

Original article

Adolescent pregnancy prevention: an abstinence-centered randomized controlled intervention in a Chilean public high school

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Abstract

Purpose: To evaluate the efficacy of an abstinence-centered sex education program in adolescent pregnancy prevention, the TeenSTAR Program was applied in a high school in Santiago, Chile.

Methods: A total of 1259 girls from a Santiago high school were divided into three cohorts depending on the year they started high school: the 1996 cohort of 425 students, which received no intervention; the 1997 cohort, in which 210 students received an intervention and 213 (control group) did not; and the 1998 cohort, in which 328 students received an intervention and 83 (control group) did not. Students were randomly assigned to control and intervention groups in these cohorts, before starting with the program. We conducted a prospective, randomized study using the application of the TeenSTAR sex education program during the first year of high school to the intervention groups in the 1997 and 1998 cohorts. All cohorts were followed up for 4 years; pregnancy rates were recorded and subsequently contrasted in the intervention and control groups. Pregnancy rates were measured and Risk Ratio with 95% confidence interval were calculated for intervention and control groups in each cohort.

Results: Pregnancy rates for the intervention and control groups in the 1997 cohort were 3.3% and 18.9%, respectively (RR: 0.176, CI: 0.076–0.408). Pregnancy rates for the intervention and control groups in the 1998 cohort were 4.4% and 22.6%, respectively (RR 0.195, CI: 0.099–0.384).

Conclusions: The abstinence-centered TeenSTAR sex education intervention was effective in the prevention of unintended adolescent pregnancy. © 2005 Society for Adolescent Medicine. All rights reserved.

Keywords:

Adolescent pregnancy prevention; Abstinence-only sex education program; TeenSTAR Program

While going through a process of emotional growth in adolescence, teens frequently get involved in risky sexual behaviors that expose them to unintended pregnancy and sexually transmitted infections (STI) [1]. Both conditions

have shown an increase over the last decades in many countries [2,3], including Chile [4,5].

Several studies and programs have dealt with the challenging issue of preventing adolescent pregnancy and some of them have achieved satisfactory results [6,7]. However, as stated by Guyat et al in a meta-analysis [8] and Oakley et al in a review [10], these satisfactory results are usually described only in observational studies, and have not been observed in randomized controlled trials. Most research in

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Table 1
The TeenStar program: 14 units

1. Initial session and introduction to the program
2. Differences between genders
3. Identification of prejudices on male and female's characteristics
4. Anatomy and physiology of human reproductive organs
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 behavior
8. The manipulation of sexuality in media
9. Self assurance and maintaining decisions
10. Marriage and family
11. Beginning of life, value of human life
12. Family Planning Methods, contraception
13. Pregnancy, delivery, breast feeding
14. Final session

this area lacks designs capable of providing conclusive evidence of the program impact [9–11].

It is also important to consider that sex education programs may differ in the messages they propose: most of them are focused on safer sex, promoting access to and use of birth control methods such as oral contraceptives and condoms. Other programs are the so-called “abstinence-centered programs,” which encourage abstinence as a part of sex education. These programs have drawn particular attention lately.

In 1997 we started a sex education program for adolescent girls in a public high school located in San Bernardo, a peripheral community of Santiago, Chile. The program was applied as a randomized, prospective, controlled trial that compared an abstinence-centered intervention with no intervention. The objective of the study was to contrast pregnancy rates among female students who participated in the sex education program (TeenSTAR) with those of other female students who did not take part in the program. We hypothesized that the intervention group would exhibit lower pregnancy rates than the control group.

Methods

Participants

Participants were 1259 teenage girls, all regular high school students, white Hispanics, from middle and low-income families, 15 to 16 years old at the time they joined the study, and enrolled in Liceo A-128 “Elvira Brady,” an all-girls high school in San Bernardo, Chile. All girls included in the study were in their first high school year (corresponds to the 9th year of regular school education in Chile) at the time of the intervention. The students were divided into three cohorts: (a) the 1996 cohort, including 425 students who started high school in 1996, which received no intervention; (b) the 1997 cohort, including 423 students who started high school in 1997; and (c) the 1998

cohort, including 411 students who started high school in 1998. All students who had initiated high school in 1996, 1997, and 1998 were included in the study and followed up during their 4 years of high school.

Procedures

The program was approved by the school's Executive Board and the Bioethics Committees of the participating institutions (Faculty of Medicine of Universidad de Los Andes, Hospital de San Bernardo, Faculty of Biological Sciences of Pontificia Universidad Católica de Chile, TeenSTAR). For the 1997 and 1998 cohorts, the students were randomly assigned to one of two groups: intervention and control. The control groups did not receive a sex education program. All parents of students in the intervention groups were required to sign an informed consent form. Intervention was applied to 210 of 423 students in the 1997 cohort and to 328 of 411 students in the 1998 cohort. Control groups of 213 students and 83 students were created for the 1997 and 1998 cohorts, respectively.

Randomization process

Girls enter the school for their first high school year (equivalent to 9th year). When accepting the girls, the school administration distributes them among 10 classes of 30 to 35 girls each, without previously knowing them. This distribution is random. Among these 10 classes, five of them were alternately selected, as intervention and control groups in the 1997 cohort. As initial results during the first year of the 1997 cohort showed a decrease in pregnancy rates in the intervention group, we were asked to expand the intervention group for the 1998 cohort. There were 8 available monitors this year, so we expanded the intervention group to 8 classes in this cohort, while maintaining a control group of 2 classes that allowed us to complete the follow-up period as initially programmed. These eight classes were chosen blindly, taking the letter of the class from a bag to be intervention group in the 1998 cohort, thus leaving 2 classes as control group in this cohort. This process was done the week before the initiation of the school year, also before meeting the students. Each monitor worked with 35 students.

Table 2
Pregnancy rates—1996 cohort

Year	Grade	n	Pregnancies	%
1996	9th	425	5	1.18
1997	10th	358	14	3.91
1998	11th	339	17	5.01
1999	12th	318	17	5.35
Average		360	13.2	3.86
Total			53	14.7

Table 3
Pregnancy rates—1997 cohort

Year	Grade	TeenSTAR			Control		
		n	Pregnancies	%	n	Pregnancies	%
1997	9th	210	0	0	213	6	2.82
1998	10th	184	3	1.63	189	9	4.76
1999	11th	164	0	0	169	6	3.55
2000	12th	162	3	1.85	168	14	8.33
Average		180	1.5	0.87	185	8.75	4.87
Total			6	3.3		35	18.91

Intervention methods

For the 1997 and 1998 cohorts, the TeenSTAR Program [12] was applied during the first year of high school to students assigned to the intervention group. The TeenSTAR Program is an abstinence-only sexual education program stressing the importance of the biological and physiological aspects of fertility. It delivers special training in fertility awareness, together with the psychological and personal aspects of sexuality.

Intervention consisted of 14 units. Each unit was developed in one or more 45-minute class depending on the achievement of the objectives by the students before going on to the next unit. This allows a full year course in a one class per week pattern (Table 1). Each unit, designed to be interactive, comprised group discussions, brainstorming, fertility awareness instruction, homework, videotapes and skill building activities. Skill building activities were taught with several exercises during the program, such as role playing, dramatizations, and group discussions. Contraception methods were mentioned and explained theoretically in unit 12, although contraceptive use was not recommended. The program recommended sexual abstinence and taught Fertility Awareness registration methods. The tutoring component is achieved by personal, voluntary interviews during the course. These interviews are maintained confidentiality.

Teachers assigned as monitors were regular teachers of any area, related or not to sex education or biology course. All monitors had to approve the 45-hour TeenSTAR training program. No interventions were received by any of the cohorts during the second, third or fourth year of high

school. In the school there was no formal sex education program before 1997. Students in the control arm of the study did not receive any sex education. Since 1999, this program has been included as in the normal curriculum for all students in first year.

Outcome measures

Each cohort was followed up along the 4 high school years. All clinical pregnancies that ended in term or preterm deliveries or in spontaneous abortion were registered by the school administration and attended our hospital for pregnancy control and delivery. The data presented correspond to these pregnancies. Induced abortion is not legal in our country so we do not have reliable data on its rates among our students.

Statistics

The statistical analysis was based on a comparison of the pregnancy Risk Ratio with 95% Confidence Interval for the intervention and control subjects. Homogeneity tests consisted of the application of the Chi-square test. The Stata computer program was used for calculations.

Results

Parental consent

Of the girls in the intervention group, 98.5% (207 of 210) had parental consent in the 1997 cohort, whereas 98.2% (322 of 328) of girls had parental consent in the 1998 cohort. Before giving their consent, parents were com-

Table 4
Pregnancy rates—1998 cohort

Year	Grade	TeenSTAR			Control		
		n	Pregnancies	%	n	Pregnancies	%
1998	9th	328	0	0	83	1	1.20
1999	10th	294	3	1.02	74	4	5.41
2000	11th	279	6	2.15	71	2	2.82
2001	12th	274	4	1.46	71	10	14.08
Average		293	3.2	1.16	75	4.25	5.88
Total			13	4.43		17	22.66

Table 5
Overall cumulative pregnancy rates over 4-year follow-up—1997 and 1998 cohorts

Cohort	TeenSTAR			Control			RR (CI 95%)
	n	Pregnancies	%	n	Pregnancies	%	
1997	180	6	3.3	185	35	18.9	0.17619 (0.0759–0.4086)
1998	293	13	4.4	75	17	22.6	0.19574 (0.0995–0.3848)

pletely informed about the contents of the program. Girls without parental consent were not included in the program.

1996 Cohort

Students in this cohort received no sex education during the follow-up period (1996–1999). Pregnancy rates for the 1996 cohort appear in Table 2. A total of 53 pregnancies occurred in this cohort during the follow-up period, with an average of 13.2 pregnancies per year. Average pregnancy rate was 3.86% per year in this cohort.

1997 Cohort

As stated in Table 3, over the 4-year follow-up, six pregnancies occurred in the intervention group (average: 1.5 pregnancies per year) and 35 in the control group (average: 8.75 pregnancies per year). Average pregnancy rates were 0.87% in the intervention group and 4.87% in the control group during the follow-up period.

1998 Cohort

As stated in Table 4, over the 4-year follow-up, 13 pregnancies occurred in the intervention group (average: 3.2 pregnancies per year) and 17 in the control group (average: 4.25 pregnancies per year). Average pregnancy rates in the intervention group were 1.16 % in the intervention group and 5.88 % in the control group during the follow up period.

Table 5 presents the crude overall pregnancy rates in the 1997 and 1998 cohorts over the 4-year follow-up. A clear protective effect for pregnancy is observed among students who received the sex education program. RR and 95% CIs for pregnancy were 0.1761 (0.0759–0.4086) and 0.1957 (0.0995–0.3848) in the intervention groups of the 1997 and 1998 cohorts, respectively.

Table 6
Pregnancy rates—1996 cohort and control groups of 1997 and 1998 cohorts*

Grade	1996 Cohort		1997 Cohort		1998 Cohort	
	n	%	n	%	n	%
9th	5/425	1.18	6/213	2.82	1/83	1.20
10th	14/358	3.91	9/189	4.76	4/74	5.41
11th	17/339	5.01	6/169	3.55	2/71	2.82
12th	17/318	5.35	14/168	8.33	10/71	14.08
Total	53/360	14.7	35/185	18.9	17/75	22.6

* $\chi^2 = 7.26$; $p = .297$.

Table 6 compares pregnancy rates in the control groups of the 1997 and 1998 cohorts with pregnancy rates in the 1996 cohort (preintervention cohort) for each high school year. Pregnancy rates in the 1996 cohort were similar to those of the control groups in the 1997 and 1998 cohorts. The Chi-square homogeneity test result for these values is $\chi^2 = 7.26$ ($p = .297$), confirming homogeneity among the groups.

During the 4-year follow-up period the dropout rates from school were similar in the three studied cohorts, and also they were similar to historic dropout rates for the school (Table 7). Dropout rates were also similar when comparing the intervention with the control groups for the 1997 cohort (22.9% vs. 21.1%) and the 1998 cohort (16.5% vs. 14.5%). Finally it must be stressed that causes of dropout were also comparable, being related mainly to change of residence and financial problems. There were no pregnancies detected among girls who left the school.

Discussion

In Chile, 15.6% of all live births in the 1996–1998 period involved adolescents between 15 and 19 years [13]. This means that about 40 thousand teens get pregnant each year in our country, excluding illegal abortions, which go unrecorded [13]. The specific fecundity rate for this age group is 40 per 1000, which corresponds with the pregnancy rates observed in the 1996 cohort and in the control groups of 1997 and 1998 cohorts (nonintervention groups) [13]. These data support the idea that the studied school is comparable to other public high schools in our country.

Greater sexual involvement by increasingly younger teenagers leads to unintended pregnancies. Although oral

Table 7
High school dropout rates during follow-up—1996, 1997 and 1998 cohorts

	n Initial	n Final	n Dropout	%
1996 Cohort	425	318	107	25.2
1997 Cohort				
Total	423	330	93	22.0
Intervention	210	162	48	22.9
Control	213	168	45	21.1
1998 Cohort				
Total	411	345	66	16.1
Intervention	328	274	54	16.5
Control	83	71	12	14.5

and other contraceptives are effective pregnancy prevention methods, they have a scant impact on this age group. It is necessary, as a consequence, to provide useful teenage sex education programs. Programs aimed at delaying the start of sexual activity have proved effective in terms of modifying adolescent sexual behavior [14,15]. They promote a person's own sense of worth, together with free and informed decision-making, and appear to produce an impact on adolescents. The application of a program such as TeenSTAR, which embraces all aspects of human behavior, leads to satisfactory outcomes, including the fivefold reduction in pregnancy rates observed in our study.

The results of our study demonstrate that long-term, cognitive-behavioral interventions proposing abstinence can curtail unintended pregnancies among female high school students. The intervention produced the predicted impact on its controlled outcome: a significant reduction in pregnancy rates over long-term follow-up. We do not have reliable data about the modifications on sexual activity and contraceptive use among our students during the follow-up period. Anyway, it must be stressed that our program recommends sexual abstinence, and explains, but does not recommend, the use of contraceptives.

Our intervention supplied accurate and comprehensive information. We think that the leading reason for unintended adolescent pregnancies and STIs is the fact that during adolescence sexual impulse maybe intense. For this reason it may be difficult for adolescents to control their behavior, leading them to assume some risks. Our program addresses this aspect of adolescent life straightforwardly, while helping teens to grow self-esteem, assertiveness and negotiation skills.

Programs must extend for at least one semester—ideally for a full year—to generate changes in habits or reinforce the desired existing habits and behaviors. Teachers are effective monitors for this type of program. They can propose a comprehensive, coherent, abstinence-centered sex education program; also, they can get proficiently involved without affecting their teaching activities. Teacher participation was essential in obtaining the results yielded by our program.

Control groups in our study received no intervention of any kind. Pregnancy rates in control groups of both studied cohorts were similar to those observed in the nonintervention 1996 cohort, so we can assume that contamination of or social effects on the control groups, if any, were minimal.

School dropout rates were similar for the 1996, 1997, and 1998 cohorts, and correspond to the historic rates for the school. In the 1997 and 1998 cohorts there were no differences between the intervention and control groups. Causes of dropout were also similar among these groups, mainly change of residence and economical factors. Dropout rates, consequently, should not be considered as a factor influencing the results obtained.

There are some limitations in our study: first, measurement of pregnancy rates is difficult because it is not possible to know if there were any induced abortions in the control or study groups. Being illegal in Chile, induced abortion is kept in secret, so it is impossible to assess its incidence. Second, reliable data on sexual activity and contraceptive use was not obtained in this study. We think that these limitations do not affect the principal conclusion of the study, which is that the TeenSTAR program is effective in preventing adolescent pregnancies. Further research is needed to elucidate the reasons that explain the preventive effect observed.

Conclusions

The abstinence-only TeenSTAR sex education intervention applied was effective in the prevention of unintended adolescent pregnancies. Properly trained schoolteachers proved to be effective monitors during the application of this program. The program produces an impact in pregnancy prevention, which extends for at least the 4 years of high school if applied during the first year.

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