

Sociodemographic Factors Associated with AIDS Knowledge in a Random Sample of University Students

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Abstract A telephone survey was used to assess knowledge of the transmission, prevalence, and infectivity of acquired immunodeficiency syndrome (AIDS), and the safety of casual contact among 214 randomly selected university students. Males were more knowledgeable than females overall (odds ratio [OR], men/women = 4.8). Although most students understood the dangers of unprotected sex and intravenous needle sharing, up to 30% believed some kinds of casual contact (e.g., shared eating utensils) can transmit AIDS. Older students (≥ 23 yrs) were more knowledgeable than those 17 to 19 years old about the safety of casual contact (OR = 3.8). Students are in need of education programs that stress the ways AIDS is *not* transmitted. Since most students identified newspapers and television as their main sources of information, these may be effective vehicles for education efforts.

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A blinded survey of human immunodeficiency virus (HIV) infection at 17 American college campuses found an overall seroprevalence rate of 0.2% (Dondero, Papaioanou, & Curran, 1988; Centers for Disease Control, 1989). If that rate reflected the situation among all 12.5 million American college students, it would mean that 25,000 are infected. Because a large proportion of college students are sexually active and likely to have several sexual partners (King, Balswick, & Robinson, 1977; Keller, Elliot, & Gunberg, 1982), a significant potential exists for spread of the virus in this population. Yet college students provide an excellent target for acquired immunodeficiency syndrome (AIDS) education and prevention because they are accessible and receptive to such efforts (Manning et al., 1989).

A number of universities have evaluated AIDS knowledge* among their students, and in general have found them to be moderately well-informed about sexual and blood transmission of the disease (Dorman & Rienzo, 1988; Fan & Shaffer, 1990; Goodwin & Roscoe, 1988; Katzman, Mulholland, & Sutherland, 1988; Landefeld et al., 1988; Lesnick & Pace, 1990; McDermott et al., 1987; Manning et al., 1989; Strader & Beaman, 1989; Thomas, Gilliam, & Iwrey, 1989). Only two of the surveys (Katzman et al., 1988; McDermott et al., 1987) used probability sampling, however, and neither assessed students' knowledge about the safety of casual contact.

The level of AIDS knowledge is likely to vary from campus to campus, so it is important that studies be carried out at several universities. Information about specific deficits in knowledge among identifiable subgroups of students is necessary to facilitate the design and implementation of effective education programs. The purpose of this study was to characterize knowledge about casual and intimate transmission of AIDS in a random sample of students at a large Midwestern university.

METHODS

A telephone questionnaire was administered during 10 days in March 1988 to 214 of the 35,945 students registered for the winter term. Names were selected in sequence from a list containing a 1.5% simple random sample of all registered students, and calls were made until the minimum target of 200 interviewees was reached. To ensure confidentiality, no names or identification numbers were used in recording responses.

*The current trend is to use "HIV infection" instead of "AIDS" to include the spectrum of illness from infection to full-blown disease. When this survey was conducted, "AIDS" was used more commonly, particularly in addressing general audiences. Because we used the term in the survey, we retained it in this report.

Twenty-four statements assessed knowledge in three areas: (1) HIV prevalence and infectivity, (2) transmission by blood and body fluids, and (3) transmission by casual contact (Table 1). The statements were adapted from a previous instrument (Rhodes & Wolitski, 1988) and modified after pilot testing (Cronbach's alpha for internal reliability = 0.75). Students were asked to "agree strongly," "agree," "disagree," or "strongly disagree" with each statement. Factor analysis was used to assess the contribution of each statement within each area of knowledge. For this analysis, "don't know" and "no answer" were placed in the middle of the scale between correct and incorrect. Two questions about the possibility of transmitting AIDS by saliva and kissing showed low loading. Because they were also the subject of controversy in the scientific literature, they were dropped from the study.

To fit the data to 2×2 tables, the six possible answers to each statement were dichotomized into correct and incorrect responses, with "don't know" and "no answer" coded as incorrect. Overall and area specific knowledge scores were obtained by summing correct answers.

Sociodemographic information included the student's primary source of AIDS information, whether the student was, by self-assessment, sexually active, and eight demographic items: age, gender, race, religion, major area of study, type of campus housing (dormitory or nondormitory), whether the student was a Michigan resident, and whether the student was from a large metropolitan area. For the analysis, students were categorized into three age groups: 17 to 19, 20 to 22, and 23 years and older.

For each demographic variable and knowledge area, students with perfect scores were compared with those who missed questions. Odds ratios (OR) and 95% confidence intervals were calculated using the dEpid computer program (Foster & Sullivan, 1987). Stratified analysis was used to control for confounding among variables. Unless otherwise noted, crude odds ratios were reported because they did not differ from the adjusted ones. Logistic regression analysis was used to measure the combined effect of sociodemographic factors on total knowledge and on knowledge about the safety of casual contact.

RESULTS

Interviewers telephoned 278 students and reached 224; of those, 214 (96%) participated. Fifty-three percent of respondents were men, 87% were white, and 7.5% were black or Hispanic. Fifty-six percent considered themselves sexually active. Of those, 57.5% were men and 42.5% were women. The mean age was 21 years (range

TABLE 1. Responses of 214 Randomly Selected University Students to Questions Assessing Knowledge of AIDS, March 1988

Statement	Percentage of Persons Giving Correct Answers	Statement	Percentage of Persons Giving Correct Answers
<i>Transmission by blood and body fluids</i>		It is safe to share drinking glasses and eating utensils with people who have AIDS.	70.5
A person can get AIDS by sharing needles with a drug user who has AIDS.	88.8	<i>Prevalence and infectivity</i>	
In this country, there is a strong chance that receiving a blood transmission would give a person AIDS.	78.5	More people carry the AIDS virus than have the disease AIDS.	91.6
The more sex partners a person has, the greater the person's risk of getting AIDS.	98.6	More than a million Americans are infected with the AIDS virus.	69.1
A person can get AIDS by donating blood.	89.3	In some parts of the world, AIDS is found mostly among heterosexual men and women.	60.3
Women who have AIDS can transmit the disease through sexual intercourse.	93.9	All gay men are infected with the AIDS virus.	99.5
Condoms can reduce the chance of passing AIDS from one sex partner to the other.	99.1	Many more cases of AIDS have been found among health care workers than among the general public.	87.9
A pregnant woman who has AIDS can pass the virus to her unborn baby.	94.9	AIDS is less common in Michigan than in California.	62.1
AIDS is spread by mosquitos.	82.7	AIDS is about as contagious as the common cold.	93.9
<i>Transmission by casual contact</i>		The AIDS virus is easily killed by ordinary bleach or detergent.	24.8
People can get AIDS by eating food that has been prepared by someone who has AIDS.	94.4	<i>Other</i>	
It is safe to shake hands with somebody who has AIDS.	98.1	A person who has AIDS can transmit the disease by kissing.*	78.1
It is safe for children to be in school with a child who has AIDS.	94.8	AIDS is transmitted by saliva.*	60.2
It is safe to use toilets that might have been used by somebody who has AIDS.	87.0	A person infected by the AIDS virus who has no symptoms can transmit the disease.†	95.3

*This question did not show high load in any area of knowledge. Because of controversy in the scientific literature it was excluded from analysis.

†This question did not show high load in any area of knowledge. It was included only in the total knowledge score.

17-40 yrs). Compared to the overall student body, a significantly greater proportion of respondents were younger than 21 ($P < 0.02$). Respondents did not differ from the student body by race or gender.

Fifty-six percent of the respondents said newspapers (35%) and television (21%) were their primary sources of AIDS information. Five percent mentioned pamphlets and 1.4% cited the University Health Service (UHS). Primary information source did not differ by sex

or age. However, blacks and Hispanics were significantly more likely than whites to cite television (40.7% vs 17.2%; $P < 0.02$).

Overall knowledge scores ranged from 12 to 22 (mean 18.6, mode 20). Students did well on questions about transmission of AIDS by casual contact and blood/body fluids, and relatively poorly on questions about prevalence and infectivity (Table 2). Of the 214 respondents, perfect scores were recorded for 116 (54.2%) on ques-

TABLE 2. Number and Percentage of Persons with Incorrect Answers in Three Categories of AIDS Knowledge and Total Knowledge Among University Students (n = 214)

Number of Incorrect Answers	Casual Contact (5 questions) No. (%)	Blood/Body Fluids (8 questions) No. (%)	Prevalence/ Infectivity (8 questions) No. (%)	Total Knowledge (22 questions) No. (%)
0	131 (61.2)	116 (54.2)	19 (8.9)	12 (5.6)
1	60 (28.0)	67 (31.3)	55 (25.7)	29 (13.6)
2	17 (7.9)	26 (12.1)	63 (29.4)	45 (21.0)
3	1 (0.5)	4 (1.9)	46 (21.5)	44 (20.6)
4	4 (1.9)	1 (0.5)	24 (11.2)	29 (13.6)
5	1 (0.5)		6 (2.8)	19 (8.9)
6			1 (0.5)	14 (6.5)
≥7				22 (10.3)

tions of transmission by blood/body fluids, 131 (61.2%) on casual contact questions, and 19 (8.9%) on questions of prevalence and infectivity.

Despite the overall high scores, almost one in three students believed one or more kinds of casual contact to be dangerous. For example, almost 30% doubted the safety of shared eating utensils, and 13% felt it was not safe to use toilets that might have been used by persons with AIDS. They also had misconceptions about the safety of blood donation and transfusion. More than 20% believed that receiving a blood transfusion is associated with a high risk of AIDS, and more than 10% believed that blood donation can be dangerous. In addition, almost three-fourths of the respondents did not believe that the AIDS virus can be destroyed by ordinary bleach or detergent.

Age, gender, and race were the most important predictors of AIDS knowledge. Table 3 shows the odds of being more knowledgeable than the reference groups. Older students were significantly more knowledgeable than younger students about the safety of casual contact. Men tended to be better informed than women, although the difference was significant only for knowledge of AIDS prevalence and infectivity. Whites tended to be more knowledgeable than blacks or Hispanics, but the differences were not significant. Other social and demographic variables were not associated with knowledge.

Logistic regression analysis confirmed gender and age as the strongest predictors of overall knowledge (Table 4). Males and students over age 23 years were more knowledgeable overall than females and the

TABLE 3. Demographics Associated with Total Knowledge and Knowledge of AIDS Transmission, Prevalence, and Infectivity Among University Students (n = 213)*

Variable	Casual Contact OR (95% CI)†	Blood/Body Fluids OR (95% CI)	Prevalence/ Infectivity OR (95% CI)	Total Knowledge OR (95% CI)
Age (yrs) 20–22/17–19 (n = 119/43)	2.37 (1.17, 4.8)	0.80 (0.40, 1.60)	0.36 (0.10, 1.86)	0.71 (0.17, 2.97)
23 + /17–19 (n = 52/43)	3.78 (1.60, 8.92)	1.96 (0.84, 4.53)	2.42 (0.60, 9.78)	0.82 (0.16, 4.27)
Male/female (n = 113/110)	1.00 (0.58, 1.74)	1.46 (0.85, 2.51)	5.33 (1.51, 18.89)	4.76 (1.02, 22.26)
Whites/minorities‡ (n = 186/16)	1.58 (0.57, 4.41)	1.21 (0.44, 3.37)	3.41 (0.19, 59.27)	1.96 (0.11, 35.00)

Referent groups are age 17–19 years, females, minorities. An odds ratio (OR) > 1 indicates greater knowledge than the referent group and vice versa.

*One respondent did not answer the demographic part of the questionnaire.

†Ninety-five percent confidence interval of the odds ratio.

‡Hispanics and blacks; twelve Asians were excluded from this part of the analysis.

TABLE 4. Odds Ratios for Sociodemographic Predictors of Total and Casual Contact Knowledge Obtained from Logistic Regression Analysis

Predictor	Odds Ratio	95% Confidence Interval
<i>Total knowledge</i>		
Age 20–22/17–19 yrs	1.23	[0.57, 2.67]
Age 23 + /17–19 yrs	4.54	[1.86, 11.12]
M/F	2.53	[1.39, 4.60]
<i>Casual contact</i>		
Age 20–22/17–19 yrs	2.37	[1.16, 4.82]
Age 23 + /17–19 yrs	3.77	[1.59, 8.92]

youngest students. Only age predicted knowledge about casual contact. At each age level, older people were more likely to know that casual contact is not dangerous. As expected from the results of the bivariate analysis, we found no relationship between the predictor variables and knowledge of AIDS transmission by blood/body fluids.

DISCUSSION

The results of this study in a random sample of students are consistent with nonrepresentative reports in the literature that found students to be fairly knowledgeable about AIDS transmission. As did the other studies, we found some gaps in this knowledge; for example, students still appear confused about the dangers of casual contact and giving and receiving blood. Our study differed from previous ones because it attempted both to define the sociodemographic factors associated with AIDS knowledge and to determine whether students understand how AIDS is and is not transmitted.

Age and gender were the main sociodemographic predictors of knowledge. The finding that knowledge increases with age could be explained by older students' greater opportunities for exposure to information about AIDS. It is not clear, however, why women are less informed. Our results differ from those of Goodwin and Roscoe (1988), who found women to be more knowledgeable. However, theirs was a convenience sample, and their study was conducted in a different place. Further studies are needed to clarify this issue. In the meantime, our results suggest that at this university, educational efforts directed at women should include more information about prevalence, infectivity, and transmission by blood and body fluids.

Our sample had too few minorities to draw conclusions about their knowledge compared to whites. Two reports in the literature addressed this issue (Lesnick et

al., 1990; Thomas et al. 1989), but neither included a white comparison group.

We found some distressing misconceptions among students, many of whom still believe that indirect contact can transmit AIDS. Similar findings were reported for the overall United States population (Dawson, Cynamon, & Fitti, 1988). These misconceptions contribute to the stigmatization of people with AIDS and to a sense of futility about the possibility of controlling the epidemic. Therefore, we believe education programs should stress the differences between safe and unsafe contact.

Our sample was relatively poorly informed about AIDS prevalence and infectivity. This may reflect the specialized nature of such information, its lack of relevance to students, and the relative disinterest of the media in those aspects of the epidemic. Very few students said that the health care system is their main source of information. This points to two avenues for improving outreach efforts: use those sources that students identified as their most important (student newspapers, closed-circuit television, cooperative efforts with local newspapers and television stations), and find out why students do not use the health care system and correct the problem.

Although knowledge is not a sufficient condition for safe behavior, it is one of the links in the chain of events that affects behavior (Bettinghaus, 1986). Continuous monitoring of knowledge should be part of AIDS prevention and intervention programs on university campuses.

REFERENCES

- Bettinghaus, E.P. (1986). Health promotion and the knowledge-attitude-behavior continuum. *Preventive Medicine, 15*, 475–491.
- Centers for Diseases Control. (1989). AIDS and human immunodeficiency virus infection in the United States: 1988 update. *Mortality and Morbidity Weekly Report, 39*(suppl S-4), 9.
- Dawson, D.A., Cynamon, M., & Fitti, J.E. (1988). AIDS knowledge and attitudes for September 1987: Provisional data from the National Health Interview Survey. Advance data, National Center for Health Statistics, January 18, 1988, no. 148.
- Dondero, T.J., Pappaioanou, M., & Curran, J.W. (1988). Monitoring the levels and trends of HIV infection: The Public Health Service's HIV surveillance program. *Public Health Reports, 103*, 213–220.
- Dorman, S.M., & Rienzo, B.A. (1988). A survey of university students' AIDS-related knowledge and attitudes. *Journal of the Florida Medical Association, 75*, 441–444.
- Fan, D.P., & Shaffer, C.L. (1990). Use of open-ended essays and computer content analysis of survey college students'

- knowledge of AIDS. *Journal of American College Health*, 38, 221-229.
- Foster, D., & Sullivan, K. (1987). *dEpid 2.1*. Ann Arbor: Department of Epidemiology, University of Michigan School of Public Health.
- Goodwin, M.P., & Roscoe, B. (1988). AIDS: Students' knowledge and attitudes at a Midwestern university. *Journal of American College Health*, 36, 214-221.
- Katzman, E.M., Mulholland M., & Sutherland, E.M. (1988). College students and AIDS: A preliminary survey of knowledge, attitudes, and behavior. *Journal of American College Health*, 37, 129-131.
- Keller, J.F., Elliot, S.S., & Gunberg, E. (1982). Premarital sexual intercourse among single college students: A discrimination analysis. *Sex Roles*, 8, 21-22.
- King, K., Balswick, J.O., & Robinson, I.E. (1977). The continuing premarital sexual revolution among college females. *Journal of Marriage and Family*, 39, 455-459.
- Landefeld, C.S., Chren, M.M., Shega, J., Speroff, T., & McGuire, E. (1988). Students' sexual behavior, knowledge, and attitudes relating to the acquired immunodeficiency syndrome. *Journal of General Internal Medicine*, 3, 161-165.
- Lesnick, H., & Pace, B. (1990). Knowledge of AIDS risk factors in South Bronx minority college students. *Journal of Acquired Immune Deficiency Syndrome*, 3, 173-176.
- Manning, D., Balson, M.P., Barenberg, N., & Moore, T.M. (1989). Susceptibility to AIDS: What college students do and don't believe. *Journal of American College Health*, 38, 67-73.
- Manning, D.T., Barenberg, L.G., Gallese, L., & Rice, J.C. (1989). College students' knowledge and health beliefs about AIDS: Implications for education and prevention. *Journal of American College Health*, 37, 254-259.
- McDermott, R.J., Hawkins, M.J., Moore, J.R., & Cittadino, S.K. (1987). AIDS awareness and information sources among selected university students. *Journal of American College Health*, 35, 222-226.
- Rhodes, F., & Wolitski, R.J. (1988). Factor analytically based surveys for measuring AIDS Knowledge and attitudes. Presented at the annual meeting of the Western Psychological Association, San Francisco, CA. April 1988.
- Strader, M.K., & Beaman, M.L. (1989). College students' knowledge about AIDS and attitudes toward condom use. *Public Health Nursing*, 6(2), 62-66.
- Thomas, S.B., Gilliam, A.G., & Iwrey, C.G. (1989). Knowledge about AIDS and report risk behaviors among black college students. *Journal of American College Health*, 38, 61-66.