

## Predicting AIDS-Induced Behavioral Change in the General Population of Young People

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Sets of individual-psychological and sociodemographic variables for predicting self-reported AIDS-relevant behavioral change were examined. The self-completing questionnaire used in the study contained scales of knowledge and attitudes about AIDS, sex and drug abuse experience scales, and six behavioral change scales. It was anonymously administered to 2,655 young people of both sexes, 15-30 years of age, living in 18 cities and towns, regularly employed or attending school. The overall level of knowledge was high and the attitudes moderately liberal. Regression analyses showed that only a small fraction of variance in any of the six behavioral change criteria (sex, drugs, personal concern, chance of contracting the disease, desire for more knowledge, and nonfunctional practices) could be attributed to the four predictors presumed to influence the criteria directly (sex risk index, drugs risk index, knowledge, and attitudes). The prediction improved when another 10 variables with assumed indirect influence were included. Socioeconomic status and the drug abuse risk index were most predictive of behavior change. Knowledge and attitudes proved to be poor predictors. It is stressed that the social and cultural specifics in planning prevention activities must be observed.

Since AIDS (Acquired Immunodeficiency Syndrome) was recognized as a disease in June 1981, it has become clear that an extremely complex problem is at issue bearing deep medical, social, economic, legal-ethical, and psychological dimensions. The disease itself, as well as a number of problems that have emerged with it, has its origins in human behavior. It has been well established which behavior patterns lead to an increased risk of HIV (Human Immunodeficiency Virus) infection. This means that the ways of

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reducing the risks are also known. However, as is well known from experience in treating other behaviors that are harmful to human health, this goal is not easy to attain. In the case of AIDS the task is additionally hindered because it is spread by some of the most intimate activities among people. Since the appearance of AIDS an impressive number of papers on the knowledge, attitudes, beliefs, and behaviors of the "high-risk" group members have been published, but far fewer studies addressed these issues among the general population. However, the increased interest in these issues among the general population is reflected in a growing number of reports appearing during the last several years (Ajduković & Ajduković, 1988, 1990; Austin, Sung-Mook, & Hunter, 1989; Carducci, Avio, Calamusa, & Bendinelli, 1988; Clift & Stears, 1988; Crawford, 1990; Deniaud, 1988; DiClemente, Zorn, & Temoshok, 1986, 1987; Goodwin & Roscoe, 1988; Kann, Nelson, Jopnes, & Kolbe, 1989; Kelly, St. Lawrence, Smith, Hood, & Cook, 1987; King et al., 1988; King & Gullone, 1990; Krupka & Verner, 1988; Masters, Johnson, & Kolodny, 1988; Ross, 1988; Sheeran, Abraham, Abrams, Spears, & Marks, 1990; Simkins & Aberhage, 1984; Strunin & Hingson, 1987; Triplet & Sugarman, 1987; Velimirovic, Raab, & Kriechbaum, 1989; Walkey, Taylor, & Green, 1990; Wilson, Greenspan, & Wilson, 1989; Witt, 1989; and others). The research findings generally show that a large number of people, despite their fear of AIDS and adequate knowledge about the subject, nevertheless engage in activities that increase their chances of contracting HIV (Baldwin & Baldwin, 1988; Baldwin, Whiteley, & Baldwin, 1990; Edgar, Freimuth, & Hammond, 1988; Kegeles, Adler, & Irwine, 1988; Rickert, Jay, Gottlieb, & Bridges, 1989).

A growing number of studies addressing the means of facilitating the adoption of risk-reducing practices among the general heterosexual population of young people may soon be expected. This is due to the fact that young people, because of their individual and social characteristics, are quickly becoming the potentially most imperiled segment of the general population. Some authors consider risk taking to be a normal transitional behavior during adolescence (Baumrid, 1988; Schneider & Morris, 1991). A number of developmental changes take place at this period of life which make adolescents feel invulnerable and encourage them to experiment with risks. For example, they are sexually more active, but also less responsible; they are curious and rebellious, and therefore indulge in experiments concerning various risky behavior; they are immature and thus have more difficulty enduring social pressure exerted by peer groups; they are relaxed about precautions, etc. From a long-term perspective, prevention and education must be directed toward young people because they will be living in a period of history marked by an increasing danger of becoming HIV-infected (Brooks-Gunn, Boyer, & Hein, 1988; Flora & Thoresen, 1989; World Health Organization, GPA, 1991).

A few years ago a research project was launched with the overall purpose of helping to outline a model for preventing the spread of HIV/AIDS in the Republic of Croatia which would take into account the psychological principles of human behavior and experiences. Among other things, one of the aims was to examine the structure of interrelations among sets of individual-psychological and sociodemographic variables and reported behavioral change, and to determine the significant correlates of this change. Some of the correlates were interpreted as predictors. Because the study to be reported was correlational in design, the distinction between outcome variables and covariates was not provided by time of measurement, but rather was derived theoretically. When causal interpretations were offered they were based on assumptions from the model we developed (see the next section). Of course, more rigorous testing of the model would require a prospective study. However, conclusions drawn from correlation research might be useful because of its exploratory and heuristic value. These findings are discussed here.

### Methods

#### *The Research Design Model*

The variables included in the research design pertain to three levels (Figure 1). The first level consisted of predictors having two clusters: (a) the respondent's characteristics and (b) his or her past behavioral experiences. These variables were assumed to be predictors (determinants) because they either temporally preceded other variables (e.g., age, parent's education) or because they cannot be influenced by other variables (e.g., gender). They were assumed to influence the outcome of other variables either directly or indirectly.

The mediating variables were represented by the respondents' knowledge about AIDS and attitudes toward AIDS-induced issues. They were assumed to mediate influences of predictors upon the behavioral criteria.

The third level consisted of the criterion variables. These variables were related to AIDS-induced change in a broad sense. Some of them were proper behavior change variables (e.g., sex practices, drug abuse, types of behavior by which the virus is not transmitted), whereas the others were more related to cognitions (e.g., personal concern, self-assessed chance of contracting AIDS, and the desire for more knowledge about AIDS).

#### *Materials*

Throughout the study the same complex set of instruments was administered. The questions dealing with the respondent's past experience referred

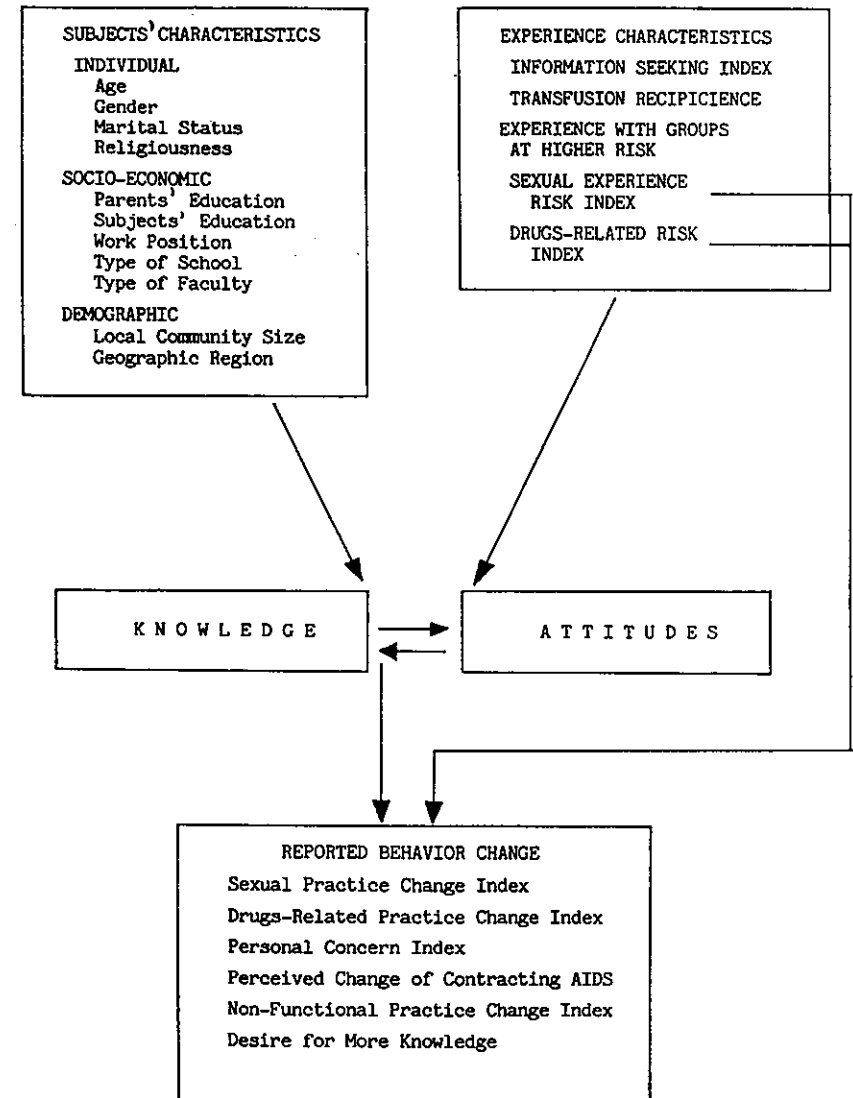


Figure 1. The research design model showing the assumed direct and indirect relations between the predictor variables (A), mediating variables (B), and the criterion variables (C).

to: the risk of infection through sexual contacts (nine items such as age at first intercourse, number of partners in lifetime, number of casual partners, anal intercourse practices, consistency of condom use, etc.), the risk of infection due to drug abuse (seven items including use of marijuana, LSD, heroin,

morphine and cocaine, age at initiation to drugs, intravenous drug abuse practices, etc.), receiving blood transfusions (one item), and personally knowing people at higher risk (one item). The next seven items referred to both formal and informal sources of information about AIDS (including parents, friends, mass media, teachers, doctors, brochures, and lectures).

Knowledge about AIDS was assessed by a 16-statement scale. The statements' contents covered a wide spectrum of knowledge about AIDS: the means by which the disease is or is not transmitted (e.g., sexual intercourse, sharing of injection equipment, blood transfusion, kissing on cheek, drinking after another person from a glass, etc.), risk reduction practices (e.g., regular condom use, being faithful to a faithful partner), its definition (e.g., that AIDS is characterized by decrease of body immunity), possible treatment, symptoms, and threats to the population (e.g., if AIDS can now be cured, if one can be infectious without showing symptoms, if the number of AIDS cases is above 300 (in contrast to about 70 cases nationally at that time)). These contents have become standard worldwide in scales of this type. The subjects indicated whether each statement was true or not. The possible range of individual knowledge scores was from 16 to 32 with a higher score indicating better overall knowledge of AIDS-related issues. Due to diversity of knowledge dimensions included in the scale, the average intercorrelation among the items was only 0.07. This produced a rather low internal consistency coefficient (Cronbach's alpha of 0.53).

The scale-tapping attitudes toward AIDS-induced issues consisted of 19 statements with Likert-type 4-point scales. The subjects were asked to indicate their degree of support for the attitudes expressed by each item (e.g., "AIDS problems are exaggerated," "AIDS is a disease of immoral society," "Enough money has already been spent on AIDS research," "AIDS is just another among incurable diseases," "People with AIDS should be quarantined," "There should be mandatory testing for people who belong to the risk groups," "AIDS is important only to the professionals," or "Education is the best way to fight AIDS"). Individual scores could range from 19 (extremely restrictive attitudes) to 76 (extremely liberal attitudes). The internal consistency of this scale as measured by Cronbach's alpha coefficient was 0.77.

The respondents' behavior change was self-assessed with reference to the period since they first learned about AIDS by six scales comprising different number of individual items: sex-related practices change (three items), drug-related change (two items) and nonfunctional practices change (five items). All the questions were asked in a format like "Since hearing about AIDS have you increased/not changed/decreased your. . .". The level of personal concern (five items), perceived chance of contracting AIDS (one item), and the desire for more knowledge (one item) were estimated for the present time period. Perceived chance of contracting AIDS or the assessed level of per-

sonal concern are primarily perception and cognition processes rather than overt behavior manifestations, but, as mentioned before, all criterion variables were considered to indicate behavior change in its broader meaning.

In order to reduce the number of variables and to quantify characteristics of an individual's past behavior or behavior change more thoroughly, within sets of predictors and criteria several multiitem indices were derived. These were used for further analyses. Each index was a differentially weighted linear combination of items referring to the particular aspect of either past experience or behavior change. Specific weights were ascribed to each item independently by three competent assessors using the magnitude scaling method (Stevens, 1957, 1972) and averaging the weights across the assessors. The inter-assessor consensus was high, ranging from 0.91 to 0.97 for particular indices. The very few instances of assessors' disagreement were thoroughly discussed and the final weight agreed upon.

Within the cluster of predictors, indices of behavioral risk due to past sexual and drug abuse experiences were developed. The behaviors known to put people at higher risk of contracting HIV were ascribed higher weights. For example, some of the items making up the sexual risk index had the following weights: frequent unprotected anal intercourse and frequent unknown partners were each ascribed the weight 10; group sex experiences and high number of different partners per year of sexual experience 8, sex with prostitutes, not using a condom 7; low age of first intercourse 4, etc. For the drug-related risk index some of the items and their respective weights were: sharing injection equipment 10, abuse of heroin 7, low age of initiation to drugs 6, abuse of marijuana 1. The index referring to information sources indicated the degree in which the subject actively seeks of information about AIDS (e.g., buying brochures about AIDS 7, learning from friends 3, from mass media 1, etc.).

Within the set of criteria, for each multi-item scale an index of change was developed that described the degree and direction of change reported by the subjects. For items referring to sexual or drug-related behavior change a positive weight was ascribed to a reported practices change which may put an individual at higher risk of HIV transmission. A negative weight showed that a subject reported more cautious or risk-reducing behavior. No change in frequency of a particular behavior was indicated by a zero weight. The higher the weight, either positive or negative, the more extensive the reported behavior change. Thus increased number of unknown partners was weighted +4, and decrease in this practice -4. Similarly, decreased regular use of a condom was weighted +2, and an increase in regular use -2. The possible score range for this index was from -7 over 0 to +7. The same was done for the drug-related practices change index (stopped sharing injection equipment -3, increase in sharing +3; change in nonintravenous drug abuse

$\pm 1$ ), with a possible range of index scores from  $-4$  over  $0$  to  $+4$ . In each case the weights were summed across the applicable items in order to derive an individual index of either sexual or drug-related behavior change. A similar transformation was done for items describing behaviors not related to HIV transmission, except that these items were ascribed the same weight ( $\pm 1$ ). This nonfunctional practice change index included items such as blood donating, use of public toilets or drinking from a glass after another person. The possible range was from  $-5$  to  $+5$ , with  $0$  indicating no change in reported behaviors. The level of personal concern attributed to the appearance of AIDS was self-assessed by five items each using a 4-point scale. This variable included items such as thinking about getting infected, discussing with friends possibility of infection, buying literature about AIDS, etc. The responses were summed into an index with higher scores indicative of a greater concern and ranging from  $5$  to  $20$ .

### Subjects

The target population was defined as young people 15 to 30 years of age living in the Republic of Croatia, Yugoslavia, employed or attending school, living in urban communities of various size. A multistage quota sampling technique consisting of six sampling frames, one for each stage (geographical region, community size, work position, sex, education level, and age) was used. The number of subjects within each sampling frame was decided according to the census data, and every effort was undertaken to randomize subject sampling. However, this was limited by the fact that not all communities had secondary schools and only the four largest cities had universities. In order to allow for different comparisons among groups of subjects, students and younger subjects (15–19 years) were oversampled. This procedure resulted in 2,655 usable individual records with a response rate of 96.5%.

### Procedure

Self-completing questionnaires were administered to groups of respondents not larger than 30. All the respondents managed to finish the task within a 30-min period. The respondents were approached in their work settings (i.e., schools, colleges, or places of employment) where entire groups (such as classes or work sections) were randomly selected. They were asked to volunteer to participate in a study looking into various AIDS-related issues. In order to guarantee absolutely anonymous administration, on each occasion standard measures of maintaining secrecy regarding the respondent's identity and privacy of responding were undertaken. Ample space was provided for each respondent so that he or she could maintain absolute

privacy during the task. After filling out the questionnaire each subject deposited it into a ballot-type box located at the back of a room. Data were gathered by 25 psychologists, including the authors of the study, in 18 cities and towns throughout Croatia, in high schools, at colleges, and in companies and factories within the period from May 1989 to July 1989. Detailed instructions were strictly followed by each questionnaire administrator, so that a standardized test-like situation was achieved on all sites.

## Results and Discussion

### *Extent of Risk Behaviors in the Sample*

Croatia belongs to the "pattern three countries" (Sato, Chin, & Mann, 1989) and is still characterized by a comparatively low incidence of AIDS cases (9 per 1,000,000 inhabitants). Nevertheless, the extent of risk behaviors among the young population is one of the critical types of information necessary for planning and implementing AIDS-prevention activities. Thus, the extent of behavior which put people at risk was assessed first.

Of all the respondents 67.3% (1,787) reported having had sexual intercourse. On the average men experienced their sexual initiation at the age of 17.1 years, and women at the age of 17.9 years. Among the sexually experienced 81.1% of men and 65.4% of women reported having their first intercourse by the age 18. This age has not really changed over the past 20 years in Croatia (Trenc & Beluhan, 1973), in contrast to the USA or some European countries, where there is an apparent trend of an ever lower first intercourse age (King, Balswick, & Robinson, 1977; Zelnik & Kantner, 1980).

On the average, sexually active people aged 15–21 had 3.2 partners in their lifetime, which, of course, was less than the subjects aged 22–30 who had 5.8 partners on the average. However, when the length of sexually active life was accounted for, it emerged that younger subjects (15–18 years) had more partners per each year of sexual life (3.3) than the older subjects had (2.1). This shows that younger people change their partners more often and therefore should be considered at higher risk. About 60% of the sexually experienced respondents reported having several casual sexual relationships with anonymous partners (three on the average). Having had sexual intercourse with a person of the same sex was reported by 4% of the subjects (1.7% men and 2.3% women), which is consistent with some of the more recent reports (Cameron & Cameron, in press; Remafedi, 1987). A fairly large number of young men (36.1%) and women (12%) had sexual relationships with more than one partner during the same time period. As many as 47.3% of the men and 25.7% of the women had sexual contacts with persons who were known

to them to be promiscuous. Almost 5% reported having participated in a group sex situation. The fact that only a small number of the respondents regularly used condoms makes the risk even greater: 4.5% of the men and 4.4% of the women always used condoms, 36.5% of the men and 58.8% of the women never used condoms.

If the influence of age upon length of sexual experience is controlled, it becomes obvious that the respondents younger than 18 are those who take more risks. They change sexual partners more often and have more anonymous partners. This is consistent with the findings from other countries, which make adolescents as a group more susceptible to HIV infection risk (Bowie & Ford, 1989). This finding was even more evident when individual sexual experience risk indices were compared among different groups of subjects. Higher indices were more characteristic of teenagers aged 15 to 18, males, unmarried, those with less education, and high-school students rather than college students or employed subjects. Evidently, high-risk sexual behavior was not rare within this sample of young people.

The analysis of the extent of drug abuse indicated that 300 subjects (11.3%) have reported personal experience with drug abuse during past 12 months. For the most part they used only marijuana (88.3%); heroin or morphine use was reported only by 10 subjects altogether (0.03%). Drugs were consumed more by young men than women, by people having a better family socioeconomic background, by those living in larger cities, and by university students. Most of these people had their first experience with drugs under the age of 18. Similar findings have been reported in earlier studies of the spread of drug addiction among the young people in the city of Zagreb, and in monitoring the behavior of known drug addicts and dependents over the years (Srdar & Kosovec, 1988). However, the distribution of drug-related risk indices clearly demonstrated that the vast majority of the respondents who reported ever using drugs were either experimenters or recreational (occasional) consumers. Furthermore, 95.6% of them stated that they have never injected drugs.

#### *Knowledge and Attitudes*

The average level of knowledge about AIDS was found to be considerable, with a small variability of individual scores ( $M = 28.88$ ,  $SD = 1.79$ ; actual score range 19–32). On average, 90% of the questions were answered correctly. It may be asserted that the young people who participated in this study have demonstrated good knowledge of the issues related to AIDS, which is consistent with most of the earlier findings in various countries (DiClemente et al., 1987; Carducci et al., 1988; King et al., 1988; Deniaud,

1988; Velimirovic et al., 1989) and our own (Ajduković & Ajduković, 1990; Ajduković, Ajduković, & Prislin, 1990).

In the present study the respondents, as a whole, expressed moderately liberal attitudes toward the means for handling AIDS-related issues ( $M = 52.89$ ;  $SD = 7.11$ ; actual range 24–72). However, depending on a number of their characteristics they differed in the degree of liberal-conservative orientation.

#### *Reported Behavioral Change*

The number of subjects who reported that a particular aspect of behavioral change referred to them differed from one type of behavior change index to another. Most of them provided data about their perception of the risk of contracting AIDS (2,649) and whether they desired more knowledge about AIDS (2,630). A personal concern index was calculated for 510 subjects, sexual practices change index for 446, and the index of behaviors not related to HIV transmission for 143 subjects. The smallest number of subjects provided data about changes in their drug-related practices (34), which is understandable because the absolute number of people who reported ever abusing drugs was much smaller compared to other types of experiences.

Overall, the results indicate that the subjects reported somewhat more careful and risk-reducing behavior attributed to the appearance of AIDS. This holds true for sexual practices, drug-related practices, and practices which are nonfunctional for HIV transmission. On the other hand, they expressed a very low level of personal concern about AIDS: More than 90% of them assessed that there is absolutely no chance that they may ever develop AIDS. Similar to findings from other studies (King et al., 1988; Carducci et al., 1988; Velimirovic et al., 1989) it was established that the majority of young people (75%) wanted to learn more about this disease.

#### *Predicting Behavior Change*

The attempt to look for predictors of reported behavior change which the subjects attributed to the appearance of AIDS was done by two sets of stepwise regression analyses. Included as predictors were variables assumed by the model to have both direct and indirect impact upon behavior change. Comparing the analyses outcomes for *four direct* predictor variables (past sexual behavior risk index, past drug-related behavior risk index, knowledge, and attitudes scores) with the analyses including also *indirect predictors* (individual-psychological and sociodemographic variables) may help identify the variables that are more easily assessed and nonstigmatizing. In

turn, this might help the implementation of preventive programs among the general population of young people.

*Direct predictors of behavior change.* The first set of analyses was performed using only the variables assumed by the model to have direct influence upon the criteria: knowledge, attitudes, sex experiences, and drug-related experience (Table 1).

The combination of these four variables had a significant but small multiple correlation coefficient with the reported change in sexual practices, accounting for only about 1% of the criterion variance. The regression analysis revealed that only the index of risk due to past sexual experiences was predictive. Thus, the assumed direct influence of this predictor was confirmed, although the partial correlation was small ( $r_p = .09$ ). The positive correlation between this predictor and the criterion indicated that young people who have practiced high-risk sex in the past have changed their behaviors but, contrary to what one would expect, they have increased their sex-risk behaviors! Because the high level of knowledge about AIDS did not prove to be predictive for sexual practices change, it is obvious that knowing relevant facts about risk-reducing practices did not provoke behavioral change. This indicated that some other, perhaps individual or sociodemographic, predictors may have an important role, and that education by itself did not bring about the change in manifest behaviors important for AIDS transmission. Increased adherence to sexual risk-reducing guidelines was reported among homosexuals, but published evidence so far about change in the behavior of heterosexuals is scarce. A notable exception seems to be the impressive increase in condom use in Switzerland (Zimmerman, Hausser, Dubois-Arbor, & Zaugin, 1991). It is probable that heterosexual relations are not perceived to be hazardous enough to bring about the change in intimate practices.

For the second most important criterion, data were available for 34 subjects only, because these were the respondents who had had experience with drugs and reported any drug-related behavior change. The set of four predictor variables did not prove to be significantly predictive for this change. But, the negative partial correlation ( $r_p = -.31$ ) between the higher exposure to risk due to drug abuse and the criterion indicated (although not significantly) that those people with a higher risk index reported lower risk behavioral change. It is quite possible that the intravenous injectors within this sample have adopted some of the safety measures of which they were aware. The indication that people at risk due to drug abuse may have adjusted their behaviors more than the people at risk because of sexual practices is consistent with other findings (Radford, King, & Warren, 1988). Furthermore, our results corroborate the indications that drug abusers more often reported

Table 1

*Predicting Behavior Change with the Set of Four Variables Assumed to have Direct Influence Upon Behavior Change Indices. Outcomes of the Final Regression Analyses*

Criteria	$R'$	Retained predictors	$\beta$	$r_p$
Sexual practices change	.11	Sex risk index	.09	.09
Drug-related practices change		ns		
Personal concern	.34	Sex risk index	.35	.33
		Drug risk index	-.10	-.10
Perceived chance of contacting AIDS	.29	Attitudes	.18	.17
		Knowledge	.12	.11
		Sex risk index	.14	.13
Nonfunctional practices change	.42	Attitudes	.25	.23
		Drug risk index	.21	.20
Avoidance of more knowledge	.15	Attitudes	-.13	-.12
		Sex risk index	.07	.06
		Drug risk index	.05	.05

*Note.*  $R'$  = final multiple correlation coefficient,  $\beta$  = standardized regression coefficient,  $r_p$  = partial correlation coefficient.  $p < .10$ .

drug-related risk reduction, whereas their high-risk sexual practices proved to be more resistant to change (Friedman et al., 1987).

The level of personal concern due to the appearance of AIDS was significantly predicted (the multiple correlation coefficient of the final regression equation was  $R' = .34$ ) by two variables of past risk behavior: sexual and drug-related experience. The people who had practiced high-risk sex in the past reported increased concern. But those who had practiced high-risk drug use behavior reported being less concerned about AIDS. The first finding seems logical, but the later appears to be contradictory. Nevertheless, previously discussed findings offer an explanation for this. The respondents who had practiced high-risk sex before did not change their behavior, but as they were aware of the potential risk, they became concerned. The increased concern is a consequence of their cognitive and behavior inconsistency. On

the other hand, those who had practiced high-risk drug abuse behavior earlier changed their practice in accordance with the knowledge of transmission risks, and this made them less concerned.

The assessed chance of contracting AIDS was predicted by three variables: past high-risk sex, knowledge and attitudes ( $R' = .29$ ). As expected, the higher likelihood of getting AIDS was perceived by people who had practiced higher-risk sex, who had better knowledge about AIDS, and who had more liberal attitudes toward AIDS-related issues.

The two variables, drug risk index and attitudes, accounted for 17.6% of the variance of behaviors irrelevant for transmission of HIV. It is interesting that both correlations with the criterion were positive, showing that these nonfunctional behaviors are more characteristic of the people who have previously exposed themselves to higher drug abuse risks and who hold more liberal attitudes.

Desire for additional AIDS knowledge scale was oriented so that the higher score indicated avoidance of information about AIDS. Thus, avoidance was more typical of subjects with more restrictive attitudes, and for those who scored higher on both experience risk indices. Apparently, these are the people who really needed accurate information most. In the case of AIDS the well-known influence of attitudes upon information acquisition is evident: Subjects with more restrictive attitudes did not wish to expose themselves to information that might be inconsistent with their beliefs. Similarly, subjects who practiced high-risk behaviors had no desire to learn more about the disease to which they might have exposed themselves. However, only a small part of the criterion variance could be attributed to this set of predictors (about 2%).

*Indirect predictors of behavior change.* The presented analyses demonstrated that only a small fraction of variance in any of the six criteria could be attributed to the variables presumed to have direct influence upon them. Therefore, another set of stepwise regression analyses was done in which the set of direct predictors was expanded with a number of individual, socio-demographic, and individual experience variables, which were originally assumed not to influence the behavioral change criteria directly.

As expected, expanding the group of 4 variable predictors with another 10 variables increased the multiple correlation with the behavioral change. But improvement of prediction differed from one criterion to another (Table 2).

The variance of the sexual practices change index which could be accounted for by the predictor variables increased only from 1% to 3%. This was achieved by retaining respondents' age and their socioeconomic status as significant predictors in addition to their sex-risk index score. It was found that, in this sample, younger subjects with better socioeconomic backgrounds and with previous higher sex-risk experiences reported increased

Table 2

*Regression Analyses Outcomes for Behavior Change Criteria Using 14 Variables*

Criteria	$R'$	Retained predictors	$\beta$	$r_p$
Sexual practices change	.17	Sex risk index	.13	.11
		Age	-.13	-.08
		Family SES	.09	.08
Drug-related practices change	.74	Drug risk index	-.35	-.32
		Gender	.29	.27
		Marital status	.37	.29
		Family SES	.29	.25
		Community size	-.33	-.31
		Information seeking	-.36	-.35
Personal concern	.43	Sex risk index	.37	.31
		Drug risk index	-.09	-.09
		Age	.10	.07
		Gender	.08	.07
		Family SES	-.15	-.13
		Subject's education	-.11	-.09
		Transfusion recience	-.07	-.07
		Information seeking	.20	.19
Perceived chance of contracting AIDS	.30	Attitudes	.17	.15
		Knowledge	.11	.10
		Sex risk index	.11	.10
		Community size	-.03	-.03
		Experience with risk groups	.10	.10
Nonfunctional practices change	.50	Attitudes	.18	.16
		Drug risk index	.19	.17
		Age	-.28	-.18
		Marital status	.19	.15
		Family SES	.19	.17
		Subject's education	.16	.12
Avoidance of more knowledge	.24	Attitudes	-.11	-.10
		Drug risk index	.04	.04
		Gender	-.09	-.09
		Family SES	.05	.04
		Information seeking	-.15	-.14

risk behavior change. Perhaps this can be attributed to the specific socialization process of this particular population segment, where being perceived as sexually "successful" and "liberal" may be a salient aspect of a role. At the same time this kind of projected image may include high-risk sexual practices.

Drug-related behavior change prediction was greatly improved when the nonsignificant combination of four "direct" predictors was substituted by another six variables which accounted for 55% of the criterion variance. Their combination showed that increased drug-risk behavior change was more characteristic of subjects who were married, female, more affluent, lived in smaller towns, had lower drug-related risk indices, and who did not seek AIDS-information actively. Although highly significant, these findings are somewhat limited because of the small number of subjects who have reported any kind of behavior change concerning their use of drugs and whose data were entered into the analysis. The other limitation is that the ratio between the number of subjects (34) and the number of predictor variables (6) probably resulted in an inflated multiple correlation coefficient. Nevertheless, the results indicate that the problem of exposure to HIV through the drug abuse transmission route may be shifting into the segments of the population which have traditionally been less exposed (women, smaller communities, better socioeconomic background).

Personal concern prediction was improved by retaining eight variables which explained about 19% of its variance instead of 11% as with the original two "direct" predictors. More concerned were older subjects, females, those with lower socioeconomic status and poorer education, those who had higher sex-risk and lower drug-risk indices, blood transfusion recipients, and subjects with a more active information seeking status.

Practically no increase was found in prediction efficacy of perceived chance of contracting AIDS when the size of a home community and the index of knowing people at higher risk were added to the sex risk index score, attitudes, and the AIDS knowledge score.

The prediction of changes in nonfunctional practices was improved from 18% to 25% of the accounted variance by retaining six significant predictors in the final regression equation: age, marital status, family socioeconomic status, and subject's education in addition to the attitudes and drugs risk index score.

Expanding the predictor variables set did not contribute much to the amount of accounted variance of the desire for more knowledge about AIDS: It increased to 6% as compared to 2% when only the three direct predictors were retained. Avoidance of learning about AIDS was more typical of males, subjects with higher socioeconomic backgrounds, higher drug-

risk index, more restrictive attitudes, and the subjects who did not seek of AIDS information actively.

If the efficacy of all the variables used to predict the six behavioral change criteria is assessed, the *family socioeconomic background* seems to be most effective. It contributed significantly to explaining the variations in five out of six criteria. Then follows the *drug-related risk index* which proved to be a significant predictor for the four criterion variables. The *sex risk index*, *attitudes to AIDS-related problems*, *respondent's age and gender*, and *sources of information seeking index* had a significant role in explaining variations in the three criteria. The fourth group of variables contributed to predicting the behavior change outcome in two criteria. This group of predictors included *the subject's education*, *marital status*, and *the size of a local community*. Finally, the *knowledge score*, *being a transfusion recipient*, and *personally knowing people at higher risk* contributed to prediction of one criterion only. *Being religious or not* was not predictive of behavior change whatsoever.

Thus, socioeconomic status was found to be the most predictive of all the variables. This finding is particularly important with regard to the identification of easily accessible and nonstigmatizing predictors of behavioral change. Contrary to findings from the countries more exposed to HIV and AIDS epidemic, where lower socioeconomic background in the general population is associated with higher levels of risk behaviors (e.g., King et al., 1988), in the present sample this was not the case. This fact might be in part attributed to differences in sampling frames, because the subjects in this study were young people who lived in urban communities of different sizes, and who were either still in the schooling process or were regularly employed. This means that school dropouts, street people, or inhabitants of rural communities were not recruited for this study. A more meaningful source of this dissimilarity may have to do with specific sociocultural differences. In our social environment, the more affluent segment within the general population of young people probably have easier access to drugs and have more often been personally exposed to experiences and social norms in other countries, some of which are known to have relaxed the norms concerning sexual behavior. This may have influenced the formation of peer norms that vary according to socioeconomic status. This does not exclude an assumption that socially marginalized population segments (i.e., school dropouts, chronically unemployed) may have similar sexual behavior patterns as their counterparts in other countries have, but because they were not studied here, this assumption remains to be tested.

Another important implication of these findings is that, as in most other studies, AIDS-related knowledge and attitudes to the general issues related



to the appearance of this disease proved to be rather poor predictors of behavioral change. This does not imply by any means that factual information about HIV and AIDS should not be widely disseminated or that such information is irrelevant for adjusting one's own behavior. Part of the reason for this finding is the small variability of knowledge scores. The high average knowledge score and small variability of individual scores clearly demonstrated that besides knowledge other prerequisites are needed in order to bring about the targeted, risk-reducing behavior change.

The fact that behavioral patterns of increased risk of contracting the AIDS virus due to sexual and drug abuse behaviors were identified in younger respondents and in those with better socioeconomic status signals that they should be thoroughly studied and that adequate prevention programs should be directed toward them, and not only to the general population or to the socially marginal and hard-to-reach groups. All these programs should address a broader complex of health-responsible behaviors and be accessible to youth before they enter the period of life when the interest in sex and drugs commences.

#### References

- Ajduković, D., & Ajduković, M. (1988). Cross-professional and cross-national survey of AIDS related knowledge and attitudes. Abstracts of the 12th International Congress of Anthropological and Ethnological Sciences. *Collegium Antropologicum*, 12 (Suppl.), 274.
- Ajduković, D., & Ajduković, M. (1990). AIDS-related knowledge, attitudes and behavior in student population. In: Dj. Ajduković (Ed.), *Oral AIDS* (pp. 201-210). New York: Elsevier.
- Ajduković, D., Ajduković, M., & Prislín, R. (1990). *WHO schools knowledge, attitudes, beliefs and practice (KABP) pre-testing report for Yugoslavia* (Report). Zagreb: University of Zagreb, Department of Psychology and Department of Social Work.
- Austin, D., Sung-Mook, H., & Hunter, W. (1989). Some determinants of fear about AIDS among Australian college students. *Psychological Reports*, 64, 1239-1244.
- Baldwin, J. D., & Baldwin, J. I. (1988). Factors affecting AIDS-related sexual risk-taking behavior among college students. *Journal of Sex Research*, 25, 181-196.
- Baldwin, J. I., Whiteley, S., & Baldwin, J. D. (1990). Changing AIDS and fertility related behavior: The effectiveness of sexual education. *The Journal of Sex Research*, 27, 245-262.
- Baumrid, D. (1988). A developmental perspective on adolescent risk taking in contemporary America. In C. E. Irwin, Jr. (Ed.), *Adolescent social behavior and health: New directions for child development* (pp. 93-127). San Francisco: Jossey-Bass.
- Bowie, C., & Ford, N. (1989). Sexual behavior of young people and the risk of HIV infection. *Journal of Epidemiology & Community Health*, 43, 61-65.
- Brooks-Gunn, J., Boyer, C. B., & Hein, K. (1988). Preventing HIV infection and AIDS in children and adolescents: Behavioral research and intervention strategies. *American Psychologist*, 43, 958-965.
- Cameron, A., & Cameron, K. (in press). The prevalence of homosexuality: Is a new survey needed? *Psychological Reports*.
- Carducci, A., Avio, C. M., Calamusa, A., & Bendinelli, M. (1988). Percezione del problema AIDS de parte di popolazione studentesca [Perception of the AIDS problem among the student population]. *L'Igiene Moderna*, 90, 464-480.
- Clift, S. M., & Stears, D. F. (1988). Beliefs and attitudes regarding AIDS among British college students: A preliminary study of change between November 1986 and May 1987. *Health Education Research*, 3, 75-88.
- Crawford, I. (1990). Attitudes of undergraduate college students toward AIDS. *Psychological Reports*, 66, 11-16.
- Deniaud, F. (1988). Des jennes et le SIDA [Young people and AIDS]. *Retrovirus*, 1, 118-126.
- DiClemente, R. J., Zorn, J., & Temoshok, L. (1986). Adolescents and AIDS: A survey of knowledge, attitudes, and beliefs about AIDS in San Francisco. *American Journal of Public Health*, 76, 1143-1145.
- DiClemente, R. J., Zorn, J., & Temoshok, L. (1987). The association of gender, ethnicity, and length of residence in the Bay Area to adolescents' knowledge and attitudes about AIDS. *Journal of Applied Social Psychology*, 17, 216-230.
- Edgar, T., Freimuth, V. S., & Hammond, S. L. (1988). Communicating the AIDS risk to college students: The problem of motivating change. *Health Education Research*, 3, 59-65.
- Flora, J. A., & Thoresen, C. E. (1989). Components of comprehensive strategy for reducing the risk of AIDS in adolescents. In: V. M. Mays, G. A. Albee, & S. F. Schneider (Eds.), *Primary prevention of AIDS: Psychological approaches* (pp. 374-389). London: Sage.
- Friedman, S. R., Des Jarlais, D. C., Sotheran, J. L., Garebr, J., Cuhén, H., & Smith, D. (1987). AIDS and self-organization among intravenous drug users. *International Journal of Addiction*, 22, 202-220.
- Goodwin, M. P., & Roscoe, B. (1988). Students' knowledge and attitudes at a Midwestern university. *Journal of American College Health*, 36, 214-222.

- Kann, L., Nelson, G. D., Jopnes, J. T., & Kolbe, L. J. (1989). Establishing a system of complementary school-based surveys to annually assess HIV-related knowledge, beliefs, and behaviors among adolescents. *Journal of School Health, 59*, 55-58.
- Kegeles, S. M., Adler, N. E., & Irwine, C. E. (1988). Sexually active adolescents and condoms: Changes over one year in knowledge, attitudes and use. *American Journal of Public Health, 78*, 460-461.
- Kelly, J. A., St. Lawrence, J. S., Smith, S. Jr., Hood, H. V., & Cook, D. J. (1987). Medical students' attitudes toward AIDS. *Journal of Medical Education, 62*, 549-556.
- King, K., Balswick, J. O., & Robinson, I. E. (1977). Sexual revolution among college females. *Journal of Marriage and the Family, 39*, 455-459.
- King, A. J., Beazley, R. P., Warren, W. K., Hankins, C. A., Robertson, A. S., & Radford, J. L. (1988). *Canada youth and AIDS study*. Kingston: Queen's University.
- King, N. J., & Gullone, E. (1990). Fear of AIDS: Self-reports of Australian children and adolescents. *Psychological Reports, 66*, 245-246.
- Krupka, L. R., & Verner, A. M. (1988). College student attitudes toward AIDS carriers and knowledge of the disease. *College Student Journal, 22*, 263-269.
- Masters, W. H., Johnson, V. E., & Kolodny, R. C. (1988). *Crisis: Heterosexual behavior in the age of AIDS*. New York: Grove Press.
- Radford, J.L., King, A. J., & Warren, W. K. (1988). *Street youth and AIDS*. Kingston: Queen's University.
- Remafedi, G. (1987). Homosexual youth: A challenge to contemporary society. *Journal of the American Medical Association, 258*, 222-225.
- Rickert, V. I., Jay, S. M., Gottlieb, A., & Bridges, C. (1989). Adolescents and AIDS: Females' attitudes and behaviors toward condom purchase and use. *Journal of Adolescent Health Care, 10*, 313-316.
- Ross, M. W. (1988). Components and structure of attitudes toward AIDS. *Hospital and Community Psychiatry, 39*, 1306-1308.
- Sato, P. A., Chin, J., & Mann, J. (1989). Review of AIDS and HIV infection: Global epidemiology and statistics. *AIDS, 3* (suppl. 1), S301-S307.
- Schneider, D., & Morris, J. (1991). Risk-taking behaviors of college students. *Environment & Behavior, 23*, 575-591.
- Sheeran, P., Abraham, S. C., Abrams, D., Spears, R., & Marks, D. (1990). The postAIDS structure of students' attitudes to condoms: Age, sex and experience of use. *Psychological Reports, 66*, 614.
- Simkins, L., & Aberhage, M. G. (1984). Attitudes toward AIDS, herpes II, and toxic shock syndrome. *Psychological Reports, 55*, 779-786.
- Srdar, J., & Kosovec, A. (1988). *Analiza socijalnih faktora pojave uzimanja sredstava ovisnosti mladih u radnom odnosu* [The analysis of social factors of drug abuse among young employees]. Zagreb: Zavod grada Zagreba za socijalni rad.
- Stevens, S. S. (1957). On the psychophysical law. *Psychological Review, 64*, 530-541.
- Stevens, S. S. (1972). *Psychophysics and social scaling*. Morristown, NJ: General Learning Press.
- Strunin, L., & Hingson, R. (1987). AIDS and adolescents: Knowledge, attitudes, and behaviors. *Pediatrics, 79*, 825-828.
- Trenc, P., & Beluhan, A. (1973). Ispitivanje stavova i aktivnosti u seksualnom zivotu srednjoskolske omladine u SR Hrvatskoj [Sexual life attitudes and behaviors among the secondary school youth in the SR Croatia]. *Arhiv Zavoda za zastitu majki i djece, 17*, 269-320.
- Triplet, R. G., & Sugarman, D. B. (1987). Reactions to AIDS victims: Ambiguity breeds contempt. *Personality and Social Psychology Bulletin, 13*, 265-274.
- Velimirovic, B., Raab, S., & Kriechbaum, N. (1989). Kenntnisse zum Thema AIDS bei Schülern in Österreich [Knowledge of AIDS among school students in Austria]. *AIDS-Forschung, 4*, 192-197.
- Walkey, F. H., Taylor, A. J. W., & Green, D. E. (1990). Attitude to AIDS: A comparative analysis of a new and negative stereotype. *Social Science Medicine, 30*, 549-552.
- Wilson, D., Greenspan, R., & Wilson, C. (1989). Knowledge about AIDS and self-reported behavior among Zimbabwean secondary school pupils. *Social Science and Medicine, 28*, 957-961.
- Witt, A. L. (1989). Authoritarianism, knowledge of AIDS, and affect toward persons with AIDS: Implication for health education. *Journal of Applied Social Psychology, 19*, 599-607.
- World Health Organization, Global Program on AIDS (1991). *Current and future dimensions of the HIV/AIDS pandemic*. Geneva: World Health Organization.
- Zelnik, M., & Kantner, J. F. (1980). Sexual activity, contraceptive use and pregnancy among metropolitan-area teenagers: 1971-1979. *Family Planning Perspectives, 12*, 230-237.
- Zimmermann, E., Hausser, D., Dubois-Arbor, F., & Zaugin, P. (1991). Changes in Switzerland: Condom use in casual sex. *VII International Conference on AIDS, Florence, Abstracts Volume 2*, 424.