

HUMAN FERTILITY  
WHERE FAITH AND SCIENCE MEET

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RICHARD J. FEHRING &  
THERESA NOTARE  
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## A RANDOMIZED CONTROL TRIAL OF TEEN STAR

PILAR VIGIL, MANUEL E. CORTÉS, HANNA KLAUS

The Teen STAR (Sexuality Teaching in the context of Adult Responsibility) program avoids the two extremes of sexuality education—abstinence-only or “comprehensive”—as it balances the facts of fertility with the emotional, cognitive, social, and spiritual aspects of human sexuality.

A primary and secondary program was initiated to prevent sexual activity among Chilean teens aged 12–18 years old. Among the females who participated in the program, only 3.4% transitioned from virginity to intercourse, compared with 12.4% of control females who did not participate in the program. Among the males who participated in the program, only 8.8% transitioned from virginity to intercourse, compared with 17.6% of control males who did not participate in the program. Twenty-one percent of sexually active program subjects discontinued intercourse, compared with 9% controls. Of those program subjects who discontinued intercourse, none resumed activity at the end of one year, whereas 11.7% of control subjects did resume sexual activity.

Pregnancy rates were studied among female students who participated in Teen STAR versus female students who did not participate in the program (i.e., the control group). Average pregnancy rates per year were 0.87% in the program group and 4.87% in the control group during the follow-up period.

### INTRODUCTION

During the last twenty-five years, there have been extensive efforts to reduce the consequences of risky adolescent sexual behaviors by programs classified either as abstinence-only or as comprehensive sexuality (also known as abstinence-based education, safer-sex, secular, or abstinence-plus programs) education programs (Thomas 2000, Silva 2002). The first kind of program—



abstinence-only sex education programs, which the United States government defined under Section 510 of the 1996 Social Security Act—can be perceived as inherently coercive in the sense that they do not promote free choice on the part of the teen participant. They can also be seen as authoritarian in approach. The second kind of program—comprehensive sexuality education—also promotes abstinence as the first and best choice for preventing pregnancy and sexually transmitted diseases (STDs), including Human Immunodeficiency Virus (HIV), but it also provides education and sometimes services regarding all contraceptive methods. These comprehensive sexuality education programs are designed to assist students in becoming well-informed decision makers (Pittman 2006), but these programs sometimes view the consequences of sexual behaviors mechanistically, or isolated from social and individual values.

Although controlled randomized evaluation has been scant for both approaches (Silva 2002), the available evidence suggests that adolescent sexual behavior is a complex phenomenon and that addressing it requires an integrated, sophisticated approach that is not unduly bound by ideological simplicity (Kirby 2001).

The Teen STAR (Sexuality Teaching in the context of Adult Responsibility; see: [www.teenstar.cl](http://www.teenstar.cl) and [www.teenstarprogram.org](http://www.teenstarprogram.org).) program began twenty-seven years ago in an attempt to offer a program of education in human sexuality that encompasses the whole person. In so doing, the program has avoided the two extremes of abstinence-only and comprehensive sexuality education programs.

Teen STAR is an interactive, holistic education program in human sexuality leading to the acceptance of one's own sexuality and fertility. It involves feelings as well as intellect, requires that fertility patterns be learned through observation, and demands both parental participation and teacher-student confidentiality. Learning through observation challenges teens to integrate their biological capacity to be fathers or mothers into all aspects of their lives, i.e., social, emotional, intellectual, spiritual, and physical aspects of their sexuality (Vigil 2004a; de Malherbe 2005). Adolescence can produce a temporary "deafness" to the teachings that adults would like to transmit to young people (Hall et al. 2004). Teens need to make decisions about their own behavior, make their own discoveries, and reach

their own conclusions. Adolescents are immersed in the task of establishing their own ego identity. This requires at least a theoretical distancing from the "parental ego". Knowledge of their fertility helps them understand their sexuality (Vigil et al. 2006a, 2006b), as well as their capacity to procreate. Experiencing their body's messages about fertility and its potential for procreation is a source of intellectual learning for teens. Additionally, it allows teens to choose to express this potential with total freedom and to save it for a committed relationship: marriage (Vigil et al. 2002a). At the same time, parental involvement is still an important component of the Teen STAR program. Other studies have also shown that parental participation in interventions appears to be associated with a higher tendency toward abstinence (Silva 2002).

To reach these goals, Teen STAR develops the following areas:

1. Improving self-identity and self-esteem. Adolescents need to know who they are, so they are encouraged to become aware of themselves as free, if limited, persons.
2. Valuing their freedom and decision-making ability. Teens are informed about free and responsible choices. Self-control is a prized fruit that feeds on self-knowledge.
3. Building a feeling of respect for the gift of life. Human life is a gift, received to be given. Only those teens who value their own life will be able to present it as a gift to others. If youngsters despise themselves, they will despise life and will not consider their possible surrender as a precious gift.

#### PURPOSE OF THE STUDY

The objective of the present review is to analyze the results obtained with the Teen STAR program in two randomized, controlled trials: (1) a study conducted to evaluate the effect of Teen STAR on sexual behaviour among Chilean female and male adolescents (Vigil et al. 2005a) and (2) a study conducted to evaluate the effect of Teen STAR on teenage pregnancy rates in Chilean adolescent girls (Cabezón et al. 2005).

## METHODOLOGY

### TEEN STAR TEACHER TRAINING

Teachers from different schools voluntarily participating in the study were trained in a five-day seminar-workshop at the Pontifical Catholic University of Chile (PUC), Santiago. They were prepared to develop all units of the Teen STAR program with the students and hold effective meetings with parents. Teen STAR has different developmental curricula, differentiated on the basis of age, sex, and school class. Each curriculum has 14 units (Cabezón et al. 2005):

1. Initial session and introduction to the program
2. Differences between genders
3. Identification of prejudices on female and male's features
4. Anatomy and physiology of human reproductive system
5. Puberty, fertility in women, and fertility in men
6. Fertility awareness, registration of fertility records (classes distributed along the course)
7. Knowing emotions and controlling behaviors
8. The manipulation of sexuality in media
9. Self-assurance and maintaining decisions
10. Marriage, family, and parenthood
11. Beginning of life, value of human life
12. Family planning methods, contraception
13. Pregnancy, delivery, breastfeeding
14. Final session and feedback

The units are delivered in one or more 45–90 minute sessions. Progression depends on satisfactory completion of each unit by the students before passing to the next unit.

Teachers were trained to maintain fluent communication with parents, while at the same time respecting the confidentiality of com-

munications with students. Personal interviews with the students are an integral aspect of the program, so teachers were also trained in counselling skills. Each teacher received a Teen STAR manual including the curricula and supplementary articles and audiovisual materials, such as posters, videotapes, and CDs.

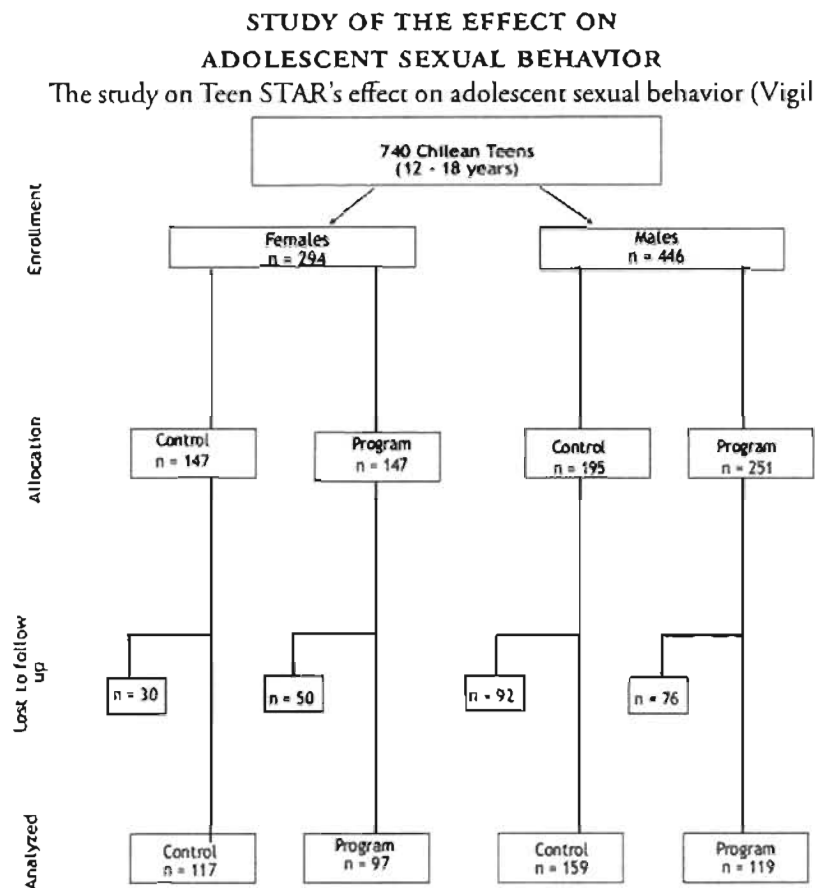


Figure 1: Flow of Participants through Each Stage of the Study of the Effect of Teen STAR on Adolescent Sexual Behavior

et al. 2005a; 2005b) included 740 Chilean white teens (12–18 years old) attending 10 basic schools or high schools (Figure 1). The study and control groups consisted of students in the same grade in classes

of 30 to 40 students. They were randomly divided into program and control groups by drawing the letter of the class from a black bag. The program group ( $n = 147$  females, 251 males) consisted of those teens who participated in the Teen STAR program with parental consent. A trained Teen STAR teacher who was part of the school's staff and had voluntarily agreed to participate in the training workshop worked with the program group over eight months. The program's curricula, differentiated on the basis of age, sex, and school class, were offered twice a week during school hours. In addition, at least one personal interview was conducted with each student as part of the program. The intervention with parents consisted of three meetings along the school year, which described the characteristics of the program and physical and psychological development of teens and requested parents' feedback. Program impact was assessed by means of anonymous pre- and post-program questionnaires administered to study and control subjects (Vigil et al. 2005a).

The control group ( $n = 147$  females, 195 males) comprised students with similar characteristics (same age, sex, and socioeconomic and educational levels) from parallel classes at each school who did not participate in the Teen STAR program and received the regular school education. These students also completed the pre- and post-program questionnaires. Questionnaires were given at the same time to control and program students. The questionnaires for both groups were identified by a name chosen by each student and known only to him or her. The completed questionnaires were placed into a special box, which was sealed in front of the students. The box was then submitted to a statistician. The pre- and post-program responses of the control group and the program group were compared. The surveys contained 135 questions about diverse topics. Their analysis allowed evaluation of the impact of the Teen STAR program on the teens' sexual activity via rates for (1) primary abstinence, (2) discontinuation of intercourse, (3) resumption of sexual activity, and (4) influence of the curriculum on abstinence (Vigil et al. 2005a).

The study was approved by the directing councils of all participating educational establishments, as well as by the Ethics Committee of the Faculty of Biological Sciences of the Pontifical Catholic University of Chile, Santiago.

The study included all those teenagers willing to take part who had their parents' consent. Before the initiation of the study, all adolescents younger than 12 and older than 18 years of age (both ends of the normal distribution curve) were excluded. Also excluded from the outcome analysis were all those students whose pre- and post-tests either were missing identifiers (e.g., missing date of birth) or had internal inconsistencies or unreliable data, (e.g., noncorrelated questionnaires in terms of date of birth and ID code, omitted questions, or noncorrelated answers to paired questions in the questionnaire). For certain variables, exclusion criteria were lack of answer or dissenting replies (e.g., saying he/she had intercourse in pre-program questionnaire and saying he had not in post-program questionnaire) to a specific question (Vigil et al. 2005a).

The statistical study employed a student's t-test and analysis for sample homogeneity for dropouts in both groups.

#### STUDY OF THE EFFECT OF TEEN STAR ON TEENAGE PREGNANCY

A randomized, controlled study to evaluate the efficacy of the program in preventing adolescent pregnancy (Cabezón et al. 2005) was conducted that compared intervention with the Teen STAR program with no intervention in a public girls school in San Bernardo, a peripheral community of Santiago, Chile. The trial included a total of 1,259 Chilean white girls, 15 to 16 years old at the time they joined the study, who were divided into three cohorts depending on what year they started high school: the 1996 cohort of 425 students, in which no one received intervention; the 1997 cohort, in which 210 students received Teen STAR and 213 (control group) did not; and the 1998 cohort, in which 328 students received Teen STAR and 83 (control group) did not (Cabezón et al. 2005; Rev. Pan. 2005) (Figure 2 [next page]). As in the previous study, participants were randomly divided into program and control groups by drawing the letter of the class from a black bag. The classes each had 30 to 35 girls. The 1998 cohort included more girls in the program group. This was because initial results obtained with the 1997 cohort showed a decrease in pregnancy rates, so we were asked to expand the program group. Eight teachers were available, so the program group included eight classes (328 girls) for the 1998 cohort. All cohorts were fol-

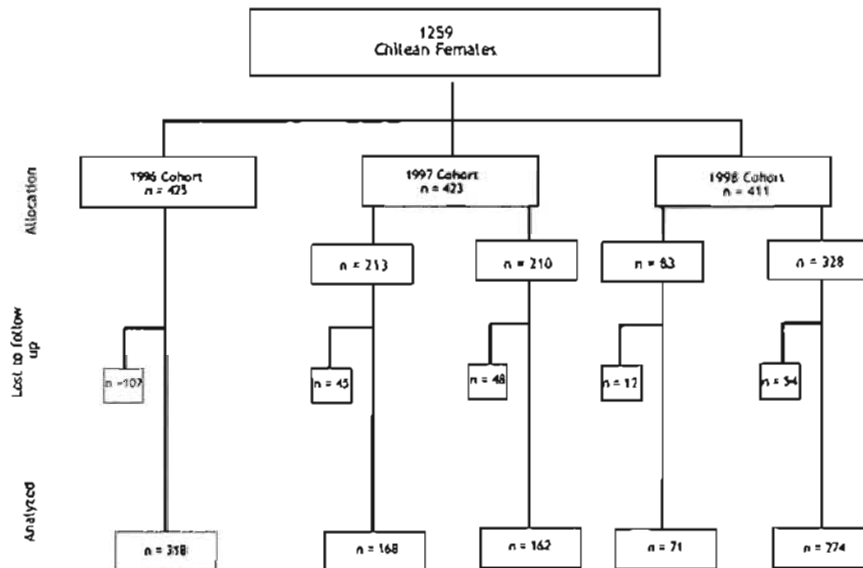


Figure 2: Flow of Participants Through Each Stage of the Study of the Effect of Teen STAR on Teenage Pregnancy Prevention

lowed for four years; pregnancy rates were recorded for program and control groups. Pregnancy rates were measured, and risk ratio (RR) with 95% confidence interval (CI) was calculated for program and control groups in each cohort. The homogeneity test consisted of the application of the chi-square ( $\chi^2$ ) test (Cabezón et al. 2005).

## RESULTS

### EFFECT ON ADOLESCENT SEXUAL BEHAVIOR

In the program group, 8.8% of virgin males and 3.4% of virgin females transitioned to sexual activity, versus 17.6% of virgin males and 12.4% of virgin females in the control group ( $p = 0.004$ ) (Vigil et al. 2005a; 2005b) (see Figure 3 [next page]). The delay observed in the initiation of sexual activity within the program group was similar for females and males (V-square = 0.32;  $p = 0.571$ ); V-square is a corrected  $\chi^2$  value obtained from a 2 x 2 table) (Cortés et al. 2006). Within the group of sexually active students, 20.5% of program students discontinued sexual activity (i.e., had no act of intercourse within the final three months), compared with 9% of students in the

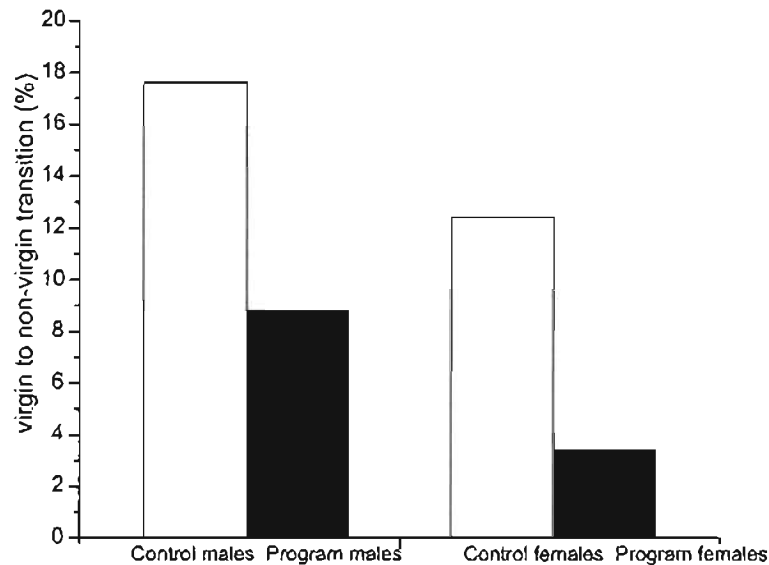


Figure 3: Transition Rates of Sexual Activity in Program and Control Students for Males and Females

control group who discontinued sexual activity ( $p \leq 0.03$ ). Among students who had initiated sexual activity before the intervention, but who were sexually inactive at the time the study began, 11.7% of the control group resumed intercourse during the period of the study, while none of the students in the program group did (Vigil et al. 2005a). Adolescents participating in the program exhibited an increase in the number of reasons for not having intercourse, or “maintaining abstinence,” from one reason at the beginning of the program to three reasons at the end of it (Vigil et al. 2005a).

#### EFFECT ON TEENAGE PREGNANCY

Over the four-year follow-up, 6 pregnancies occurred in the program group and 35 in the control group. Average pregnancy rates per year were 0.87% for the program and 4.87% for the control group during the follow-up period. For the 1996 cohort (no intervention), the pregnancy rate was 14.7%. For the 1997 cohort, the pregnancy rates were 3.3% and 18.91% for program and control groups, respec-



tively (RR: 0.17619, CI: 0.0759–0.4086). For the 1998 cohort, the pregnancy rates were 4.43% and 22.66% for program and control

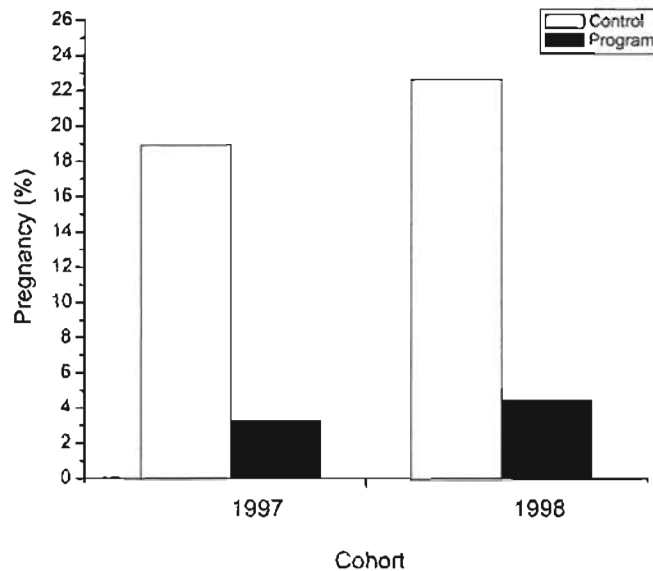


Figure 4: Overall Cumulative Pregnancy Rates over 4-Year Follow-Up for the 1997 and 1998 Cohorts

groups, respectively (RR: 0.19574, CI: 0.0995–0.3848) (Cabezón et al. 2005; Rev. Pan. 2005) (see Figure 4). Program adolescents also exhibited a significant change in their reasons for abstinence, particularly “I can’t seem to find the right person” and “I don’t feel ready,” suggesting an internalization of their locus of control. They pointed out that they felt less prepared to have sexual intercourse. A reverse trend was found in the control group adolescents for the second of the above reasons (being one year older, they felt better qualified to initiate sexual activity), while choices for the first reason remained unchanged (Cabezón et al. 2005).

#### DISCUSSION

Although many sex education programs have been conducted and lavish amounts of money have been spent, it is well known that teenage pregnancies continue to be a significant problem. In Chile,

15.6% of all live births in the 1996–1998 period involved mothers younger than 20 years. Therefore, in Chile, about 40,000 teens become mothers every year (Vigil et al. 2005a), and this does not consider illegal abortions or pregnancies starting at 19 and ending at 20 years (Álvarez et al. 1990; Delpiano and Aguilera Reyes. 2001).

In countries such as the United States, teenage pregnancies have decreased during the last 15 years, but still about 800,000 adolescents give birth each year. It should be noted that the decrease in teenage pregnancy rates is different according to ethnic groups. Currently, the highest pregnancy rates are within the Hispanic groups (Brindis 2006).

Adolescents are at high risk of contracting STDs: nearly one half of new reported cases occur among 15 to 24 year old people (Brindis 2006). Teens' perceptions of invulnerability (Hall et al. 2004), teen pregnancies, and the increasingly earlier initiation of sexual activity signal an urgent need to provide effective sex education programs to this age group.

DiCenso's meta-analysis (DiCenso et al. 2002) of primary prevention strategies found that provision of contraception, even while acknowledging that abstinence is preferable, did not delay the initiation of sexual intercourse or improve use of birth control among young men and women. Nor was there a reduction in pregnancies among young women, while the interventions increased pregnancies in partners of male participants.

Other studies, in addition to ours, have demonstrated that sexual education programs can have an impact in the delay of initiation of sexual activity and teen pregnancies (Olsen et al. 1991; Darroch et al. 2000; Sather and Zinn 2002; Rev. Pan. 2005). These programs promote a person's sense of worth, together with free and informed decision making, and appear to have greater impact on teens. A program that embraces all aspects of the human person leads to satisfactory outcomes. Teen STAR is such a program. It has resulted in (a) increased tendency toward abstinence, (b) discontinuation of sexual activity, and (c) taking personal responsibility for decisions about when to give oneself to another. An additional factor to be considered is parental involvement. Our program included three meetings with parents. A positive correlation between parental involvement

and delay in initiating of sexual activity has been shown (Klaus et al. 1987). For this reason, we believe that including and integrating parents is a key factor in the success of the program.

Attitudes precede behavior change; hence, changes in attitude toward primary (decides to abstain from intercourse without having had it previously) or secondary abstinence (decides to abstain from intercourse having had it previously) are significant. When these changes settle in, a holistic perception and transformation of life can be expected. Understanding the following factors helps Teen STAR foster changes in attitude:

1. **The psychological underpinnings of the increased tendency toward abstinence.** Teen STAR's anthropological rationale encourages the free decisions not only by adolescents (our first and foremost goal) but also by anyone who says yes to the program. The above data show that the values people get in touch with work both through their innate appeal and through group interaction (i.e., increased awareness of one's own dignity and the value of freedom).
2. **Causes for discontinuation of sexual activity.** The participants' post-test responses appear to show that they stopped activity as a result of a changed perception of themselves, rather than out of boredom or peer pressure.
3. **Strong personal decisions, reached through internalized understanding of one's procreative capacity.** The focus on personal decisions shows the value of the Teen STAR program as a proposal with a future—with firm roots. The program is based on convictions and adherence to values.

This study showed a decrease in initiation of sexual activity, along with an increase in discontinuation of sexual activity. Analysis of the long-term effects of this type of intervention is important and has not been done sufficiently. Preliminary studies indicate that continued observation and attention to the girls' fertility patterns reinforces their decision to remain, or return to, abstinence. The reduction in pregnancies was sustained in the groups of girls who participated in the program. However, the goal of long-term follow-up of these students to assess behavior after high school still needs to be met.

We believe that the effectiveness of the Teen STAR program is mainly based on certain characteristics that make it substantially dif-

ferent from both abstinence-only and comprehensive sexuality education programs. Fertility awareness, coupled with placing a high value on possessing fertility, in terms of both future procreation and present understanding of their bodily processes, makes the program a whole-person experience whose impact may well last for the rest of participants' lives. Generally, self-esteem and self-confidence result from integrating what one understands of oneself into making one's own decisions about all behaviors.

For teens, recognizing their fertility not only leads to better knowledge of themselves but also can become a tool for them to recognize various endocrine-metabolic pathologies. Specifically, among girls, certain gynecological problems can be discovered through the charting of their fertile period by the observation of the different patterns of cervical mucus, as well as the regularity of their menstrual cycles (Vigil et al. 2006a, 2006b). Some disorders, such as polycystic ovarian syndrome, can be suspected in patients who have noticed abnormal cervical mucus patterns, as well as an abnormal distribution of adipose tissue in the body. Symptoms of other pathologies, such as ovarian and adrenal tumors, problems in the hypothalamo-hypophyseal-gonadal axis, and autoimmune diseases, could also be identified from the cervical mucus patterns, a tool that every woman should be familiar with (Vigil 2004b). In the case of males, appropriate learning of their anatomy and physiology could help them to discover emerging problems at their juvenile stages, such as obesity, hypo- and hyperandrogenism, abnormal development of their genitals, growth dysfunctions, and STDs such as *Chlamydia trachomatis*, an infection that can impair the fertility of men as well as women (Vigil et al. 2002b; Gonzales et al. 2004; Vigil and Cortés 2006). Prompt recognition of abnormalities would hasten medical diagnosis and treatment.

Today's challenge for educators is to help young people to perceive sexuality as a whole, including all dimensions of one's human experience. Reason, freedom, and emotions should be integrated into sex education programs. Programs should overcome the tendency to separate affections and emotions from bodily requirements, as well. Personal actions such as precocious sexual activity not only can cause undesirable consequences, e.g., unintended teen pregnancies and the

contraction of STDs, but also have an impact on the adolescent's psyche and emotions.

### CONCLUSIONS

The Teen STAR program delayed sexual initiation among virgins and facilitated discontinuation of sexual activity among sexually active students: program students found more reasons to maintain sexual abstinence than control students (Vigil et al. 2002a; Vigil et al. 2005a). The program was also effective in preventing unintended adolescent pregnancies (Cabezón et al. 2005; Rev. Pan. 2005). Properly trained high school teachers proved to be efficient in delivering the program. Teen STAR has shown an impact on pregnancy prevention that extends for at least the four years of high school when begun during the first year of high school (Cabezón et al. 2005).

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