The Impact of an Elementary School–Based Violence Prevention Program on Visits to the School Nurse

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Introduction: In Tucson, Arizona, an elementary school–based violence prevention program (PeaceBuilders) was implemented during the 1994–1995 school year. Anecdotal evidence from school nurses suggested that children were visiting the nurse less often following the implementation of the program. We examined nurses' logs to assess whether the program had an impact on visits to the school nurse.

Methods: For the school years 1993–1994 and 1994–1995, the weekly number of nurse visits for all reasons, all injuries, and injuries caused by fights in each of the four PeaceBuilders schools were compared with those for three control schools. As part of a planned evaluation, schools had been matched on demographic factors and randomly assigned as intervention or control schools.

Results: Between 1993–1994 and 1994–1995, the rate of visits/1,000 student days decreased 12.6% in the intervention schools while remaining unchanged in the comparison schools. The same trend was detected for injury-related visits. Rates of fighting-related injuries changed little in the intervention schools but increased 56.0% in the control schools. An analysis of covariance confirmed that injuries and visits to nurses decreased in intervention schools relative to control schools.

Conclusions: These data indicate that in the intervention schools, injuries and visits to the school nurse decreased over the two-year period and that the intervention may have contributed to this change. They also suggest that visits to the school nurses' office may be a useful tool to evaluate some types of elementary school–based violence prevention programs.

Medical Subject Headings (MeSH): injuries, violence/prevention and control, child, schools, nursing records, epidemiology. [Am J Prev Med 1997;13:459–63]

Concern about violence has prompted many schools across the country to implement violence prevention programs. These interventions range from specifically targeted interventions such as conflict resolution lessons in the classroom to multifaceted community based programs for high-risk youth.[1-5] To reduce violence-related victimization and perpetration, the public health approach emphasizes primary prevention. Previous research suggests that primary prevention efforts should begin early in life, before violent behavioral patterns are established.[6-8] As a result, some intervention programs in the United States are targeting children in elementary school.[9,10]

In Tucson, Arizona, a school-environment violence prevention program called PeaceBuilders, was implemented in fall 1994. PeaceBuilders was developed for elementary schools (grade K-5) and fosters prosocial behavior. Activities are designed to improve daily interactions among students, teachers, administrators, support staff, and parents. The program is purposely woven into the school's everyday routine to make it "a way of life," not just a time- or subject-limited curriculum. All of the activities, actions, and words of the program emphasize rewards, praise, and prosocial behavior.

The program provides children with models of positive behavior, environmental cues to signal this behavior, opportunities to rehearse it, and rewards for practicing it. Children learn five simple principles: praise people, avoid put-downs, seek wise

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people as advisors and friends, notice and correct hurts, and right wrongs. Examples of PeaceBuilders activities are multiple: teachers greet a child by a cue to think about how he or she is going to be a PeaceBuilder that day; during story time, teachers can ask children to comment on how the characters in the story modeled PeaceBuilding. During recess, children can take turns being PeaceCoaches who praise other children for sharing or inviting others to play. Parents are prompted to praise their children when they receive a PeaceBuilders home note. The principal promotes the program throughout the day by reading aloud on the public address system the names of children who exhibited positive PeaceBuilding behavior.[11,12]

Anecdotal evidence from nurses in the schools participating in the PeaceBuilders project suggested that children were visiting the school nurse less often during the implementation of the program. There are several reasons to expect that the implementation of a violence prevention program might be associated with a decrease in the number of visits to the school nurse. First, such a program should reduce the number of fights, thereby reducing the number of fighting-related injuries requiring a nurse's attention. Second, various program components could reduce the incidence of unintentional injuries. For example, in PeaceBuilders schools, "PeaceFeet" are placed in the hallways to show children where and what direction to walk, thereby making shoving and collisions less likely.[11,13] Third, in elementary schools, children often visit the nurse for nonmedical reasons.[11] Previous research suggests that children sometimes complain about symptoms or injuries as a means of escaping an unpleasant situation, such as a class bully, or to gain positive reinforcement.[14–16] A violence prevention program that creates an environment where students receive positive reinforcement from peers, teachers, and other adults may reduce the number of visits to the school nurse for nonmedical reasons. We examined nurses' logs to assess whether the PeaceBuilders program had an impact on visits to the school nurse

METHODS

A full-scale evaluation of the program using multiple outcome measures based on student self-reports, teacher reports, playground observations, and school and law enforcement records was initiated in 1993. As part of the planned evaluation, nine schools, selected because of high rates of crime in their catchment areas, were grouped into four matched pairs on the basis of demographic criteria. One school with grades K–2 and another school with grades 3–5 in the same geographic area were combined to form a single K–5 school unit. All other schools in the study contained grades K–5. Among the four matched pairs, schools were randomly assigned as intervention (wave 1) or wait-list control (wave 2) schools.[12] PeaceBuilders was implemented in wave 1 schools beginning in August 1994 and in wave 2 schools beginning in August 1995. To assess whether visits to the school nurse declined during the intervention period, we used the original evaluation design and examined nurses' logs in both the intervention and control schools.

A nurse or other school official is available during all school hours in each school to see students complaining about a health problem. All such visits are recorded in a log. These logs differ slightly by school district, but all logs contain the following information for each encounter: time in and out, student name, grade, principal reason for the visit as described by the care provider, and treatment plan. The nurse also records whether the visit was for illness or injury and whether a parent was notified. For the purpose of this study, we defined a "nurse visit" as any episode, recorded in the nurse's log book, during which a student had consulted the nurse.

Data collection. Between September 25 and 29, 1995, a team of researchers visited the nine elementary schools to review the nurses' logs. Data were collected for the school year preceding the intervention (1993–1994) and for the school year during which the project was implemented in the four wave-1 schools (1994–1995). Using a standard protocol, the researchers counted the weekly number of visits to the school nurse for all causes and the weekly number of visits for injuries only at each school.

The logs indicate whether visits were for injury or illness. To collect data on the incidence of fighting-related injuries, the researchers sampled every fourth week in the logs and devised the following coding scheme: *confirmed fighting* included all injuries for which a deliberate action was mentioned (e.g., "slapped," "punched," "pushed") or if another person was mentioned (e.g., "hit by John"). *Possible fighting* was used for entries without enough information to determine whether fighting had taken place. For example, "hit in face" would be coded as possible fighting because whether the child was hit by another student or by a piece of sporting equipment is not clear. *Nonfighting* was used for all other injuries, such as those noted as "bumped head on monkey bars" or "tripped and fell on ball."

At each school researchers used a standard protocol to interview nurses. The purpose of the interview was to learn about events that may have influenced the number of nurse visits, injuries, and fights during the two school years. Examples of such events include a change in staffing, an outbreak of an infectious disease, and a change in physical facilities.

Data analysis. Two control schools were excluded from the analysis because the nurses' logs from an entire school year had been discarded. For the remaining seven schools the data were analyzed using SAS software.[17] For visits for all reasons, visits for injuries only, and visits for noninjuries, a weekly rate of visits per 1,000 students per day (1,000 student days) was calculated by school and by wave. For visits for injuries attributed to confirmed, possible, and nonfighting, a weekly rate was calculated on the weeks included in the sample of every fourth week described above. For each of the weekly rates, we calculated the average for each school year by giving an equal weight to each week regardless of the number of days the school was open. Because this calculation method is required for comparative analysis, we also used it for the descriptive analyses. The results obtained by this method are very similar to those found by calculating the average rates using the entire year's total number of outcomes divided by the entire year's total number of student days.

For each outcome variable, we calculated the percentage difference between the 1993–1994 and 1994–1995 rates by school and by wave. A t test was performed to determine the statistical significance of these differences. Finally, analysis of covariance (ANCOVA) was used to compare the control and intervention schools taking into account baseline differences between schools. Each analysis compared the 1994–1995 rates for the control and

Table 1. Rates of visits to school nurses in intervention and control schools, 1993–1994 and 1994–1995: PeaceBuilders Program, Tucson, Arizona

	Visits/1000 student days				
	1993–1994	1994–1995	Difference (%)	t	P
Intervention schools					
School A	39.7	27.4	30.8	7.61	<.001
School B	56.2	45.7	−18.7	4.91	<.001
School C	32.8	30.4	−7.3	1.26	.21
School D	28.6	31.4	10.1	−1.76	.08
Total	38.9	34.0	−12.6	3.55	<.001
Control schools					
School E	31.8	25.0	−21.2	4.12	.002
School F	43.4	46.4	6.9	−1.28	.21
School G	34.7	41.1	18.3	3.20	.002
Total	36.6	37.5	2.5	−.62	.54

All schools contain grades K–5, except school E (grades 3–5).

Table 2. Rates of injury-related visits to school nurses in intervention and control schools, 1993–1994 and 1994–1995: PeaceBuilders Program, Tucson, Arizona

	Injuries/1000 student days				
	1993–1994	1994–1995	Difference (%)	t	P
Intervention schools					
School A	12.6	9.0	−28.9	4.67	<.001
School B	28.0	21.8	−22.3	5.13	<.001
School C	14.4	13.8	−3.9	.54	.59
School D	10.1	11.4	13.4	−1.62	.11
Total	16.0	14.0	12.6	2.35	.02
Control schools					
School E	12.8	10.0	−21.8	3.39	.001
School F	20.0	21.8	9.1	−1.52	.13
School G	17.5	22.2	26.6	−3.84	<.001
Total	16.7	18.0	7.5	−1.45	.15

All schools contain grades K–5, except school E (grades 3–5)

intervention schools, using the 1993–1994 rates and the mean rates in each of the schools individually as covariates. We used the .05 level as the cut-off value for statistical significance.

RESULTS

In fall 1993 there were 2,393 students enrolled in the four intervention schools and 1,506 enrolled in the three control schools. The percentage of students receiving free and reduced cost lunches was similar for the intervention and control schools (71% versus 73%). Intervention schools had a higher percentage of Hispanics (55% versus 37%) and lower percentages of Caucasian (33% versus 43%) and Native-American (5% versus 14%) students. Because one of the three control schools had students only in grades 3–5, control schools had a larger percentage of students in grades 3–5 (62% versus 49%).

In the seven schools analyzed, 51,373 visits to nurses were counted: 26,629 visits in the 1993–1994 school year and 24,744 visits in the 1994–1995 school year. The weekly rate of visits per school ranged from 10.6 to 73.5 visits per 1,000 student days. Injuries accounted for 43.6% of the total number of visits. The weekly rate of injuries per school ranged from 2.0 to 42.2 injuries per 1,000 student days. Among the sample of 6,768 injuries, 6% were classified as confirmed fighting episodes, 42.7% as possible fighting-related injuries and 51.3% as nonfighting-related injuries.

When the data were aggregated across the intervention schools, the weekly rate of visits for all reasons per 1,000 student days decreased by 12.6% ($P < .001$) between 1993–1994 and 1994–1995. In the comparison schools, the overall rate remained unchanged (Table 1). An analysis by school revealed that not all schools followed these overall trends. The rate of visits for all reasons decreased ($P = .002$) in one of the three control schools.

The patterns for injury-related visits were the same as the patterns for visits for all reasons (Table 2). Between 1993–1994 and

Table 3. Rates of confirmed fighting-related injuries in intervention and control schools, 1993–1994 and 1994–1995: PeaceBuilders Program, Tucson, Arizona

	Fights/student days				
	1993–1994	1994–1995	Difference (%)	t	P
Intervention schools					
School A	0.83	0.50	−39.9	1.50	.16
School B	0.79	1.06	33.5	−.76	.46
School C	1.22	0.90	26.1	.74	.47
School D	0.28	0.48	71.2	−1.03	.32
Total	0.78	0.72	−7.6	.37	71
Control schools					
School E	0.59	1.13	91.8	−2.18	.04
School F	1.08	2.01	86.0	2.52	.02
School G	1.39	1.37	−1.8	.06	.96
Total	0.91	1.43	56.0	2.53	.01

All schools contain grades K–5, except school E (grades 3–5).

1994–1995, the rate of weekly injury-related visits per 1,000 student days decreased by 12.6% ($P < .001$) in the intervention schools; however, no significant change was observed in the control schools. A school-by-school analysis revealed results comparable to those found for the rates of visits for all reasons.

Rates of confirmed fighting-related injuries did not change significantly in the intervention schools but increased 56.0% ($P = .01$) in the control schools (Table 3). Rates of injuries due to possible fighting- or nonfighting-related incidents did not differ significantly between 1993–1994 and 1994–1995.

The differences noted above could be due to differences in the baseline rates between schools. To control for this factor, we performed an ANCOVA. The results of the ANCOVA confirmed that, relative to the control schools, the intervention schools had a significant reduction in the rates of visits to nurses for all reasons ($F_{(1,247)} = 16.43$; $P < .001$) and the rates of visits due to injuries only ($F_{(1,147)} = 42.38$; $P < .001$). The results also indicated a significant reduction in the rates of injuries related to confirmed fighting ($F_{(1,59)} = 9.06$; $P = .004$) and the rates of nonfighting-related injuries ($F_{(1,33)} = 19.05$; $P < .0001$). The rates of injuries due to possible fighting episodes did not differ significantly between intervention and control schools ($F_{(1,19)} = .02$; $P = .89$).

In the interviews, the nurses reported that more than 95% of the visits to their office were recorded in the logs and those not reported were mostly motivated by minor problems. The interviews also revealed that schools A and G were affected by outbreaks of head lice in 1993–1994; however, most of these cases were recorded separately. School A experienced a change in nurse at the beginning of the 1994–1995 school year. No changes in accessibility, type of services offered, or method of recording the visits occurred during 1993–1994 or 1994–1995.

DISCUSSION

The rates of visits for all reasons and visits for injuries per 1,000 student days decreased significantly in the intervention schools between 1993–1994 and 1994–1995 while remaining almost unchanged in the control schools. The major change in the control schools was an increase in the rate of confirmed fighting episodes. These findings confirm the impression of the school nurses that children were visiting their offices less frequently during the implementation of the PeaceBuilders program. Results of the ANCOVA suggest that the program may have contributed to the change in number of injuries and visits to school nurses over the two-year period and may have prevented an increase in the number of injuries caused by fighting in the intervention schools.

Despite these promising results, this study has some limitations. First, in two of the nine study schools, logs from an entire school year were missing. Both were control schools and were excluded from the analysis. The exclusion of these schools changed some of the demographic distributions upon which the schools were initially matched. How this may have influenced the results of the study is unknown.

Second, misclassification of fighting-related injuries is possible. Data in the seven schools appeared to be consistently recorded, and almost all of the handwritten notes were legible; however, the notations were rarely more than a few words. Because very little information was provided for each visit, we had difficulty determining whether the sample of injuries coded for fighting were definitely fighting-related, possibly fighting-related, or nonfighting-related. Misclassification of visits for illness or injury is much less likely, however, because the nurses' logs contained a column to be checked indicating whether the motive of the visit was injury or illness.

Third, the number of visits coded as confirmed fighting episodes was small. Only seven to 10 weeks were coded per year for each school, and the number of confirmed fighting-related injuries per week never exceeded 10. Because of the small sample size, the results regarding this variable should be interpreted with caution.

Fourth, the nurse records may not have been completely free from information bias, because students and nurses in PeaceBuilders schools may have been less likely than those in the control schools to report injuries from fighting. But, because the program is a prosocial rather than a punitive program, it is probably not the case that students in PeaceBuilders schools would be reluctant to report fighting-related injuries for fear of punishment. In addition, the nurses' logs were not part of the original evaluation plan; therefore, the nurses did not know their records might be used for this purpose, which reduces the likelihood of bias. Furthermore, the analyses included comparisons between the non injury-related visits as well as injury-related visits.

Finally, information in the nurses' logs did not allow for the examination of differences in the degree of implementation of the program between schools. All intervention schools received the same instructions on how to implement the program, including a wide range of possible activities. However, each teacher and school administrator had freedom choosing which activities they implemented and when. Efforts to assess the timing and the intensity of PeaceBuilders are included in the ongoing evaluation. The results could explain why some schools did not follow the overall pattern detected in the aggregated analyses.

The results of this study not only confirm the validity of the anecdotal evidence that rates of visits to the nurses decreased but also suggest that PeaceBuilders may have contributed to this change. Our experience in the elementary schools also suggests that nurses' logs may be a useful tool to assess the effects of elementary school–based violence prevention programs. Ideally, nurses' logs should be used in conjunction with other data sources. But when no resources are available for evaluation, nurses' records could serve as a simple and inexpensive assessment tool.[10] Student self-reports, teacher reports, playground observations, and school and law enforcement records are currently being used to evaluate the PeaceBuilders program. The findings of that evaluation will help confirm the conclusions of our study.[12]

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