

# A Longitudinal Comparison of the AIDS-Related Attitudes and Knowledge of Parents And Their Children

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*As part of an evaluation of an experimental school-based AIDS risk-reduction program, data from 2,392 middle-school students in 15 high-risk school districts and from 1,627 of their parents were compared to examine how young adolescents and their parents differ with respect to AIDS-related knowledge and attitudes. At the time of the seventh-grade pretest, parents knew significantly more about AIDS than their children did. At the eighth-grade posttest, students who participated in the program knew either more than or at least as much as their parents in several subject areas, while among those not exposed to the program, parents still knew more than their children in most areas. The intervention had a positive impact on students' attitudes toward people with AIDS and on their degree of comfort about discussing with their parents such issues as drug use and sexuality.*

(Family Planning Perspectives, 27:4–10,17, 1995)

There is often debate and discussion about the roles of schools and parents in relation to the education of children about AIDS, sexuality, drug use and risk reduction. There is only sparse research on parent-child relationships and communication, as well as on how these may affect students' knowledge, attitudes, intentions and behavior. Additionally, to date no longitudinal experimental study has reported on how schools can influence parent-child interaction regarding the reduction of risk-taking behavior among young adolescents.

The dramatic twofold increase in the number of AIDS cases among older adolescents between 1989 and 1993, as well as the fact that nearly one in five persons with AIDS are aged 20–29, clearly justify the need for AIDS prevention education

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targeted to youths.<sup>1</sup> Given the long incubation period of the human immunodeficiency virus (HIV), it is clear that many older adolescents and young adults with AIDS were infected as younger teenagers,<sup>2</sup> yet the literature on parents' and children's AIDS-related attitudes, beliefs and behavior predominantly centers on older adolescents, with relatively little focus on adolescents aged 12–15.

Parental demand, coupled with the growing number of AIDS cases, has prompted the majority of states to mandate public schools to teach AIDS education as a part of their regular health curricula.<sup>3</sup> Many schools have tried to involve parents in key decision-making about controversial health curricula, including the extent and explicitness of educational materials, the length of time that teachers should spend on various topics and the amount of interaction parents should have with their children. Since relatively few parents actually participate in this decision-making process, the primary way parents affect their children's health beliefs and behavior is through discussions and experiences (e.g., as role models) that communicate family values, beliefs and expectations.

Previous studies have targeted several aspects of parent-child communication, including mother-child relationships, the impact of maternal discussions on their child's

behavior and the association between parents' and children's knowledge and attitudes. A two-year study that compared 500 matched pairs of teenagers and mothers found maternal-child communication to have little effect either on the child's initiation of coitus or on his or her contraceptive behavior.<sup>4</sup> In fact, adolescents were often ignorant of their parents' attitudes toward sex-related issues, and adolescents and their parents often contradicted one another in describing the kinds of sex-related conversations they had had.

Studies regarding AIDS-related knowledge and attitudes between adolescents and their parents generally indicate that parental knowledge and attitudes about AIDS have a limited impact on their child's AIDS-related knowledge and attitudes. One found that parental knowledge of AIDS transmission myths was related to children's knowledge of the same myths only when parent-child communication about AIDS was frequent.<sup>5</sup> Another showed that parents' attitudes toward people with AIDS are a significant predictor of a child's attitudes, but not a significant predictor of a child's knowledge about AIDS.<sup>6</sup> This study also demonstrated that children's attitudes could be predicted by their own knowledge, but not by their parents' knowledge. Other researchers found that family factors (such as nurturance, psychological pressure, family cohesion and adaptability) and mothers' AIDS-related knowledge and attitudes were not linked with their child's knowledge or attitudes.<sup>7</sup>

In these studies, parents frequently expressed a desire for schools to take a more active role because they believed they were not "up to the task of providing AIDS education themselves."<sup>8</sup> In addition, a secondary data analysis summarizing findings from several youth surveys conducted between 1985 and 1987 and from the National Health Interview Survey

(which has included AIDS-related questions for adults since 1986) concluded that although most adults and teenagers are aware of the main modes of HIV transmission, teenagers are generally less well-informed about this topic than are adults.<sup>9</sup>

Because AIDS and HIV-related diseases are relatively new phenomena on which both children and their parents are concurrently exposed to new information, this situation provides a unique opportunity to examine differences in parent-child knowledge and attitudes toward a disease and the behavior associated with it. The study recounted in this article goes further than those described above in exploring generational differences in HIV knowledge and attitudes by using a matched sample of students and their parents in a longitudinal experimental design that also included a control group of matched students and parents.

In a preliminary report on a partial data set from only five of the 15 participating school districts<sup>10</sup> (one that included pretest-posttest treatment-group results only<sup>11</sup>), we conducted analyses of parent-child differences with respect to AIDS-related knowledge and attitudes and studied the short-term (approximately one week postintervention) impact of a school-based AIDS prevention program on these generational differences. Posttest results indicated that the program had significantly improved students' AIDS-related knowledge and their tolerance towards people with AIDS, as well as communication patterns between students and their parents.

The results presented in this article incorporate the preliminary findings from the treatment group, and expand on them to assess the impact over one year and the maintenance of the intervention effects. Our study is one of the first to examine program effects on generational perceptions of parent-child interactions using a longitudinal experimental design. The advantages of this design include a control group, two waves of longitudinal data collection (pretest and posttest) from matched student-parent pairs, data from all 15 participating schools districts and an assessment of the long-term impact and maintenance of the intervention effects.

In this article, we present the results of our survey of young adolescents' knowledge of and attitudes toward HIV infection and of their perceptions concerning their parents' attitudes with respect to sex and drugs; these data are coupled with the results of the corresponding parent survey. The purpose of the research is to examine how young students and their parents dif-

fer with regard to AIDS-related knowledge and attitudes, as well as to assess the impact of a school-based AIDS prevention program on generational differences and the stability of its effects over time.

## Methods

### Subjects & Intervention

The Youth AIDS Prevention Project is a school-based, multiple-risk reduction program designed to prevent sexually transmitted diseases (STDs), HIV and AIDS, and substance abuse among young teenagers attending junior high school. The project was conducted in a large metropolitan area in the Midwest and tested in high-risk schools starting in the 1991-1992 school year and ending in the 1992-1993 school year. The 15 participating school districts were recruited from among 45 districts likely to be at greatest risk of a high prevalence of HIV infection and transmission, based on such variables as the proportion of the local population living in poverty, the proportion of minorities in the school district, rates of reported STDs and adolescent pregnancies, rates of school dropout or truancy, and collective reading scores (as recorded in state examinations).

The 15 school districts were randomly assigned to one of three groups: the parental interactive treatment group (five districts), the parental noninteractive treatment group (five districts) and a control group in which students received delayed treatment\* (five districts). Students in control schools were given pretest and posttest surveys concurrently with intervention schools. During the year of the intervention and measurement in treatment schools, control students received basic AIDS education (the current practice in their districts), in compliance with state mandates.

The classroom intervention design was developed using social cognitive theory<sup>12</sup> and the social influences model of behavior change.<sup>13</sup> The 15-lesson curriculum uses

**Table 1. Percentage distribution of students in Youth AIDS Prevention Project, by study group and selected variables at baseline, according to data collection cycle, 1991-1993**

Study group and variable	All students at 7th grade pretest	Students with 8th grade posttest	Students at pretest with parent match
<b>TREATMENT GROUP</b>	(N=1,459)	(N=1,091)	(N=914)
<b>Gender</b>			
Male	50.0	48.6	45.0***
Female	50.0	51.4	55.0
<b>Race</b>			
White	20.8	22.0	23.0
Black	58.3†	57.0	56.9
Hispanic	16.0†	16.8	16.1
Other	4.9	4.3	4.0
<b>Risk behavior</b>			
Ever had intercourse	36.0	32.3**	32.8*
Ever smoked cigarettes	27.9	24.9*	27.5
Ever drank alcohol	44.8	39.6***	41.3*
Ever smoked marijuana	2.8	1.9	2.6
Ever used inhalants	1.5	1.0	1.3
Ever used cocaine or crack	0.6	0.5	0.7
<b>CONTROL GROUP</b>	(N=933)	(N=751)	(N=713)
<b>Gender</b>			
Male	52.7	51.7	49.7
Female	47.3	48.3	50.3
<b>Race</b>			
White	23.2	23.9	30.1***
Black	65.2	65.4	59.6**
Hispanic	6.7	6.3	5.5
Other	4.9	4.4	4.8
<b>Risk behavior</b>			
Ever had intercourse	36.3	33.7	29.5***
Ever smoked cigarettes	28.7	26.7	27.9
Ever drank alcohol	42.1	40.9	42.4
Ever smoked marijuana	1.6	1.5	1.2
Ever used inhalants	0.7	0.4	0.4
Ever used cocaine or crack	0.4	0.1	0.6
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

\*Difference between subgroup and seventh-grade pretest population is statistically significant at p<.05. \*\*Difference between subgroup and pretest population is statistically significant at p<.01. \*\*\*Difference between subgroup and pretest population is statistically significant at p<.001. †Difference between treatment and control groups at seventh-grade pretest is statistically significant at p<.001.

an integrative approach to multiple risk prevention and reduction, through knowledge transfer, active learning and skills-building activities designed to affect students' knowledge, attitudes, intentions and behavior. Topics included HIV and AIDS, pregnancy and STD prevention, and enhancement of decision-making and resistance skills. Specific activities consisted of lectures, class discussions, small-group discussions, role plays, educational games and anonymous questions that students put in a question box.

The school-based classroom intervention was the same in the two experimental groups; it included 10 sessions (two consecutive weeks) in seventh grade and five booster sessions (one week) in eighth grade. All sessions were conducted by pro-

\*In control schools, the seventh grade and eighth grade interventions were delivered to the cohort of students one year younger than the students reported in this study, during the next academic year after data collection was complete.

**Table 2. Percentage of parents, by demographic variables, according to study group and data collection cycle**

Variable	Control		Treatment	
	All parents at 7th grade pretest (N=577)	Parents with 8th grade posttest match (N=228)	All parents at 7th grade pretest (N=1,050)	Parents with 8th grade posttest match (N=485)
<b>Gender</b>				
Male	12.6	10.6	11.8	12.3
Female	87.4	89.4	88.2	87.7
<b>Race</b>				
White	32.8	44.0***	26.3†	28.0
Black	59.3	48.3***	57.9	54.8
Hispanic	6.1	6.8	13.2‡	14.1
Other	1.9	1.0	2.6	3.3
<b>Family</b>				
Both parents live at home	56.3	64.0**	53.8	60.6***
Mean no. of children <18 at home	2.52	2.32	2.63	2.58

\*Difference between pretest and matching posttest subgroups is statistically significant at  $p < .05$ . \*\*Difference between pretest and posttest matching subgroups is statistically significant at  $p < .01$ . \*\*\*Difference between pretest and posttest matching subgroups is statistically significant at  $p < .001$ . †Difference between treatment and control groups at pretest is statistically significant at  $p < .01$ . ‡Difference between treatment and control groups at pretest is statistically significant at  $p < .001$ .

fessional health educators who received extensive training in delivery of this program.

In addition, students in both groups were required to complete homework assignments. However, in the parental interactive group, students were required to complete their homework assignments with their parents, who were also encouraged to attend parent meetings. Parent meetings were held in both groups and were designed to introduce parents to the program, give them an opportunity to ask questions, and deliver up-to-date AIDS information. In addition, parents in the interactive group were expected to participate in additional activities, such as organizing parent networks and AIDS-prevention activities within their children’s schools.

Despite multiple attempts and numerous incentives (e.g., raffles, prizes and refreshments), getting large numbers of parents actively involved in the program proved difficult. The level of parental participation was similar in the two experimental groups, and preliminary analyses showed no significant differences between them. We have, therefore, combined them into a single experimental group for our current analyses.

**Data Collection and Measures**

Approximately one week prior to the seventh-grade pretest, “passive” informed consent forms were mailed to students’ parents or guardians. These forms briefly described the intervention and informed parents that

the project met state-mandated AIDS education requirements. Parents or guardians were instructed to return the consent form only if they did not want their child to participate in the program or did not want their child to fill out a questionnaire. Fewer than 1% of parents refused to allow their child to participate in the intervention, and fewer than 1% of those who permitted participation refused to allow their child to fill out a questionnaire.

All participating students were surveyed prior to the seventh grade intervention. Students were also surveyed in the eighth

grade, 1–2 weeks after the booster sessions. (The survey instrument measured material covered in the seventh grade intervention; primarily new material was covered in the eighth grade intervention, and is not reported here.) The surveys were administered by trained data collectors, each during a class period ranging from 38 to 50 minutes in length. The majority of students (approximately 75%) were able to complete each questionnaire in the allotted time period. (On average, students needed an entire class period to complete the questionnaires.) Additional time was not given to students who were unable to complete the surveys during a class period; instead, uncompleted questions were classified as missing information.

The questionnaires focused on decision-making, refusal skills, estimates of risk behavior among peers, participation in various types of risk behavior, attitudes toward people with AIDS, knowledge of AIDS facts, knowledge and attitudes about condoms and foam, and feelings about family rules and parental opinions. Students were also asked about a number of demographic characteristics, such as their age, race, ethnicity, parents’ education and typical grades in school.

A total of 2,392 seventh-grade students (1,459 treatment adolescents and 933 controls) completed the preintervention survey. As a result of family mobility, student drop-out rates and absenteeism, the number of students with matching posttest data decreased to 1,842 (1,091 in the treatment

group and 751 in the control group) by the end of eighth grade, resulting in 25% attrition for the treatment group and 20% for the control group (Table 1, page 5).

Based on seventh-grade pretest data, there were significant behavioral differences between students lost to follow-up and those remaining in the project in terms of their use of licit drugs (i.e., cigarettes and alcohol) and their sexual activity. However, students in both treatment and control groups who were lost to follow-up were similar in terms of demographic and behavioral variables, which minimizes the potential for bias. Despite the fact that students were randomly assigned to their group, there were racial differences at baseline between the treatment and control groups. Because we know from previous research that race, licit drug use and sexual activity are related to AIDS knowledge and attitudes,<sup>14</sup> we controlled for these variables in our analyses by using them as covariates.

At the beginning of seventh grade and at the end of eighth grade, students were given a survey for their parents to complete confidentially and return in a sealed envelope. A total of 1,627 parents (matched to 68% of the students who completed a seventh-grade questionnaire) completed and returned a self-administered questionnaire in seventh grade. As can be seen in Table 1, the subsample of seventh-grade students for whom there were matching data from their parents differed from the overall seventh-grade student sample in terms of race, sexual activity and alcohol use.

Of the 1,627 parents who completed a questionnaire in the seventh grade, 713 (44%) also completed a similar questionnaire in the eighth grade. There were statistically significant differences in terms of race and in whether or not both parents lived at home between the subsample of parents who completed the questionnaires in both grades and the sample of parents who completed only the seventh-grade questionnaire (Table 2). There also were racial differences between the parents participating in the seventh-grade pretest, with the proportion of whites being smaller in the treatment group than in the control group and the proportion of Hispanics being larger. Again, we took these racial differences into account by using race and ethnicity as a covariate in the analyses.

The parent questionnaires included their estimates of the extent of risk behavior among students in their child’s grade, their attitudes toward people with AIDS, their knowledge of basic AIDS facts, their knowledge and attitudes

**Table 3. Mean number of knowledge items answered correctly (and standard deviations), by timing of test, experimental group and family member**

Index	Pretest				Posttest				Main effects			Interactions			
	Control		Treatment		Control		Treatment		Group*	Family†	Time‡	Family x group	Group x time	Family x time	Group x family x time
	Student	Parent	Student	Parent	Student	Parent	Student	Parent							
<b>Total knowledge (34 items)</b>															
Mean	23.13	27.24	22.23	26.98	24.76	27.80	27.78	28.09	p<.001	p<.001	p<.001	p<.001	p<.001	p<.001	p<.001
SD	(5.16)	(4.16)	(4.65)	(4.16)	(5.15)	(4.15)	(5.25)	(4.10)							
<b>Transmission via blood (3 items)</b>															
Mean	1.04	1.25	1.04	1.15	1.09	1.44	1.53	1.47	p<.001	p<.001	p<.001	p<.001	p<.001	p=.232	p<.001
SD	(0.76)	(1.04)	(0.79)	(1.02)	(0.85)	(1.08)	(1.03)	(1.09)							
<b>Transmission via casual contact (4 items)</b>															
Mean	2.39	2.50	2.15	2.48	2.56	2.68	2.96	2.81	p=.014	p=.524	p<.001	p=.844	p<.001	p<.001	p<.001
SD	(1.40)	(1.37)	(1.41)	(1.41)	(1.33)	(1.36)	(1.18)	(1.30)							
<b>Prevention (4 items)</b>															
Mean	2.61	3.29	2.40	3.16	3.05	3.36	3.22	3.32	p=.468	p<.001	p<.001	p=.277	p<.001	p<.001	p<.001
SD	(1.20)	(0.91)	(1.22)	(1.02)	(1.16)	(0.93)	(1.07)	(0.93)							
<b>Prevention myths (3 items)</b>															
Mean	1.30	2.64	1.16	2.60	1.56	2.59	2.23	2.63	p<.001	p<.001	p<.001	p<.001	p<.001	p<.001	p<.001
SD	(0.89)	(0.70)	(0.88)	(0.74)	(0.95)	(0.76)	(0.92)	(0.70)							
<b>Modes of transmission (6 items)§</b>															
Mean	5.36	5.78	5.34	5.76	5.43	5.84	5.55	5.74	p=.855	p<.001	p<.001	p=.022	p=.323	p=.003	p=.021
SD	(1.06)	(0.59)	(1.03)	(0.68)	(1.11)	(0.51)	(0.99)	(0.63)							
<b>Use of condoms and foam (6 items)</b>															
Mean	3.78	4.34	3.65	4.36	4.21	4.42	5.09	4.57	p<.001	p<.001	p<.001	p<.001	p<.001	p<.001	p<.001
SD	(1.41)	(1.23)	(1.38)	(1.21)	(1.38)	(1.33)	(1.27)	(1.27)							
<b>General knowledge (8 items)</b>															
Mean	6.29	7.29	6.06	7.14	6.56	7.34	6.93	7.23	p=.464	p<.001	p<.001	p=.002	p<.001	p<.001	p<.001
SD	(1.54)	(1.02)	(1.61)	(1.15)	(1.47)	(0.98)	(1.45)	(1.10)							

\*Treatment vs. control. †Child vs. parent. ‡Seventh grade vs. eighth grade. §Simplified model (intragroup variation only).

about condoms and foam, communication patterns with their child, their feelings about their child's possible participation in risky behavior, and their beliefs and opinions about their child's school and homework.

In this article, we consider three categories of items that were on both the student and parent questionnaires: knowledge, prevalence estimates and selected AIDS-related attitudes, and parent-child communication about sex and drugs. Seven knowledge indices were created from a set of 34 items measuring knowledge about HIV and AIDS. Items were grouped according to content; Kuder-Richardson-20 measures of internal consistency ranged from moderate to good (.43-.74).

These seven indices measured knowledge about AIDS transmission through the blood supply, knowledge about AIDS transmission via casual contact (such as by holding hands with or by going to school with a person with AIDS), actual modes of AIDS transmission, prevention of HIV infection, awareness of myths related to HIV infection, use of condoms and foam (including nonoxynol-9 spermicides), general facts about AIDS and HIV infection and overall AIDS-related knowledge (all indices combined). The knowledge indices are the sum of responses in

which a correct answer was coded as 1 and an incorrect response as 0.

Previous findings suggested that young adolescents tend to have different attitudes toward sexual intercourse than toward substance use, and are more comfortable with discussing and resisting drug use than with discussing and resisting sexual activity.<sup>15</sup> As a result, questions about perceived prevalence estimates and attitude measures were asked separately for sexual intercourse and for drug use. Students and parents were asked the following: their estimates of the prevalence of drug use and of sexual activity among students in the seventh and eighth grades (scaled from 1=none to 5=all); how upset parents would be if their children were using drugs or having sex (scaled from 1=not at all upset to 3=very upset); their attitudes toward people with AIDS (scaled from 1=least tolerant to 4=most tolerant); the importance of parents' feelings about whether or not the student uses drugs or has sex (scaled from 1=very unimportant to 4=very important); and their level of comfort in talking with their parent or child about drugs or sex (scaled from 1=very uncomfortable to 4=very comfortable). Tests of internal consistency (Cronbach's alpha) ranged from moderate to very good (.51-.97).

### Overview of Analyses

To compare the two waves of data for both students and parents, we conducted a series of random-effects regression analyses, because of the manner in which this procedure handles missing data in longitudinal studies.<sup>\*16</sup> This procedure was considered the optimum way to analyze the data because it allowed us to use all of the data, instead of being restricted to the subsample that had matching pretest-posttest student data and matching seventh-grade and eighth-grade parent data.

In all analyses, we conducted a series of random-effects regression analyses with two intragroup variables—time (seventh grade vs. eighth grade) and family (parent vs. student)—and with one between-groups variable (treatment group vs. con-

\*A random-effects regression handles missing data by estimating individual time-trend lines based on available data for each individual, and augmenting them with information from data for all other individuals in the sample from which the person is drawn. Therefore, this approach minimizes potential bias caused by attrition. Each individual does not need to have provided complete information in order to be included in the analyses. The model assumes that the data available for a given subject are representative of that subject's deviation from the average trend lines that are observed for the whole sample. (For a more detailed description of the manner in which missing data are handled by random-effects regression, see N. M. Laird, "Missing Data in Longitudinal Studies," *Statistics in Medicine*, 7:305-315, 1988.)

trol group), with covariate adjustment to control for possible variation because of sex, race, sexual activity and licit drug use. In terms of the random-effects model, besides allowing for intrastudent and intraparent variation, we also allowed for the estimation of intragroup variation. In some cases, once intragroup variation was accounted for, there was no evidence of differential variation related to students and parents. In all cases, however, we first attempted to estimate these three components of variation, and only used the simplified model (allowing only intragroup variation) when the additional variance terms were not reliably estimated as deviating from zero.

In terms of the impact related to the experimental group, we predicted a three-way interaction between time, family and experimental group. Specifically, we expected that among the seventh-grade respondents, parents would have higher knowledge levels and be more comfortable with discussing sex or drugs, regardless of experimental group. However, we expected that these parent-child differences would change, depending on whether they belonged to the experimental or the control group: For example, we expected that by eighth grade parents in the control group would still know more than their children, but that in the treatment group children's knowledge levels would have caught up to or surpassed those of their parents.\*

## Results

### Knowledge

Table 3 (page 7) presents mean knowledge scores for students and parents in seventh grade (pretest) and eighth grade (posttest), as well as significance levels for the family, time and experimental groups and their interactions. At the time of the pretest, parents in both groups knew significantly more than their children did (i.e., prior to the students' participation in the classroom intervention). In the treatment group, these pretest differences occurred for each knowledge index; in the control group, these differences occurred for all indices except knowledge about HIV transmission through casual contact. For example, at pretest, on the 34-item index measuring overall knowledge, control parents scored much higher than their children (27.24 and 23.13, respectively), while the difference between treatment-group parents and control

parents was even greater (26.98 vs. 22.23).

By the time of the posttest, the pattern of parent-student differences varied by experimental group. Thus, the predicted three-way interactions were statistically significant. Knowledge levels for parents in both groups remained relatively stable from seventh to eighth grade. However, after the intervention, post-hoc contrasts indicate that treatment students knew more than their parents about transmission via casual contact (scores of 2.96 vs. 2.81) and about the use of condoms and foam (5.09 vs. 4.57). In addition, after the intervention, treatment students knew approximately as much as their parents about transmission through the blood supply (1.53 vs. 1.47), actual modes of transmission (5.55 vs. 5.74), prevention of HIV transmission (3.22 vs. 3.32), general knowledge about AIDS (6.93 vs. 7.23) and overall AIDS-related knowledge (27.78 vs. 28.09). Although students' knowledge improved as a result of the intervention, parents still knew more about prevention myths at posttest than did students (2.63 vs. 2.23).

In contrast, for the control group, many of the parent-student knowledge differences remained. Post-hoc contrasts indicate that control parents still knew more than their children about transmission via blood (1.44 vs. 1.09), actual modes of transmission (5.84 vs. 5.43), prevention myths (2.59 vs. 1.56), general knowledge about AIDS (7.34 vs. 6.56) and overall AIDS-related knowledge (27.80 vs. 24.76). By eighth grade, control students had caught up to their parents in terms of knowledge about transmission via casual contact (2.56 vs. 2.68), prevention of HIV (3.05 vs. 3.36), and use of condoms and foam (4.21 vs. 4.42).

Using the overall knowledge index as a summary measure, we found that in the seventh grade, parents in both groups knew more than their children did; moreover, parental knowledge levels remained relatively stable from seventh grade to eighth grade. Students in the control group increased their knowledge slightly by eighth grade, but their parents still knew more. In contrast, treatment students increased their knowledge to the point where their overall knowledge was comparable to that of their parents and significantly greater than that of control students. Thus, the three-way interaction is significant.

### Perceived Estimates of Prevalence

An examination of the upper panel of Table 4 indicates that parents and students differed in their estimates of the prevalence of risk behavior in the student's grade. The prevalence estimates of student drug use

varied by grade (i.e., a significant family-by-time interaction). Specifically, in the seventh grade, in both groups, parents believed that students were more likely to be using drugs than their children did (mean index scores of 1.82 and 1.56 among controls and 1.84 and 1.58 among members of the treatment group). By eighth grade, students and parents in both groups were in agreement in estimating drug use and were able to provide estimates fairly close to actual figures taken from students' survey responses. Conversely, both at pretest and at posttest, students in both groups indicated that they believed that more of their fellow students were having sex than did their parents.

### Attitudes and Communication Patterns

The remainder of Table 4 indicates that in seventh grade, students in both treatment and control groups correctly estimated how upset their parents would be if they found out their child was using drugs. By eighth grade, students slightly underestimated how upset their parents would be (a significant family-by-time interaction). In spite of the significant difference in the eighth grade, students in both groups assessed fairly accurately how upset their parents would be if they were using drugs. However, young adolescents in both groups significantly underestimated how upset their parents would be if they were having sex. This underestimation occurred at both pretest and posttest, but parent-child differences were slightly larger in the eighth grade than in the seventh grade (a significant family-by-time interaction).

Students and parents also differed in terms of their attitudes toward people with AIDS. Students in both groups were slightly more tolerant than their parents at pretest. However, in the treatment group, parent-child differences changed from seventh grade to eighth grade (a significant three-way interaction). The attitudes of parents in both groups, and of students in the control group, remained relatively consistent from seventh to eighth grade; however, students who participated in the intervention became much more tolerant toward people with AIDS. Thus, by eighth grade, treatment students were significantly more tolerant toward people with AIDS than were parents or control students.

Table 4 also demonstrates that there were significant differences between parents and students in the perceived importance of parents' feelings about whether or not their child used drugs or had sex. For both drug use and sexual be-

\*Once significant interactions were identified, we used post-hoc contrasts (Bonferroni t-tests) to determine if specific data points (e.g., treatment-group parents and their children at pretest) were statistically significant.

**Table 4. Mean scores (and standard deviations) indicating estimates of risk behaviors, attitudes toward risk behaviors and communication of those attitudes, by timing of test, experimental group and family member**

Index	Pretest				Posttest				Main effects			Interactions			
	Control		Treatment		Control		Treatment		Group*	Family†	Time‡	Family x group	Group x time	Family x time	Group x family x time
	Student	Parent	Student	Parent	Student	Parent	Student	Parent							
<b>ESTIMATES OF RISK BEHAVIORS</b>															
<b>Drug use**</b>															
Mean	1.56	1.82	1.58	1.84	1.86	1.92	1.83	1.90	p=.628	p<.001	p<.001	p=.729	p=.039	p<.001	p=.747
SD	(0.53)	(0.52)	(0.54)	(0.53)	(0.64)	(0.52)	(0.51)	(0.50)							
<b>Sexual experience**</b>															
Mean	2.92	2.08	2.94	2.13	3.15	2.22	3.11	2.36	p=.135	p<.001	p<.001	p=.930	p=.974	p=.604	p=.355
SD	(1.27)	(0.80)	(1.27)	(0.84)	(1.20)	(0.88)	(1.18)	(1.09)							
<b>ATTITUDES</b>															
<b>Parents' reaction to their child's using drugs**,††</b>															
Mean	2.87	2.88	2.90	2.89	2.83	2.90	2.82	2.86	p=.862	p<.001	p<.001	p=.268	p=.015	p=.001	p=.704
SD	(0.34)	(0.23)	(0.30)	(0.24)	(0.36)	(0.17)	(0.38)	(0.27)							
<b>Parents' reaction to their child's having sex**,††</b>															
Mean	2.57	2.87	2.59	2.88	2.48	2.89	2.50	2.84	p=.732	p<.001	p<.001	p=.232	p=.230	p=.006	p=.068
SD	(0.55)	(0.30)	(0.53)	(0.30)	(0.58)	(0.26)	(0.59)	(0.34)							
<b>Attitudes toward people with AIDS‡‡</b>															
Mean	3.02	2.86	2.92	2.85	3.05	2.86	3.36	2.98	p=.003	p<.001	p<.001	p=.229	p<.001	p<.001	p<.001
SD	(0.97)	(0.77)	(0.99)	(0.75)	(0.92)	(0.75)	(0.78)	(0.71)							
<b>COMMUNICATION OF ATTITUDES</b>															
<b>Importance of parents' feelings about drugs**,§§</b>															
Mean	3.29	3.88	3.29	3.85	3.45	3.88	3.48	3.81	p=.416	p<.001	p<.001	p=.140	p=.891	p<.001	p=.329
SD	(1.15)	(0.49)	(1.16)	(0.55)	(0.95)	(0.42)	(0.94)	(0.59)							
<b>Importance of parents' feelings about sex**,§§</b>															
Mean	3.32	3.85	3.31	3.82	3.30	3.81	3.38	3.79	p=.988	p<.001	p=.697	p=.095	p=.257	p=.247	p=.149
SD	(0.98)	(0.53)	(1.01)	(0.60)	(0.96)	(0.51)	(0.96)	(0.56)							
<b>Parents'/child's comfort talking with child/parent about drugs**,††</b>															
Mean	2.83	3.92	2.83	3.86	2.95	3.94	3.23	3.87	p=.363	p<.001	p<.001	p<.001	p=.012	p<.001	p=.002
SD	(1.22)	(0.29)	(1.20)	(0.45)	(1.19)	(0.24)	(1.04)	(0.45)							
<b>Parents'/child's comfort talking with child/parent about sex**,††</b>															
Mean	2.60	3.71	2.55	3.64	2.60	3.74	2.90	3.67	p=.435	p<.001	p<.001	p<.001	p=.001	p=.003	p<.001
SD	(1.03)	(0.53)	(1.06)	(0.61)	(1.06)	(0.48)	(1.02)	(0.61)							

\*Treatment vs. control. †Child vs. parent. ‡Seventh grade vs. eighth grade. §Scale ranges from 1=none to 5=all. \*\*Based on a simplified model (intragroup variation only). ††Using a scale in which 1=not at all upset and 3=very upset. ‡‡Using a scale in which 1=least tolerant and 4=most tolerant. §§Using a scale in which 1=very unimportant and 4=very important. \*†Using a scale in which 1=very uncomfortable and 4=very comfortable.

havior, parents overestimated the importance of their feelings to their children, but the pattern of parent-child differences varied depending on the risk behavior.

Specifically, for drug use, the family-by-time interaction for the treatment and control groups combined indicates that differences between students and their parents were slightly less in the eighth grade than in the seventh. Thus, in the eighth grade, parents were slightly more accurate in estimating the importance of their feelings to their child about whether or not their child used drugs. For sex, the parent-child differences remained the same in both seventh and eighth grades, for both treatment and control groups. Parents significantly overestimated the importance to their child of their feelings about whether or not the child had sex.

In both groups, parents and students re-

ported significantly different comfort levels when talking to each other about using drugs and having sex. These differences were especially pronounced at pretest. The family-by-group interactions indicate that differences between students and parents were greater in the control group. Furthermore, these interactions differed by time: In seventh grade, there were no differences between treatment and control groups in terms of parent-child differences; by eighth grade, parents' comfort level had remained stable, while students' comfort level had increased, especially among those in the treatment group.

## Discussion

This study reports on some knowledge and attitudinal differences toward HIV infection between young adolescents and their parents living in high-risk commu-

nities in the Midwest. Members of this younger generation (12-13-year-olds) have not been studied in depth with regard to these issues and have not been included as part of the national Youth Risk Behavior Survey conducted by the Centers for Disease Control and Prevention. Similar to findings from an earlier study utilizing data from separate surveys of adolescents and adults,<sup>17</sup> adults in our study had higher levels of AIDS-related knowledge than their children prior to the children's participation in an education program.

However, after participating in the intervention, adolescents knew more than their parents about HIV infection on two scales and had a similar level of knowledge on five scales. It is not surprising that there were no significant posttest differences between the students and parents on five of these indices. Since parents'

knowledge was high on most of the scales (with the exception of knowledge about blood-borne transmission), it would have been very difficult for treatment students to score significantly better than their parents, even after participating in the intervention. These data indicate that when youths are given adequate information about AIDS, they are able at least to catch up to (if not outdistance) their parents. These results support previous findings<sup>18</sup> and demonstrate the stability of knowledge gains over time.

By eighth grade, students in the control group had levels of knowledge comparable to those of their parents about transmission through casual contact, prevention of HIV, and knowledge about condoms and foam. Again, these results are not surprising, since their parents did relatively poorly on each of these indices (except for the prevention scale). The fact that control students did not demonstrate much improvement from seventh grade to eighth grade suggests that the general AIDS education provided by their schools was insufficient to significantly improve their AIDS-related knowledge or change their attitudes about risk-taking. Although we cannot precisely document the nature of AIDS education in each control school, we are aware that in some control schools the AIDS program was limited to a rudimentary field trip to a health museum, and that no control school implemented a comprehensive skills-based program similar to the Youth AIDS Prevention Project.

Given that the value of explicit sex education in the schools remains controversial, studying parent-child communication patterns offers some insights into how important schools can be in teaching young people about sexuality. For example, discrepancies in parent-child perceptions about the importance of parental attitudes toward a child's sexual behavior and teenagers' level of comfort in talking to parents about these sensitive issues suggest that both parents and children may be receptive to children learning and discussing AIDS-related topics within the context of schools.

Parents' levels of misinformation about AIDS also demonstrate the need for school-based, comprehensive AIDS prevention education. Adults in our study continued to be misinformed about some aspects of AIDS, particularly about the safety of the blood supply and about transmission via casual contact. This suggests that better AIDS education for children should include improving AIDS education for adults. However, given the

difficulty of involving parents in their own children's education, it appears that there is a need for community-based AIDS education for adults that is independent of their children's schooling.

Youths' attitudes toward people with AIDS were consistently more favorable than those of their parents, in both the seventh and the eighth grades. However, after the intervention, treatment students became substantially more tolerant of people with AIDS than their parents or than control students. This newly acquired tolerance will become especially important, given that HIV-related diseases and AIDS will become more prevalent as the students age and interact with HIV-infected people on a more regular basis.

Our previous research indicated that while young people from high-risk communities view both drug use and sex as risky behavior, sex is generally considered more acceptable than drug use.<sup>19</sup> Data from this study support these general conclusions. Although parents and adolescents are in agreement about how upset the parents would be if they discovered their children were using drugs, youths perceive that their parents would be less upset about their involvement in sexual activity than their parents report. This discrepancy increased from the seventh to the eighth grade. These results conflict with the findings of a study in which adolescents underestimated the liberalism of their parents with regard to sex.<sup>20</sup>

Moreover, while children view parents' feelings as important, they are not as important as parents believe. Parents overestimate the importance of their feelings to their child about whether or not their child uses drugs or has sex. Students' involvement in risky behaviors suggests that parents' feelings alone may not be sufficient to counteract other influences.

For adolescents, especially those growing up in low-income areas, early initiation of sexual behavior may not be perceived as a problem behavior or as associated with other problem behaviors.<sup>21</sup> If increased parental attention to teenage drug use is at the expense of attention to sexual involvement, it may leave youths without explicit guidance about participation in sexual activity. This is particularly problematic because it is unsafe sexual activity that puts teenagers at greatest risk of becoming infected with HIV. It should not go unnoticed that the number of young students in this study population who reported having had sexual intercourse was quite high (about 36% at pretest). The general acceptance of sex-

ual activity as commonplace behavior among very young adolescents suggests that community, school or parental initiatives that focus on the consequences of early sexual behavior are essential to preventing HIV infection in this population.

Parents also report more comfort than students with respect to communicating with each other about both drugs and sex, a finding that is supported by the work of previous researchers.<sup>22</sup> However, results indicate that this program had an impact in making students feel more comfortable about discussing these topics with their parents. Through knowledge transfer, interactive homework, role plays, and skills-building activities, the intervention directly addressed communication issues with adults and peers. Skills development in these areas, plus knowledge enhancement, strengthened program impact and maintenance of effects over time.

Clearly, one of the implications of our research is that schools need to expand and improve their existing AIDS prevention programs to address social influences (e.g., media, friends, family and school environment), to promote self-efficacy, to use active learning and modeling by significant adults, and to create opportunities to practice peer negotiation and resistance skills. It is our belief that for these curriculum changes to take place, states must revise legislative mandates to include specific guidelines for the content and extent of AIDS education. Legislatures and school districts need to adopt and implement policies and programs that have consistent long-term goals for comprehensive and reinforced AIDS education. Schools should support the training of competent, knowledgeable staff, including certified health educators. When this is not sufficient, schools should consider bringing in outside health educators (or other health professionals) who are already trained in and may be more comfortable with discussing sensitive and controversial issues such as sexuality and drugs. This is especially important in schools that have limited resources and staff, making it difficult for them to provide training opportunities and material support to their employees.

Our findings speak to the ability of and the need for comprehensive school-based education programs both to be a primary source of health knowledge and to supplement the messages and information transmitted to youths via parents and other influences. However, it appears that what is being offered as mandated AIDS education has not been enough to im-

*(continued on page 17)*

## AIDS-Related Attitudes

(continued from page 10)

prove knowledge or attitudes among junior high school students. Our school-based, theory-driven AIDS education approach indicates a greater degree of success is possible when HIV education programs are comprehensive and provide skills-building and active-learning opportunities for very young teenagers.

### References

1. Centers for Disease Control and Prevention, *HIV Surveillance Report*, 5:10, 1993.
2. J. Brooks-Gunn and F. F. Furstenberg, Jr., "Coming of Age in the Era of AIDS: Puberty, Sexuality, and Contraception," *Milbank Quarterly*, 68:59-84, 1990.
3. M. Schumacher, "HIV / AIDS Education Survey: Profiles of State Policy Actions," National Association of State Boards of Education, Alexandria, Va., 1989.
4. S. F. Newcomer and J. R. Udry, "Parent-Child Communication and Adolescent Sexual Behavior," *Family Planning Perspectives*, 17:169-174, 1985.
5. C. K. Sigelman et al., "Parents' Contribution to Knowledge and Attitudes Regarding AIDS," *Journal of Pediatric Psychology*, 18:221-235, 1993.
6. L. H. McElreath and M. C. Roberts, "Perceptions of Acquired Immune Deficiency Syndrome by Children and Their Parents," *Journal of Pediatric Psychology*, 17:477-490, 1992.
7. G. J. Deloye, S. W. Henggeler and C. M. Daniels, "Developmental and Family Correlates of Children's Knowledge and Attitudes Regarding AIDS," *Journal of Pediatric Psychology*, 18:209-219, 1993.
8. C. K. Sigelman et al., 1993, op. cit. (see reference 5).
9. J. Brooks-Gunn and F. F. Furstenberg, Jr., 1990, op. cit. (see reference 2).
10. S. R. Levy et al., "Adolescent Risk for HIV as Viewed by Youth and Their Parents," *Journal of Family and Community Health*, 17:30-41, 1994.
11. T. D. Cook and D. T. Campbell, *Quasi-Experimentation: Design and Analysis Issues for Field Settings*, Houghton Mifflin, Boston, Mass., 1979.
12. A. Bandura, *Social Foundations of Thought and Action: A Social Cognitive Theory*, Prentice-Hall, Englewood Cliffs, N.J., 1986.
13. J. D. Fisher, S. J. Misovich and W. A. Fisher, "Impact of Perceived Social Norms on Adolescents' AIDS-Risk Behavior and Prevention," in R. J. DiClemente, ed., *Adolescents and AIDS: A Generation at Risk*, Sage, Newbury Park, Calif., 1992.
14. S. M. Kegeles, N. E. Adler and C. E. Irwin, Jr., "Sexually Active Adolescents and Condoms: Changes Over One Year in Knowledge, Attitudes and Use," *American Journal of Public Health*, 78:460-461, 1988; and A. Handler et al., "Attitudes Toward People with AIDS and Implications for School-Based Youth AIDS Education," *AIDS Education and Prevention*, 6:175-183, 1994.
15. S. R. Levy et al., "Young Adolescents' Attitudes Towards Sex and Substance Use: Implications for AIDS Prevention," *AIDS Education and Prevention*, 5:340-351, 1993.
16. R. Gibbons et al., "Some Conceptual and Statistical Issues in Analysis of Longitudinal Psychiatric Data: Application to the NIMH Treatment of Depression Collaborative Research Program Dataset," *Archives of General Psychiatry*, 50:739-750, 1993.
17. J. Brooks-Gunn and F. F. Furstenberg, Jr., 1990, op. cit. (see reference 2).
18. S. R. Levy et al., 1994, op. cit. (see reference 10).
19. Ibid.; and S. R. Levy et al., 1993, op. cit. (see reference 15).
20. S. F. Newcomer and J. R. Udry, 1985, op. cit. (see reference 4).
21. B. Stanton et al., "Early Initiation of Sex and Its Lack of Association with Risk Behaviors Among Adolescent African-Americans," *Pediatrics*, 92:13-19, 1993.
22. G. L. Fox and J. K. Inazu, "Patterns and Outcomes of Mother-Daughter Communication About Sexuality," *Journal of Social Issues*, 36:7-29, 1980; S. G. Philliber, "Socialization for Childbearing," *Journal of Social Issues*, 36:30-44, 1980; and S. R. Levy et al., 1994, op. cit. (see reference 10).