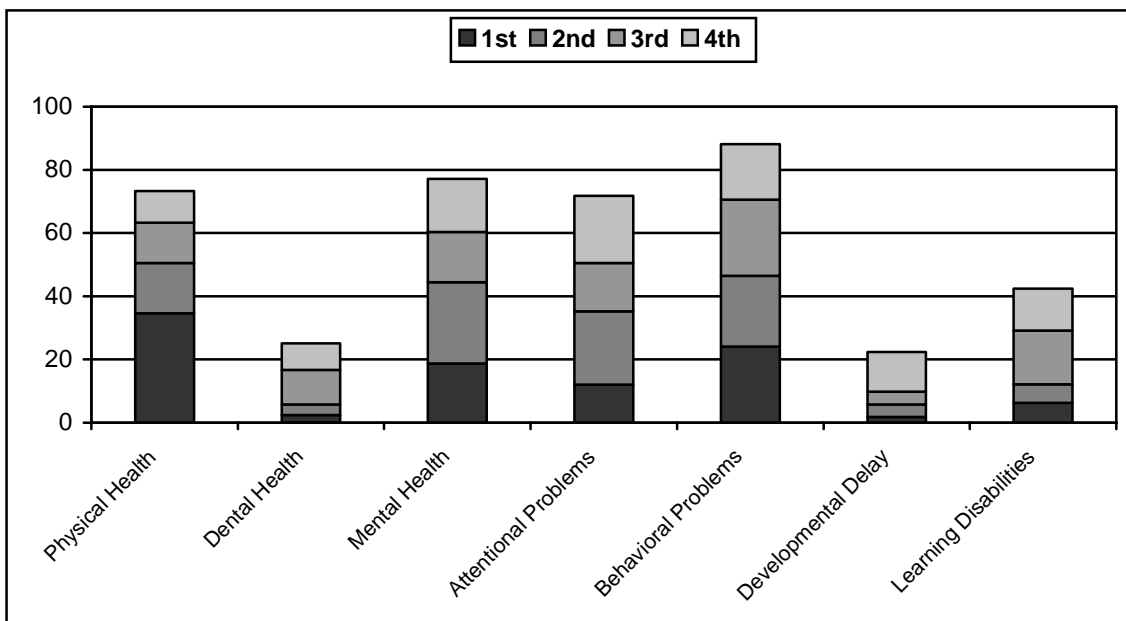
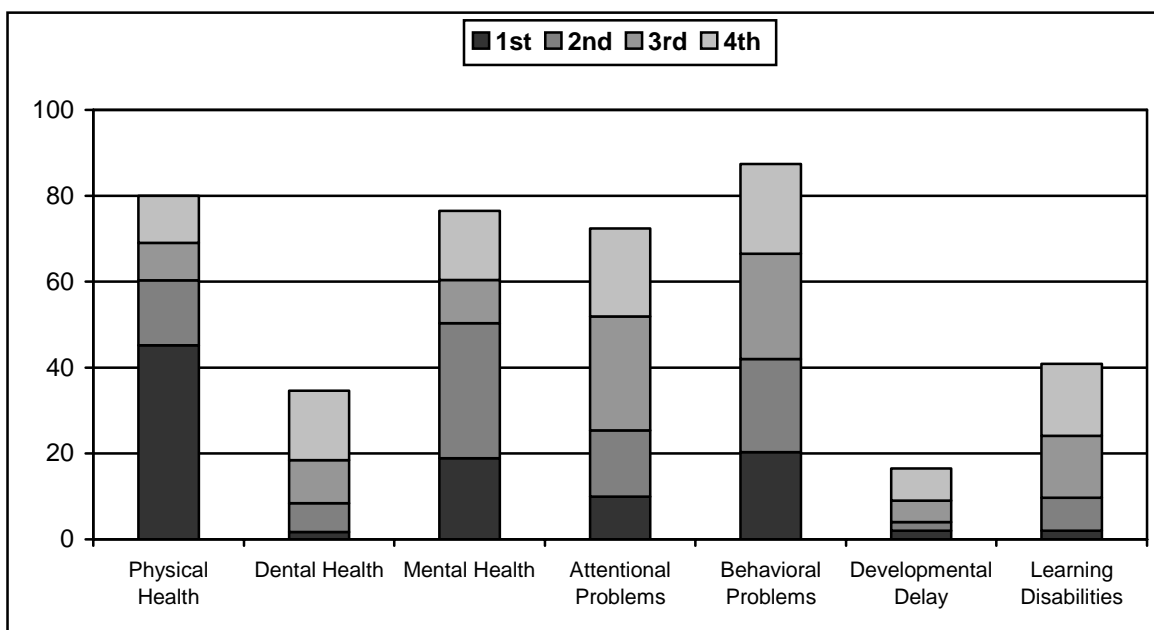


Figure 58. School Personnel Ranked Importance of Various Health Dimensions on Student Learning, Year 3



2.5 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. Up to and including the first five responses given were coded and are presented in Table 42.

Table 42: Important Contributors to the Success of SBHC as Identified by School Personnel (N = 379)

Position Title/Attribute	Percent ¹
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%

¹ Percentages do not total 100% because of the possibility of multiple responses per respondent.

2.6 Parent and Student Satisfaction with SBHC

Parents

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. A factor analysis of the results for Years 2 and 3 revealed that all eight items loaded on a single factor. The reliability for this factor made up of all eight items was $\alpha = 0.88$ for both years 2 and 3.

An analysis of differences in satisfaction revealed no significant differences among parents of students in intervention and comparison schools. Nor were there any differences between parents of students in intervention schools who were enrolled or not enrolled in the SBHCs or who used SBHC services.

Table 43. Parent Satisfaction with Primary Care Provider by SBHC Enrollment and Utilization for Years 2 and 3

	Year 2					Year 3				
	Comparison School (224)	Enrolled in SBHC (224)	Not Enrolled in SBHC (118)	Used SBHC (126)	Didn't Use SBHC (216)	Comparison School (328)	Enrolled in SBHC (257)	Not Enrolled in SBHC (85)	Used SBHC (159)	Didn't Use SBHC (183)
Mean Satisfaction Score ¹	27.6	27.5	28.1	27.6	27.8	27.8	27.5	28.2	27.4	27.9

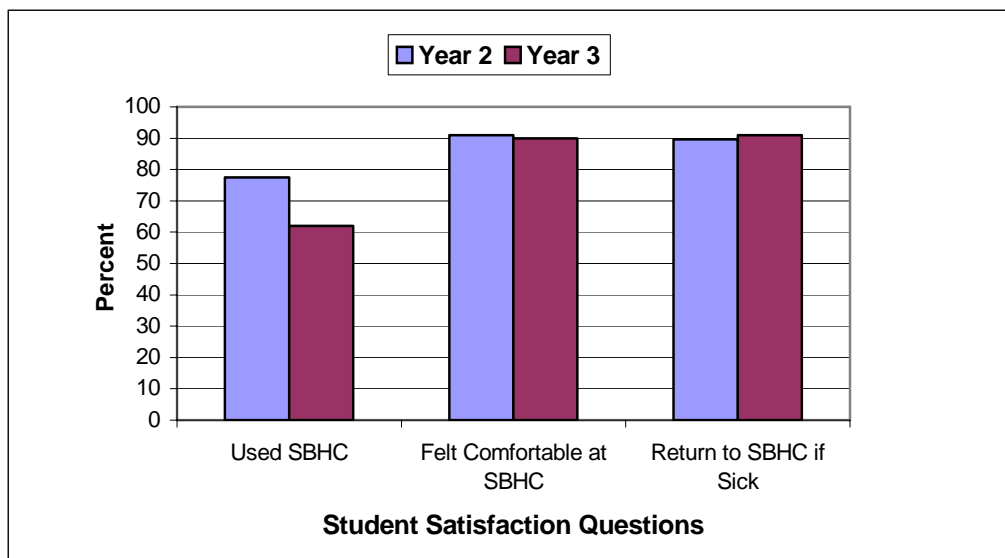
¹ Parents rated their satisfaction with the primary care provider on a scale from 8-32, with 8 being the lowest and 32 being the highest. The scores reflect the mean scores for the eight questions.

Students

In Years 2 and 3, we asked students in the intervention schools a series of questions centered on their use of the SBHCs. We asked students who said that they uses 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 (see Figure 59).

Figure 59. Percent Student Satisfaction with SBHCs, Years 2 and 3



CONCLUSIONS

This was a three-year longitudinal study to examine the effect of SBHCs on student health, absences, and service utilization. This was a very large, omnibus evaluation encapsulating several data sources that examined both outcomes and processes of SBHCs. This study was also the basis for a subsequent study using the Ohio State Medicaid data to examine the cost-effectiveness of the SBHC as a provider for children (see *Evaluation of Health Care Costs and Utilization among Medicaid Recipients Enrolled in School-Based Health Centers*, available online at <http://www.healthfoundation.org/sbhcstudy>).

This section presents some common underlying trends suggested by the data and findings previously discussed.

One of the findings, serendipitous to the study, was the high level of student mobility resulting in higher than expected attrition rates. This attrition was significantly higher in the inner-city schools among already disadvantaged children. This attrition occurred both in the longitudinal survey sample and the three-year longitudinal school administrative absence data. A high level of school mobility is associated with significant socioeconomic disadvantage and a host of social and behavioral problems among children (Wade et al 1999).

The high level of attrition also had implications for the outcomes component of the study. Beginning with 1360 parent-child dyads in Year 1, we were left with 588 cases, or 43% of the original sample, by Year 3. This was almost 100 cases below our estimated attrition rate, threatening our statistical power to identify significant effects.

Among the outcomes we were interested in (health related quality of life, schools absences, and access to care), the effects we identified were generally in the direction we hypothesized. However, the overall strength of most of the relationships was modest and many were not significant. Moreover, many were significant only for subgroups of students living in urban areas (absences), and students with public or no health insurance (absences). The potential reasons for the modest effect size for the total sample are many and are described both above in the methods section and below in the following section (see “Factors that May Affect Results” below).

Notwithstanding these limitations, the collective interpretation of the overall trending of several outcomes provides some evidence that SBHCs appear to have some influence on student health, absence rates, and access to healthcare. Moreover, they appear to have more influence on children who can most benefit from them—children that generally have impeded access to care. This includes two central groups: students who are socio-economically disadvantaged and have public or no health insurance and students in rural schools where there are general problems accessing healthcare. For example, 70% of urban students with public or no insurance used the SBHCs, compared to 53% of urban students with private health insurance (see Table 41). Interestingly, we did not see a difference in health insurance status and utilization in rural schools, due, we surmise, to an overall limit in accessibility to health services in these areas.

The significant improvements in HRQL over time that were identified among SBHC users were significant only for psychosocial health and, while not significant, the trends were in the correct direction for both physical and total HRQL. This trending was due only in part to improvements over time among users. It was also due to reductions in HRQL over time by both nonusers and comparison students (see Figures 2, 4, and 6 and Tables 10, 11, and 12).

It is interesting that most improvements were identified for psychosocial HRQL. Dealing with psychosocial aspects of health is generally the least likely to be compensated, but it is where we notice students may potentially have both the largest need and realize the largest benefit. This is evidenced by the substantial increase from Year 1 to Year 3 in mental health encounters in both absolute numbers and relative to all other types of encounters (see Tables 33 and 34).

With respect to absences, the overall trend for SBHC users and nonusers was difficult to interpret. For these two groups, there were significant reductions from Year 1 to Year 2 followed by increases in Year 3. The comparison students did not manifest the same pattern but instead showed slight reductions in each subsequent year. Several potential reasons for this have been outlined above in the methods section and in the following section (see “Factors

that May Affect Results” below), such as the influenza epidemic in some schools in the intervention group in Year 3 or the inconsistency in measurement across schools.

This being noted, we identified some interesting effects for students with chronic conditions, various school-level factors, and other subgroups. Specifically, SBHC users with identified ADHD had a significant reduction in absences over three years (see Figure 25). Among the school-level factors, the improvement in absences among urban SBHC users was consistent with the overall trend in improvements witnessed above.

Finally, upon examination of access, the trend towards improvements in access was again evident among SBHC users. This included increases in well-child visits, reductions in sick-child care visits, and increases in the number of parents with no perceived problems accessing care. In addition, we saw a substantial decrease in the number of parents of SBHC users who listed the ED as the practice their child’s physician operates within (see Table 20).

FACTORS THAT MAY AFFECT RESULTS

Variation across SBHCs in Services and Implementation

The project focused on eight different SBHCs across seven different school districts. Since each SBHC was implemented differently based on the needs identified in the specific school district, it was open to debate as to whether we had a two-group comparison (intervention schools vs. comparison schools) or a comparison of each SBHC. For example, one SBHC was established as a school-linked health center with its primary goal to link students with PCPs within the community. Their success in this as was evident in Table 37 as their continual reduction in number of SBHC encounters from Year 1 to Year 3. There were also extreme variations in the types of services provided onsite across all SBHCs. For example, some offered onsite dental or mental health services while others did not. Some practiced external billing from the start or began billing during the study, while others did not. Refer to the section entitled “Structural Attributes of School-Based Health Centers” for further detail on how each differed.

Inconsistency in Absence Definition and Record Keeping across Schools

Consistent with the variation between schools, the differences in the way each school defined and reported student absences threatened their utility in this analysis. While we cleaned, coded, and verified the data directly with the school whenever possible in order to provide the most accurate and comparable summary of the total student body for all 12 schools, there remained substantial definitional and reporting variation.

Sample Attrition

There was a great deal of attrition among students, and this was more pronounced in specific schools. As discussed above, two inner-city schools had about a 50% attrition rate from Year 1 to Year 2. In fact, we supplemented the sample in Year 2 for follow-up to Year 3 to attempt to ensure sufficient numbers of students in these schools for analysis.

Those who were more likely to drop out of the sample were black, urban, and had a lower household income. Dropouts included those who moved schools as well as those who refused to continue to participate in subsequent follow-up surveys. This suggested that students in more disadvantaged families were more likely to drop out from the sample. The attrition rate among intervention schools was also significantly higher from Year 2 to Year 3 than among the comparison schools. This may be due to the fact that the first round of SBHC funding went to schools with the greatest level of demonstrated need. As such, this may have biased the intervention group as being more disadvantaged overall than the comparison group.

Time and Environment Factors

This evaluation was established as a three-year study. It is questionable whether three years is long enough to identify significant change in some of the measures used. Moreover, some of the measures used may be measuring more than just the effect of the SBHC. For example, HRQL among children is generally described as a more omnibus measure incorporating several dimensions of a child’s life. These dimensions include, but are not limited to, psychosocial functioning; general life difficulties; immediate family, school, and community environment; and distal social-structural factors in addition to physical functioning. As such, an intervention targeted towards only one or two of these dimensions may not have a pronounced effect over a short period.

There were also several events external to the SBHCs and school districts through this 3-year study that also may influence the results:

Cincinnati Civil Disturbances—Civil disturbances occurred in Cincinnati during the first year of this project. The riots were located in the inner-city areas of Cincinnati around the locations of at least four of the schools participating in the study.

September 11, 2001, Terrorist Attacks—The traumatic events of September 11, 2001, in New York, Washington, and Pennsylvania occurred just shortly before we went into the field for data collection in Year 2. Anecdotal reports from telephone interviewers suggest that some of the high attrition between Year 1 and Year 2 may be a result of these events. For example, one respondent began berating an interviewer claiming that she/he “was just like the terrorists that flew into the World Trade Towers.” In addition to the high rate of attrition, 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 among all groups (comparison child self-report, comparison parent report, intervention parent report) except the intervention child self-report.

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 entire schools closed as a result of the flu. Ill students absent on days other than during the school closures would have affected absence rates. This was evident upon inspection of Year 3 absence rates among students in intervention schools affected by this epidemic.

Changes in Medical Partner Organizations—Changes in the leadership of medical partners linked to the SBHCs may also have had some effect on results. For example, a change in leadership and other political issues in the medical partner organization of one school was associated with a decrease in personnel’s perception of and satisfaction with services offered, as well as a reduction in SBHC health encounters.

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.

Lessons Learned

The SBHC Evaluation study brought out very clearly the significant importance of prior planning and preparation when dealing with school systems. In addition to some environmental factors that could not be controlled (i.e.: attrition rates, civil disturbances, 9/11/01, severe illness), there were also some implementation and data collection factors that played a huge role in the execution of this project. The following section outlines factors, which, had they been addressed differently, sooner, or at all, may have led to more reliable data collection processes during the first two years of the study. By the third year of the study, our data collection processes were in excellent working order.

IMPLEMENTATION

Contracting

One very important point to remember when contracting with schools is that it will require significantly more time than anticipated. Consider the first year as a planning year to build positive relationships and secure necessary agreements to facilitate the success of the project. This project experienced issues in this area that significantly delayed data collection for some of the participating schools.

It is essential to involve several key people in contract discussions, including school district administration such as the Superintendent, Director of Pupil Services, school principal(s) for all the involved schools; and, if any computers or data reports will be needed, the inclusion of the Information Systems Director is imperative to the success of the project.

Consider obtaining the baseline data during the contract phase. It would help to prepare you for the type of data the school can supply and what the reports will look like.

Communicating with Schools

The project needs to be presented to all involved school staff with a specific outline of their participation requirements and timelines. It is essential to notify those who will be doing the work. A great deal of interaction will occur between the evaluation staff and school staff during times of data collection, survey completion, and other correspondence.

Consider having a short written notification outlining the project requirements and how the different stages will impact each involved position.

Start early by attending a staff meeting to provide an opportunity for questions or a face-to-face update on the important role staff are playing. Provide periodical written updates (newsletters) on the project for posting or distribution at the school. These are beneficial to “buy in” and help to keep the schools linked to what goal their involvement is serving and to thank them for participating.

The comparison schools do not have a visible interest in the study and may require additional nurturing. Show gratitude and provide visible incentives when possible.

DATA COLLECTION

Absence & Health Data

It was very difficult to get the specific data elements needed from the school data systems due to the varied levels of computer knowledge of their staff. School data is entered into and pulled from the computer differently by each person doing it, and they are not always trained computer professionals. In addition, each school often has their own way of coding and interpreting their information. This study contracted with 10 school districts and dealt with a total of 32 individual schools, compounding the interpretation factor tremendously. To help ensure a common understanding of terms, the use of appropriate tools, and the development of meaningful training materials try the following:

Send a detailed communication to each SBHC and school about what data elements are needed and the formats required to have a meaningful database that will be valid for analysis.

Create detailed reference manuals for the users and a brief description of why certain data elements are required for the study.

Have school and SBHC staff use the system or program being used for data collection immediately after training is completed.

Ensure that the school information systems/technology department is included from the start of the project. They need to be informed about the entire study, any data requirements, and timelines.

Try to have direct contact with Information Systems or the person who will be pulling the data. Requests for data files need to be made far in advance.

Student Interviews

Awareness of the interview process for the principal, teachers, and clerical staff prior to the start of the interview process helps them to understand their roles. Schools require ample time to prepare for the visit to interview students. Take the following steps to help to facilitate the process:

Set up who your contact person will be.

Send student lists ahead of time.

Include arrival times and length of time you expect to be there.

Let the school know how the interviews will be conducted (i.e.: one-on-one, older students in larger groups, etc.) so they can prepare any room(s) necessary.

School Personnel Survey

To obtain a reasonable response rate for a school personnel survey, it is extremely important for the principal to convey support and the importance of their answers to staff. Teachers are often asked to complete numerous surveys. We found it necessary to provide closer supervision for the administration of this survey to be successful.

Using a teacher and staff checklist was a very effective tool to improve the return rate. With a checklist and principal support, the need for our presence at distribution dropped quite a bit.

With the principals' approval, administration of the survey at a staff meeting was very effective. It also provided an opportunity to give an update on the study and allowed school staff to ask questions.

The incentives we offered (food or a little gift) were well received; however they did not seem to impact the response to the survey. They were just seen as a "thank you."

Providing periodic updates (newsletter) to the teachers and staff may foster feelings of connectivity to the study. It would also keep the communication lines open and make the SBHC more visible.

References

- Varni JW, Burwinkle TM, Seid M, Skarr D. 2003. The PedsQL 4.0 as a Pediatric Population Health Measure: Feasibility, Reliability, and Validity. Ambulatory Pediatric 3: 329-341.
- Wade, Terrance J., David J. Pevalin and Augustine Brannigan. The Clustering of Severe Behavioural, Health and Educational Deficits in Canadian Children: Preliminary Evidence from the National Longitudinal Survey of Children and Youth. Canadian Journal of Public Health, 1999; 90(4): 253-259 .

Appendix A: Parent Interviews

An analysis of differences in satisfaction with the child's primary care provider revealed no significant differences between parents of students in intervention schools and comparison schools. Nor were there any differences between parents of students in intervention schools who were not enrolled in, enrolled in, or who used the SBHCs

Appendix B: Student Interviews

Among children using the SBHCs, around 90% reported feeling comfortable and most reported that they would use it again if they were sick.

Intervention Schools	Students	Comparison Schools	Students
Year 1 Total	678 (49.9%)		682 (50.1%)
Year 2 Total Longitudinal Sample	384 (48%)		418 (52%)
Supplement	95	Supplement	78
Year 2 Total Sample	479 (49.1%)		496 (50.9%)
Year 3 Total Longitudinal Sample	296 (50.3%)		292 (49.7%)
Supplement	47	Supplement	38
Year 3 Total Sample	343 (51%)		330 (49%)

SCHOOL-BASED HEALTH CENTER EVALUATION PROJECT

INTERVENTION SCHOOL STUDENT INTERVIEW (NOTE: PEDSQL QUESTIONS ARE NOT INCLUDED)

Name: _____ Grade: _____ Teacher: _____

☺ Please circle all your answers ☺

In general, how is your health? Would you say	Excellent	Very Good	Good	Fair	Poor
What is your favorite TV show? _____					
What hand are you using to hold your pencil?	Left Hand		Right Hand		
Did you go to the School-Based Health Center (SBHC) at your school when you were sick?					
YES ↓			NO ↓		
Did you feel comfortable at the School-Based Health Center (SBHC)?			Where do you go for care when you get sick?		
YES NO			No Where		
YES NO			Doctor		
The next time you are sick, would you want to go back to the School-Based Health Center (SBHC)?			Nurse		
YES NO			Hospital Emergency Room		
			Somewhere else (Where? _____)		

Next, please tell us how much you agree with these sentences. (☺ Please circle your answers ☺)

	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
My family spends time doing things together.	1	2	3	4	5
My family cares about me.	1	2	3	4	5
I feel close to my family.	1	2	3	4	5
I am happy to be at my school.	1	2	3	4	5
I feel I am a part of my school.	1	2	3	4	5
I feel close to the people at my school.	1	2	3	4	5
I feel safe in my school.	1	2	3	4	5
The teachers at my school treat students fairly.	1	2	3	4	5
There are good playgrounds near where I live.	1	2	3	4	5
I feel safe on my way to and from school.	1	2	3	4	5

Next, please tell us how often these things happen. (☺ Please circle your answers ☺)

	Always	Most of the time	Sometimes	Never
How often do you wear a seat belt when you ride in a car?	1	2	3	4
How often do you wear a helmet when you ride a bicycle?	1	2	3	4
How often do you eat breakfast on school days?	1	2	3	4
How often does your stomach hurt?	1	2	3	4
How often does your head hurt?	1	2	3	4

☺ **Thank you** ☺

SCHOOL-BASED HEALTH CENTER EVALUATION PROJECT

COMPARISON SCHOOL STUDENT INTERVIEW (NOTE: PEDSQL QUESTIONS ARE NOT INCLUDED)

Name: _____ Grade: _____ Teacher: _____

☺ **Please circle all your answers** ☺

In general, how is your health? Would you say	Excellent	Very Good	Good	Fair	Poor
What is your favorite TV show? _____					
What hand are you using to hold your pencil?	Left Hand	Right Hand			
Where do you go for care when you get sick?					
<p>No Where</p> <p>Doctor</p> <p>Nurse</p> <p>Hospital Emergency Room</p> <p>Somewhere else (Where? _____)</p>					

Next, please tell us how much you agree with these sentences. (☺ Please circle your answers ☺)

	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
My family spends time doing things together.	1	2	3	4	5
My family cares about me.	1	2	3	4	5
I feel close to my family.	1	2	3	4	5
I am happy to be at my school.	1	2	3	4	5
I feel I am a part of my school.	1	2	3	4	5
I feel close to the people at my school.	1	2	3	4	5
I feel safe in my school.	1	2	3	4	5
The teachers at my school treat students fairly.	1	2	3	4	5
There are good playgrounds near where I live.	1	2	3	4	5
I feel safe on my way to and from school.	1	2	3	4	5

Next, please tell us how often these things happen. (☺ Please circle your answers ☺)

	Always	Most of the time	Sometimes	Never
How often do you wear a seat belt when you ride in a car?	1	2	3	4
How often do you wear a helmet when you ride a bicycle?	1	2	3	4
How often do you eat breakfast on school days?	1	2	3	4
How often does your stomach hurt?	1	2	3	4
How often does your head hurt?	1	2	3	4

☺ **Thank you** ☺

Appendix C: School Personnel Interviews

Across all three years, over 94% of teachers reported that they liked having an SBHC and 86% reported that an SBHC made their jobs easier.

School personnel perceptions of student overall health and services offered by the SBHCs steadily increased every year. Personnel consistently rated programs and services as “Excellent” or “Very Good.”

Over the last year, the percentage of staff knowing their SBHC hours increased from 63% to 71%. The most positive aspects of having an SBHC as reported by the staff were increased attendance, convenience for students and staff, teachers can be more productive not playing nurse, and students can receive screenings, immunizations, and well-child checks.

School personnel consistently rated the SBHCs’ effect on student health status as very positive or positive. They also indicated the most influence to be on physical, dental, and mental health.

Physical health problems remained the most likely reason personnel sent a child to the SBHC (90%), with personnel referring an average of four children per week to the centers for a physical health problem. All other health problems were referred less than once per week.

School Based Health Center Survey

1. Name (optional) _____

2. Please list your school: _____

3. Please CHECK the position you currently hold:

- Teacher
- Instructional Aide
- Secretary/Office Staff
- Counselor
- Other (please specify) _____

4. a. (Teachers only) How many years in total have you been a teacher?
_____ years

b. (Non-Teachers only) How many years in total have you been in your current staff position?
_____ years

5. How many years have you been working at this school? _____ years

6. For Teachers only: (Non-teachers, please skip to Question # 7)

What is the primary grade you taught this school year? (CHECK only one)

- | | |
|---------------------------------------|-----------------------------------|
| <input type="checkbox"/> Preschool | <input type="checkbox"/> Sixth |
| <input type="checkbox"/> Kindergarten | <input type="checkbox"/> Seventh |
| <input type="checkbox"/> First | <input type="checkbox"/> Eighth |
| <input type="checkbox"/> Second | <input type="checkbox"/> Ninth |
| <input type="checkbox"/> Third | <input type="checkbox"/> Tenth |
| <input type="checkbox"/> Fourth | <input type="checkbox"/> Eleventh |
| <input type="checkbox"/> Fifth | <input type="checkbox"/> Twelfth |

7. Do you know what hours your SBHC is open? Yes No

8. If yes, what hours are they open? (Please circle the days open, insert times open for those days and circle whether it is am or pm)

Monday	Hours: _____ am/pm	to	_____ am/pm
Tuesday	Hours: _____ am/pm	to	_____ am/pm
Wednesday	Hours: _____ am/pm	to	_____ am/pm
Thursday	Hours: _____ am/pm	to	_____ am/pm
Friday	Hours: _____ am/pm	to	_____ am/pm

9. Please rate your perception of the following programs/services offered by the SBHC at your school.
(Please circle your answer using the scale provided)

Programs/Services	Excellent	Very Good	Good	Fair	Poor	Don't Know	Not Offered
Comprehensive Health Assessment: physical exams, screenings (vision, hearing, dental, mental health, etc.)	1	2	3	4	5	6	7
Diagnosis/Treatment of Physical Health Problems: acute/chronic illnesses, injuries, prescriptions	1	2	3	4	5	6	7
Preventive Health Services and Risk Management: dental care, immunizations, Health Check screenings, nutrition	1	2	3	4	5	6	7
Laboratory Testing:	1	2	3	4	5	6	7
Mental Health Assessment and Treatment: response to crisis, physical/sexual/drug abuse, depression, behavior/performance or relationship problems	1	2	3	4	5	6	7
Health Education/Promotion: educational resources for individual, classroom, family and community	1	2	3	4	5	6	7
Support for Comprehensive Health Education in the Classroom: child & alcohol/drug abuse prevention, chronic health conditions, STD/HIV/AIDS prevention	1	2	3	4	5	6	7
Social Services: referrals to public assistance, Medicaid/CHIP, child protective services	1	2	3	4	5	6	7
Nutrition Services: weight mgmt., eating disorder screenings and referrals, sports nutrition	1	2	3	4	5	6	7
Overall, what is your perception of the SBHC programs/ services offered at your school	1	2	3	4	5	6	7

10. Within the last year, how would you rate the health status of your current students for the following health issues? (Please circle your responses using the scale provided). In the final column, please rank the top four health issues in order of their importance (e.g.: 1, 2, 3, 4), that impact a student's ability to learn at school.

	Excellent	Very Good	Good	Fair	Poor	RANKING
Physical health	1	2	3	4	5	
Mental health	1	2	3	4	5	
Dental health	1	2	3	4	5	
Behavioral problems	1	2	3	4	5	
Attention problems	1	2	3	4	5	
Learning disabilities	1	2	3	4	5	
Developmental delay	1	2	3	4	5	
Overall health	1	2	3	4	5	

11. How would you describe your comfort level with the role you play in meeting the health needs of students regarding the following health issues? (Please circle your responses using the scale provided)

	Very comfortable	Somewhat comfortable	Not at all comfortable
Physical health	1	2	3
Mental health	1	2	3
Dental Health	1	2	3
Behavioral problems	1	2	3
Attention problems	1	2	3
Learning disabilities	1	2	3
Developmental delay	1	2	3
Overall health	1	2	3

12. During an average week, about how many students do you send to the SBHC for the following health issues? (Please write in your numbers below)

Health Issue	# of Students
Physical health issues	
Mental health issues	
Dental health issues	
Behavioral problems	
Attention problems	
Learning disabilities	
Developmental delay	

13. In general, how likely would you be to send a child to the school nurse/SBHC for the following situations? (Please circle your responses using the scale provided)

	Very likely	Somewhat likely	Not very likely	Not at all likely
Physical health issues	1	2	3	4
Mental health issues	1	2	3	4
Dental health issues	1	2	3	4
Behavioral problems	1	2	3	4
Attention problems	1	2	3	4
Learning disabilities	1	2	3	4
Developmental delay	1	2	3	4

14. Do you like having a SBHC in your school? YES
 NO

15. Has having a SBHC made your job easier? YES
 NO

Optional – Please explain how having a SBHC has made your job easier or not.

16. Please list the positive aspects of having a SBHC in the school?

17. Please list the negative aspects of having a SBHC in the school?

18. Please rate the degree to which you believe having a SBHC has positively or negatively affected the students' health status. (Please circle your answers using the scale provided).

	Very Positively Affected	Positively Affected	Neutral	Negatively Affected	Very Negatively Affected
Physical health	1	2	3	4	5
Mental health	1	2	3	4	5
Dental health	1	2	3	4	5
Behavioral problems	1	2	3	4	5
Attention problems	1	2	3	4	5
Learning disabilities	1	2	3	4	5
Developmental delay	1	2	3	4	5
Overall health	1	2	3	4	5

19. Please rate, in your opinion, how your students feel about their school. (Please circle your answer using the scale provided)

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Students feel as though teachers and staff care about them.	1	2	3	4	5
Students feel close to people at their school.	1	2	3	4	5
Students feel like they are a part of their school.	1	2	3	4	5
Students feel happy to be at their school.	1	2	3	4	5
Students feel as though they are treated fairly in their school.	1	2	3	4	5
Students feel connected to their school.	1	2	3	4	5
Overall, students feel positive about their school.	1	2	3	4	5

20. Is there anything else you would like us to know about your SBHC? (Please use back of page if you need more room)

Thank you!