Precursors of protective sexual behavior in Mexican youth

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Development and Longitudal Evaluation of an Intervention

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PROEFSCHRIFT

ter verkrijging van de graad van doctor aan de Universiteit van Tilburg
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MEXICO CITY, SEPTEMBER 2003

MARTHA GIVAUDAN

Contents

Chapter 1

Introduction

In an effort to improve the quality of life, social and health psychology have been extended beyond the treatment of individual persons or small groups to focus on communities. This shift entails the development, implementation, and evaluation of programs that can be incorporated on a large scale into the public health policies of countries. The AIDS pandemic has been a major trigger for the development of effective prevention strategies. With the support of governmental and nongovernmental organizations different programs have been designed all over the world, in order to prevent the transmission of HIV, to promote safer sex behavior, and to improve the support for people living with AIDS and for their families. The opportunity for psychology to counteract one of the major public world health problems (Kelly, 1995; Rugg, 1990) in collaboration with many other disciplines has never been greater. To be effective, HIV/AIDS prevention programs require not only the commitment of different organizations, but also systematic efforts at program implementation and continuous evaluation of program impact.

This thesis deals with theoretical, methodological, and applied aspects of health intervention programs in the field of sexual education and AIDS prevention. A school intervention study was carried out in Mexico, a developing country with one of the largest numbers of young people in America, with a traditional culture in which talking about sexuality with adults is considered disrespectful, the use of condoms is not a common practice, and where the social and political controversy about the implementation of formal sexual education at school still continues.

School-based HIV prevention programs represent one of the most efficient channels for influencing adolescents. Another attractive feature of school-based programs is their targeted age. Young adolescents are sexually inexperienced and their attitudes and behavior vis-à-vis safe sex may still be relatively easy to change. The need for these programs is enormous as 60% of the new HIV/AIDS infections in Mexico are in the age range between 15 and 24 years and the prevalence of STDs is highest in this age group.

Reviews of literature (Coyle, Basen-Engquist, Kirby, Parcel, Banspach, 1999; Fisher & Fisher, 2000; Kirby & Di Clemente, 1994; Walter & Vaughn, 1993) indicate that most of the school-based interventions have not been based on validated theoretical approaches and have not demonstrated a significant impact on determinants of safe-sex behavior.

WHAT IS THE CURRENT SITUATION OF ADOLESCENTS IN MEXICO AND LATIN AMERICA WITH RESPECT TO AIDS?

In Mexico, the first case of AIDS was registered in 1983 and 46,870 cases had been diagnosed by the end of 2000, half of whom had passed away (Cruz, 2000). Due to delay in notification and to sub-registration of cases in the rural areas, health authorities estimate that there are approximately 64,000 case of AIDS, while there are between 116, 000 and 177,000 people infected with HIV, the majority of whom do not know they carry the virus (Magis & Uribe, 2000). Seventy-two percent of the cases diagnosed are in the 15 to 44 years age group. Given the time lapse between infection and the diagnosis of AIDS, these data indicate that a high number of individuals are becoming infected in adolescence and early adulthood. AIDS is the third leading cause of death among people from 25 to 40 years of age and more than 80% of those infected have acquired the disease through sexual contact (Cruz, 2000).

In Latin America and the Caribbean, the growth rate of HIV infections in adolescents is among the highest in the world. According to UNAIDS estimates, by the year 2,000 there were more than 107 million young people in Latin America (UNAIDS, 2000). Current demographic data show that one out of every five people in Latin America is an adolescent in a transition process from dependence on parents to contributing to society. Opportunities for young people are limited due to a lack of appropriate education systems, health services, and jobs. The lack of access to these basic services is reflected in a high dropout rate from schools, deficient academic performance, unwanted pregnancy, abortion, premature marriage, delinquency, use of psychoactive substances, and indifference to the surrounding environment (Ehrenfeld, 1999).

Adolescents are vulnerable to HIV infection because they are about to begin or have just begun their sexual activity. There is a clear need to educate young people on the risk of AIDS and to encourage preventive behavior from the beginning of the individual's sexual history. Various issues regarding sexual behavior, contraceptive use, gender roles and transmission of sexual infections still need to be investigated to gain better knowledge about the needs and perspectives of young people and to improve prevention strategies in the area of sexual and reproductive health (Brown, Jejeebhoy, Shah, & Yount, 2001).

In recent years, governments and the private sector have begun to recognize the importance of young people's social and health problems and have started to implement programs and services for adolescents. However, activities that are implemen-

ted often are not evaluated for years (Fisher & Foreit, 2002). Adolescents' needs for services in areas such as hygiene, nutrition, use of free time, future planning, and sexuality are interrelated and should be dealt with simultaneously to encourage adequate long-term behavioral attitudes and life skills in young people (Flay, 2002).

In order to encourage young adolescents to take preventive measures against contracting HIV and other STIs, it is important to both effectively transmit accurate information and to provide interventions that encourage behavioral change. In fact, data suggest that most Mexicans already have accurate information about HIV prevention: 91.4% of 15-49 year-old men surveyed by the Ministry of Health in Mexico City were able to name at least two acceptable ways of protection from HIV infection (UNAIDS, 1998). The true challenge is to design interventions encouraging Mexicans to put their knowledge into action, and to evaluate the short-term and the long-term effects of such interventions.

RESEARCH ON ADOLESCENT SEXUALITY IN LATIN AMERICA AND MEXICO

The majority of the studies in Latin America that have been done with adolescents have focused on age of sexual debut and contraceptive use. Unfortunately most of the findings are in unpublished reports (cf. Alarcón & González, 1996; Lopez, 1997; Mendez, 1994; Pick, Givaudan, & Aldaz, 1996; Rodriguez-Lay, 1997). Premarital sexual relations have been found to differ according to gender. Men are more likely to have had sexual relations and to have started their sexual activity at an earlier age than women. However, because of the lack of formal reports it is difficult to find dependable data. In a representative home survey conducted in Mexico City with female adolescents, 12 to 19 years of age, Pick, Andrade-Palos, Díaz-Loving, and Atkin (1988), found that 38% of adolescents who had begun sexual relations used some type of contraceptive method during their sexual debut (including rhythm and withdrawal). The principal reason adolescents cited for not using contraception was that they had been unprepared for their first sexual experience.

Other research has studied psychological variables such as assertion, locus of control, obedience of social norms, future orientation, use of affect and school aspirations in relation with teenage sexual and contraceptive use. Diaz-Loving and Pick de Weiss (1988) found that future orientation was a determinant of preventive behaviors in sexuality. They also showed that assertive communication was highest among pregnant adolescents as compared to non-pregnant ones who had had sex and to non-pregnant ones who had never had sex. Adolescents explained this by saying that pregnant people are treated with more deference, which opened the space for them to act in an assertive manner. Further confirmation for this finding comes from the fact that the level of assertiveness remained high only in adolescents who became pregnant for the second time.

Pick de Weiss, Atkin, Gribble, and Andrade-Palos (1991) looked at the psycho-

social determinants of abstaining from sexual intercourse and practicing contraception to avoid getting pregnant. They found that the following were the main determinants of these behaviors: assertive communication, use of affect to achieve ends, non-acceptance of parental norms and rules, high level of school aspirations, communication with parents and friends about sexuality, knowledge about sexuality and future orientation. They did not find a relationship between safe-sex behaviors and locus of control. Most of the reported research in Mexico has explored the sexual and contraceptive behavior of teenage women; data on young males are rarely included, even though they have been found, on average, to start having sexual intercourse at an earlier age. Other researchers looking at risk perception have found the following order in degree of perceived risk: homosexual males with more than one sexual partner, homosexual women with more than one sexual partner, heterosexual males and females with more than one sexual partner and heterosexual females and males with one sexual partner (Villagran, Cubas, Diaz-Loving, & Camacho, 1990). As is the case in most studies, these authors have focused on young adults in a university setting.

THE CONTEXT FOR SEXUALITY EDUCATION

In Mexico, as in the rest of the world, government and private-sector agencies have faced political and ethical obstacles to implementing thorough surveys on adolescent sexuality, although this information is highly necessary for intervention policy. Conservative social groups linked to the Roman Catholic Church have repeatedly managed to block expansion of sexuality education programs and publicity advocating AIDS prevention, and have even interfered with some organizations that provide family planning services. These groups do not represent majority opinion in Mexico, but they skillfully use the media and are backed by substantial resources. We have found that the best way to confront this opposition is through accurate, widely disseminated information that demonstrates the population's need and support for sex education, family planning, and AIDS prevention (IMIFAP, 1993).

The current research was carried out in the context of a Mexican NGO (IMIFAP-education, health and life) and with the support of the Population Council and the Horizons Foundation. IMIFAP is a non-profit organization that was established in Mexico City in 1985 for the purpose of developing and disseminating research and implementing programs for children, adolescents, and adults in order to promote physical and mental health through the development of psychosocial skills that contribute to the personal and social growth of individuals. Among other things, IMIFAP has addressed problems such as unwanted pregnancy, AIDS and other sexually transmitted infections, and prevention of sexual violence. A fundamental aim of the institutional work has been the development and implementation of innovative educational programs and materials for schools, community organizations, health personnel, and the mass media.

PROBLEM STATEMENT

The risk behavior of today's adolescents will shape the course of the AIDS pandemic in the future. In developing countries, recent data indicate that up to 60 percent of all new HIV infections are among 15-24 year olds (UNAIDS, 2000). Moreover, teenagers and young adults between the ages of 15-24 have the highest incidence of STIs of all age groups. Clearly adolescents are a key target group for behavior change interventions designed to help them adopt safe behaviors. Adolescents in countries with a high prevalence of HIV/AIDS are often knowledgeable about AIDS, its causes and means of prevention, but there is little evidence that youth change their behavior on the basis of this knowledge in order to protect themselves (Kinsman, Harrison, Kengeya-Kayondo, Kanyesigye, Musoke & Whitworth, 1999). Therefore, the design of effective HIV prevention strategies for adolescents is one of the most urgent challenges for public health today (Santielli, Robin, Brener, & Lowry, 2001).

On the other hand, the psychological variables that lead adolescents to act in certain ways and specifically to take risks that expose them to unprotected sexual behavior have hardly been investigated in the Mexican population. Available research on adolescent sexuality has not provided sufficient theoretical information and current interventions have not been adequately evaluated to demonstrate a significant impact on the precursors of safe-sex behavior (Kirby, 2000). Such information is needed to develop, support or change intervention strategies and to improve the implementation of effective, comprehensive education and prevention programs that confront the widespread problem of AIDS among adolescents. The overall goal of the study is to contribute to the understanding of theoretical and applied approaches that effectively reduce unsafe behavior among young people.

This study deals with both the theoretical and the applied components of HIV prevention. From the theoretical perspective, this study explores which variables can be considered as precursors of safe-sex behavior for Mexican adolescents that have not had sexual experience and for a subgroup of Mexican adolescents that have had sex. An explanatory model aimed at understanding the relationships between variables that theoretically had been demonstrated to play a role in AIDS prevention is tested.

The variables included in the study have frequently been applied to AIDS research guiding the development of behavior change interventions. These variables have been the base of most of the theories of behavioral prediction and behavioral change (Azjen & Fishbein, 1980; Bandura, 1994; Rosenstock, 1994) which state that health behaviors develop as the result of a variety of personal, emotional, cognitive and social factors that interact with features of the social context.

For this study, the relationship between the variables is conceptualized at three levels: personal dispositions (self-esteem, self-efficacy, and decision-making); mediator and moderator variables (knowledge, attitudes toward condoms, and norms about condoms), and outcomes (partner communication and intentions to use condoms). The simplified model (Figure 1) shows that any behavior is most likely to occur if the

person has both the necessary skills and the intention to perform the behavior. These are in turn are determined by mediator or moderator variables (knowledge, norms and attitudes) that are also determined by personal dispositions.

Fishbein (2000) argues that very different types of intervention are needed if the person has formed an intention but is unable to act upon it than if one has a low intention to perform the behavior. Therefore, in some populations the behaviors may not be performed because of a lack of intentions to do it, that in turn are determined by norms and attitudes; while in others the problem may be related with lack of specific skills or for the influence of different constraints that impede the performance of the behavior.

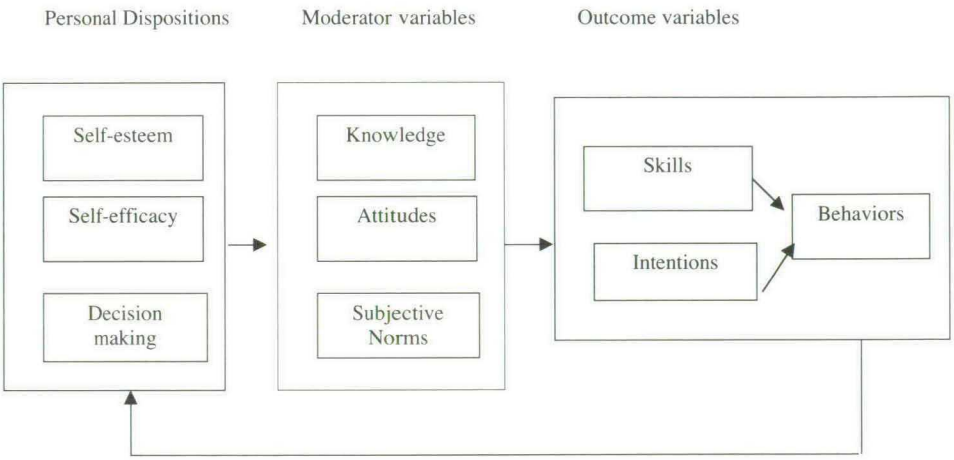

Figure 1. *Simplified model*

From the applied perspective the problem of developing and implementing effective HIV/AIDS prevention programs is particularly challenging in schools in developing countries. Many program planners are still not convinced of the need to provide detailed information or to teach life skills. Their doubts rest on the lack of carefully evaluated programs that demonstrate that these program components are effective. In the last few years some activities regarding sexual education have been implemented in Mexican schools but have not been assessed through experimental designs. Determining the characteristics of an effective intervention considering both the contents and the strategies for implementation is a challenge. This project will provide a needed evaluation of an intensive, interactive program. The evaluation of a school-based curriculum for HIV/AIDS prevention in adolescents is also needed in order to institutionalize effective school-based interventions as an alternative to deal with the growing epidemic.

OVERVIEW OF THE CHAPTERS

In **Chapter 1** I present the theoretical components of the study. An explanatory model including relevant variables from theories of reasoned action (Ajzen & Fishbein, 1980) and social learning (Bandura, 1997) is tested using data from 2064 Mexican adolescents, most of them without sexual experience. Structural equation modeling is applied to find a path model based on relevant theories of sexual health behavior. In the case of adolescents without sexual experience precursors of safe sex, such as communication and intentions to use condoms are considered to be the outcome variables. In the case of adolescents with sexual experience protective sex behavior is included as the final outcome.

Chapter 2 is focused on the short-term evaluation of a HIV/AIDS school-based life skills and sexual educational program for high-school Mexican adolescents. A multivariate analysis of variance is used to compare pretest and posttest measures. The explanatory model obtained with the pretest data is tested again applying a multisample option that includes data from the posttest and different subgroups according to gender and sexual experience.

In **Chapter 3** theory, and methodological and statistical analyses are integrated in order to examine the validity and the longer-term effects of an HIV/AIDS school-based life skills and sexual educational program for adolescents. The effects of the long-term intervention are evaluated using a quasi-experimental design with four measurement occasions. A multilevel model is used to analyze the effects of the intervention with respect to each of the variables included in the intervention.

Finally, the **Epilogue** presents a summary of the main findings and the general conclusions. Some salient aspects of the project are presented, aimed at analyzing principles and strategies for the evaluation of intervention programs. The implications of the study are discussed both from a theoretical and an applied perspective.

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Chapter 2

Identifying Precursors of Safe-Sex Practices in Mexican Adolescents with and without Sexual Experience: An Exploratory Model

ABSTRACT

Theoretical variables were examined for their empirical relevance as precursors of safe-sex behavior in 2011 young Mexican adolescents most of whom had not yet had sexual experience. Using structural equation modeling, a good fit was found for a path model with partner communication and intention to use condoms as outcome variables, self-esteem, self-efficacy, and decision making as antecedent variables, and perceived norms about sexual practices, attitudes toward condom use, and knowledge of HIV as mediating variables. A good fit was also found for a slightly elaborated model, involving condom use as outcome variable that was fitted in a subsample with 319 adolescents who reported sexual experience. Gender differences are discussed, as well as implications for intervention programs promoting safe-sex behaviors.

INTRODUCTION

In the year 2000, Mexico had 96.3 million inhabitants, with an annual growth rate of 1.88%. Out of these, 40 million were younger than 19 years of age. The absolute number of young people will continue to grow and is estimated to reach a maximum of 21.2 million adolescents between 15 and 19 years of age in 2010. The number of adolescents today is the highest in the history of the country and represents more than twice the youth population that existed in 1970 (Consejo Nacional de Población [CONAPO], 2001). The sexual risk-taking behavior of today's youth directs the course of the AIDS pandemic in the future. Data from developing countries indicate that up to 60% of all new HIV infections are among young people aged 15 to 24 (e.g., Rivers & Aggleton, 1999). Moreover, the group of 20 to 24 year olds has the highest

incidence of sexually transmitted infections of all age groups (World Health Organization [WHO], 1996). In 1999 the adult prevalence rate of sexually transmitted diseases was .29% in Mexico. The HIV prevalence rate among young people in the age range 15 to 24 was reported to be between .05% and .08% for females and between .33% and .48% for males (UNAIDS/ WHO, 2000). Presently, HIV is the fourth leading cause of death among Mexicans between the ages 25 to 34 (Secretaría de Salud [SSA], 1999). While prevalence is still low, the epidemic is on the verge of expanding rapidly in the general population.

Cultural Context of HIV/AIDS in Mexico

In Mexico, even though information is available to the general public regarding sexual and reproductive health, society and culture impose standards that limit the discussion, implementation and transmission of educational materials. This monitoring and limitation of access to information about sexuality is an important factor in widespread misunderstandings and misconceptions. Myths that encourage socially accepted practices continue to spread, even though they promote high-risk behavior.

Gender-related social norms and their effect on sexual behavior have been particularly prominent topics in the literature on HIV/AIDS in adolescents (Whitaker, Miller, & Clark, 2000). Differences have been noted in communication style, proactive versus passive attitudes toward safe sex, lifetime alcohol use, self-esteem, social pressure, and perceived control (Feeney, Kelly, Gallois, Peterson, & Terry, 1999; Lock, Ferguson, & Wise, 1996; Whitaker et al., 2000).

In a survey undertaken in nine states in Mexico, it was found that amongst adolescents, the average age for first sexual intercourse was 15.3 years for men and 15.6 for females (MEXFAM, 1999). Aguilar (1998) reported that the first sexual encounter is normally unplanned and unpredicted. Mexican adolescents are often uninformed about safe-sex practices and do not use any form of contraception. In general, only one out of every three uses a contraceptive method during his or her first sexual relationship. In a national survey it was found that 42% of young men and 23% of young women had experience of sexual relations at least once at an average age of 16 and 17 years, respectively. A small percentage of the males (6%) had their first sexual experience with a prostitute (SSA & Consejo Nacional para la Prevención y Control del SIDA [CONASIDA], 1998).

Investigating gender conceptions regarding AIDS and condom use amongst young Mexican students, Rodriguez, Amuchastegui, Rivas and Bronfman (1995) reported that the school, the Roman-Catholic church, and the family greatly influence adolescents' perception of sexuality. The myths and values embedded in these institutions often provide mixed messages about sexuality and prevention, leading to misunderstanding or confusion regarding methods of prevention and the desirability of using them. Gender differences were reported; for young women, but not for young men, pleasure and eroticism are only considered acceptable when sex is performed

for reproduction as opposed to enjoyment. In addition, the use of contraception frequently is considered sinful and unnatural. Using a condom even may be a sign of degradation to the woman, denying her the opportunity of maternal confirmation and promoting an orientation to physical pleasure that is frowned upon. By no means would it be acceptable for women to propose the use of a condom, for that would diminish their passive seductive role and the seductive power of the men. Bringing a condom to an engagement implies loss of prestige for the girl and promiscuity; for a man it implies that he considers the relationship as 'casual'.

Young Mexican men often see the responsibility for pregnancy and its prevention as a matter for the woman. The condom symbolizes a threat to male virility and fertility. As the male identity is linked to bravery, strength, and security, not using a condom is proof that he is not afraid; risking his life is a sign of virility.

Theoretical framework

Effective education requires knowledge and understanding of the variables that underlie the performance of risky behavior. The scientific literature on HIV and other sexually transmitted infections (STIs) prevention suggests that there are several factors that determine high-risk sexual behavior in adolescents (Basen-Engquist et al., 1999). Experts have recommended the inclusion of multiple model components from different theories to understand health-related behaviors (e.g., Wulfert & Wan, 1995). The present study derives its theoretical basis from the Theory of Reasoned Action (Ajzen & Fishbein, 1980), the Theory of Planned Behavior (Ajzen 1991; Ajzen & Driver 1991; Ajzen & Madden 1986), and Bandura's (1991, 1997) concept of self-efficacy. The Theory of Reasoned Action states that the primary determinant of any behavior is the person's intention to perform that behavior. The Theory of Planned Behavior assumes that intention and perceived behavior control mediate the effects on behavior of attitudes, subjective norms, and external or context variables. Social cognitive theories argue that the relationship between self-efficacy and HIV prevention is characterized by the individual's confidence in his/her ability to identify and confront challenging situations, such as those that present themselves in high-risk sexual scenarios (e.g., Bandura, 1991).

Kasprzyk, Montaño, and Fishbein (1998), presented a model of condom use that includes elements from various theories. Their proposal included three main constructs as determinants of behavioral intention: attitude toward performing the behavior, social norms associated with the behavior, and self-efficacy or perceived control with regard to the behavior. They also included two constructs identified through qualitative parameters, namely alternative strategies to protection and critical events.

Empirical research indicates that attitudes, subjective norms about the use of condoms, and perceived behavioral control (which is broadly equivalent to Bandura's concept of self-efficacy (Ajzen, 1998; Finlay et al., 1999), are reliable predictors of intentions to perform health behaviors in adolescents (DiClemente, 1992; Romer et

al., 1994; Schaalma, Kok, & Peters, 1992). Variables categorized as personal resources (e.g., self-esteem, self-efficacy, and perceived control/decision making) have been shown to promote health-related behavior, coping behavior, and physiological and emotional responses to stress (DeLongis, Folkman & Lazarus, 1988; Hobfoll, 1985).

Lastly, communication has been extensively included in predictive studies since it is considered as an antecedent to safer sex behavior (Thompson, Geher, Stevens, Stern, & Lintz, 2001; Zamboni, Crawford, & Williams, 2000).

Most theories and studies in the field of safe sexual behavior have been tested with adults or with adolescents who have had sex. However, there is a paucity of studies involving youngsters who have not had previous experience. The importance of exploring this aspect is directly related to the application of knowledge regarding the precursor variables of safer sex behavior. Such information is directly relevant to the promotion of future safe-sex behaviors.

The present study is meant to address the following questions:

a) Are there variables that can be considered as precursors of safer sex behavior for adolescents who have not yet had sexual intercourse and what are the interrelationships among these variables?

b) How can the variables be modeled with a view to explain differences between four different subgroups (i.e., females who have never had sex; females who have had sex; males who have never had sex; and males who have had sex)?

c) What is the relationship between the model and theoretical variables described in the literature on health behavior?

d) How can the results guide the development of educational interventions?

METHOD

Participants

The sample consisted of 2064 Mexican students from Toluca, the capital city of the State of Mexico in central Mexico. The main analyses reported in this article are based on four subgroups of students according to gender and sexual experience. Reporting of sexual experience is a sensitive issue. When questionnaires are used in the evaluation of HIV/AIDS and sexuality education programs, guaranteeing the confidentiality of the respondent's answers is a prerequisite to obtaining valid results. Therefore, the distinction between groups with and without sexual experience was based on four items. The primary question was at what age the respondent had the first sexual experience. Other responses were checked for compatibility (e.g., 'I have not had sexual relations'; 'Did you use a condom last time you had sexual relations?'). A missing score was given for non-compatibility for 2.5% of the protocols. Due to the missing values on items related with sexual experience and gender, in this article we are reporting data of 2011 students (1029 females and 982 males). The average age was 15.97 years (SD = 11 months). All students were in grade 10 of

four out of the five public high schools (middle-low socioeconomic level) in the city that are affiliated with the Autonomous University of the State of Mexico (UAEM). (One public high school was excluded from this study, because its students had previously participated in an educational program for HIV prevention.)

Instruments

The questionnaire consists partly of items written for this study and partly of questions from Planeando tu vida (Pick et al., 1994) and the CDC HIV Index Questionnaire (CDC, 2000).

Self-esteem. Refers to a person's self-evaluation, particularly in regard to responsibility for and self-image in executing an action, and can be used as a predictor of future behavior. Nine items were used to assess self-evaluation, particularly with regard to self-image (e.g., 'I like myself', 'I feel confident about myself'). Respondents were asked to answer on a four-point scale (0 = 'almost never'; 1 = 'sometimes'; 2 = 'most of the time'; 3 = 'all the time'). The index for internal consistency was acceptable (Cronbach's $\alpha = .78$).

Decision-making. Refers to the degree to which individuals perceive events in their lives as being a consequence of their own actions, and thereby controllable by their own decisions (internal control), or as being unrelated to their own behavior, and therefore beyond personal control (external control). The seven items in this scale are mainly related to perceived personal control (e.g., 'I have control over what happens in my life'; 'I think about things carefully before I make a decision'). Participants were asked to answer on a four-point scale ranging from 1 ('almost never') to 4 ('all the time'). Cronbach's alpha was .79.

Self-efficacy. Refers to the individual's ability to carry out necessary behavior and to control own motivations, actions, and the social environment. The present scale consisted of three items that focus on the person's belief that she or he has the elements to cope with risk in a sexual encounter (i.e., 'I can interrupt a sexual relation to wear a condom'; 'I consider myself able to tell my partner that I will only have sexual relations if we use a condom'; 'I am certain I can get a condom if I want to'). Responses were made on a scale ranging from 1 ('disagree completely') to 5 ('agree completely'). The scale had an adequate internal consistency (Cronbach's $\alpha = .71$).

Norms about the use of condoms. Refer to standards of the person and the perception of whether significant others think that one should or should not perform a specific behavior. Theoretically the notion of norms is based on the perception that normative referents support or justify one's behavior (Ajzen & Fishbein, 1980). Three items were used to assess norms about the use of condoms ('My significant others think I should use condoms'; 'My family thinks that if I am to have sexual relations, I should use a condom'; 'It is right to ask the partner to wear a condom'). Respondents were asked to answer on a five points scale from (1= 'disagree completely' to 5 'agree completely'). Cronbach's a was .68.

Attitudes toward the use of condoms. These attitudes are seen as dispositions of the person that either facilitate or impede the adequate handling of situations. There were 10 items related to ideas about advantages and disadvantages of condom use, (e.g., 'It takes fun out of sex if you use a condom every single time'; 'People who use condoms sleep around'; 'Using a condom every time I have sexual relations is a protection for me'). Answers were given on a five-point scale ranging from 1 ('disagree completely') to 5 ('agree completely'). The internal consistency was acceptable (Cronbach's $\alpha = .74$)

Partner communication. Refers to difficulties in talking about and negotiations about sexual relationships in social contexts, relevant to young adults, including the management of affect under difficult or emotionally high-pressure situations. The 11 items in this scale reflect behaviors that usually cause shame and could be an obstacle to communication and negotiation with the partner (e.g., 'I am ashamed to talk about HIV/AIDS with my partner'; 'Just to please my partner, I concede to everything'). That is to say, the person is not able to demonstrate the skills and abilities necessary to resist pressure and to negotiate the use of condoms. Responses were made on a 4-point scale (1 = 'almost never' to 4 = 'all the time'), which afterwards reverse coded (in order to make sure that higher scores reflect higher communication skills). The scale had an internal consistency of Cronbach's $\alpha = .64$.

Knowledge. Information increases the range of alternative courses of action that can be considered by a person in a particular situation. In the case at hand knowledge ensures that individuals have information about safer sex, modes of HIV transmission, ways of preventing HIV transmission, and condom use. A scale assessing knowledge included a total of 19 items. Sixteen items were related to the transmission of HIV (e.g., 'A person can contract HIV by having a blood transfusion from an infected person') and there were three items concerning HIV testing (e.g., 'The ELISA test is used to find out whether a person is infected with HIV/AIDS'). The items were answered on a five point scale ranging from 1 ('I am certain this is incorrect') to 5 ('I am certain it is correct'). Cronbach's alpha was .71.

Intentions. This variable was assessed by a single item with five response options asking: 'Which of the following answers best describes your plans about the use of the condom for you and your partner during your next sexual encounter'. The item was scored from 1 to 5 (1 = 'I am planning not to use a condom'; 2 = 'I am planning to use a condom, as long as my partner does not oppose to it'; 3 = 'I am planning to use a condom only if we both agree'; 4 = 'I am planning to use a condom even if my partner opposes to it'; and 5 = 'I am planning to use a condom').

Behavior. In order to assess actual behavior we developed a 10-item scale, which included safety and risk practices (e.g., 'Sometimes I have had sexual relations with penetration and without protection'; 'I always use a condom'; 'I have had sexual relations with only one partner'). Safe practices were scored 1 and risky behavior with 0. Cronbach's alpha reached a value of .87.

Procedure

Authorities at the schools reviewed the questionnaire before its administration and gave their support for the study, considering it unnecessary to send a consent letter to parents. Informed consent of the students was obtained. The consent form explained the objective of the study, the topics included in the questionnaire and the time necessary to fill it out. The same version of the instrument was administered to male and female participants. Students were told that their participation was voluntary and that they could choose not to participate or not to answer questions they were not comfortable answering. The instrument was administered during a regular class. The questionnaire was applied at the same time in all groups at each of the four schools by teachers, who were instructed on how to administer the questionnaire.

RESULTS

Descriptive Statistics

At the moment of the study 32.9% (660) reported to have a boyfriend or girlfriend. Most of the students (97%) lived with their parents. Adolescents in Mexico commonly do not leave their parents' home until they get married. Regarding marital status, most of the students were single 1974 (98.2%), 26 (1.2%) reported being married or living in a free union and 3 (.1%) reported that they were widowed. We are not certain whether the last data are correct in any instance, but even if these answers are all false, the level of inaccuracy remains low. 15.8% (319/2011) were reported as ever having had sexual intercourse (6.9% females (71/1029) and 25.2% (248/982 males). The mean age at first intercourse for this sample was 14.2 years.

Table 1 gives descriptive statistics for the scales. A high score on each scale is associated with safer behavior. In most of the scales the average score is above the midpoint of the scale but remains well below the maximum.

Table 1 *Descriptive Statistics for the Scales*

Scale	Range	Mean	SD
Self-esteem	0-3	2.17	.44
Self-efficacy	1-5	3.22	.87
Decision making	1-4	2.26	.49
Subjective norms about the use of condoms	1-5	3.32	.67
Attitude	1-5	3.30	.50
Knowledge	1-5	3.06	.42
Communication	1-4	2.25	.35
Intentions	1-5	4.04	1.10
Behavior	0-1	.53	.21

For decision-making and partner communication this is not the case and means are somewhat below the midpoint. A behavior score is only available for respondents

who reported having had sex. Although the knowledge scale scored above the mean point it is interesting to note which items showed a high percentage of correct scores and which reflected a relative lack of knowledge. For example, 98% thought ('I think this is true' or 'I am certain this is true') that you could become infected with HIV by receiving a blood transfusion from an infected individual, 94% thought that sharing a syringe with an infected individual could infect you, and 88% thought that a person could acquire HIV infection from vaginal or anal intercourse without protection (which means that as many of 12% of these adolescents apparently did *not* know this). As many as 29.8% thought that it was possible to become infected through the sting of mosquitoes and an additional 26.8% did not know whether the latter is true. A relatively low percentage of 80% agreed you could protect yourself from HIV by using a condom correctly every time you have sexual relations: 78.3% believed that a person who is HIV positive and has no symptoms of AIDS can infect other people: 78.3% agreed that a person who looks healthy can have HIV and only 69.4% knew that a person can carry the virus for several years without developing symptoms. The results show that basic facts about HIV and AIDS are widely known in this group of Mexican adolescents, but that their knowledge is far from complete.

Structural Equation Model

We split the data in four different subgroups on the basis of sexual experience and gender. We conducted structural equation modeling using AMOS 4 (Arbuckle, 1999) to evaluate interrelationships between the variables. The analysis was based on 2011 participants; four records were excluded because of missing information on gender, and 49 cases had missing information on sexual experience. Two percent of the cases contained missing values for communication, self-esteem or self-efficacy; these missing values were estimated before the analysis using a regression technique.

Two models were tested. In the first one we included all respondents and left out safe-sex behavior as dependent variable, since most of the subjects reported no prior sexual intercourse. In the second model we only included the respondents (both males and females), who reported sexual experience. Here practicing of safe-sex behavior was the output variable.

To test the fit of the structural equation model we considered various model statistics. In addition to the chi-square test of fit, various statistics were examined, which do not have a known sampling distribution. Rules of thumb have been developed about which values are admissible for adequately fitting models (e.g., Carmines & McIver, 1981; Tabachnick & Fidell, 1996). We employed the ratio of chi-square to the degrees of freedom of the model (the latter should not be larger than 3): the comparative fit index (CFI), which should be .90 or higher: an adjusted goodness of fit index (AGFI) which should be larger than .90, the Tucker-Lewis-Index (TLI), which should be larger than .90, and the root mean square error of approximation (RMSEA), which should not be larger than .05.

The model has three levels of variables (see Figure 1). The first level refers to personal resources. These resources include perceptions about self-esteem, person's beliefs that she or he has the elements to cope with sexuality-related risk situation (self-efficacy), and perceived ability to control important outcomes (decision making). Two of these scales contained items that were not limited to sexuality-related situations. This suggests that this level reflects general characteristics of the individual. The second level of the model includes mediating variables; the constructs at this level reflect attitudes toward and knowledge about (the use of) condoms. The last level refers to outcome variables. Communication and intentions to use condoms are the final outcomes in the model.

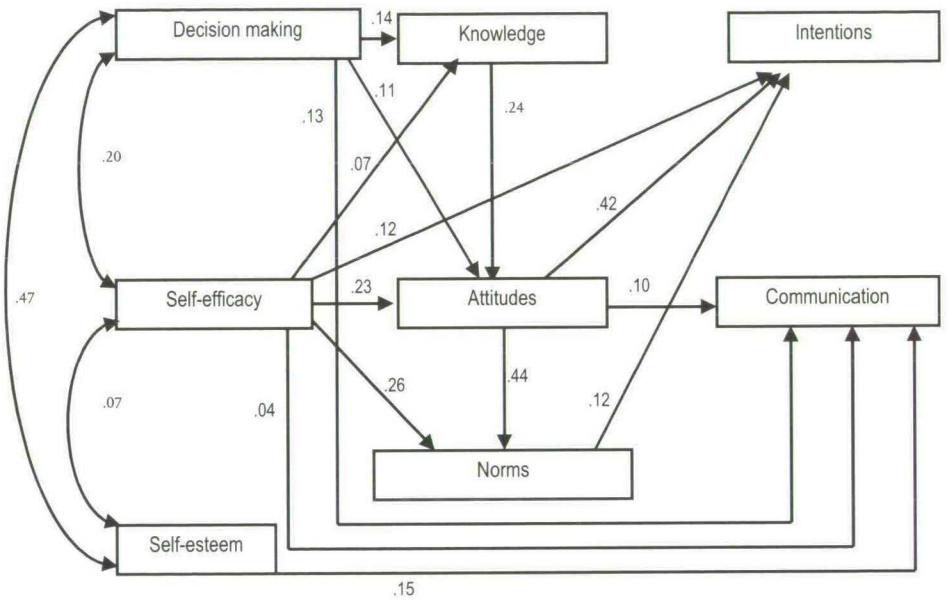

Figure 1 *Structural model for male and female adolescents with and without sexual experience (N = 2011)*

Parameters were constrained to be equal across the four groups, except for the relations between except self-esteem, self-efficacy and decision making which were left free. The model had a very good fit: $c^2(94, N = 2011) = 268.31$, $p < .01$; $c^2/df = 2.85$; *CFI* = .97; *AGFI* = .95; *NNFI* = .93; *RMSEA* = .03. The two general (i.e., not sexuality related) scales of decision-making and self-esteem showed a fairly strong relationship ($r = .47$). Correlations between (sexuality specific) self-efficacy and the two general scales at the first level of Figure 1 were much lower (for decision making and self-efficacy $r = .20$, and for self-efficacy and self-esteem $r = .07$). Self-esteem had a positive influence on communication regarding use of condoms ($b = .15$, $p < .01$). Five paths from self-efficacy were significant, giving this variable a central position

in the model: to attitudes (b = .23, $p < .01$), personal norms about the use of condoms (b = .26, $p < .01$), knowledge (b = .07, $p < .01$), communication (b = .04, $p < .01$), and to intentions (b = .12, $p < .01$). The strongest influence in the model was from self-efficacy to attitudes and from self efficacy to norms. Self-esteem had a positive influence on communication regarding use of condoms (b = .15, $p < .01$). Three paths from decision-making were significant to: knowledge (b = .14, $p < .01$), attitudes toward condoms (b = .11, $p < .01$), and communication (b = .13, $p < .01$). Attitudes toward condom use was the variable with the highest significant relationships to other variables in the model. It had an effect on norms (b = .44, $p < .01$) and on intentions of use condoms (b = .42, $p < .01$). A significant influence of subjective norms about the use of condoms on intentions was also found (b = .12, $p < .01$). Knowledge was positively related to attitudes (b = .24, $p < .01$), but the path from knowledge to intentions was not significant (b = -.09, *ns*). The model explained 50% of the variance in communication about the use of condoms. This variable was considered the final outcome for these young students, among whom most (85%) had no prior sexual experience.

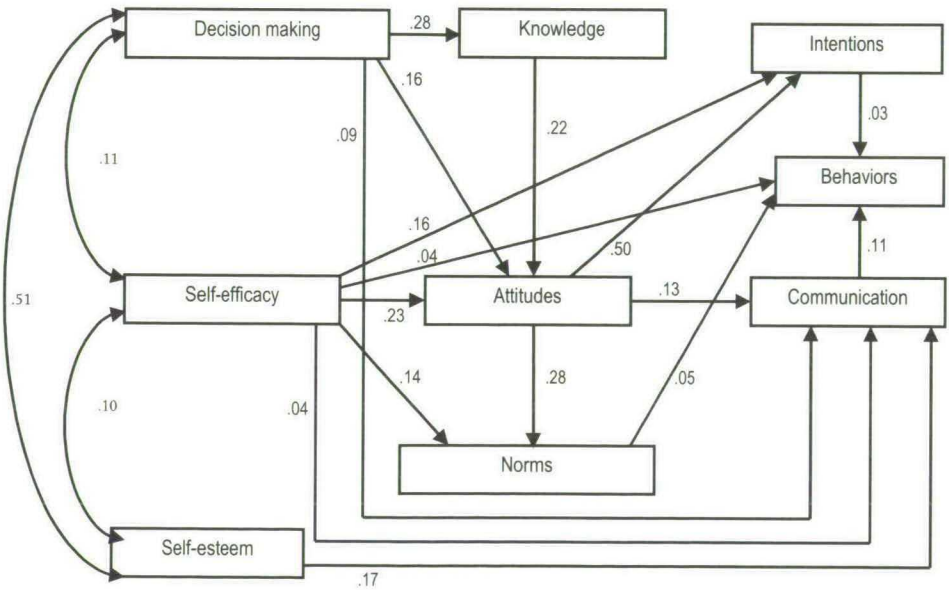

Figure 2 *Structural model for males and females who have had sexual experience (N = 319)*

Figure 2 shows the second model that was derived for the subgroups of adolescents (males and females) who reported having had a sexual relationship ($N = 319$). Actual safe-sex practices were the final outcome. This model also had a good fit ($c^2(50, N = 319) = 80.62$, $p < .01$; CFI = .94; $c^2/df = 1.61$). Not surprisingly, correlations between

decision-making and self-esteem ($r = .51$), decision-making and self-efficacy ($r = .11$) and self-efficacy and self-esteem ($r = .10$) showed the same pattern as in the previous model. Self-esteem influences communication regarding use of condoms ($b = .17$, $p < .01$). In this model five significant paths from self-efficacy can be observed. Contrary to the previous model, there was no significant relationship with knowledge ($b = .04$, *ns*). Still, self-efficacy had again a central role; paths from self-efficacy to the following variables were significant: attitudes ($b = .23$, $p < .01$), norms about the use of condoms ($b = .14$, $p < .01$), communication ($b = .04$, $p < .01$), intentions ($b = .16$, $p < 01$), and actual safe-sex behavior ($b = .04$, $p < .01$). The strongest influence was found for the effect of self-efficacy on attitudes. The paths from decision-making to knowledge ($b = .28$, $p < .01$), to attitudes ($b = .16$, $p < .01$), and to communication ($b = .09$, $p < .01$), were significant. Attitudes had an effect on norms about the use of condoms ($b = .28$, $p < .01$), and particularly on intentions to use condoms ($b = .50$, $p < .01$). There was a positive regression effect from knowledge on attitudes ($b = .22$, $p < .01$). Again there was no significant path from knowledge to intentions ($b = -.05$, *ns*). In this model the influence of norms about the use of condoms on intentions was not significant ($b = .01$ *ns*).

Norms had a direct influence on behavior ($b = .05$, $p < .01$). There were also significant paths from communication about the use of condoms ($b = .03$, $p < .01$), and from intentions of condom use ($b = .03$, $p < .01$) to sex behavior. The second model explains 42% of the variance in communication about use of condoms and 12% in safe-sex behavior. The explained variance in behavior came about through direct effects from communication to use condoms, intentions to use those, self-efficacy and personal norms about the use of condoms and through indirect effects from the other variables of the model of Figure 2.

In sum, the structural equation modeling of the complete group and the subgroup with sexual experiences yielded largely similar results. If the modeled variables were significantly related, the influence was always positive. There were a few small differences between the models of the two figures. Future research will tell us whether these differences are replicable or whether they are due to mere sampling fluctuations.

Multivariate Analysis of Variance

A multivariate analysis of variance on the continuous dependent variables was carried out to test the effects of gender differences and sexual experience. Effect sizes (proportion of variance accounted for by an effect) are presented in Table 2.

The subgroup of 319 adolescents who had reported to have sex were older ($M =$ 16 years 7 months; $SD =$ 1 year 5 months) than the subgroup who had not had sex ($M=$ 15 years 10 months; $SD =$ 9 months). Several statistically significant differences were found between females and males, and also between adolescents who reported

Table 2 *Effect Sizes (Proportion of Variance Accounted for) and Significance Levels of MANOVA*

	Effects Sizes		
Dependent variable	Gender	Sexual Experience	Gender x Sexual Experience
Self-esteem	.002**	.000	.000
Self-efficacy	.024**	.000	.004*
Decision making	.001	.001	.002*
Norms	.002*	.006**	.000
Attitudes	.006**	.004**	.002*
Knowledge	.000	.007**	.002*
Communication	.058**	.006**	.000
Intentions	.004**	.001	.000

*$p < .05$. **$p < .01$.

having had sex and those who never had sex. The largest differences in means between genders were found for communication; girls scored higher than boys (Cohen's (1988) $d = .73$, which is substantial). The second largest effect showed the same pattern, with girls scoring higher than boys in self-efficacy (Cohen's $d = .38$). Regarding the differences between youngsters who have had sex and those that have not had sex, we found significant differences in four variables. However, the d measures indicated only a small or very small effect on these scales. (A detailed description of the d values for the variables with significant differences, $p < .05$, is given in Table 3).

The multivariate analysis of variance also showed some significant interaction effects between gender and sexual experience. The most substantial effect was in terms of self-efficacy scores where girls without prior experience had the highest mean score ($M = 3.54$), while boys who did report sexual experiences had the lowest mean ($M = 2.93$).

The second largest effect was for attitudes where females with sexual experience had significantly more positive attitudes toward condoms than males without sexual experience.

DISCUSSION

We examined the relationships between various psychological constructs that have been mentioned in the literature as playing a role in health behavior. Most studies in the field of safe sexual behavior have been conducted with adults or with sexually active adolescents. However, there is a lack of information about adolescents who are not sexually active. The focus of this exploratory study is on precursors of protective sex behavior.

In Mexico, as in other strict and traditional societies, it is difficult to acquire information about sexual behavior especially when it refers to premarital relationships. Hence, a questionnaire with an anonymous code of identification was used.

Table 3 *Significant ($p < .05$) Differences between Males and Females, and between Youngsters Reporting to Have Had Sex (Labeled: Sex) and Those Reporting Not to Have Had Sex (Labeled: No Sex) on the Scales*

Dependent variable	Gender	Sexual experience
Self-esteem	females < males (0.16)	
Self-efficacy	females > males (0.38)	
Decision making		
Subjective norms	females < males (0.08)	sex > no sex (0.28)
Attitudes	females > males (0.10)	sex > no sex (0.10)
Knowledge		sex > no sex (0.21)
Communication	females > males (0.73)	sex < no sex (0.02)
Intention	females > males (0.20)	
Behavior		

Only significant differences ($p < .05$) are mentioned. Between parentheses, the standardized difference between both groups is found as measured by Cohen's *d* (Cohen, 1988).

Most of the participating adolescents (84.7%) reported no prior sexual intercourse. Data showed that the percentage of adolescents who are having sex in high school is lower than the data reported in studies from some other countries. In the present study, 15.8% of the adolescents reported having had sex. A study conducted by Markham et al. (2000) in Texas with similar conditions (10th and 11th grades, mean age 16.3) showed that 43.4% of students reported ever having had sexual intercourse and 26.5% reported having had sexual intercourse in the last three months.

Two models were derived from the data by means of a path model. The first analysis included all respondents, with and without reported sexual experience. Partner communication and the intention to use condoms were outcome variables (actual safe-sex behavior could not be the final outcome in this model because the large majority of the sample had no sexual experience). The second model, based on the respondents who reported having sexual experience, had safe-sex behavior as final outcome. A largely similar structural equation model was found to fit the data in the group with and the group without sexual experience.

Three levels of variables were distinguished in the models. Apart from the outcome variables that formed the third level, there is a first level that included self-esteem, self-efficacy, and decision-making. Items in the first two scales do not refer to specific situations and can be best conceived of as individual disposition variables (resources). Of the three, self-efficacy was the only scale where the items referred to sexually-related content. The items of the remaining scales also had mostly sexuality-related content. We considered attitudes, norms about the use of condoms, and know-

ledge, which are all mutually related, as variables at an intermediate level. It is interesting that norms did not emerge as an exogenous variable that impacts all sexuality-related aspects. In our model, norms are influenced by attitudes and self-efficacy, thereby emphasizing that they refer to perceptions of the adolescents rather than to an externally imposed source (e.g., the norms from the Roman Catholic Church).

Our interpretation of the outcome variables is that in a group of adolescents who are not sexually active, open-partner communication and the intention to use condoms are proximal precursors that contribute to safe-sex practices.

Personal disposition variables were found to have direct effects on partner communication. In this exploratory model, self-esteem and decision-making were assessed as domain-independent constructs; the items in these scales did not refer directly to situations dealing with sexuality. Self-esteem and decision making turned out to be predictors of communication. Luthar (1991) found that variables involved with decision making as internal locus of control were involved in protective processes for communication and assertiveness. The finding that self-efficacy, although formulated with items pertaining directly to sexuality-oriented situations, emerged as a first-level variable in the models reflects the dispositional character of this concept. Self-efficacy showed significant direct effects on most of the variables in the analysis, including norms, attitudes, partner communication, intentions and safe-sex behavior. Most models of health behavior currently include an efficacy determinant (Bandura, 1997) and several authors have added this variable to the theory of reasoned action (Schwarzer, 1992; De Vries & Backbier, 1994). The results can best be interpreted as showing that self-efficacy can affect various phases of personal change and are consistently predictive. The relationship between self-efficacy, HIV-risk index, and condom use has also been demonstrated in repeated studies (Basen-Engquist & Parcel, 1992; Kasen, Vaughan, & Walter, 1992; Walter et al., 1992). Higher self-efficacy scores in using condoms and communicating about condom use to a partner were seen among the consistent users of condoms (Basen-Engquist et al., 1999). Personal perceptions (self-esteem, self-efficacy and perceived control/decision making) have been shown previously to promote health-related behavior, coping behaviors, and physiological and emotional responses to stressors (e.g. DeLongis et al., 1988; Hobfoll, 1985). In the present study we found that such variables can also be seen as precursors to future safe-sex behaviors. The relationship between self-efficacy and HIV prevention is characterized by the individual's confidence in his/her ability to identify and confront challenging situations, such as those that present themselves in high-risk sexual scenarios. As Bandura suggests, however, self-efficacy is not achieved through an 'act of will' (Bandura, 1997), but it requires the active development of self-regulatory skills.

The second level variables in the model, including attitudes and norms, can function as consequents of broader person dispositions, and as antecedents to actual

behavior, constraining or facilitating available alternatives. Attitudes emerged as the most central variable in the two models, influencing norms as well as outcome variables. These findings correspond to the Theory of Reasoned Action and its derivatives (Fishbein & Ajzen, 1975; Fishbein et al., 1995; Sheeran & Taylor, 1999).

Knowledge did not contribute directly to the outcomes. There was only a direct, and fairly substantial, effect on attitudes which in turn had a significant effect on norms and the intent to use condoms. One factor likely to have influenced correlations with other variables is the high proportion of respondents with at least a fair knowledge on crucial items. Such a ceiling effect limits the extent of correlations with other variables. Another factor may have been the use of a response scale asking for ratings of certainty, rather than for a true/false dichotomy; the expression of certainty can be a personality variable as well as a reflection of cognition. This interpretation is supported by the relationship between decision-making and knowledge. In short, the data do not allow us to conclude that knowledge does not matter. Knowledge is perhaps best seen as a necessary but insufficient condition for safe-sex behavior.

Taken as a whole, the findings suggest that effective adolescents' use of condoms is the outcome of a multi-faceted process that involves personal dispositions and critical skills. A differentiation of factors in models, as presented, should help guide the design of interventions that help prepare young adolescents to adequately handle their early sexual encounters.

Differences between subsamples

As mentioned before, we have no findings pointing to large differences in structural relationships between disposition variables and mediator variables for the subsamples reporting prior sexual experience and those reporting not yet have been sexually active.

We found statistically significant differences showing that respondents with sexual experience scored higher in knowledge, attitudes, subjective norms about the use of condoms and partner communication than the group without sexual experience. However, these differences implied only small effects according to Cohen's d measure. As to be expected, the subgroup of sexually active respondents was older (M = 16.7, SD = 1.5 years) than the subgroup without sexual experience (M = 15.1, SD = 9 months).

When analyzing the differences between the males and females who participated in this study, results showed that the largest effects (in terms of Cohen's d) were found in self-efficacy and in partner communication about condoms. This likely reflects cultural aspects that reinforce girls' ability to carry out necessary behavior and to control their motivations, actions, and the social environment, particularly in situations related to sexuality. On the other hand, males scored slightly higher than females in self-esteem, which is culturally reinforced in males from infancy. Males also scored slightly higher in norms about the use of condoms, perhaps because they

receive more messages from friends and family about what they should do to prevent pregnancies and sexually transmitted infections. Females who have never had sex showed higher levels of self-efficacy and decision-making. This suggests that adolescents who perceive themselves as capable of carrying out the necessary behavior and of controlling own motivations, actions, and social environment are at a lower risk to start sexual relations at an early age or to have unsafe sexual relations. Females who have never had sex perceived that they have the skills to cope with a risk situation (e.g., 'I can interrupt a sexual relation to wear a condom,' 'I consider myself able to tell my partner that I will only have sexual relations if we use a condom') and perceive events in their lives as being a consequence of their own actions, and therefore directed by their own decisions (internal control). In contrast, males who have had sex had the lowest scores on these variables. It is important to note that males are frequently encouraged by social norms to be brave, impulsive and to therefore expose themselves to risk situations in order to demonstrate power and control. Females need to be more conscious and are usually judged negatively and blamed for any impulsive actions.

Females who have had sex have more positive attitudes toward the use of condoms than males who have had sex. Having positive attitudes toward condoms reflects being in opposition to the traditional norms that assert that females should not have sex before marriage. This confirms results from previous Mexican studies (e.g., Pick, Andrade-Palos, Townsend & Givaudan, 1994) which reported that females who use contraceptives are less submissive than females than do not. Although knowledge did not have an important effect in the models, it is interesting to note that males and females who have had sex scored higher on this variable.

Males without sexual experience had the lowest score in attitudes and also a low score in knowledge. This confirms results from previous studies (Givaudan et al., 1994), showing that Mexican males are less informed than females. Females usually receive information from mothers and school teachers and are more exposed to sexual education because they need to know about menstruation. Mothers are more accustomed to talking to their daughters than to their sons because they expect that fathers will educate their sons. However, fathers do not talk to their sons and males often learn about sexual relations through such informal channels like friends, movies, and jokes. They are thus in a disadvantaged and risky situation when they start having sex. In general, males and females who have had sex also scored significantly higher than adolescents who have never had sex in norms about the use of condoms, attitudes to use them, knowledge regarding HIV prevention, and communication regarding safe-sex behavior than adolescents without experience.

Implications for interventions

Knowledge is an important ingredient in regulating behavior, but it is unlikely that increasing knowledge is a sufficient strategy to cause changes in behavior (DiClemente,

Forrest, & Mickler, 1990; Fisher & Fisher, 1992). The present study confirms that most young people have a fair amount of information about HIV/AIDS. At the same time, adolescents' further need for information was evident – especially in regard to popular myths claiming, for example, that mosquitoes are transmitters of HIV. Reducing the number of HIV/AIDS transmissions among adolescents is not only a matter of teaching safer sex guidelines, which should be fairly easy to achieve, but also of equipping these adolescents with skills that enable them to translate knowledge into practice.

The third level of variables in the models, intention to use condoms and communicating with one's partner about matters of sexuality, points to the importance of developing skills that appear to be proximal precursors to safe-sex practices. Communication and negotiation about the use of condoms is the core skill (Lock et al., 1996); because of their direct effect on safe-sex behavior, the precursor behaviors are an target of intervention.

These findings are in line with a strategy for health-oriented interventions formulated by Pick and colleagues (Pick, Poortinga & Givaudan, 2003), in which the importance of addressing such immediate antecedents to actual behavior is emphasized. The argument is that changes in actual behavior are best produced by providing skills, such as communication skills and knowledge that enable persons to handle new and problematic situations. The availability of knowledge about appropriate action forms the foundation for gradual changes in more general variables, such as self-esteem and self-efficacy, which in turn maintain and further strengthen competencies in handling demanding situations.

The relative late age for sexual debut in Mexican adolescents (compared to the USA) makes the implementation at high school level of preventive programs still meaningful, as this still takes place before the start of sexual intercourse. This is important in a society like Mexico in which the exposure to sexual education programs is often frowned upon, definitely for younger children.

From the modeling of relationships between relevant variables, three levels of variables emerged. The first level consisted of general person characteristics, especially self-esteem and decision-making, which were shown to have an influence on partner communication. Improving general self-esteem is a long process that ideally needs to be started at an early age. This is, to a great extent, out of reach for interventions that take place within the school curriculum. At the same time, it points to the need for broader social programs that promote social competencies (e.g., Pick, Givaudan, Troncoso, & Tenorio, 1999). The association between communication and self-esteem, particularly among children and adolescents, is well documented (Desselle, 1994; Enger, Howerton, & Cobbs, 1994; Friedman, 1989). This relationship is characterized by a positive correlation between strong two-way communication abilities and higher self-esteem (September, 2001).

At the second level of variables, the central position of attitudes in the models

deserves to be noted. Since norms and attitudes tend to be shared with significant others in the social context, they should probably not only be addressed in individual-level programs, but be targeted by complementary interventions that try to bring about changes through advocacy and dissemination at the group level (Pick et al., 2003).

The predictive nature of open sexual communication as an antecedent to safer sex behaviors and the fact that communication about sexuality tends to postpone the age of sexual debut has been well demonstrated in the literature on communication and sex in adolescents (Paiva, 1993; Thompson et al., 2001; Zamboni et al., 2000). Interventions strengthening such skills can be expected to have a direct effect on actual behavior. Intervention programs providing simulated experiences in exercising control over social situations, taking into account such cultural and group characteristics as age, gender and educational level, would serve to enhance the competence of trainees to deal with demanding situations. Programs emphasizing personal skills and communication skills, as well as building the intention to use condoms should ultimately have a significant impact on safe-sex behavior, and its most important societal consequence: preventing the spread of HIV in adolescents.

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Chapter 3

Early Effects of a School-Based Life Skills and HIV Prevention Program for High School Mexican Adolescents

ABSTRACT

An intervention of an AIDS-focused, school-based life skills and sexual educational program for adolescents was evaluated in Toluca, Mexico through a quasi-experimental pre-post design with 1566 matched cases split up in a control and an experimental group. A path model involving a) decision-making, self-esteem and self-efficacy as predictors, b) norms about, knowledge of and attitudes toward condom use as mediating and moderating variables, and c) partner communication and intentions to use condoms as outcome variables was tested in eight groups (males/females x experimental/control x with/without sexual experience). Results showed a good fit of the model. Significant increases in precursors of safe sex were found in the experimental group. As the number of participants reporting sexual activity turned out to be rather small, changes in actual practices (such as condom use) were difficult to detect.

INTRODUCTION

Mexico, as most of the countries in the world, is experiencing a growing HIV epidemic. While the prevalence is rather low (0.29%, UNAIDS/WHO, 2000), there is a rapid expansion throughout the whole country, particularly among young people; 72% of AIDS cases are diagnosed in men and women between the ages of 15-44. AIDS is now the third highest cause of death among people 25 to 40 years of age (Cruz, 2000). Acquisition of HIV/AIDS occurs in the majority of cases through sexual contact: in Mexico, the disease has been sexually transmitted in 92% of the male and 58% of the female patients. Of the cases where the source of HIV infection

has been identified, the percentage of Mexicans who are reported to have contracted the disease through heterosexual and/or homosexual contact is as high as 86% (Consejo Nacional para la Prevención y Control del SIDA [CONASIDA], 2001). Drug use represents less than 2% of identified sources of HIV infection (CONASIDA, 2001). Correct condom use is an obvious tool in controlling the epidemic.

Although enough information is available regarding sexual and reproductive health, the traditional and conservative standards of communication on sexuality prevalent in Mexican society and culture limit discussion, implementation, and transmission of educational materials thus serving as a significant impediment to prevention. Consequently, misunderstandings about HIV continue to exist and myths still encourage socially accepted practices that promote high-risk behavior. Módena and Mendoza (2001), exploring social and cultural patterns related to sexual and reproductive behavior, found that subjective norms play an important role in the persistence of risky sexual behavior. Their study indicated that many people conform to cultural norms regarding communication about sex, limiting communication from parents to children, from teachers to students, and even communication within couples. Children and adolescents are poorly informed on sexual education and misunderstandings about sex and sexuality are never clarified. Among the most significant 'beliefs' and practices regarding sexuality in Mexico are the following: talking about sexuality encourages and induces adolescents to initiate sexual activity; a woman who talks to her partner about sex may cause her partner to leave her; people will have a negative opinion of a woman who talks openly about sex and sexuality; talking about sexuality with one's parents is disrespectful; talking about sexuality with the partner is acceptable only when the man initiates the conversation; and a woman who takes the initiative to communicate about sexual relations is too interested in sexual pleasure (Amuchástegui, 1998). Hence for an intervention about sexual conduct to be efficient in Mexico, it is important to teach partner communication skills.

Gender issues and stereotypes limit decision-making power to practice safe sex, especially among women. A review of research on HIV/AIDS preventive behavior indicates that individuals are less likely to practice safe sex with close relationship partners (Misovich, Fisher, & Fisher, 1997). Although research on intimate relationships suggests that close partnerships are associated with improved physical and mental health (Feeney, Kelly, Gallois, Peterson, & Terry, 1999), a growing body of evidence reveals that HIV may be an exception to this rule: 'Feelings of security and trust, and the associated desire to maintain these feelings, produce and perpetuate elevated levels of AIDS risk behavior in couples and serve as a frequently overlooked source of risk of HIV infection' (Misovich et al., 1997 p. 77). The complexity of gender roles requires interventions at different levels. A discussion of gender stereotypes must therefore be included in sexuality education programs. Furthermore, programs should target potentially modifiable attitudes, beliefs, and norms that have been associated with condom use (Sheeran, Abraham, & Orbell, 1999).

The assumed direct relationship between knowledge of HIV prevention and preventive behavior underlies most of the first interventions regarding HIV prevention (Fisher & Fisher, 1992), and knowledge about HIV/AIDS and its relationship with condom use has been investigated in most of the studies on condom use (Di Clemente et al.,1991; Fishbein et al., 1995).

Models of decision-making and self-efficacy have been applied to understand health behavior (Ajzen & Fishbein, 1980; Bandura, 1977, 1986; Becker et al., 1977). These approaches show a series of overlapping variables that predict behavior, suggesting the need for their inclusion in intervention programs. The Theory of Reasoned Action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) is a widely used framework that allows a broad understanding of behavior, including condom use. According to this theory, intentions are determined by attitudes and subjective norms. Ajzen (1998) added perceived behavioral control as a predictor of both intentions and actions. As a result, the impact of intervention programs is expected to increase if, in addition, it focuses on attitudes, subjective norms, and self-efficacy with respect to sexual issues.

School-based programs for family planning education or HIV prevention have often been implemented and have been shown to increase students' knowledge and positive attitudes toward reproductive health and safe-sexual behavior (Newman, DuRant, Ashworth, & Gaillard, 1993; Siegel, Marilyn, Roghmann, & Maisha, 1998). With respect to the implementation of intervention programs, two modalities have been shown to be important. First, the teaching methods should be interactive to facilitate solid understanding of the information and development of skills (Kirby, 1997; Kirby & DiClemente, 1994). Second, sexual education programs should be given to adolescents before their sexual debut (Pick de Weiss, Andrade-Palos, Towsend, & Givaudan, 1994).

Data suggest that most Mexican adolescents and adults already have accurate information about HIV prevention: 91% of 15-49 year old men surveyed by the Ministry of Health in Mexico City were able to name at least two adequate ways of protection from HIV infection (UNAIDS, 1998). Although a general awareness of HIV and AIDS is considerable among youth in developing countries, more in depth knowledge of the major modes of transmission was limited; for example, one common misconception relates to the asymptomatic nature of HIV. Misperceptions appear to dissuade youth from using condoms, (Brown, Jejeebhoy, Shah, & Yout, 2001).

The present study has two objectives. The first is to examine to what extent an explanatory model dealing with antecedents of safe-sex behavior that was found to apply to the preprogram data, would still fit after the implementation of an intervention program. The second objective is to evaluate the effectiveness of an AIDS-focused, school-based educational program that attempts to reduce unsafe-sexual behavior among Mexican youth through development of skills and demystification of erroneous information. The evaluation of the program is based on an explanatory

model. As most of the participants could expect not to have sexual relations, indicators to assess the effectiveness of the program for both the explanatory model and the program evaluation are limited to variables that are considered as precursors of safe-sex behavior, such as partner communication and intentions to use condoms (Givaudan, Poortinga, & Van de Vijver, 2003).

METHOD

Materials

A new program, called *A team against AIDS* (Fernandez & Givaudan, 1999), was developed, based on a previous more general Mexican program called *Planeando tu vida [Planning your life]* (Pick et al., 1988) that has been evaluated with Mexican adolescents (Pick et al., 1994). *Planeando tu vida* has components tailored to develop life skills to enhance knowledge about sexuality and contraception, and to change perceptions of prescriptive norms in order to prevent unwanted pregnancies.

The curriculum of *A team against AIDS* includes the main topics of *Planeando tu vida,* plus an additional component that targets HIV prevention. It was developed as an alternative to a health education curriculum entitled *Sexuality and first aid* that has been part of the official high school curriculum of various Mexican states. *A team against AIDS* addresses topics that are not included in this standard program or are included with a different perspective. The main topics are: Sexuality (i.e., social aspects; myths and realities; gender equality); Values and subjective norms (i.e., personal values, respect to diversity); Sexual orientation (i.e., homosexuality, homophobia); HIV/AIDS (i.e., transmission, detection, people living with AIDS); Safe sex (i.e., strategies towards safe sex), and life skills (self-knowledge, critical thinking, assertion, negotiation, communication of feelings, and planning of activities to achieve goals).

Two versions of the training were developed: one for teachers and one for adolescents. The two courses are slightly different, although they include the same topics. The program for the teachers is ten hours longer. The program was designed to follow standardized and specific contents through participatory methodology. The emphasis in the training for both teachers and adolescents was on the development of psychosocial skills to bridge the gap between information and actual behavior.

Teacher's training

Seventeen teachers, who were to apply the curriculum in their classes, answered a pretest questionnaire. The questionnaire evaluated the following factors: self-confidence, self-efficacy, HIV/STD knowledge, and advantages and disadvantages of condom use. Teachers were trained by an experienced instructor to become sexuality educators and AIDS instructors in their schools. The training of teachers lasted one week (40 hours). Through participatory methodology teachers received information

and they participated in exercises that promoted the analysis of their own personal skills as sexual educators. They discussed how to deliver sex information to adolescents, and how to promote the development of life skills that are needed for the application of knowledge related to behaviors, such as self-efficacy, decision-making, partner communication, and negotiation. Teachers were also trained in how to address sensitive issues in class. Teachers were evaluated after the training in order to assess whether they had the necessary characteristics and skills (knowledge, attitudes, and interaction tools) to deal with their groups.

The mean age of the teachers was 39 years (range: 23-45), twelve being married and five being single; nine were psychologists, six physicians; one was a chemist and one a lawyer. Analyses of pre-post differences using *t* tests showed significant ($p < .05$) increases in self-confidence, self-efficacy in sexuality-related matters, knowledge about HIV-prevention, and in perception of the perceived advantages of using condoms and a significant decrease in the perceived disadvantages of using condoms (see Table 1). In written comments collected at the end of the training, many teachers expressed that the course was useful for both their personal and professional life. They expressed increases in feelings of self-worth related to their role of health educators and HIV preventive agents. With respect to self-confidence, teachers after completing the course reported that they felt more confident about making decisions related to their own sexual behavior and they reported speaking more openly with their partner about sexual matters. We interpreted these results as positive signs of the effect of the training of the teachers and as necessary antecedents of the potential effects of the program delivery to the students.

Table 1 *Mean Scores for Teachers on Pretest and Posttest Application (N = 17)*

Psychological variables	Range	Pretest	Posttest
Self-esteem	1-3	2.11	2.37*
Self-efficacy	1-3	1.07	2.29*
Knowledge about HIV/AIDS	1-2	1.14	1.30*
Advantages of using condoms	1-2	1.06	1.24*
Disadvantages of using condoms	1-2	1.39	1.02*

Note. $p < .05$ calculated with paired *t* test

Participant students

Participants in the pretest were 2064 tenth-grade students from four public high schools in Toluca, State of Mexico[1]. The initial sample was 49.5% male and 50.4%

1. The State of Mexico is located in Central Mexico. This state and the city of Toluca were selected as research site because (1) it is one of the urban and metropolitan areas, which are likely to be the center of the epidemic; (2) education authorities are committed to adapt and extend the educational program to all high schools in the state; and (3) administrative advantages (proximity to Mexico City) to control the homogeneous implementation of the intervention.

female. Mean age was 15.97 years (SD = 11 months). Two schools were assigned to the control group (N = 957) and two schools constituted the experimental group (N = 1107). For the immediate posttest we obtained 1877 questionnaires (871 for the control group and 1006 for the experimental group).

Students answered a questionnaire designed to allow for precise matching from one measure (pretest) to the next (posttest), while maintaining both the confidentiality and anonymity of the students. The basis for matching was a code that each student created from his or her name by changing the letters to '0s' and '1s' for vowels or consonants respectively. Although ideally this should lead to unique codes that could be matched from one measure to the next, the procedure had some difficulties. Reasons for the matching problems are varied but most were due to students either changing the order between parts of their name or the letter content, thus altering the code from one measure to the next. This may have occurred either because they were concerned about the confidentiality of their responses or because they simply made errors in the coding procedure. A more extensive matching procedure was developed and implemented in a computer program. The program takes into account a subject's name code as well as additional variables that may help in establishing a correspondence between questionnaires, including gender, month and year of birth, age, school, and class schedule. Furthermore, the method allows the user to adjust the probability of different types of errors in the name code and for assigning a different weight to the respective additional variables. Finally, the method includes a parameter indicating how stringent the procedure is in establishing a link. Matching questionnaires based on the computer procedure resulted in 1566 matched cases (experimental group: N = 892; control group: N = 674).

The socioeconomic and demographic characteristics of the experimental and control groups were similar (see Table 2 for demographics of pretest, posttest, and matched cases).

When we compared the demographic data from matched and unmatched cases we found that 11.6% of the unmatched subjects were repeating the course, hence they were older (M = 16.3) than the subjects that remained in the study. Most likely these subjects continue with a different curriculum than the rest of the students. We also lost more males than females in both groups, and 19.2% of the unmatched males reported to have had sex in contrast with 10.4% of the males for who there were matching records.

In Toluca, Mexico, the majority of the adolescents at this age are single; they belong to extensive families and live with their parents until they get married. Most of the families are Catholic, the rate of divorce is relatively low (7%), and maternity is highly valued, even at young age. Most of the students who attend government schools are classified in the low to medium socioeconomic level, where the average income per family is about 500 USD monthly.

Table 2 *Percentages of the Matching Cases for the Experimental and Control Groups and Nonmatching Cases in Pretest and Posttest*

Variable	Matching cases N= 1566		Non-matching cases
	Experimental (*N* = 892)	Control (*N* = 674)	(*N*= 498)
Gender			
Missing		.4	.6
Men	46.7	49.1	54.8
Women	53.3	50.4	44.6
Mean age (years)	15.8	16.0	16.3
Civil status			
Missing	.4	.4	.6
Single	98.7	97.9	97.2
Married or living together	.9	1.3	1.8
Widow	.3	.3	.4
Divorced			
Have a boyfriend or girlfriend			
Yes	30.8	33.1	36.6
No	69.2	66.5	63.4
Sexual experience by gender			
Females without	51.5	47.3	40.7
Females with	1.9	4.1	5.6
Males Without	37.6	36.3	34.4
Males With	9.0	11.8	19.2
Age at first intercourse (years)			
-14	2.0	2.7	3.8
14-17	7.0	10.0	16.0
18-		.3	.2
Repeating school semester	2.3	5.2	11.6

The school system is regulated by the Autonomous University of the State of Mexico (UAEM). Schools are similar with respect to curricula and organization, drop-out rates, rates of continuation to university, and average number of students per class. Little information on sexuality is provided by the schools in the biology courses, the topic of sexuality is covered without a standardized program and at the discretion of the teacher. Friends and mass media are usually the main source of information of sex-related topics for the students.

Design

To measure the impact of a life skills and sexuality curriculum on the students, this

study used a quasi-experimental pre-post design with an experimental and a control group. The present data are part of a longitudinal study with four repeated measures that ultimately should enable us to gauge lasting effects of the school-based intervention. In this chapter we report early effects through a comparison of the pre- and post intervention results.

Four of the five public schools that exist in Toluca, Mexico, were selected to participate in the study. One school was excluded from the analysis because it is larger in size and, being the first and largest high school in the state, has somewhat more resources than other schools. Four schools were subsequently matched by size and assigned randomly to either the experimental or the control condition.

The experimental schools received the enhanced HIV-prevention and sexuality education program *A team against AIDS*. Uncontrolled dissemination of the experimental treatment to the control group (i.e., members of the control group gaining knowledge about the intervention) is unlikely, because of the geographical distance between the schools that are widely dispersed around the city of Toluca. Control schools received a standard health education course (*Sexuality and first aid*[2]).

Implementation

The intervention consisted of two stages: (1) training of teachers and (2) training of the students through their teachers. Once the teachers' training for the experimental group was completed, they carried out the program *A team against AIDS* with their students. Before the first class all students in experimental and control schools signed a consent letter to participate in the study and filled out the pretest questionnaire manually. In the experimental schools, the curriculum for the students was completed in 30 hours during one school semester (15 sessions of two hours each). After the training, the students received a pamphlet with specific messages about HIV prevention to encourage them to talk about the topic with their friends. The control schools received the standard curriculum *Sexuality and first aid* at the same time as the experimental group. At the end of the semester all students filled out the posttest questionnaire.

Questionnaire

A closed questionnaire with 174 questions for students was developed. A participant

2. *The Sexuality and first aid* course is given in 30 hours. It includes topics such as: anatomy and physiology of the body, gender issues, sexuality and reproductive physiology, first aid, and prevention of accidents. It differs from the new one with respect to the amount of time dedicated to HIV prevention. It is based on lectures and readings, with little or no participation of the students. Doctors, nurses, dentists or social workers may teach the course. They are not necessarily trained, although some of them have taken the initiative to update themselves on new sexuality education approaches. The course is not standardized in contents, materials, methodology, implementation or evaluation.

identification code was used to maintain confidentiality and anonymity. The instrument included the following topics: demographic information, sexual experience, self-esteem, self-efficacy, decision-making, knowledge, attitudes toward use of condoms, subjective norms regarding use of condoms, partner communication, intentions concerning the use of condoms, perception of accessibility to obtain condoms (where to get them, how to use them, and confidence in dealing with them) and sexual behavior, including risky practices and safe-sex behaviors.

Self-esteem. This scale has 9 general items not related with sexual situations. Examples are 'I like myself' and 'I feel confident about myself'. The scaled response alternatives ranged from 1 (*almost never*) to 4 (*all the time*). Cronbach's a was .78 (Cronbach's alphas reported here were calculated for the second measure. Reliability for the pretest data was largely similar (Givaudan et al., 2002).

Decision-making. The scale has 7 general items not related with sexuality situations. An example of an item is 'I have control over what happens in my life'. Responses ranged from 1 (*almost never*) to 4 (*all the time*) ($\alpha = .81$).

Self-efficacy. This scale has 3 items about self-efficacy related to condom use. Examples are 'I can interrupt a sexual relation to wear a condom' and 'I consider myself able to tell my partner that I will only have sexual relations if we use a condom'. Response alternatives ranged from 1 (*disagree completely*) to 5 (*agree completely*) ($\alpha = .78$).

Norms about the use of condoms. It is a scale with 3 items related to subjective norms about the use of condoms. Examples of items are: 'My significant others think I should use condoms' and 'My family thinks that if I am to have sexual relations, I should use a condom'. Responses ranged from 1 (*disagree completely*) to 5 (*agree completely*) ($\alpha = .68$).

Attitudes toward the use of condoms. The scale has 10 items related to ideas about advantages and disadvantages of condom use. Examples are: 'It takes fun out of sex if you use a condom every single time' and 'People who use condoms sleep around'. Responses ranged from 1 (*disagree completely*) to 5 (*agree completely*) ($\alpha = .83$).

Knowledge. It is a scale with 19 items regarding information about safe-sex, modes of HIV transmission, and ways of preventing HIV transmission. Examples of items are 'A person can contract HIV by having a blood transfusion from an infected person' and 'The ELISA test is used to find out whether a person is infected with HIV/AIDS'. Responses ranged from 1 (*I am certain this is incorrect*) to 5 (*I am certain it is correct*) ($\alpha = .79$).

Partner communication. This scale has 11 items to explore behaviors that usually induce shame and could be an obstacle to communication and negotiation with the partner. Examples are 'I am ashamed to talk about HIV/AIDS with my partner' and 'Just to please my partner, I concede to everything'. Responses ranged from 1 (*almost never*) to 4 (*all the time*); $\alpha = .70$).

Intentions. This variable was assessed by the question: 'Which of the following

answers best describes your plans about the use of the condom for you and your partner during your next sexual encounter'. The item was scored on a scale ranging from 1 (*I am planning not to use a condom*) to 5 (*I am planning to use a condom*).

Behavior. This scale has 10 items that explore protective and risk sexual practices.

Examples are 'Sometimes I have had sexual relations with penetration and without protection' and 'I always use a condom.' The items had dichotomous answer alternatives and were scored as 1 (risky behaviors) or 2 (protective behaviors) ($\alpha = .80$).

Consistency of data

The quality of the data varied somewhat, depending on the kind of information requested from the students. Consistency tended to be high in the general responses; even of the three cases (out of 1566) who reported to be widowed in the pretest, two repeated this response in the posttest. However, the questions regarding actual behavior showed missing data and shifts in the answers even within the same administration. This made it necessary to countercheck the variables[3] in order to classify the respondents as sexually or not sexually experienced. This shows a clear difficulty in exploring sexual behavior of adolescents having new experiences that might bring them into conflict with themselves.

Statistical analyses

The statistical analyses are presented in two parts. The first part shows the analysis of an explanatory model of the relationship between the variables reported in previous analysis with the pretest data (Givaudan et al., 2002). In the second part, differences in mean scores on the psychological variables are tested. Two repeated measure analyses of variance (ANOVA) were carried out with the two time points (pretest-posttest) as within-subjects variable, while gender (male-female) and group (control-experimental) were the between-subjects variables. In the first ANOVA the dependent variables were: self-efficacy, self-esteem, decision-making, knowledge, attitudes, subjective norms; partner communication and intentions (N = 1566). In the second ANOVA the dependent variable reported was actual behavior and only the subjects with sexual experience (N = 158) were considered. Results of the eta square values (proportion of variance accounted for by the variable) are presented. In addition, Cohen's *d* was used to measure the size of the most important effects of the study considering the group, time and group x time interactions.

3. The question 'At what age did you have your first sexual relation?' was counterchecked with three other variables that had the option I haven't had sexual relations.

RESULTS

Explanatory Model

We conducted structural equation modeling using AMOS 4 (Arbuckle, 1999) to evaluate interrelationships between the variables. The analysis was based on a previous model obtained with 2011 of the 2064 subjects of the pretest (four records were excluded because of missing information on gender, and 49 cases had missing information on sexual experience). The groups were divided into four different subgroups, on the basis of previous sexual experience (yes/no) and gender. In the present analysis we added 1819 of the 1877 records of the second application (two records were excluded because of missing information on gender and 57 respondents insufficiently answered the questions on sexual experience). So the posttest had eight subgroups, based on splits on sexual experience (with/without), gender, and treatment (control/experimental). In addition, four pretest groups were formed, based on splits in gender and sexual experience. Pretest and posttest data were combined (N = 3,830), constituting a total of 12 subgroups (see Table 3).

The model has three levels of variables (see Figure 1). The first level refers to personal resources. These include perceptions of self-esteem, a person's beliefs that she or he can cope with sexuality-related risk situations (self-efficacy), and perceived ability to control important outcomes (decision-making). The second level of the model includes mediating and moderating variables; the constructs at this level reflect knowledge about HIV, attitudes toward condoms, and subjective norms about condom use. Communication and intentions to use condoms are the outcome variables of the model. Sexual behavior was not included as final outcome due to the fact that 83% of the participants reported not to have had sexual experience.

Table 3 *Cases Included in the Explanatory Model*

	Pretest		Post-test			
			Control Group		Experimental Group	
Sexual experience	No	Yes	No	Yes	No	Yes
Males	734	248	286	125	329	124
Females	958	71	382	44	490	39
Subtotal	1692	319	668	169	819	163
Subtotal	2011[a]		837		982	
			1819[b]			
Total	3,830					

[a] Four records were excluded because of missing information on gender, and 49 cases had missing information on sexual experience.

[b] Two records were excluded because of missing information on gender and 57 subjects did not answer the questions related with sexual experience.

Various statistics were examined to test the fit of the structural equation model (Carmines & McIver, 1981; Tabachnick & Fidell, 1996). We employed the ratio of chi-square to the degrees of freedom of the model which should not be larger than 3, the comparative fit index (CFI) which should be .90 or higher, an adjusted goodness of fit index (AGFI) which should be larger than .90, the Tucker-Lewis-Index (TLI) which should be larger than .90, and the root mean square error of approximation (RMSEA). The RMSEA was considered helpful as an additional tool to evaluate fit because it indicates the size of the residuals. Values less than .05 indicate a relatively good fit between the hypothesized model and the observed data (Hu & Bentler, 1999).

Parameters were constrained to be equal across the 12 groups, except for the relations between the exogenous variables (self-esteem, self-efficacy and decision-making) that were left free. The model showed an acceptable fit: $c^2(341; N = 3{,}830) = 958.98$, $p < .01$; $c^2/df = 2.81$; $CFI = .94$; $AGFI = .92$; $NNFI = .86$; $RMSEA = .02$. The model fitted here is remarkably stable, as it holds across the 12 subgroups distinguished (males/females, sex/no sex experienced, experimental/control, pretest/posttest).

Mean values of the correlations over the twelve different subgroups were calculated for the exogenous variables. The two general (i.e., not sexuality-related) scales of decision-making and self-esteem showed a strong relationship $r = .55$). Correlations between (sexuality specific) self-efficacy and the two general scales at the first level of Figure 1 were lower (between decision-making and self-efficacy $r = .27$, and between self-efficacy and self-esteem $r = .21$). Self-esteem had a positive influence on communication regarding use of condoms ($b = .29$, $p < .01$). Self-efficacy was the variable with the highest number of significant relationships to other variables in the model: to attitudes ($b = .25$, $p < .01$), subjective norms about the use of condoms ($b = .28$, $p < .01$), knowledge ($b = .09$, $p < .01$), communication ($b = .03$, $p < .01$), and to intentions ($b = .09$, $p < .01$). Self-esteem had a positive influence on communication regarding use of condoms ($b = .15$, $p < .01$). Three paths from decision-making were significant too: to knowledge ($b = .14$, $p < .01$), to attitudes toward condoms ($b = .11$, $p < .01$), and to communication ($b = .13$, $p < .01$). Attitudes toward the use of condoms had a positive effect on subjective norms ($b = .47$, $p < .01$) on intentions of use condoms ($b = .32$, $p < .01$) and on communication ($b = .14$, $p < .01$). The strongest influences in the model were from attitudes to subjective norms and from attitudes to intentions. A significant influence of subjective norms about the use of condoms on intentions was also found ($b = .16$, $p < .01$). Knowledge was positively related to attitudes ($b = .29$, $p < .01$).

As in the model obtained with pretest data, self-esteem, self-efficacy, and decision-making were considered as individual dispositions. The mediating and moderating variables were subjective norms about the use of condoms (37% of the variance explained), attitudes (24% of the variance explained), and knowledge (12% of the variance explained). Finally, the model explains 23% of the variance of partner com-

munication resulting from direct positive effects of self-esteem, self-efficacy, attitudes and decision-making. Intentions to use condoms (8% explained) resulted from direct positive effects of self-efficacy, attitudes, and subjective norms.

In summary, the same model was applicable in all the 12 subgroups. The model explains two outcomes: partner communication and intentions to use condoms. Self-esteem, self-efficacy, and decision-making were considered as individual resources. Self-efficacy, regarding sex related behaviors, occupied a central position in the model with positive influence on most of the variables: knowledge, attitudes toward condoms, subjective norms, intentions to use condoms and partner communication. Knowledge only had a significant effect on attitudes towards condoms, which in turn had the strongest effect of the model on subjective norms and on intentions to use condoms.

The intention to use condoms was also explained by the influence of subjective norms and self-efficacy. Finally, the variable partner communication was influenced by the individual resources (self-esteem, self-efficacy, and decision making) as well as by attitudes toward condoms.

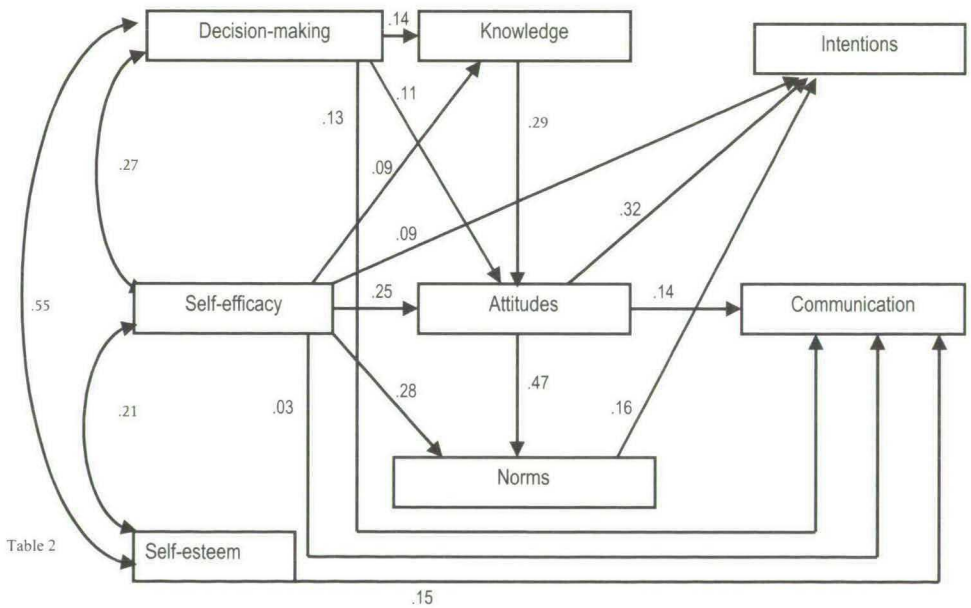

Figure 1. *Structural model for pretest and posttest data for male and female adolescents with and without sexual experience (N = 3,830) Arrows indicate significant effects (p < .01)*

Analyses of Variance

In a first ANOVA ($N = 1566$ matched cases) the dependent variables were: self-efficacy, self-esteem, decision-making, knowledge, attitudes, subjective norms; partner communication and intentions to use condoms. Results of the eta square values (proportion of variance accounted for by the variable) are presented in Table 4. Significant gender differences were found in five of the eight variables. Females scored higher than males on self-efficacy (the mean scores were 3.36 and 2.99 respectively); attitudes toward condoms ($M = 3.39$ and $M = 3.25$); partner communication ($M = 2.40$ and $M = 2.13$) and intentions to use condoms ($M = 3.98$ and $M = 3.19$). Males scored significantly higher than females only in self-esteem but the effect size was negligible; the mean scores were 2.22 and 2.14 respectively.

Some small time x gender effects were also found. Females scored higher ($M = 3.46$) than males ($M = 3.26$) in the posttest on attitudes toward condoms and males scored higher ($M = 3.33$) than females ($M = 3.27$) on subjective norms about the use of condoms.

Group, time, and time x group effects are taken together as they are related to the treatment. We found group-effects in all variables except decision making. Time-effects (with rather small effect sizes) were found for self-esteem, attitudes toward condoms and partner communication. Only for knowledge there was a substantial effect ($M = 3.06$ on the pretest and $M = 3.49$ on the posttest).

Finally, time x group effects showed that the experimental group improved significantly in all variables after the intervention. The strongest effects of time x group were observed on knowledge (.141) and attitudes (.049).

Table 4 *Effect Sizes (eta squared) of the Multivariate Analysis of Variance with Time, Gender and Group as Independent Variables and Psychological Scales as Dependent Variables (N=1566)*

	Between	Within					
	Gender	Group	Gender* group	Time	Time* gender	Time* Group	Time* gender Group
Self-esteem	.009**	.003*	.000	.009**	.001	.005*	.002
Self-efficacy	.063**	.014**	.000	.001	.001	.005*	.000
Decision-making	.000	.007	.001	.000	.000	.017**	.001
Knowledge	.000	.079**	.001	.148**	.004	.141**	.000
Attitudes	.026**	.051**	.001	.015**	.010**	.049**	.001
Norms	.002	.024**	.000	.000	.005*	.031**	.000
Communication	.177**	.004*	.000	.012**	.001	.007*	.000
Intentions	.005*	.020**	.001	.001	.001	.037**	.001
Behavior[a]	.021	.023	.008	.000	.000	.010	.007

[a]Participants with sexual experience only ($N = 158$). * $p < .05$. ** $p < .01$.

In order to assess the effect size of the treatment Cohen's *d* was calculated for all variables in the experimental and the control groups (see Table 5). The analysis confirmed that the mayor effects were associated with the mediating or moderating variables. Knowledge increased clearly in the experimental group, from 3.06 to 3.47 (Cohen's $d = .99$), attitudes toward the use of condoms increased from 3.32 to 3.53 (Cohen's $d = .56$) and subjective norms with respect to the use of condoms changed from 3.32 to 3.46 (Cohen's $d = .20$). No increases were observed in the control group.

Smaller effects were found in the personal resources variables. In the experimental group, self-esteem increased significantly from 2.17 to 2.24 (Cohen's $d = .15$); self-efficacy increased from 3.26 to 3.30 (Cohen's $d = .04$) and decision making increased from 2.28 to 2.35 (Cohen's $d = .14$). Again, scores in control group did not show corresponding increases.

With respect to the variables situated in the third level of the model, which are considered as outcomes, students in the intervention group had small but significant gains on both partner communication, which increased from 2.26 to 2.34 (Cohen's $d = .22$) and on intentions to use condoms, which rose from 4.05 to 4.19 (Cohen's $d = .20$). The scores in the control group remained at the same level at pretest and posttest.

In a second ANOVA the dependent variable was reported actual behavior and only matching pairs of protocols of participants with sexual experience ($N = 158$) were included. This analysis was carried out with 15 females and 63 males from the experimental group and 20 females and 60 males from the control group who provided consistent answers and were considered as valid cases. No significant effects were found (see the last row of Table 4 and Table 5).

A final issue involved the comparison of the number of participants with and without sexual experience in the experimental and control groups. Twelve females from the experimental group and 25 males who had not reported vaginal sexual relations in the pretest reported being sexually active in the posttest, as did 12 females and 24 males from the control group. So, the proportions of participants with a sexual debut since the beginning of the experiment were largely similar for the experimental and control group. Our data do not provide any support for the popular belief that that more attention to matters of sexuality leads to promiscuous behavior.

The questionnaire contained an item about actual condom use. Ten of 37 participants in the experimental group reported that they had used a condom the last time that they had sexual relations, compared to 11 of 38 participants in the control group. These results, reflecting behavior during the course of the program, are limited by the number of valid cases for this variable and are by sexuality no means conclusive. Although the sample size is small and results are inconclusive, it is remarkable that the differences of the experimental and control groups are not larger. Follow-up data are needed to fully evaluate the impact of the training program.

Table 5 *Estimated Means and Effect Size (Cohen's d) for Control and Experimental Group at Pretest and Posttest*

Scale	Time	Group			
		Experimental	Cohen's *d*	Control	Cohen's *d*
Self-esteem	Pre	2.17		2.16	
	Post	2.24	.15	2.17	.02
Self-efficacy	Pre	3.26		3.16	
	Post	3.33	.04	3.06	-.10
Decision-making	Pre	2.28		2.27	
	Post	2.35	.14	2.20	-.14
Knowledge	Pre	3.06		3.05	
	Post	3.47	.99	3.06	.00
Attitudes	Pre	3.32		3.25	
	Post	3.53	.56	3.19	-.10
Norms	Pre	3.32		3.29	
	Post	3.46	.20	3.14	-.20
Communication	Pre	2.26		2.25	
	Post	2.34	.22	2.26	.03
Intentions	Pre	4.05		4.02	
	Post	4.19	.22	3.98	-.02
	Pre	.39		.38	
Behavior	Post	.49	.04	.40	.02

[a]Participants with sexual experience only ($N = 158$).

DISCUSSION

The study examined to what extent an explanatory model dealing with antecedents of safe-sex behavior that was found to apply to the preprogram data, was still valid at the conclusion of the implementation of an intervention program. Results showed the stability of an explanatory model for antecedents of safe-sex behavior. Data from the pretest and posttest were split according to gender, sexual experience, treatment group (experimental and control) and time of measurement (pretest-posttest). The model showed a good fit, when paramaters were constrained to have the same values in all groups. The model explains two outcomes: partner communication and intentions to use condoms. This is as far as assessment can reach with participants who mostly are not yet sexually active.

Self-esteem, self-efficacy, and decision-making were included as individual resources. It is remarkable that self-esteem has a demonstrable influence on communication, but not on any other variable in the model. Its role seems to be overshadowed by self-efficacy. The latter, referring here specifically to sex-related behavior, occupied a central position in the model. This variable had a significant effect on most of the variables included in the model, more specifically on attitudes toward condoms, knowledge, intentions, subjective norms, and partner communication. Therefore, it appears to act on different variables that can be seen as determinants of actual behavior. The combination of direct and indirect effects of self-efficacy on psychological

outcome variables is in line with Bandura (1998) who describes that self-efficacy may regulate motivations, thought process, affective states, and actions of changing environmental conditions. As an antecedent variable in the model the significance of decision making holds a middle-position between self-esteem and self-efficacy, with pathways to knowledge, communication, and attitudes.

Mediating and moderating variables were subjective norms about the use of condoms, attitudes toward condoms, and knowledge. The strongest paths in the model were from attitudes to subjective norms and to intentions. The integration of these variables with the observations regarding self-efficacy is in line with Fishbein's explanation (2000) arguing that attitudes, perceived norms, and self-efficacy are the three primary determinants of intentions and subsequently of behavior.

Partner communication and intentions to use condoms were considered as outcome level variables; we could not rely on actual condom use as the main outcome indicator as 83% of the participants reported no prior sexual experience. We are inclined to see partner communication as a key variable in prevention strategies with adolescents, especially when most of the population is not sexually active and when safe-sex behavior cannot be studied as the final outcome variable. So far the results are compatible with this expectation, although the final proof will have to be provided by assessments of future behavior. It is notable that communication is affected by each of three personal resource variables (decision-making, self-efficacy, and self-esteem) and by attitudes. Our findings agree with Cline, Freeman, and Johnson (1990) who found that adolescents who had a positive attitude toward protective practices, were more likely than others to talk openly with their partner about AIDS prevention. On the other hand, intentions are only influenced by one resource variable, self-efficacy, as well as by attitudes and norms (see Figure 1).

Finally, the lack of a pathway between communication with the partner about sexuality, which clearly involves self-esteem and social skills, and the intention to use condoms, which refers here more to a personal decision whether or not to use a condom, suggests that these two outcome variables have a somewhat different psychological background and require the development of different skills. For future intervention programs this can be relevant information.

Evaluation of the Effectiveness of the Intervention

In the Analyses of Variance significant differences for gender were found; girls scored higher than boys on self-efficacy, attitudes toward condoms, partner communication and intentions to use condoms, whereas males only scored higher than females in self-esteem. Other authors have mentioned that males have a higher self-concept and self-esteem than girls (Amezcua & Pichardo, 2000; Wilgenbusch & Merrell, 1999). This difference is attributed to gender stereotypes (Crain, 1996). Females in general were reported by the teachers to be more cooperative than males during the intervention. This finding is consistent with other authors (Agha, 2002;

Kirby & DiClemente, 1994) indicating that most sexual education interventions better address women than men, or that women are more receptive to such interventions.

Of direct interest for the effects of the intervention program are time x group effects which showed that the experimental group improved significantly on all variables after the intervention. The strongest effects were observed for knowledge and attitudes (See Table 4). Cohen's *d* confirmed that the major effects of the intervention corresponded to the mediating or moderating variables. Although data suggest that most Mexican adolescents already have accurate information about HIV prevention (UNAIDS, 1998), the intervention had a clear and strong effect on knowledge. The specific information included in the program *A team against AIDS* apparently had an impact on the experimental group, suggesting the need to clarify myths as a first step of intervention with both teachers and students. It is relevant to mention here that teachers also had increased significantly in knowledge after the training.

Some studies report that knowledge about HIV is a relatively poor predictor of safe-sex behavior (Fisher & Fisher, 1992) and suggest that other factors, like attachment style and emotional control play an important role in determining whether knowledge about AIDS is translated into safe practices (Feeney, 1995). In the present study significant although modest effects, were found in the personal resources variables of self-esteem, self-efficacy and decision making. The significant differences on these variables compared with the absence of positive changes in the control group can be interpreted as a positive effect of the intervention.

Students in the intervention group scored significantly higher on both partner communication and on intentions to use condoms, which in this intervention were considered as final outcomes. Combined with the directions of the pathways in the model, these results suggest that initial and easier changes in this type of intervention occur at the cognitive level, in knowledge and attitudes. This would imply that it may require a longer process of intervention to obtain major effects on other relevant variables as relevant skills and personal resources. It has been argued that safe-sex practices involve a sequence of behavior in which knowledge must be followed by the learning of skills to resist peer pressure and to communicate and negotiate the use of condoms in sexual encounters (Feeney et al., 1999). We consider that the increase at both cognitive level and skills allow adolescents to apply knowledge in practice, as was mentioned above. In this sense the evaluation of the intervention can only be positive especially for the adolescents who have not been involved in sexual relations having a significant effect on the precursor variables of safe-sex behavior.

Data from the unmatched cases showed that the adolescents who did not answer the second questionnaire were slightly older and more sexually experienced. Some of these subjects were repeating the 10th semester or had irregularities in their

curriculum, suggesting that they were atypical of the population in the intervention. Another limitation of the study was the difficulty to get consistent information regarding sexual experience. This demonstrates the problem of attaining accurate, yet confidential, responses from adolescents, especially those outside of the intervention program. This also focuses attention on the answers in the experimental group that may be influenced by social desirability. Nevertheless, we believe that the generally positive consistency checks show unambiguously that it is worthwhile to follow up the participants to gain information on their future sexuality behavior.

Further follow-up studies, for both matching and non-matching cases, would allow us to look at greater number of adolescents who become newly sexual. Many studies recommend early prevention programs in the field of sexual education. However, it is extremely difficult to assess the final outcomes and to demonstrate the benefits of early interventions. Further research including long term follow up and the possibilities of maintenance programs beyond an initial intervention program is necessary.

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Chapter 4

Longitudinal Study of a School-Based Program for HIV/AIDS Prevention for Mexican Adolescents

ABSTRACT

A quasi-experimental study with four measurement occasions is reported to evaluate an intervention delivered by trained teachers to Mexican high school students in order to promote precursors of safer sex behavior. The study was based on an explanatory model derived from theories of reasoned action and social learning, aiming at understanding the relationships between the variables included in the intervention: individual resources (self-esteem, self-efficacy and decision-making); mediator and moderator variables (knowledge, attitudes toward condoms and norms about condoms) and outcomes (partner communication, intentions to use condoms). The results demonstrate a positive impact (over one year of follow-up) in all variables. The effect on actual behavior was not significant, a finding presumably related to the small proportion of students who reported to be sexually active.

INTRODUCTION

The risk behavior of today's adolescents shapes the course of the AIDS pandemic in the future. In developing countries like Mexico, recent data indicate that up to 60% of all new HIV infections are among 15-24 year olds. Moreover, teenagers and young adults between the ages of 15 and 24 have the highest incidence of STDs of all age groups (Unidad de Investigación, Enseñanza y Comunicación en Salud Reproductiva. Facultad de Medicina, UNAM, 2002). Clearly, adolescents are a key target group for behavior change interventions aimed at adopting safe behaviors. Adolescents in countries with a high prevalence of HIV/AIDS are often knowledgeable about AIDS, its causes and means of prevention, but there is little evidence that youth change their behavior based on this knowledge in order to protect themselves. Furthermore,

past research in developing countries shows that youngsters even may lack basic knowledge about HIV/AIDS. School programs provide an obvious approach to prevention; in this way, one can reach large numbers of young people at a relatively low cost. It has been shown that school programs have increased knowledge about HIV/AIDS and have led to more positive attitudes toward safe sex behaviors (e.g., Cáceres, Rosasco, Mandel, & Hearst, 1994; Dolan, Ramirez, Strouse, Hedges, & Sogolow, 2002; Pick de Weiss, Atkin, Gribble, & Andrade-Palos, 1991). However, the impact of school-based interventions on actual behavior of youth in developing countries has been poorly documented. The current manuscript describes the effects of a school-based intervention study among adolescents in Mexico.

The scientific literature on HIV/STD prevention presents evidence that there are several factors that affect and predict high-risk behavior in sexually active adolescents (Basen-Engquist, et al., 1999). These protective factors include communication, self-esteem, self-efficacy, decision-making, knowledge about sexuality and HIV/AIDS, and social norms (Bandura 1997; Feeney, Kelly, Gallois, Peterson, & Terry, 1999; Fishbein & Ajzen, 1975). There is a pressing need to examine whether addressing protective factors among adolescents before their sexual debut is an appropriate and effective strategy for early HIV/STD prevention. Recent reviews of school-based programs indicate that youth need accurate knowledge on topics such as sexual relations as well as sexually transmitted diseases, but that they also need to be taught life skills such as assertive communication, self-knowledge, mutual respect, and commitment (Grunseit, 1997). Other studies conclude that programs need to provide AIDS and sexual health education to young people before they initiate sexual activity (Pick de Weiss, Andrade-Palos, Townsend, & Givaudan, 1994). Yet, in many educational systems, sexuality education is not part of the curriculum. Strategies and programs that promote AIDS prevention in this vulnerable population are needed.

Siegel, Aten, and Enaharo (2001) have pointed to the need for longer periods of follow-up to gain insight in the stability of short-term effects of preventive interventions. However, the studies they reviewed have been carried out with sexually experienced young adults and, to the best of our knowledge, no long-term effects of such interventions among adolescents prior to sexual experience have been reported.

Most projects consist of short-term interventions without follow-up, in part because both international donor organizations and national government authorities press for quick results and do not have funds earmarked for long-term maintenance and follow-up efforts. While short-term interventions that promote safer sex may indeed increase knowledge, improve attitudes, and in some cases change behaviors in the months following the training program or course, it remains to be seen whether a short-term classroom intervention is sufficient to maintain safer sex behavior changes and prevent a return to risky behavior over time (DiClemente & Wingood, 1995; Jemmot, 1996; National Institute of Mental Health, 1998). Social pressure from peers or life changes that are common among adolescents could be factors that

contribute to the reintroduction of risky behavior in adolescents. At the same time, these life changes could also provide an opportunity for renegotiating or reestablishing safer sex norms, when adolescents have acquired the necessary skills to do so. Without adequate evaluation designs and specific analyses it is difficult to distinguish between effects of an intervention and other life changes of adolescents.

The earlier phases of the project including the theoretical rationale and baseline and posttest data of this study have been described by Givaudan, Poortinga, and Van de Vijver (2003) and Givaudan, Van de Vijver, Poortinga, Leenen, and Pick (2003). The theoretical basis of the study was derived from the theory of reasoned action (Fishbein, 1998, 2000) and social learning theory (Bandura, 1987, 1998). A curriculum, called *A team against AIDS*, was especially developed for this study. The program was implemented through personnel especially trained in administering it using participatory and interactive methods. The program was tailored to promote life skills, enhance knowledge, and change attitudes and norms in order to promote precursors of safer sex behavior in adolescents. Research in Mexico has shown that the climate in the family as well as in the school system is toward passivity and obedience of the child (Andrade-Palos, 1998; Díaz Guerrero, 1994; Gonzalez-Forteza, 1996). For this reason, the training program emphasized decision-making skills and individual responsibility; attempts were made to overcome the culturally prevalent shame and embarrassment among young adults of asking a partner to use a condom. The intervention program also took into account differences between boys and girls that are interesting as part of the 'machismo' tradition (Díaz Guerrero, 1994). For example, male adolescents hold the belief that men should take the initiative in sexual relations and contraceptive matters; women perceive rejection from their partner and from society if they attempt to take the initiative. In addition, it has been found in Mexico, as in other countries that most adolescents believe that the most serious risk associated with sex is an unwanted pregnancy, not contracting HIV (Sheeran, Abraham, & Orbell, 1999).

Givaudan, Poortinga et al. (2003) and Givaudan, Van de Vijver et al. (2003) studied partner communication and intentions to use condoms as the two main outcomes. A good fit was found for a path model with self-esteem, self-efficacy, and decision-making as (exogenous) individual resources. Self-efficacy regarding sex-related behaviors was the most salient variable of the model with positive influence on various other variables: knowledge, attitudes toward condoms, subjective norms, and intentions to use condoms and partner communication. Knowledge had a significant effect only on attitudes toward condoms, which in turn had strong effects on subjective norms and on intentions to use condoms. The intention to use condoms could also be explained in part by the influence of subjective norms and self-efficacy. Finally, partner communication was influenced by the individual resources (self-esteem, self-efficacy, and decision-making) as well as by attitudes toward condoms. The purpose of the present article is to report longer-term effects of this

HIV/AIDS prevention program. The current study set out to evaluate longer-term effects of a school-based program that (1) trains and supports school teachers in participatory methodology to implement the program, (2) is implemented at an early age before most of the students are sexually active, and (3) is evaluated on four occasions to explore the effect of the intervention up to one year after its conclusion. The design of the study was geared to the questions of (1) whether, and to what extent, there are differences between the control and experimental groups in the variables included in the program by the end of the intervention, (2) whether and to what extent, there is a decrease between the posttest and follow-up measures administered 6 and 12 months later, and (3) which adolescents (boys or girls/with or without sexual experience) received most benefits of the intervention.

METHOD

Participants

Participating schools. Four of the five public schools that exist in Toluca, Mexico, were invited to participate in the study; one school was excluded from the study because it is larger in size and, being the first and largest high school in the state, has somewhat more resources than the four remaining schools. The four participating schools were divided in two pairs based on similarity in size. Within each pair, one school was assigned by random to the control group and one to the experimental group. The Autonomous University of the State of Mexico (UAEM) regulates the school system and schools are similar with respect to curricula and organization, dropout rates, rates of students continuing to university, and average number of students per class. Uncontrolled dissemination of the experimental treatment to the control group (i.e., members of the control group gaining knowledge about the intervention) was unlikely, because of the geographical distance between the schools that are widely dispersed around the city of Toluca.

Students. All students beginning the tenth grade in the four schools were invited to participate in the study, including participation in the course for the experimental schools and responding to repeated administration of a questionnaire (for all the four schools). Students answered the same questionnaire on four occasions with the following distribution: pretest = 2064; posttest = 1877; follow-up after six-months = 1696 and follow-up after 12 months = 1793. Thus, the total number of protocols was 7430. The initial sample was 49.5% male and 50.4% female. Mean age was 15.97 years (*SD* = 11 months). In Toluca, Mexico, the majority of the adolescents at this age are single; they belong to extensive families and live with their parents until they get married. Most of the families are Catholic. Most of the students who attend government schools are classified in the low to medium socioeconomic level, where the average income per family is about 500 USD monthly. The general socioeconomic and demographic characteristics of the experimental and control groups were similar.

Measures

Drawing from experience and complemented with additional information provided by indicators included in The Handbook for Evaluating HIV Education (CDC, 2000), we developed a self-report questionnaire with 174 items. The instrument included the following topics: demographic information, sexual experience, self-esteem, self-efficacy, decision-making, knowledge, attitudes toward use of condoms, subjective norms regarding use of condoms, partner communication, intentions concerning the use of condoms, perception of accessibility to obtain condoms (where to get them, how to use them, and confidence in dealing with them) and sexual behavior, including risky practices and safe-sex behaviors.

Self-esteem. This scale has nine general items not related with sexual situations. Examples are 'I like myself' and 'I feel confident about myself'. The response alternatives ranged from 1 (*almost never*) to 4 (*all the time*). Cronbach's a was .78 (values reported here were calculated across all applications).

Decision-making. The scale has seven general items not related with sexuality situations. An example of an item is 'I have control over what happens in my life'. Response alternatives ranged from 1 (*almost never*) to 4 (*all the time*) ($\alpha = .81$).

Self-efficacy. This scale has three items about self-efficacy related to condom use. Examples are 'I can interrupt a sexual relation to wear a condom' and 'I consider myself able to tell my partner that I will only have sexual relations if we use a condom'. Response alternatives ranged from 1 (*disagree completely*) to 5 (*agree completely*) ($\alpha = .78$).

Norms about the use of condoms. It is a scale with three items related to subjective norms about the use of condoms. Examples of items are: 'My significant others think I should use condoms' and 'My family thinks that if I am to have sexual relations, I should use a condom'. The response scale ranged from 1 (*disagree completely*) to 5 (*agree completely*) ($\alpha = .68$).

Attitudes toward the use of condoms. The scale has 10 items related to ideas about advantages and disadvantages of condom use. Examples are: 'It takes fun out of sex if you use a condom every single time' and 'People who use condoms sleep around'. The response scale ranged from 1 (*disagree completely*) to 5 (*agree completely*) ($\alpha = .82$).

Knowledge. This is a scale with 19 items regarding information about safe-sex, modes of HIV transmission, and ways of preventing HIV transmission. Examples of items are 'A person can contract HIV by having a blood transfusion from an infected person' and 'The ELISA test is used to find out whether a person is infected with HIV/AIDS'. Responses ranged from 1 (*I am certain this is incorrect*) to 5 (*I am certain it is correct*) ($\alpha = .78$).

Partner communication. This scale has 11 items to explore behaviors that usually induce shame and could be an obstacle to communication and negotiation with the partner. Examples are 'I am ashamed to talk about HIV/AIDS with my partner' and 'Just to please my partner, I concede to everything'. Responses ranged from 1 (*almost never*) to 4 (*all the time*) ($\alpha = .69$).

Intentions. This variable was assessed by the question: 'Which of the following answers best describes your plans about the use of the condom for you and your partner during your next sexual encounter'. The item was scored on a scale ranging from 1 (*I am planning not to use a condom*) to 5 (*I am planning to use a condom*).

Behavior. This scale has 10 items that explore protective and risk sexual practices (which were only analyzed for the sub-sample of adolescents reported to have been sexually active at the beginning of the study). Examples are 'Sometimes I have had sexual relations with penetration and without protection' and 'I always use a condom.' The items had dichotomous answer alternatives and were scored as 1 (risky behaviors) or 2 (protective behaviors) ($\alpha = .78$).

PROCEDURE

Code to match questionnaires

The questionnaire was designed to allow for precise matching from one measure (pretest) to the next (posttest and two times follow-up), while maintaining both the confidentiality and anonymity of the students. The basis for matching was a code that each student created from his or her own name (first name, father's last name and mother's last name) by changing the letters to '0s' and '1s' for vowels and consonants, respectively.

Design

To measure the impact of a life skills and sexuality curriculum on the students, this study used a quasi-experimental pre-post design with an experimental and a control group. It is a longitudinal study, with four measurement occasions, that enable us to explore longer effects of a school-based intervention.

Intervention

The intervention consisted of two stages: (1) training of teachers and (2) training of the students through their teachers. The program *A Team against AIDS* (Fernandez & Givaudan, 1999) was developed specifically for the intervention, based on a previous program *Planeando tu vida* (Pick de Weiss et al., 2000).The training of teachers includes two manuals: *Planeando tu Vida* (Pick de Weiss et al.) and *A team against AIDS* (Fernandez & Givaudan). The teacher's training was given in 40 hours, whereas the student's training lasted 30 hours during one school semester (15 sessions of two hours each). After the training, the students received a pamphlet with specific messages about HIV prevention to encourage them to talk about the topic with their friends.

The experimental program consisted of a comprehensive AIDS and sexual health education curriculum including activities that allow students to practice the skills they learn. The program gives accurate information about HIV prevention, uses

active learning methods, such as small group discussions, and emphasizes skill modeling and practice through role-playing.

Teacher training. Seventeen high school teachers (13 women and 4 men) from the experimental schools were trained by an experienced instructor with the program *A team against AIDS* to become sexuality educators in their schools. In the training, the teachers learned how to conduct an interactive AIDS-focused sexuality education program based on the development of life skills. Teachers also learn how to address sensitive issues in class discussions. Both versions of the program (for teachers and for adolescents) place an emphasis on dynamic group exercises to strengthen life skills (decision-making, partner communication, and self-efficacy), knowledge about accessibility to condoms and HIV/AIDS prevention, attitudes, norms and intentions toward preventive behavior. The teacher training was positively evaluated (Givaudan, Poortinga et al., 2003).

Control group intervention. A traditional sexuality education course *Sexuality and First AID* is usually taught in the second semester of the first high school year, or tenth grade. It consists of a two-hour course during each of 15-16 weeks. The topics included are anatomy and physiology of the body, gender issues, sexuality, reproductive physiology and first aid. The instructional methodology is based on lectures, readings and informational material and usually is not participatory. Instructors are teachers who happen to be physicians, nurses, dentists or social workers may also teach the course. Sexuality education instructors are not necessarily trained, although several teachers have actively updated themselves on new sexuality education approaches. Courses are often not evaluated.

Program implementation and questionnaire administration.
Once the teachers in the experimental group were trained, experimental and control students received their respective curriculum. All students signed an informed consent letter and the questionnaire was applied to the students to obtain a baseline measure, in both the intervention and comparison schools. The experimental schools received the enhanced HIV-prevention and sexuality education program *A team against AIDS*, and the control schools received the standard health education course (*Sexuality and First Aid*). Both curricula, enhanced and traditional, were completed in one school semester. A questionnaire was applied in both groups by the end of the semester (posttest). The third measurement was taken six months after completing the intervention; and the fourth measure was carried out one year after completion of the intervention.

Statistical Analysis

We considered that given the characteristics of the present design, the most pertinent way of analyzing the data is using a multilevel model (Goldstein, 1995); also known under the names of random coefficient model (Longford, 1993), hierarchal linear

model (Bryk & Raundenbush, 1992), and mixed (effects) model (Littell, Millken, Stroup, & Wolfinger, 1996). The data of this study show a hierarchal structure with three levels, where (up to four) measurements are nested within individuals and individuals are nested within schools. Advantages of the multilevel approach over traditional methods, like linear regression models or (multivariate) analyses of variance, have been amply documented and have included the correct estimation of the standard error of the fixed regression coefficients and the use of all available data, even though one or more data points in the repeated measure design may be missing.

We aimed at finding an identical specification of the multilevel model for each of the measures mentioned above. The model specification being identical means that the same fixed and random effects are included at all levels for each of the dependent variables. In line with the three main objectives of the study, we initially considered the following independent variables: gender, sexual experience at each of the four moments, experimental status, and measurement occasion (and, possibly, interactions between them). As explained below, the model has parameters for an adolescent's starting value, the change between pretest and posttest, and for the change in the follow-up period. As a starting point of our analyses; we specified a general three-level model which explains each of these parameters by (1) a number of fixed effects, namely all main and interaction effects between gender, sexual experience and experimental status and (2) a number of random effects to account for differences between both individuals and schools. Since many of the effects in this initial model turned out to be nonsignificant, we reduced the model retaining only those effects that made a significant contribution to at least one of the dependent variables. This is the final model that is presented in more detail and for which the results are given in the next section.

First, it is important to note that the final model has only two levels: adolescents and measurement occasions nested within adolescents. Note that the multilevel model elegantly deals with missing data of adolescents who did not participate in one or more measurement occasions. Application of the more general three-level model showed nonsignificant small variances for the random effects associated with the schools (in all the dependent variables), and hence, these parameters and the school level can be safely omitted. However, one should be aware that this most probably is a consequence of the fact that the design only counts with two experimental and two control schools. As a result, from a theoretical point of view, a statistical analysis of these data cannot distinguish whether the changes between pretest and posttest (or changes during the follow-up period) are due to effects of the program or to differences between experimental and control schools unrelated to the program. However, since schools were selected because they had similar properties and no initial differences between them were found, it is unlikely that any subsequent changes have to do with differences among schools.

We now proceed with a detailed presentation of the model. In this model, Y refers

to a score variable at one of the measurement occasions. At the first level, we model the score Y of subject i ($1 \leq i \leq 2591$) at occasion t ($1 \leq t \leq 4$) as follows:

$$Y_{.it} = \beta_{0i} + \beta_{1i}X_{1it} + \beta_{2i}X_{2it} + \varepsilon_{it}, \quad (1)$$

The variable X_{1it} assumes a value of 1 for applications after the first measurement occasion (i.e., for $t > 1$), and 0 otherwise; on the other hand, X_{2it} is defined to equal $t - 2$ for $t > 2$, and 0 otherwise. The residual variance e_{it} is assumed to follow a normal distribution: $\varepsilon_{it} \sim^{i.i.d.} N(0, \sigma^2\varepsilon)$.

At level 2, the model in Equation (1) is restricted further with:

$$\beta_{0i} = \gamma_0 + \gamma_{0G}G_i + \gamma_{0E}E_i + \gamma_{0GE}(G \times E)_i + u_{0i} \quad (2)$$
$$\beta_{1i} = \gamma_1 + \gamma_{1G}G_i + \gamma_{1T}T_i \quad (3)$$
$$\beta_{2i} = \gamma_2 + \gamma_{2T}T_i + u_{2i}, \quad (4)$$

Where $(u_{0i}, u_{1i}) \sim^{i.i.d.} N(0, \Sigma_u)$. G_i denotes the gender of the subject i and equals 1 for girls and 0 for boys. The variable E_i equals 1 if subject i indicated having had sexual relations at the first application, and 0 otherwise. $G \times E$ denotes the interaction between gender and sexual experience, and, as such, equals 1 for girls who have had sexual experience at onset, and 0 in any other case. Finally, T_i refers to whether subject i belongs to a schools where the program was implemented ($T_i = 1$) or not ($T_i = 0$).

As a result of the above parameterization, β_{0i} can be interpreted as the initial value for the subject i (for, following (1), $\widetilde{Y}_{i1} = \beta_{0i}$ as both X_{1it} and X_{2it} are 0 for the first application). Equation (2) further specifies that the initial value depends on gender and sexual experience (and the interaction between both). The random effect u_0 in (2) accounts for differences among the adolescents unexplained by sex and sexual experience. Likewise, one may derive that the parameter β_{1i} should be interpreted as the difference between the first and the second application. In Equation (3), this difference is explained by gender (which, as such, accounts for different growth rates between the two moments in boys and girls) and the treatment of the subject. With respect to the latter, we expect positive values for the associated parameter γ_{1T}, which denotes the net immediate effect of the program. Finally, β_{2i} refers to the change after the program. For simplicity (and because we only have two follow-up moments), this change is assumed to be linear. Equation (4) further specifies that this change may depend on T_i, this is, whether or not the subject i was given the course. The random effect u_{2i} is included to account for differences in growth rate after the program among adolescents of the same experimental group. Note finally that the model allows u_0 and u_2 to be correlated (Σ_u may be any positive-definite matrix); positive correlations would imply that adolescents

with high initial values tend to show a more positive growth rate after the program (as compared to other students with the same values on the independent variables like sex, sexual experience, or experimental status).

Equations (2), (3) and (4) are not symmetric (i.e., they do not include the same fixed and/or random effects) as a consequence of omitting nonsignificant parameters from the more general model. For example, it was found that gender and sexual experience at onset do not have a significant effect on changes after the posttest (in parameter β_{2i}). Similarly, a random effect u_1 to explain differences between students with respect to their change between pretest and posttest was not needed. In the same line, it is worth mentioning that only sexual experience at onset was found to explain differences significantly, whereas adolescents who had their first sexual relation after the program had started were not significantly different from those who did not initiate sexual relations before the end of the study. The latter, however, might be due to low power, since the numbers of subjects initiating sexual experience in the course of the study were very low (12 females and 19 males).

Estimates of the parameters in the multilevel model for the current data set were obtained using the program MLwiN (Rasbash, Brown, Healy, Cameron, & Charlton, 2002).

RESULTS

Code Matching Procedure

Although ideally the coding procedure should have led to unique codes that could be matched from one measure to the next, the procedure had some difficulties. Reasons varied, but most apparently were due to students omitting parts of their name, using nicknames, and changing the order between parts of their name, altering the code from one measure to the next. This may have occurred either because they were concerned about the confidentiality of their responses or because they simply made errors in the coding procedure. A more extensive matching procedure was developed and implemented by means of a computer program. The program takes into account the subject's name code as well as additional variables that may help in establishing a correspondence between questionnaires, including gender, month and year of birth, age, school, and class schedule. Furthermore, the method allows the user to adjust the probability of different types of errors in the name code and for assigning a different weight to the respective additional variables. Besides the matching procedure, questionnaires were re-checked to confirm the consistency of two variables: gender and sexual experience. Cases that presented illogical responses (for example, change of gender or reporting to have had sex in the first measure and never have had sex in the later measures) were eliminated from the analyses. Table 1 shows the number of students by gender, treatment group, and number of measurements.

Table 1 *Number of Students by Gender, Treatment Group, and Number of Measurements*

Number of measures	Control group			Experimental group		
	Female	Male	Total	Female	Male	Total
4	191	138	329	327	219	546
3	180	156	336	153	147	300
2	97	148	245	94	130	224
1	156	180	336	135	140	275
Total	624	622	1246	709	636	1345

Parameter Estimates

Table 2 summarizes the estimates of the parameters of interest for each of the dependent variables under study. Effects related to the treatment and other effects are discussed separately.

Treatment-related effects. The effects of the treatment ($\gamma_1 T$) are presented in the fifth column. All entries are positive, and with one exception, they are significant, which points to a broad, positive impact of the intervention. The eighth column ($\gamma_2 T$) represents the results of the follow-up measurement occasions. The entries in this column are mostly negative, but values are considerable smaller than in the column ($\gamma_1 T$), which points to a small loss of the intervention effects that were measured immediately after the implementation of the program. So, the overall patterning of the interventions is fairly clear: all variables show a substantial increase after intervention and there is a much smaller decrease at follow-up.

Table 2 *Estimates of the Parameters for Each of the Dependent Variables under Study*

Variables	$\gamma_0 G$	$\gamma_0 E$	$\gamma_0 GE$	γ_1	$\gamma_1 T$	$\gamma_1 G$	γ_2	$\gamma_2 T$	$\sigma(u_0)$	$\sigma(u_2)$	$\square(u_0,u_2)$
Self-efficacy	.250**	-.173**	.278**	-.168**	.319**	.067	.025	-.065**	.524**	.337**	-.188**
Self-esteem	-.077**	-.016	.058	-.013	.062**	.014	.007	.001	.335**	.190**	-.189**
Decision making	.025	-.008	-.023	-.093**	.137**	.010	.035**	-.031*	.349**	.202**	-.164
Norms	-.121**	.035	.125	-.249**	.268**	.135**	.014	-.030	.417**	.259**	-.009
Attitude	.045	-.040	.167**	-.186**	.273**	.164**	.012	-.046**	.318**	.189**	.216**
Knowledge	-.033	.008	.092	-.029	.356**	.071**	.036**	-.037**	.272**	.161**	.046
Communication	.242**	-.007	.068	-.049**	.051**	.055**	.033**	-.001	.184**	.100*	.163
Intentions	.080**	.049*	-.031	-.023	.068**	.005	-.022*	-.023	.221**	.000	.
Behavior	-.031	.005	-.021	-.019	.037	.033	-.010	-.012	.103**	.000	.

Explanation of symbols: $\gamma_0 G$ = gender effect at first application (male = 0; female = 1); $\gamma_0 E$ = sexual experience at first application (no = 0; yes = 1); $\gamma_0 GE$ = interaction between gender and sexual experience (1 for girls with sexual experience at onset, and 0 in any other case); γ_1 = changes from the first to the second measurement occasion (not considering treatment), results of the control group at the second occasion; $\gamma_1 T$ = program effect, school with program implementation (no = 0; yes = 1); $\gamma_1 G$ = gender effect at posttest; γ_2 = effect of time from the second to the follow-up application (not considering treatment), results of the control group at follow-up; $\gamma_2 T$ = measure of stability of intervention effects, effect of time from second to follow-up measure; $\sigma(u_0)$ and $\sigma(u_2)$ denote the standard deviation of u0 and u2, respectively; $\square(u_0,u_2)$ is the correlation between u_0 and u_2. The values for these parameters are derived from Σu.

*:p < .05. **:p<.01.

Figures 1 and 2 illustrate clearly this pattern taking as an example two of the variables. Figure 1 shows the large increase on knowledge of .319, followed by a slight decrease of (.065) at follow-up. Figure 2 illustrates how self-efficacy showed the highest score increase after intervention (.356), and at follow-up there was a small but significant score decrease of -.037. The increase obtained at the posttest still makes a difference between control and experimental group at the follow up measure even when we observed a decrease.

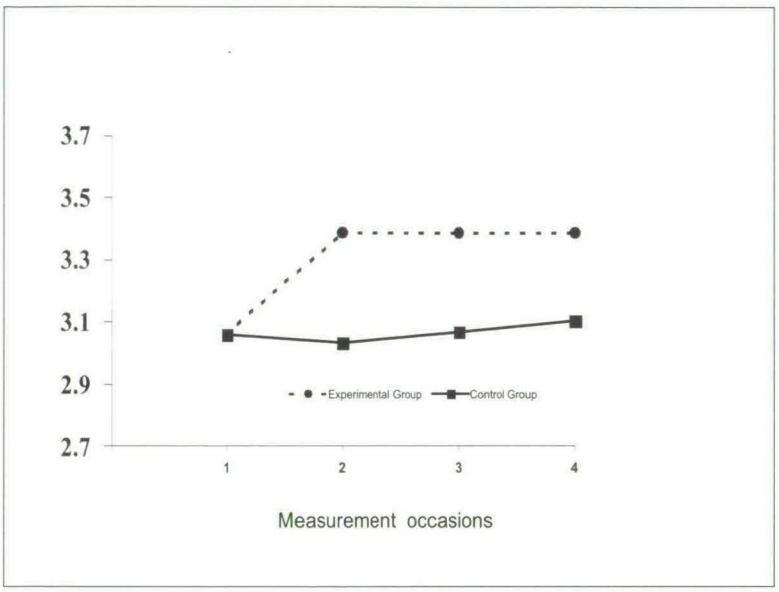

Figure 1. *Knowledge about HIV by measurement occasion and study group.*

Note: Multilevel results were used for the illustration. In this case the figure corresponds to boys without sexual experience. Scores for experimental group by measurement occasion are 3.062, 3.388, 3.387 and 3.386; scores for control group are 3.061, 3.032, 3.068, and 3.104, respectively.

Finally, although the increase of behavior was not significant, this variable showed a change in the expected direction (.037) and a slight negative change of -.012 at follow-up. However, neither of these values was significant, which presumably has to do with the much smaller numbers of participants namely sexually active.

In order to estimate the effect size, the same data were reanalyzed with the same model, but all variables being standardized (so that they have a mean of 0 and a variance of 1). As a result, the regression coefficients of the fixed parameters can approximately be interpreted as semipartial correlations between the dependent variable and the predictor, while in the latter the effect of the other predictors has been removed. The standardized regression coefficient indicates the contribution of

the associated predictor beyond the other predictors in the model. Table 3 gives the standardized regression coefficients for the fixed parameters. The largest effect sizes after the treatment were found for knowledge and attitudes and the smallest for self-esteem and communication.

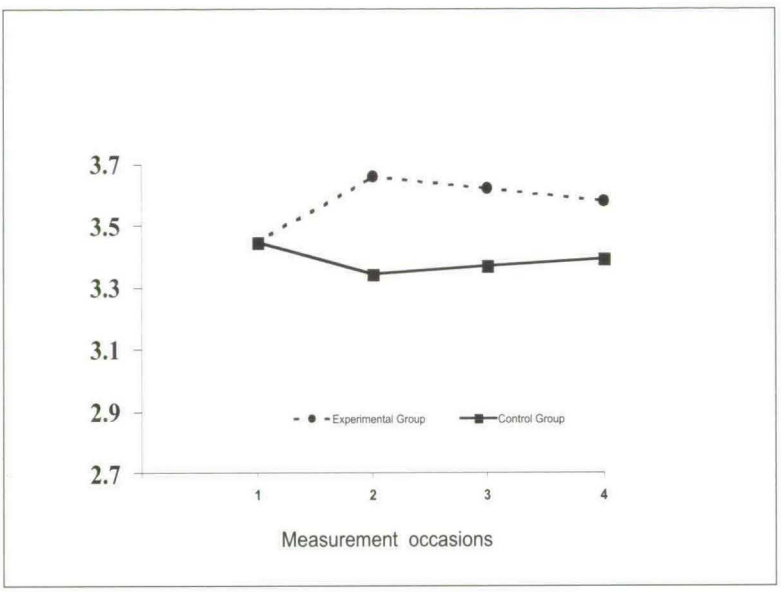

Figure 2. *Self-efficacy about the use of condoms by measurement occasion and study group.*

Note: Multilevel results were used for the illustration. In this case the figure corresponds to girls with sexual experience. Scores for experimental group by measurement occasion are 3.445, 3.663, 3.623 and 3.583; scores for control group are 3.445, 3.344, 3.369, and 3.394, respectively.

Effects not related to the intervention. The first column with estimated parameter values (γ_{0G}) shows gender differences observed at the beginning of the study; entries indicate values for girls in comparison with boys. We found that girls scored significantly higher than boys on partner communication (.242), self-efficacy about the use of condoms (.250), and intentions to use them (.080), whereas boys scored significantly higher than girls on self-esteem (-.077) and norms about the use of condoms (-.121). The second column, γ_{0E}, presents the pretest differences between boys and girls. It was found that adolescents with sexual experience had significantly lower self-efficacy (-.173) than adolescents who have not had sex at the time of the first administration. In addition, adolescents without sexual experiences were more likely to use a condom (.049). When we analyzed the interaction between gender and sexual experience (γ_{0GE}, third column), we found significant differences indicating that girls with sexual experience had higher scores in this variable (.278)

Table 3 *Standardized Regression Coefficients for the Fixed Parameters*

Variables	γ_{0G}	γ_{0E}	γ_{0GE}	γ_{1}	γ_{1T}	γ_{1G}	γ_{2}	γ_{2T}
Self-efficacy	.143**	-.063**	.051**	-.087**	.179**	.038	.023	-.055**
Self-esteem	-.083**	-.011	.020	-.014	.065**	.016	.010	.001
Decision making	.022	-.007	-.004	-.080**	.126**	.011	.052**	-.042*
Norms	-.085**	.015	.027	-.157**	.182**	.093**	.014	-.031
Attitude	.040	-.026	.049**	-.149**	.234**	.145**	.017	-.059**
Knowledge	-.033	.004	.031	-.027	.360**	.072**	.060**	-.054**
Communication	.301**	-.004	.027	-.056**	.062**	.067**	.067**	-.002
Intentions	.088**	.034*	-.011	-.022	.073**	.005	-.040*	-.037
Behavior	-.074	.008	-.015	-.039	.082	.075	-.035	-.040

Explanation of symbols:
γ_{0G} = gender effect at first application (male = 0; female = 1); γ_{0E} = sexual experience at first application (no = 0; yes = 1); γ_{0GE} = interaction between gender and sexual experience (1 for girls with sexual experience at onset, and 0 in any other case); γ_{1} = changes from the first to the second measurement occasion (not considering treatment), results of the control group at the second occasion; γ_{1T} = program effect, school with program implementation (no = 0; yes = 1); γ_{1G} = gender effect at posttest; γ_{2} = effect of time from the second to the follow-up application (not considering treatment), results of the control group at follow-up; γ_{2T} = measure of stability of intervention effects, effect of time from second to follow-up measure.

*:p < .05. **:p<.01.

and had more positive attitudes toward condom use (.167). The fourth column, γ_{1}, indicates the effect of time for all the students without taking into account the effect of the treatment; therefore, it can be interpreted as the changes in the control group at the second application. A comparison between pretest and posttest measures in the control group shows decreases on all variables, several of them are significant: self-efficacy (-.168), decision-making (-.093), attitudes toward the use of condoms (-.186), norms about the use of condoms (-.249) and partner communication (-.049). The sixth column presents the effects of gender (in girls) at the second measurement occasion. Norms (.135), attitudes (.164), knowledge (.071), and communication (.055) all showed a significant increase.

The parameter γ_{2} in the seventh column shows the effect of time from the second to the follow-up application without taking into account the treatment. Decision-making (.035), knowledge (.036), and communication (.033) showed small but significant increases, while the intention to use a condom showed a significant decrease of -.022.

DISCUSSION

The current research demonstrates a positive longer-term effect (over a one-year follow-up period) of a curriculum delivered by trained teachers to Mexican high school students in promoting life skills, enhancing knowledge, and changing norms and attitudes vis-à-vis safe-sex behavior.

Theory, design, and analysis were integrated in order to maximize the validity of the study, which was rooted in the theory of reasoned action (Ajzen & Fishbein, 1980) and social learning theory (Bandura, 1987). An explanatory model derived from the pretest data and fitting the posttest data (Givaudan, Van de Vijver et al., 2003) distinguished three categories of variables: individual resources (self-esteem, self-efficacy, and decision-making); mediator and moderator variables (knowledge, attitudes toward condoms, and norms about condoms) and outcomes (partner communication, intentions, and protective behavior). The model showed a good fit to the data, indicating the adequacy of the theoretical design to understand safe-sex behavior and its precursors among adolescents. In the present study, longer-term effects of the intervention are evaluated using a quasi-experimental design with four occasions and a multilevel model for the data analysis.

The most important finding of the study is the positive impact of the treatment on all the variables of the model, although the effect on behavior was not significant. Two reasons can be envisaged for this lack of significance. The first is sample size, since the sexually active group was small. The second is related to the extent of the impact of the training. Our data suggest that the training led to the largest changes in self-efficacy and knowledge; changes in overt behavior are presumably much smaller because behavior may be more resistant to change (for example, because of the influence of situational factors). The second important study finding is the relatively strong stability of the effect sizes of the intervention. A recurrent problem in intervention studies is the long-term decrease or even disappearance of effects that are observed immediately after the program implementation. Even for those variables that showed a significant decrease after one year, the increase due to program implementation was much larger than the decrease at follow-up.

Significant gender differences were found at baseline. Girls scored higher than boys on partner communication, self-efficacy about the use of condoms, and intentions to use them, whereas boys scored significantly higher than girls on self-esteem and norms about the use of condoms which reflects views of important others concerning condom use (e.g., My family thinks that if I am to have sexual relations, I should use a condom). It is difficult to attribute these effects to Mexican culture or to the specific conditions related with adolescence. Some authors have reported declines in European American girls' self-esteem. Simmons and Blyth (1987) suggested that girls are more likely than boys to be exposed to two major life transitions at once during the early adolescent years: the physical changes and the transition to high school. Boys are more likely to experience these changes about 18 months later. Several researchers have found that early maturation in girls is associated with lower self-esteem and less self-confidence (Buchanan, Eccles, & Becker, 1992; Stattin & Magnusson, 1990). Gender differences in self-esteem are more likely in the Mexican context anyway because boys are more valued by the society (Amezcua & Pichardo, 2000).

When we analyzed gender differences in the control group on the second measurement occasion (six months after baseline measurement), we found that girls obtained significantly higher scores than boys on the following variables: knowledge, attitudes toward condoms, norms about the use of condoms, and partner communication. The rapid growth introduced by puberty often results in an increase in body consciousness among adolescents girls, especially as they are maturating at a different rate than adolescents boys. Early maturating girls are exposed to increased knowledge about sexuality, their bodies, and increased peer pressure to involve in topics related with heterosexual behavior (Waters, 1996).

The effects of the interaction of gender and sexual experience showed significant differences on attitudes toward condoms and self-efficacy. Girls with sexual experience got the highest scores. It seems that girls with sexual experience who are attending high school have needed to learn safer sex behaviors; self-efficacy with regard to sex behavior and positive attitudes toward condoms are important elements in their safe-sex behavior. Even when they might not perceive themselves at risk of HIV, safe-sex behavior helps to prevent unwanted pregnancies and to enable them to complete their secondary education. Boys who are having sexual relations without protection can stay at the school without evidence of a possible pregnancy.

Sample size is an important issue in this type of studies. The long-term study of sexuality in adolescence inevitably implies missing data due to loss to follow-up or logical inconsistencies in response (e.g., if the respondent has not had sex during the intervening period, then the number of condom-protected sex acts must be missing). Often, empirical imputation methods are used to 'fill in' missing data in the first instance, but obviously cannot be applied in all situations. However, some studies show that maximum likelihood and related methods that use all the available data, but do not impute values where missing data are present, are superior alternatives to most empirical imputation methods (Graham et al., 1998). Thus, we used a mix of empirical imputation methods when appropriate and we decided to have a smaller sample with a higher level of reliability.

A limitation of our data is the low number of sexually active adolescents (6% of girls and 22% of the boys reported to have had sex before at the baseline measure) that limit the conclusions about the effectiveness of the program on actual safe-sex behavior. Furthermore, the period of one year between the end of the intervention and our last follow-up measure was insufficient to gauge intervention effects on the majority of the students exposed to the intervention (we registered an average increase of 4% for girls and 6% for boys of their sexual debut between each measure occasion). Our findings suggest that for future interventions we need to include sexually experienced adolescents in order to analyze the effects on behavior. In addition, if there is a long time between the program and the sexual debut, the issue of long-term stability of program effects is important.

Another way in which the treatment effects could be eliminated is the reoccur-

rence of high-risk behavior among the group of adolescents who were sexually active at the time of the program implementation. Kelly (1995) stressed the importance of reinforcing and providing support for individuals in the process of modifying their HIV high-risk behaviors, in order to prevent reoccurrence of risky behavior. Research on urban heterosexual adults suggests that any maintenance program focus on HIV prevention must address cognitive barriers such as denial of own and partner risk, doubts about efficacy of safer sex methods (Morrill, Ickovics, Golubchikov, Beren, & Rodin, 1996; Sobo, 1993), personal barriers as interference with pleasure, mastery of safer sex techniques and perceived compatibility with pregnancy (Krauss, Tiffany, & Goldsamt, 1997), and social barriers including cost, availability, and partner objections (Hetherington, Harris, Bausell, Kavanagh, & Scott, 1996; Moore, Harrison, Kay, Deren, & Doll, 1995; Morrill et al.,1996; Sikkema et al., 1995) to use of safer sex methods. It is difficult to cover all these aspects in an initial intervention suggesting the need of continuity of the programs in order to add gradually more aspects that are also important for prevention. In addition, young adulthood is often accompanied by the transition from primary to secondary school or entries to the labor market, which open new venues for social mixing. Consequently, additional topics in maintenance interventions must address the establishment of norms of safer sex within new social contexts and new relationships (Fishbein et al., 1996).

Further research is needed to follow students once they have left high school and enter a new life context. The results of this research project provided important insights in the long-term effect of an HIV school-based intervention, as well as in the effectiveness of the program in a sample in which most of the students are not sexually active. However, we know of no study that has systematically investigated the long-term effects on sexual delay, safer sex maintenance, and risk decrease for a well-designed high school curriculum after high school while monitoring changes in the social and relational contexts of sexual activity. We know of no study that has tested a post-high school maintenance program responsive to the developmental challenges of young adulthood among a general heterosexual age cohort. Therefore, there is currently an important need for research projects that address the question of to what extent long-term maintenance training reinforces safer sex behavior and prevents high-risk behavior among heterosexual young adults undergoing a change in life context in developing countries.

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Chapter 5

Epilogue

The objective of this chapter is to reflect on issues of methodology and evaluation, and on challenges related to the project presented in the previous chapters. There are three parts. The first part provides an overview of the study and the main findings. The second part focuses on the evaluation of the project; in this section I briefly discuss principles and strategies for the evaluation of intervention programs and analyze validity threats at different stages of the project. In the third and final part I analyze the implications of the study both from a theoretical and an applied perspective.

OVERVIEW OF THE STUDY AND MAIN FINDINGS

Introduction

Mexico, as most other countries of the world, is experiencing a growing HIV epidemic. The number of cases, particularly amongst young people, has increased and AIDS is now the third highest cause of death among people 25 to 40 years of age (Cruz, 2000). The risk behavior of today's adolescents will shape the course of the AIDS pandemic in the future. Clearly adolescents are a key target group for behavior change interventions designed to help them adopt safe behaviors. Adolescents in countries with a high prevalence of HIV/AIDS are often knowledgeable about AIDS, its causes and means of prevention. However, there is little evidence that youngsters change their behavior only on the basis of this knowledge in order to protect themselves. School programs provide an obvious way to reach adolescents because such programs reach large numbers of young people at a relatively low cost. Yet to date, the impact of school-based interventions on youth behavior in developing countries has been disappointing in the few studies where it has been properly documented. To optimize programs, it is necessary to know their strengths and weak-

nesses. If, for example, school programs can only change students' knowledge and attitudes, they could be designed to perform those functions and then be supplemented with other interventions that can help youths adopt safe behavior.

Although the data is not conclusive, there are some components shared by programs that had a demonstrated impact on the practice of safe behavior. Recent reviews of school-based programs indicate that youngsters need accurate knowledge on topics such as sexual relations and sexually transmitted infections; in addition, they need to be taught life skills, such as assertive communication, self-knowledge, mutual respect, and commitment (Grunseit, 1997).

The project was based on the two main western theories of behavioral prediction and behavioral change: the Self-Efficacy Theory (Bandura, 1997) and the Theory of Reasoned Action (Ajzen & Fishbein, 1980). The first aim was to develop and test an explanatory theoretical model in order to obtain a more complete understanding of the predictors of safe-sex behaviors among Mexican adolescents, most of them without sexual experience. This model was designed to answer the following research questions: (i) Which are the individual disposition variables and the mediator variables that can be considered as determinants of safe-sex behavior for adolescents who not have had sex and for adolescents who have had sex, and (ii) which are the outcome variables that need to be assessed as precursors of safe-sex behavior in adolescents who have not had sex?

The second aim was to implement and assess the longer-term effects of a school-based intervention program developed for Mexican adolescents in high-school. Specific objectives were to examine whether there were differences between an experimental group and a control group of adolescents who received a school-based program including the variables described in the explanatory model, and to evaluate the effect of the intervention after one year of follow-up. A quasi-experimental design with an experimental and a control group (constituted by two schools each) and four measurement occasions was used to assess short-term and longer-term effects of the intervention. Data were collected prior to the intervention, at the end of the intervention, 6 months after the intervention and 12 months after the intervention.

The intervention consisted of the implementation of an HIV/AIDS prevention program entitled *A team against AIDS* (Fernandez & Givaudan, 1999). It was designed on the basis of an earlier Mexican program called *Planeando tu vida [Planning your life]* (Pick et al., 1988) that had been used and evaluated previously with Mexican adolescents (Pick, Andrade-Palos, Townsend, & Givaudan, 1994). *A team against AIDS* was developed as an alternative to the standard health education curriculum entitled *Sexuality and first aid* that has been part of the high school curriculum in various Mexican states and that primarily seeks to teach children knowledge. The new curriculum addresses topics not included in the standard program and follows a different mode of teaching. The main topics were: sexuality, values and subjective norms, sex orientation, HIV/AIDS prevention, safe sex and the

promotion of specific life skills, such as self-knowledge, self efficacy, critical thinking, assertion, partner communication, negotiation, and planning of activities to achieve goals. Teachers in the experimental schools were trained by a facilitator for 40 hours and later these teachers delivered the program to their students during one school semester (30 hours). The emphasis in the training for both teachers and adolescents was on the development of psychosocial skills to bridge the gap between information and behavior.

Main findings

Theoretical aspects. Models of health promotion and health behavior have been around for many years. These models have added to our understanding of how cognitive and social factors contribute to human health. After the appearance of HIV/AIDS many conceptual models have emerged (Basen-Engquist & Parcel, 1992; De Vries & Backbier, 1994; Kasen, Vaughan, & Walter, 1992; Schwarzer, 1992). Most of them are based on classic theories such as the health belief model (Becker, 1974; Rosentock, 1974), social cognitive theory (Bandura, 1977), the theory of reasoned action (Ajzen & Fishbein, 1980) and planned behavior theory (Ajzen, 1985).

The theoretical approach of the study presented in this thesis was based on two of these theories, namely social cognitive theory and the theory of reasoned action. The resulting explanatory model, presented in Chapter 2, includes different concepts from these theories to model safe-sex behavior. The explanatory model has three levels of variables (see Figure 1). The first level refers to personal resources and includes three variables: self-esteem, decision-making and self-efficacy. The first two of these variables were considered as domain independent and not limited to sexuality-related situations. Self-efficacy referred to specific situations related to the use of condoms. The second level of the model includes three mediating and moderating variables: knowledge about HIV prevention, attitudes toward condoms, and subjective norms about the use of condoms. The last level refers to outcome variables: communication and intentions to use condoms. These are the final outcomes in the model in the case of absence of sexual experience, which implies the absence of protective sex behavior, specifically condom use. Protective sex behavior is the final outcome for the subgroup of adolescents with sexual experience.

Using the baseline data, the total sample was split up in four subgroups according to gender (female/male) and previous sexual experience (yes/no). A path model in which the personal dispositions were exogenous variables, combined with the moderating and mediating variables mentioned, explained part of the variance in the outcome variables and provided a good fit in each subgroup. The model was tested on a second occasion using posttest data. The same path model showed a good fit, which confirmed the stability of the explanatory model.

The results, presented in Chapters 2 and 3 are in line with the theory of reasoned action, which states that a proximal determinant of behavior is the intention to

perform that behavior, which in turn is determined by attitudes and subjective norms. The strongest paths in the explanatory model were from attitudes to subjective norms and from attitudes to intentions. Furthermore, self-efficacy had a significant influence on both the mediator variables and the outcome variables (Figure 1).

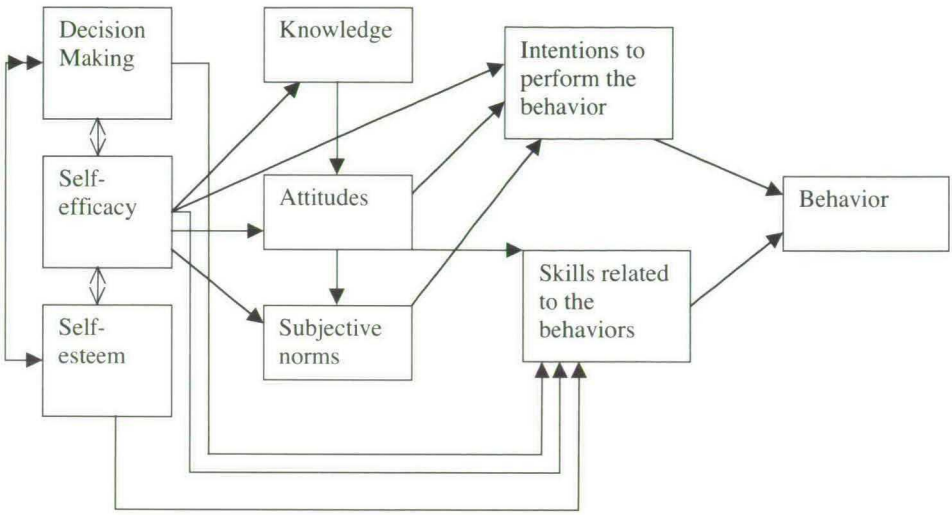

Figure 1. *Final simplified explanatory model*

Applied aspects. To realize the second aim of the project, i.e., the evaluation of the intervention, we carried out two studies. The first compared pre- and post-measurements in order to assess the immediate effects of the program; the second study assessed longer-term effects of the intervention. The pre-post comparison (Chapter 3) showed significant increases in the precursor variables of safe sex immediately after the conclusion of the program. The variables showed significantly higher scores in the experimental group, while no such changes were observed in the control group. Computation of Cohen's *d* gave useful information on the sizes of the significant effects. The major effects in the experimental group reflected greater knowledge about HIV/AIDS prevention and more positive attitudes toward the use of condoms. Subjective norms, partner communication and intentions had a medium size effect, and the variables at the first level of the model, which reflect personal dispositions, had a smaller effect. These results confirmed that the initial and easier changes in this type of intervention occur at the cognitive level, and in knowledge and attitudes; it requires a longer process of intervention to obtain sizable effects in personality dispositions. Gender differences were also explored. Results showed that females obtained significantly higher scores than males in attitudes toward condoms and subjective norms about the use of condoms. The other variables

increased to a similar extent in both males and females.

The intervention did not affect the rate of sexual relations in the adolescents. This finding is consistent with other studies of sexual education supporting the contention that programs do not increase sexual intercourse, either by hastening the onset of intercourse or by increasing the frequency of sexual relations among adolescents (Kirby & Coyle, 1997; Kirby et al., 1994; Pick et al., 1994)

The second study (Chapter 4) focused on the evaluation of the long-term impact of the treatment (one year of follow-up). Results from multilevel analyses demonstrated a positive impact of the intervention on all variables with one exception. The general trend was that increases were higher immediately after the intervention, followed by slight decreases at follow-up. It should be noted explicitly that despite these decreases there were still notable differences between control and experimental group at the final measurement occasion. The largest effect sizes in the longitudinal study were found for knowledge and attitudes, and the smallest for self-efficacy and partner communication. In the case of sexually active adolescents, protective behavior did not show significant differences between control and experimental group. There was an increase in protective behavior in the experimental group, but this was not significant in comparison with the control group. This lack of statistical significance may have to do with small numbers of sexually active participants in both groups.

EVALUATION OF THE PROJECT

Introduction

Evaluation of interventions allows the identification of the strengths and weaknesses of programs and has implications for the allocation of resources. Evaluation has to cover all aspects of a program, from the first stage – exploring the problem – to the final stage, which is to analyze the effectiveness and the efficiency of the program (preferably at a medium or long term). The planning of evaluation at each stage requires the identification of the questions to be answered. Monitoring and evaluation can tell us whether and how programs are working (Fisher & Foreit, 2002; Posavac & Carey, 1989; Shadish, Cook & Levinton, 1991).

Evaluation theory describes and justifies actions within an evaluation process: it clarifies evaluation activities, processes and objectives, and it explains the relationships between activities and goals. Research on the many factors related to the effectiveness of interventions has come a long way from the strict quasi-experimental evidence demanded by Campbell and Stanley (1963) to approaches that try to integrate a variety of sources of evidence. Program evaluation is now seen as having many functions, as being grounded in a range of theoretical positions, and as drawing from a variety of possible methodologies (Cook & Shadish, 1986; Cronbach, 1980; Lindblorn & Cohen, 1979; Rossi & Freeman, 1993; Shadish, Cook & Levinton, 1991). Process evaluation monitoring the delivery of programs is currently a natural com-

plement to impact evaluation, which focuses on inferring what outcomes resulted from an intervention, particularly by using experimental and quasi-experimental designs (Scheirer, 1994). A brief overview of some approaches about impact and process evaluation is presented to place the discussion on strengths and weaknesses in perspective of the present project.

Overview of evaluation theory

The approach to evaluation that emphasizes the validity of outcome measures is probably best summarized in Cook and Campbell (1979) and Campbell (1988), who analyzed concepts from evolutionary epistemology and approaches to causation described by philosophers of science (positivists, essentialists). They emphasized the concept of multiple causation; multiple causes lead to imperfect results and conclusions. Campbell and Cook proposed variations of basic designs to improve the quality of social experiments. These authors have made significant contributions by discussing and giving practical suggestions how to deal with problems regarding relevant threats to internal and external validity.

Campbell and Stanley (1963) described designs without random assignment of persons that incorporate conditions facilitating causal inference. The first condition is the use of pretest measurement with the same scales as the posttest, and the second condition is the use of comparison groups as a no-treatment baseline. Various quasi-experimental designs with pretest and posttest groups were elaborated. Campbell and Stanley (1963) argue that internal validity is the most important aspect of good research: 'internal validity is the basic minimum without which any experiment is uninterpretable.'

In the 1980's Cronbach (1982) loosened the demands formulated by Campbell and Stanley somewhat. He emphasized the limitations of randomized field trials, the importance of local contexts on performance, and the social and political aspects of program evaluation. Cronbach argued that internal validity is only one of the concerns of the evaluator. Relevance of circumstances that are not included in a study design is most important to evaluate whether or not previous findings apply in a new situation. Still, he prefers to gather policy-relevant information by scientific methods.

In the same decade, other traditions emphasized that evaluation is more an art than a science. For Wholey (1983, 1987) the planning of each evaluation requires difficult 'trade-off decisions' as evaluators identify the questions to be answered. His approach is predominantly qualitative in most of its structure and design; the role of the evaluator is to provide quick feedback and to monitor activities during the implementation of programs. Wholey defined *evaluability assessment* as a process of clarifying program designs, exploring program reality, and helping to re-design programs to ensure that they meet four criteria: a) well defined objectives, b) plausible objectives, c) performance data can be obtained and d) intended users of the information agree on using it and how to use it.

For Wholey, process evaluation is as important as impact evaluation. The realization and costs of potential evaluation designs are put against the benefits of the evaluation results for improving program performance or communicating the value of the program activities to policy-makers and other audiences. Measures and methods for process evaluation are necessary to cope with variations in program delivery that could affect the original design. A close vigilance of the program activities guides the researcher through a decision making process at the different stages of the project in order to maintain the quality of both the intervention and the evaluation. The data collected as part of process evaluation is important for complementing and interpreting final outcomes.

EVALUATION OF THE PRESENT PROJECT

Different elements of evaluation were considered for the present study. In order to evaluate the impact of the intervention, a quasi-experimental design with a control group was chosen. Following Cook and Campbell, the design was enhanced by including four measurement occasions that allowed us to assess the longer-term impact of the intervention. Process evaluation was conducted throughout the project. A list of the planned activities to carry out during the project was developed at the beginning in order to assure the registration and, whenever possible, control of relevant events to satisfy the proposed design and to deal with internal validity threats mentioned by Campbell and Stanley (1963) and Cook and Campbell (1979).

Design and validity threats

The objective of selecting a specific design for a study is to minimize possible errors and bias and to maximize the reliability and validity of the interpretation. The present study was based on a *pretest-posttest control group design* with four measurement occasions and with a random assignment of the four schools, either to the experimental or to the control group. All students attending the tenth grade in the respective schools were included in the study (N= 2064).

The design can be represented as follows:

Experimental group	O1	X	O2	O3	O4
Control group	O5		O6	O7	O8

Where time refers to the passage of time, X denotes a program intervention and O an observation measurement.

It is necessary to consider specific threats to internal validity related to the design selected. Factors in a pre-test post-test control group design, listed by Campbell and Stanley (1963) and Cook and Campbell (1979) were considered in the design phase

of the project. Relevant factors are discussed from two perspectives, (i) prevention and control carried out when the project was planned, (ii) and events occurring in the course of the project that needed to be resolved or registered in order to assure an objective interpretation of the final impact of the intervention. The following internal validity threats were addressed:

Selection is a threat to validity that occurs whenever there are initial differences between individuals selected for the experimental group and the control group. An observed treatment effect may then be due to this initial difference. In the current case this was controlled by a random assignment of schools to the control and the experimental condition. From the potential five participant public high schools one was excluded from the project, because it was larger in size and, being the first and largest high school in the state, had more resources than the other schools. Of the remaining four schools two were assigned to the experimental group and two to the control condition.

Testing refers to the familiarity of the subjects with items; this is especially important in repeated measure designs where the same scales are administered more than one time. The effect of repeated testing is likely to be more relevant for cognitive measures than for non-cognitive measures (increase of scores at retest is often reported for cognitive measures). However, the inclusion of a control group is a safeguard against this validity threat.

An *instrumentation* threat applies whenever a measurement instrument differs between the control and the experimental group, or between the pretest and the posttest. This can lead to an effect that is independent of the intervention. In this project we used a closed questionnaire and the interviewers were trained to give the same explanations regarding the purpose of the study, as well as the same verbal instructions and time to answer the questionnaires for control and experimental groups.

Maturation is an internal validity threat that is present when an observed effect is due to the respondents growing older during the course of the study. Therefore, the maturation process can produce changes that are independent of the program intervention. In this study it is reasonable to assume that such effects were the same for the experimental and control subjects.

History refers to events that occur during the life-time of a project, but that are not part of the intervention; they just happen and can influence the results. A closely related threat is *selection-history interaction*, i.e., exposure to external events that are different for the control and the experimental group. In this respect the collaboration of the schools' authorities was essential; they did not include any other program or related intervention in the curriculum while the study was carried out. We did not come across any community programs related to HIV/AIDS prevention in the Toluca region during the time of the study. Mass media campaigns relevant to HIV/AIDS prevention were present at the time, especially advertisements for some brands of

condoms. However, the messages given only indirectly addressed HIV/AIDS; they were not directed specifically to young adolescents but to all members of the community and were neither intensive nor permanent. It can be reasonably assumed that if these campaigns had any effects, they were the same for both groups. Furthermore, checks were conducted to assure the uniformity of the intervention in the two experimental schools as well as the quality of program delivery. Teachers from both experimental schools were trained in a single group. They answered a pre-post questionnaire in order to ensure that they had the required knowledge and skills to deliver the program. In both experimental schools authorities reviewed and agreed to the contents of the program, checking that there were no educational or political issues that might affect the implementation.

Diffusion or imitation of treatments is present when students communicate with each other in such a way that those in the control group learn from those in the experimental group. It is important to remember that the unit of selection was the school and that the four schools were far enough apart from each other to make such communication unlikely. Moreover, information was not the most salient aspect of the intervention, but rather the use of participatory techniques that promote analysis and critical thinking about the use of the information. It is important to mention that the schools in the control group were offered a complete course and materials after the study. This was done for ethical reasons as well as to ensure further dissemination of the effects of the intervention.

In longitudinal research where the same subjects are followed over time, there is the possibility that dropouts differ from those remaining in the study. Effects of such *differential mortality* were registered but not controlled; they form a validity threat. Checks were carried out on socio-demographics characteristics and sexual experience of dropouts compared to the subjects who remained in the study, but none were found. There were differences between experimental and control schools during the administrations of the questionnaire that led to some differential mortality. In experimental schools the program had the support and encouragement of the school directors and teachers. Directors informed both teachers and students when the questionnaires would be administered. In the control schools the research staff was supported less by the school administration. Directors in the control schools failed to notify the teachers about the application of the questionnaire. It was sometimes necessary to wait for the students to be assembled and this led to some subject mortality in the control group. Moreover, teachers and students in the experimental group were motivated to participate in the program; they were cooperative in filling in the questionnaire. In the case of the control schools, there was less motivation to participate and class teachers left it up to the researcher to motivate and discipline the class during the administrations of the questionnaires.

Selective mortality of the sample could also be due to difficulties in subject identification. In order to maintain student confidentiality, a sophisticated and detailed

identifying code was used. This code required students to write their first and last names in the form of 0's and 1's with consonants represented by '0' and vowels by '1'. They also noted the year and month of their birth, as well as their sex and whether they attended classes in the morning or afternoon. At the time of matching the baseline and first follow-up questionnaires it emerged that this procedure had led to significant confusion. We discussed the matching problems with teachers and students to get their input on possible reasons. In order of importance they listed the following as probable reasons: failure to use the same identifying code for the two questionnaires; refusing to participate without manifesting it openly; students repeating the semester who did not fill out the initial questionnaire; students changing from the morning to the afternoon session, or visa versa; students quitting school in mid semester, and students changing schools. All in all, it seems unlikely that any of these factors had an unequal effect on experimental and control groups.

IMPLICATIONS

Implications for theory

The explanatory model presented in this study postulated three levels of variables: personal dispositions, mediators and moderator variables, and outcomes variables related to safe sex. At the first level, self-esteem and decision making were measured as domain independent personal disposition variables and self-efficacy was considered as a domain dependent disposition. At the second level, mediators and moderators included perceived norms about sexual practices, attitudes toward condom use, and knowledge of HIV/AIDS prevention and consequences. Finally, at the third level intentions to use condoms and partner communication were the outcome preventive variables for adolescents without sexual experience. Protective behavior was an additional outcome variable in the group of adolescents with sexual experience.

When we included behavior the path model showed that intentions (attitudes, perceived norms, and self-efficacy) as well as skills (communication) predicted safe-sex behavior. Partner communication was the best predictor of protected sex behavior. We also found support for the position of Ajzen and Fishbein (1980) that a proximal determinant of behavior is the intention to perform that behavior, which in turn is determined by attitudes and subjective norms. The strongest paths in the explanatory model were from attitudes to subjective norms and from attitudes to intentions.

In the model norms did not emerge as an exogenous variable that impacts on all sexuality-related variables. Rather, norms were influenced by attitudes and self-efficacy, indicating that there are individual differences in the perceptions of adolescents and not only externally imposed rules (e.g., the norms of the Roman Catholic Church).

Knowledge did not contribute directly to the outcome variables. There was only a

direct and fairly substantial effect on attitudes, which in turn had a significant effect on norms and on the intention to use condoms. Knowledge is seen as a necessary but insufficient condition for safe-sex behavior. This is in line with previous research which shows that information about risks and risk-reducing behaviors is often insufficient to change behavior (Kalichman, Stein, Malow, Averhart, Devieux, Jennings, Prado, & Feaster, 2002). The first HIV prevention interventions were based on providing information about HIV transmission. It has been shown consistently that having only information about a disease and how it is spread does not necessarily lead to preventive action. Knowledge creates a necessary condition for change, but additional influences are needed to adopt healthy habits. In the present study knowledge was influenced by personal disposition variables, such as self-efficacy and decision-making. One reason for this finding may be the use of a response scale that asked for ratings of certainty, rather than for a true/false dichotomy; the expression of certainty perhaps combines an aspect of personality with cognition.

It is not surprising that the other individual disposition variables (self-esteem and decision making) that assessed general characteristics of the person were significantly correlated. Both of these had a direct relation only with the skills variable (partner communication), but not with the mediator and moderator variables and neither with the (domain specific) outcome.

According to Bandura (1998), most models of health behavior now include an efficacy determinant and those that do not take self-efficacy into account have less explanatory and predictive power. Many other authors (Ajzen & Maden, 1986; De Vries & Backbier, 1994; Schwarzer, 1992) have added self-efficacy to the variables in the theory of reasoned action and have reported direct relations with health behavior and a significant influence on intention, as was found in our explanatory model. Self-efficacy was a domain-dependent measure, referring specifically to sexual behavior; it had a significant positive effect on most of the variables included in the model. Bandura (1998) asserts that beliefs in one's learning efficacy enhance knowledge and skills for managing situations and also regulate motivation and the strength of commitments that people set for themselves. In our model self-efficacy was significantly related to knowledge and skills (partner communication) as well as to attitudes toward condoms, subjective norms and intentions.

The interpretation of these variables in our explanatory model is in line with Fishbein (2000) who argues that attitudes, perceived norms and self-efficacy are the three primary determinants of behavior. In his opinion the relative importance of these three psychosocial variables as determinants of intention will depend upon the behavior and the population being considered. According to Fishbein, different types of interventions are needed for different populations. In some cultures, a certain behavior may not be performed because the person does not yet have the intention to perform it, while elsewhere the lack of specific skills can be an obstacle to perform the behavior.

In summary, the explanatory model of HIV/AIDS preventive behavior in Mexican adolescents provided support for the view that interventions should be aimed at determinants of intentions to use a condom as well as skill building The relationships between the variables in the model also show that theoretical models which include variables specific to the domain addressed by the intervention are to be recommended. At the same time, the significant relationship of self-esteem, a domain independent variable, with partner communication was not trivial and confirms the relevance of personality dispositions.

Implications for interventions

The findings discussed so far imply the need to integrate a variety of psychological variables. Of the personality dispositions self-efficacy turned out to be the most relevant variable that needs to be considered in the design of interventions; it was significantly related to most of the variables included in the path model. The three mediator or moderator variables, knowledge, attitudes and subjective norms had significant paths to intentions. The strongest influences of the model emerged from attitudes and there was a clear influence of knowledge on attitudes. Furthermore, interventions need to integrate and facilitate the development of specific skills related to outcome behavior; in the present study this was demonstrated for partner communication.

All in all, the results of the study suggest that safe-sex behavior is a multi-faceted process that involves personal dispositions and critical skills that are interrelated. At this point it is important to recognize the importance of identifying the precursors of specific behaviors in order to develop focused interventions (or to reinforce these aspects in programs that are already being applied). The significant effects of the program on self-efficacy and partner communication in the follow-up results combined with the relevance of these variables in the model have implications for the design of intervention programs. It seems desirable to dedicate more time to the development and practice of skills related to partner communication and self-efficacy in sexually risky situations.

The main finding of this study is the demonstration of significant longer-term effects (over a one-year follow-up period). This has probably also to do with the mode of implementation. The program was delivered to high-school students by trained teachers using participatory methods. Teachers promoted the reflection about popular beliefs and myths clarifying the information, they also promoted the reflection on subjective norms regarding safe-sex behavior and encouraged participants to practice skills, such as partner communication and the purchase and manipulation of condoms with the objective of increasing self-confidence and self-efficacy in health control.

The strongest long-term effects of the intervention were found for knowledge and attitudes. Considering that the knowledge scale asked for levels of certainty, it is

possible that the intervention increased confidence about relevant information that most adolescents already had. Perhaps adolescents need to be confident about their own reasons to be able to defend their point of view. The relevance of self-efficacy in sexuality related situations makes sense in this context.

A limitation of the study was the rather small number of sexual debuts that occurred between program implementation and follow-up. As a consequence, the size of the sample in which we could evaluate directly the impact of the program on actual behavior (i.e., participants in the experimental and control groups who reported their sexual debut after the program implementation) was limited. Larger numbers would have yielded more conclusive data regarding the effect of the program on safe-sex behavior. Prior to the study we overestimated the percentage of sexually active adolescents. Also our expectation that by the end of the study we would have a considerable proportion of participants with sexual experience and exposure to using condom, turned out to be too high. Still, an HIV/AIDS prevention program would be less useful if it were applied to sexually active adolescents.

The value of the study, and indeed of the program, would have been limited if no long-term effects after one year had been found. The prolonged effects observed in the experimental group provide evidence that the program impacts on precursor variables of safe behavior in a population of adolescents before their sexual debut, and that this impact may last for a considerable time. However, follow-up studies extending over several years would be required to trace the maintenance of program effects on the majority of the participant adolescents.

The initial design might have been changed after the pretest showed a high proportion of sexually inexperienced students. However, interest in the effects of early intervention justified the continuity of the study in a sample in which only a few cases had sexual experience. The positive impact of the intervention is particularly relevant because schools seem an obvious location for HIV/AIDS prevention programs; they reach large numbers of young people at a relatively low cost. If such programs are effective, it is important to train teachers in the use of participatory methods of instruction. Our results indicate quite clearly that the intervention had a significant effect not only on knowledge, but also on other precursor variables related to active prevention.

In addition, the results showed that the intervention better addressed girls than boys in terms of both program effects and course attendance. Other authors (Agha, 2002; Kirby & DiClemente, 1994) have mentioned similar differences. This study confirms the need to design better strategies to strengthen the involvement of adolescent males.

In conclusion, the program evaluated in this study should have implications for the design of educational strategies in Mexico. Although the Mexican society can be characterized as sexually conservative, the majority of the population is in favor of sexuality and life skills education in schools. National opinion polls have indicated

that the majority of parents in Mexico would like to see schools take on more responsibility for sexuality and life skills education (Pick, Givaudan & Brown, 2000). Currently, after strong opposition from conservative groups, actions are being taken to strengthen health and life skills education in the country and properly evaluated programs are urgently required to optimize efforts and expenditures. Non-governmental and governmental organizations in various developing countries are negotiating with authorities to counteract effects of lack of sexual education, and to promote changes in health and educational policies. The structuring of programs according to the needs of populations and the evaluation of these programs for efficiency and effectiveness are fundamental. More research is needed to explore the relevant variables and the strategies that are required for rural and indigenous adolescents in developing countries as well as for urban adolescents who are out of the schools or have not reached high-school level. Studies to test the generalizability of the present explanatory model and the effects of the intervention program in other Latin-American populations offer a window of opportunity to expand our findings.

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Summary

School-based HIV prevention programs represent one of the most efficient channels for influencing adolescents. This thesis deals with theoretical, methodological, and applied aspects of health intervention programs in the field of sexual education and AIDS prevention. The first aim of the study was to develop and test an explanatory theoretical model in order to understand the predictors of safe-sex behaviors among young Mexican adolescents most of whom had not yet sexual experience. The explanatory model was mainly based on two theories, namely Bandura's social cognitive theory and the theory of reasoned action. The second aim of the study was the application and evaluation of a life skills and sexuality education program that was implemented at high school level. The intervention program *A team against AIDS* consisted of a standardized 40 hours teacher's training and the subsequent delivery of the program to adolescents during one school semester (30 hours), in order to promote skills and knowledge associated with safer sex behavior. In order to assess the effects of the intervention, a quasi-experimental design with an experimental and a control group (constituted by two schools each) and four measurement occasions was used. Data were collected prior to the intervention, at the end of the intervention, 6 months after the intervention and 12 months after the intervention.

Explanatory model. Using structural equation modeling, a good fit was found for two path models. The first resulting explanatory model included data from 2011 adolescents. The model provided three levels of variables: personal resources (self-esteem, decision-making and self-efficacy); mediating and moderating variables (knowledge about HIV prevention, attitudes toward condoms, and subjective norms about the use of condoms) and outcome variables (communication and intentions to use condoms). These last two variables were considered as proximal precursors contributing to safe practices when adolescents become sexually active.

A second model was obtained for the subgroup of 319 adolescents who reported previous sexual experience. In this model safe sex was the outcome variable. The model showed a good fit and presented similar relationships between the precursor

variables as the previous one. The strongest paths were from attitudes to subjective norms and from attitudes to intentions. Self-efficacy had a significant influence on both the mediator variables and the outcome variables, specifically on attitudes toward condoms, knowledge, intentions to use condoms, subjective norms about the use of condoms, and partner communication. Predictors of safe sex included self-efficacy, norms about the use of condoms, intentions to use condoms and partner communication.

Results of the explanatory model(s) are in line with the theory of reasoned action, which states that a proximal determinant of behavior is the intention to perform that behavior, which in turn is determined by attitudes and subjective norms.

Evaluation of the intervention. Two studies were carried out. The first evaluation compared pre- and post-measurements in order to assess the immediate effects of the program; the second evaluation assessed the longer-term effects of the intervention. In the pre-post comparison, significant increases in all precursors of safe sex were found in the experimental group using a multivariate analysis of variance. The major effects reflected greater knowledge about HIV/AIDS prevention and more positive attitudes toward the use of condoms. Subjective norms, partner communication and intentions had a medium size effect, and the variables at the first level of the model, which reflect personal dispositions, had a smaller effect in the intervention program. These results confirmed that the initial and easier changes in this type of intervention occur at the cognitive level, and in knowledge and attitudes; it requires a longer process of intervention to obtain sizable effects in personality dispositions. It may be noted that the intervention did not affect the rate of sexual relations in these adolescents.

The long-term impact of the treatment (one year of follow-up) was assessed using multilevel analyses. Results demonstrated a general trend in all variables. Increases were highest immediately after the intervention, and were followed by slight decreases at follow-up. Despite the decreases there were still notable differences between control and experimental group at the final measurement occasion. The largest effect sizes were found (and maintained) for knowledge and attitudes, and the smallest effects were for self-efficacy and partner communication. In the case of sexually active adolescents, protective behavior did not show significant differences between control and experimental group. There was an increase in protective behavior in the experimental group, but this was not significant in comparison with the control group. This lack of statistical significance may have to do with small numbers of sexually active participants in both the experimental and the control group.

This study has important implications for the development of early preventive interventions for high-school adolescents. The intervention showed a significant effect not only for knowledge and attitudes, but also for other psychological precursor variables related to active prevention. The intervention showed a strong stability of

the effect sizes at the follow-up. The results are more conclusive for the adolescents without sexual experience. A limitation of the study was the low number of sexually active adolescents, which limited the conclusions about the effectiveness of the program on actual safe-sex behavior.

The significant effects of the program combined with their relevance in the theoretical model have implications for the design of intervention programs for Mexican adolescents. It has to be taken into account that open partner communication and the intentions to use condoms are proximal precursors likely to contribute to safe practices when adolescents become sexually active. Self-efficacy has a significant effect on most of the variables included in the model, more specifically on attitudes toward condoms, knowledge, intentions, subjective norms, and partner communication.

This study confirms the need to design integral strategies based on life-skills with a view to strengthen early preventive interventions that can be implemented through schools. Future studies on interventions with sexually experienced adolescents are needed in order to analyze the effects on actual behavior.

Samenvatting

Interventieprogramma's die op school aangeboden worden vormen één van de meest efficiënte manieren om HIV preventie bij adolescenten te bewerkstelligen. Dit proefschrift gaat over theoretische, methodologische en toegepaste aspecten van interventieprogramma's voor seksuele voorlichting en AIDS preventie. Het eerste doel van de studie was het ontwikkelen en testen van een verklarend model gericht op een beter begrip van de predictoren van veilig seksueel gedrag bij jonge Mexicaanse adolescenten van wie het merendeel nog geen seksuele ervaring had. Het model was voornamelijk gebaseerd op twee theorieën, namelijk Bandura's sociaal-cognitieve theorie en de 'theory of reasoned action'. Het tw eede doel van de studie was de toepassing en evaluatie van een interventieprogramma voor 'life skills' en seksualiteit op middelbare school niveau. Dit interventieprogramma, *'A team against AIDS'*, bestond uit een gestandaardiseerde training van 40 uur voor leraren die daarna het programma in een semestercursus van 30 uur aan de adolescenten presenteerden, met het doel vaardigheden en kennis ten aanzien van veiliger seksueel gedrag te bevorderen. Om de effecten van de interventie te evalueren werd gebruik gemaakt van een quasi-experimenteel design met een experimentele en een controle groep. Data werden verzameld voorafgaande aan de interventie, direct na afloop, 6 maanden na de interventie en 12 maanden na de interventie.

VERKLAREND MODEL

Met behulp van structurele vergelijkingsmodellen werden twee goed passende padmodellen gevonden. Het eerste verklarende model was gebaseerd op gegevens verkregen van 2011 adolescenten. Het model liet drie niveaus van variabelen zien:

- persoonlijke kwaliteiten, ('self-esteem', beslissingen nemen en 'self-efficacy'),
- mediërende en modererende variabelen (kennis over HIV preventie), attitudes ten aanzien van condooms en persoonlijke normen ten aanzien van het gebruik van condooms),
- uitkomstvariabelen (communicatie met partner en intenties om condooms te gebruiken).

De laatste twee variabelen werden beschouwd als predictoren die vrij direct bijdragen aan veilig gedrag wanneer adolescenten seksueel actief worden. Een tweede model werd verkregen voor de subgroep van 319 adolescenten die eerdere seksuele ervaring aangaven. Ook dit model waarin veilig vrijen de uitkomstvariabele was, had een goede passing en vertoonde overeenkomstige relaties tussen variabelen als het voorgaande model. De hoogste padcoëfficiënten werden gevonden voor de relaties tussen attitudes en persoonlijke normen, en tussen attitudes en intenties. 'Self-efficacy' had een significante invloed op beide mediërende variabelen en op de uitkomstvariabelen, met name op attitudes ten aanzien van condooms, kennis, intenties om condooms te gebruiken, en communicatie met partner. Veilig vrijen werd voorspeld door 'self-efficacy', normen ten aanzien van condoomgebruik, intenties om condooms te gebruiken en communicatie met partner.

De resultaten van de verklarende modellen zijn in overeenstemming met de 'theory of reasoned action' die stelt dat intenties om iets te doen een determinant vormen van gedrag en dat deze intenties op hun beurt bepaald worden door attitudes en persoonlijke normen.

EVALUATIE VAN DE INTERVENTIE

Twee onderzoeken werden uitgevoerd. De eerste evaluatie vergeleek de voormeting en de eerste nameting en was bedoeld om de effecten van het programma vast te stellen direct na afloop; de tweede evaluatie vergeleek de langere termijn effecten van de interventie. In de vergelijking tussen voor- en nameting met multivariate variantieanalyse werden in de experimentele groep significante verhogingen gevonden voor alle aan de uitkomstvariabelen voorafgaande concepten in het model. De belangrijkste effecten waren een grotere kennis over HIV/AIDS preventie en positievere attitudes ten aanzien van condoomgebruik. Persoonlijke normen, communicatie met partner en intenties vertoonden effecten van middelmatige grootte en de variabelen op het eerste niveau van het model, die persoonlijke disposities reflecteren, lieten kleinere effecten zien. Deze resultaten bevestigden dat de initiële en gemakkelijkere veranderingen bij dit soort interventie plaats vinden in kennis en attitudes; het vereist een langer proces van interventie om beduidende effecten te verkrijgen ten aanzien van persoonlijkheidsdisposities. De interventie had overigens geen invloed op het aantal seksuele contacten van deze adolescenten.

De lange-termijn effecten van de interventie (follow-up tot een jaar) werden vastgesteld met multiniveauanalyses. De resultaten lieten een algemene trend zien op alle variabelen. Scoreverbeteringen waren groter onmiddellijk na de interventie; bij de follow-up metingen waren de scores iets lager. Ondanks deze lagere scores waren er nog aanmerkelijke verschillen tussen de controlegroep en de experimentele groep bij de laatste meting. De grootste effecten werden gevonden (en werden gehandhaafd) voor kennis en attitudes, en de kleinste effecten voor 'self-efficacy' en communicatie met partner. Bij de seksueel actieve adolescenten werden er geen significante ver-

schillen gevonden tussen de controlegroep en de experimentele groep. Er was weliswaar een scoreverbetering in de experimentele groep, maar die was niet significant hoger dan in de controle groep. Dit ontbreken van statistisch significantie kan liggen aan de kleine aantallen adolescenten in zowel de experimentele als de controlegroep die voorgaande seksuele ervaring rapporteerden.

Deze studie heeft belangrijke implicaties voor de ontwikkeling van vroege preventieve interventies bij adolescenten in het middelbaar onderwijs. De evaluaties wezen op een significant effect niet alleen voor kennis en attitudes, maar ook voor andere met preventie geassocieerde psychologische variabelen. Er was een hoge mate van stabiliteit in de effecten bij de latere follow-up metingen. De resultaten zijn duidelijker voor de adolescenten die voorafgaande aan het programma geen seksuele ervaring rapporteerden. Het kleine aantal seksueel actieve adolescenten vormde een beperking voor mogelijke conclusies over de effectiviteit van het programma voor veranderingen in het eigenlijke seksuele gedrag.

De gevonden significante effecten samen met hun betekenis in het theoretisch model hebben implicaties voor het ontwerp van interventieprogramma's voor adolescenten in Mexico. Het lijkt duidelijk dat open communicatie met de partner en de intentie om condooms te gebruiken direct bijdragen aan veilig vrijen wanneer adolescenten seksuele relaties aangaan. Verder heeft 'self-efficacy' een significant effect op de meeste variabelen in het model, vooral op attitudes ten aanzien van condooms, kennis, intenties, persoonlijke normen, en communicatie met partner. Deze studie bevestigt de behoefte aan een integrale aanpak gebaseerd op een 'life-skills' benadering bij de ontwikkeling van op interventie bij jongeren gerichte programma's die op school kunnen worden toegepast. Verder onderzoek is nodig om de effecten van interventie op het eigenlijke seksuele gedrag te analyseren.

Curriculum Vitae

Martha Edith Givaudan Moreno graduated as a Clinical Psychology at the National Autonomous University of Mexico (UNAM) in 1980. From 1991-1993 she carried out her masters studies in Social Psychology at the same university. She worked for ten years at the Instituto Nacional de Perinatología, Mexico, in the area of research on children and adolescents. She has been worked since 1990 at the Instituto Mexicano de Investigación de Familia y Población, A.C (IMIFAP) as researcher. She is author and co-author of more than 20 books and didactic materials of support in the area of family life education and health, and has collaborated with the Ministry of Public Education in Mexico in the preparation of books and materials. She was accepted as PhD candidate at Tilburg University in 2000.

Martha Givaudan (1956) studied Psychology at the National Autonomous University of Mexico (UNAM). From 1991-1993 she carried out studies for her Master's degree in Social Psychology at the same university. As of 2000, she conducted her PhD at Tilburg University in the Netherlands. Givaudan is currently Vice-President at Instituto Mexicano de Investigación de Familia y Población (IMIFAP), a Mexican NGO dedicated to evaluation and programming on education and health throughout Latin America. Her main interests are on research, development and evaluation of health education programs for children and adolescents. This book presents the results from her PhD research on an HIV/AIDS preventive intervention for high-school students.

School based HIV/AIDS prevention programs represent one of the most efficient channels for influencing adolescents. This thesis includes theoretical, methodological, and applied aspects of health intervention programs in the field of sexual education. The first aim of the study was to develop and test an explanatory theoretical model of the predictors of safe-sex behaviors among Mexican adolescents most of whom had no sexual experience. The explanatory resultant model showed that the main precursor variables of safe sex behaviors for Mexican high school students without sexual experience were partner communication and intentions to use condoms. The second aim was to implement and evaluate, based on the explanatory theoretical model, a life skills and sexual education program for adolescents. Significant differences between the control and experimental groups were found. The intervention had a significant effect on knowledge and attitudes, as well as psychological predictor variables related to active prevention. The study confirms the need to design integral strategies based on life-skills as well as the mediator and moderator variables included the model, to strengthen early preventive VIH/AIDS interventions that can be implemented through schools.

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