

Original research article

Sex education and contraceptive use at coital debut in the United States: results from Cycle 6 of the National Survey of Family Growth[☆]

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Abstract

Background: The study was conducted to characterize the relationship between formal sex education and the use and type of contraceptive method used at coital debut among female adolescents.

Methods: This study employed a cross-sectional, nationally representative database (2002 National Survey of Family Growth). Contraceptive use and type used were compared among sex education groups [abstinence only (AO), birth control methods only (MO) and comprehensive (AM)]. Analyses also evaluated the association between demographic, socioeconomic, behavioral variables and sex education. Multiple logistic regression with adjustment for sampling design was used to measure associations of interest.

Results: Of 1150 adolescent females aged 15–19 years, 91% reported formal sex education (AO 20.4%, MO 4.9%, AM 65.1%). The overall use of contraception at coitarche did not differ between groups. Compared to the AO and AM groups, the proportion who used a reliable method in the MO group (37%) was significantly higher ($p=.03$) (vs. 15.8% and 14.8%, respectively).

Conclusions: Data from the 2002 NSFG do not support an association between type of formal sex education and contraceptive use at coitarche but do support an association between abstinence-only messaging and decreased reliable contraceptive method use at coitarche.

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1. Introduction

The majority of adolescents will become sexually active between the ages of 15 and 19 years [1]. Teens are more likely than adults to use inadequate and/or inconsistent contraception, putting them at high risk for unintended pregnancies and sexually transmitted infections (STIs) [2,3]. It often falls upon school-based sex education programs to provide teens with the information and skills needed to make informed, healthy decisions about sexual behavior [4].

The content of school-based sex education programs varies widely. Based on funding decisions made at the federal level in recent years, the sex education programs at many schools are limited to abstinence-only messaging. Research has shown that abstinence-only education has increased, while education on birth control methods has decreased since 1995, despite the lack of objective evidence that abstinence-only programming is actually effective in delaying first sex or reducing high-risk sex behaviors [5–8]. Alternatively, some schools offer comprehensive sex education, in which abstinence is promoted, but adolescents are also provided information about contraceptive options and STIs. There are few studies examining the relationship between contraceptive use at coital debut and formal sex education, yet this remains an important question in terms of health outcomes and federal spending.

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This study was conducted to determine whether the use and type of contraceptive method used at coital debut among female adolescents can be explained by differences in formal sex education.

2. Materials and methods

2.1. Study population

The 2002 National Survey of Family Growth (NSFG) is a validated population-based database that includes information on a variety of reproductive health outcomes and behaviors [9]. Data for the 2002 NSFG were collected at various locations in the United States between January 2002 and March 2003 using in-person interviews with 7643 women ranging in age from 15 to 44 years. The 2002 NSFG is a weighted database. All respondents were assigned a weight based on national averages of race, ethnicity and age provided by the US Census Bureau [9]. The 7643 women interviewed were a representative sample of the 61 million women aged 15 to 44 years in the US household population in 2002 [9]. Analysis of this database was approved by the Institutional Review Board of Oregon Health and Science University, Portland, OR, USA.

2.2. Definition of outcome

The outcomes of interest in this analysis were contraceptive use (yes/no) and reliable contraceptive method use (yes/no) at coital debut. Respondents who reported having ever had sexual intercourse were asked whether a birth control method was used the first time she had intercourse (yes or no), and if yes, what was the type of contraceptive method used the first time she had intercourse. Respondents who used more than one method were classified by the most effective method they reported using, since that method most accurately reflects their risk of unintended pregnancy [10]. For the purpose of this study, reliable methods included male and female sterilization, intrauterine devices and implantable and injectable contraceptives, oral contraceptive pills, contraceptive patch and contraceptive ring. Respondents reporting method use other than these or reported method nonuse were classified as no-reliable-method use.

2.3. Definition of determinant variables

Respondents were asked a series of questions about how they learned about sex and birth control. Formal sex education included any formal instruction about “how to say no” to sex and about “methods of birth control” that was conducted at school, church, a community center or some other place. Based on answers to these questions, respondents were divided into three formal sex education categories:

- (1) Received only formal sex education on “how to say no” to sex, defined as abstinence only (AO)
- (2) Received only formal sex education about “methods of birth control”, defined as methods only (MO)
- (3) Received both types of formal sex education (“how to say no” to sex and “methods of birth control”), defined as comprehensive sex education (AM).

The effect of taking a virginity pledge and parents discussing sex topics were also included as covariates in the analysis.

Multiple sociodemographic variables were included in the analysis as potential confounders, including age, age at coital debut, race/ethnicity, marital history, insurance status, place of residence, current school enrolment, current religious affiliation, employment status, current living arrangement, family intactness, educational level achieved by respondent and respondent’s mother and father. Because substance use may affect sex behaviors, including sexual risk taking behaviors, smoking status, frequency of alcohol use, alcohol binge drinking and marijuana use were also included [11]. Lastly, the adolescent’s attitude towards teen sex was included.

2.4. Statistical analysis

The study sample was limited to females aged 15–19 years. Respondents reporting a history of first sex prior to the age of 11 years were excluded. This was done because of the concern that first sex before age 11 years might be related to abuse or other complicated issues. While descriptive statistics were obtained for the entire remaining sample, adolescents who reported no formal sex education and adolescents who reported formal sex education after coital debut were excluded from logistical regression analysis, since our primary focus was on the effect of having different types of formal sex education on our designated outcomes.

Descriptive statistics, including frequencies and percentages (weighted and unweighted), were obtained for the combined sample, separately for those with and without formal sex education, and within each of the formal sex education groups. Statistical significance was determined using chi-square tests for categorical variables. For each of the two outcomes, logistic regression analysis was used to obtain unadjusted odds ratios (ORs) and 95% confidence intervals (CIs) corresponding to each of the individual predictors. A multiple logistic regression model was then created using as predictors formal sex education type and the variables found individually to be significant at level .20. Backwards selection using the Wald statistic p value was performed, until all variables that remained in the model had p values less than .05. Additionally, assessments for confounding were conducted by comparing models with formal sex education type and a single additional variable as predictors to the model with just formal sex education type as a predictor. If the additional variable resulted in a percent change in the ORs for formal sex education of more than 10%, the variable was considered to be a confounder of the relationship between formal sex education and the outcome and so was included in the final model. The possibility of effect modification was also explored. The interactions

between age, age at coital debut and race/ethnicity with the formal sex education variable were assessed and kept in the multiple logistic regression model if significant at level .05. These interactions were considered because they are often important in health-related outcomes. Demographic characteristics commonly controlled for in other similar studies were age at coital debut, age at interview, current school enrollment, insurance status, race and place of residence [4,10]. The adjusted ORs and 95% CIs for the relationships between formal sex education and both contraceptive use and reliable contraceptive method use at coital debut were determined.

All analyses were performed using SPSS version 15.0 for Windows (SPSS, Inc., Chicago, IL, USA) with the complex samples module to account for the complex sampling design used by the NSFG, Cycle 6.

3. Results

There were a total of 7643 women who participated in the NSFG, Cycle 6 survey. Of these, 1150 were aged 15 to 19 years. After exclusions were applied, a total sample of 1147 adolescent females remained. Of this adolescent sample, 1036 reported any type of formal sex education and 111 reported no formal sex education. These two groups were compared using descriptive statistics.

Of primary interest was the influence of formal sex education content on contraceptive use, and therefore the remainder of the analysis included just the 1036 female adolescents who reported any type of formal sex education. To ensure a temporal sequence in the assessment of whether the type of formal sex education affected contraceptive use at coital debut, those who reported first vaginal intercourse

Table 1
Selected demographic and socioeconomic characteristics of the study sample

Characteristic	Total	No formal sex education	Any type of formal sex education
n [§] (%)	1147 (100)	111 (9.4)	1036 (90.6)
Weighted n	9,805,664	925,833	8,879,831
	n [§] (weighted %)	n [§] (weighted %)	n [§] (weighted %)
Ethnicity			
Hispanic	231 (15.5)	28 (21.1)	203 (14.9)
Non-Hispanic	916 (84.5)	83 (78.9)	833 (85.1)
Race			
Black	258 (16.1)	30 (20.2)	228 (15.6)
White	778 (74.8)	73 (70.4)	705 (75.3)
Other	111 (9.1)	8 (9.4)	103 (9.1)
Health insurance status			
Uninsured	148 (12.4)	22 (20.3)	126 (10.5)
Private plan	692 (64.2)	57 (55.0)	635 (65.1)
Medicaid	198 (14.9)	22 (16.1)	176 (14.8)
Public, government, state or military		10 (8.6)	99 (8.5)
Place of residence ^a			
Large urban city	537 (48.3)	39 (32.7)	498 (45.2)
Other metro area	389 (29.2)	40 (35.8)	349 (28.5)
Non-metro area	221 (22.5)	32 (31.5)	189 (21.6)
School status			
Currently enrolled in school	911 (79.4)	78 (70.8)	833 (80.3)
Not currently enrolled in school	236 (20.6)	33 (29.2)	203 (19.7)
Education ^a			
9th grade or less	322 (28.4)	43 (46.2)	279 (24.1)
10th grade	249 (20.8)	23 (17.5)	226 (21.1)
11th grade	237 (22.0)	15 (14.1)	222 (20.7)
12th grade	232 (19.8)	20 (14.3)	212 (20.4)
1 year college or more	107 (8.9)	10 (7.9)	97 (9.0)
Mother's education ^a			
No high school degree	205 (16.5)	30 (27.8)	175 (15.4)
High school degree or equivalent	377 (32.4)	39 (31.4)	338 (32.5)
Some college or more	565 (51.1)	42 (40.8)	523 (52.2)
Father's education ^a			
No high school degree	183 (14.8)	21 (24.8)	162 (13.8)
High school degree or equivalent	342 (31.0)	38 (27.7)	304 (31.3)
Some college or more	622 (54.2)	52 (47.5)	570 (54.9)

^a Based on Pearson chi-square test for comparing proportions between groups; statistically significant difference, p<.05.

[§] n=unweighted sample number.

before formal sex education ($n=20$) were excluded, leaving a sample of 1016 adolescent females aged 15 to 19 years.

The mean age of the female adolescent sample ($n=1147$) was 17.04 years (SE 0.05). The mean age of first vaginal intercourse (considered “coital debut” in this analysis) was 16.01 years (SE 0.33). A majority of the sample reported some type of formal sex education (90.4%, $n=1036$) — 20.4% AO, 4.9% MO, 65.1% AM — and 9.6% with no formal sex education. Selected demographic and socioeconomic characteristics of the two study sample populations are presented in [Tables 1 and 2](#).

When comparing those who had to those who did not have formal sex education, there were no statistically significant differences in the use of a contraceptive method at coital debut, use of a reliable contraceptive method at coital debut or type of contraceptive method used. The proportion of female adolescents in the total sample ($n=1147$) reporting reliable contraceptive method use at coital debut was 15.9% [oral contraceptives (15.3%) and depo-medroxyprogesterone acetate (0.6%)]. Type of contraceptive method used in the formal sex education groups is reported in [Table 3](#).

Those who received MO education were more likely to use a reliable contraceptive method at coital debut than both the AO group and the AM group, and this finding was statistically significant (37.0% vs. 15.8% and 14.8%, respectively, $p=.029$). Those adolescents in the MO group were twice as likely to use oral contraceptives at coital debut,

and over three times as likely to use DMPA, compared to those in either the AO or AM groups.

Those who received no formal sex education did not differ significantly from those who did receive sex education in terms of frequency of alcohol use, binge drinking, use of marijuana or smoking status. Between formal sex education groups, we found statistically significant differences in patterns of use in terms of alcohol use frequency ($p=.004$), frequency of binge drinking ($p=.008$) and frequency of marijuana use ($p=.049$). However, after adjustment for important sociodemographic factors, there was no longer a difference in groups in terms of alcohol use and marijuana use frequency. The AM group remained more likely to binge drink more frequently compared to the AO group after adjustment for these sociodemographic factors.

Of those adolescents receiving formal sex education, respondents reporting AM education were more likely to have parents talk about sex topics at home than those in the other sex education groups [75.6% (AM) vs. 64.3% (MO) and 64.5% (AO), $p=.012$]. Adolescents who received AO education were more likely to have taken a virginity pledge than those who received AM or MO education (21.2% vs. 10.9% and 13.4%, $p=.003$).

Of the female adolescent sample, 61.4% reported ever having vaginal, anal or oral sex with a male and approximately one-half (50.7%) reported ever having vaginal intercourse with a male. There were no significant differences between those who had any type of formal sex

Table 2
Selected demographic and socioeconomic characteristics of the formal sex education groups

Characteristic	Total	Formal sex education category		
		Comprehensive	Birth control method information only	Abstinence only
$n^{\$}$ (%)	1016 (100)	739 (72.0)	52 (5.4)	225 (22.6)
Weighted n	8,731,996	6,286,746	471,178	1,974,073
Place of residence	$n^{\$}$ (weighted %)	$n^{\$}$ (weighted %)	$n^{\$}$ (weighted %)	$n^{\$}$ (weighted %)
Large urban city	488 (50.0)	364 (51.9)	20 (34.6)	104 (47.6)
Other metro area	339 (28.1)	245 (28.0)	21 (29.9)	73 (28.1)
Non-metro area	189 (21.9)	130 (20.1)	11 (35.4)	48 (24.6)
School status ^a				
Currently enrolled in school	818 (80.2)	587 (79.4)	36 (65.0)	195 (86.7)
Not currently enrolled in school	198 (19.8)	152 (20.6)	16 (35.0)	30 (13.3)
Education				
9th grade or less	274 (26.5)	183 (23.7)	11 (29.9)	80 (34.7)
10th grade	224 (21.4)	157 (20.7)	12 (16.5)	55 (24.9)
11th grade	216 (22.7)	160 (23.8)	12 (25.0)	44 (18.7)
12th grade	207 (20.3)	162 (21.9)	12 (18.1)	33 (15.7)
1 year college or more	95 (9.0)	77 (9.8)	5 (10.4)	13 (5.9)
Currently or ever worked ^a				
Yes	727 (72.3)	550 (76.4)	40 (76.1)	137 (58.4)
No	289 (27.7)	189 (23.6)	12 (23.9)	88 (41.6)
Have always lived with both parents ^a				
Yes	531 (71.2)	375 (67.9)	29 (78.3)	127 (80.3)
No	242 (28.8)	189 (32.1)	14 (21.7)	39 (19.7)

^a Based on Pearson chi-square test for difference between categories; statistically significant difference between sex education groups, $p<.05$.

[§] n =unweighted sample number.

Table 3

Type of contraceptive method used at coital debut by formal sex education groups

Characteristic	Total	Formal sex education category			p Value
		Comprehensive	Birth control methods information only	Abstinence only	
n [§] (%)	471 (100)	349 (75.5)	35 (7.6)	87 (19.0)	
Weighted n	3,989,789	2,930,866	302,305	756,618	
	n [§] (weighted %)	n [§] (weighted %)	n [§] (weighted %)	n [§] (weighted %)	.029
Use of a reliable* method at coital debut					
Yes	75 (16.7)	55 (14.8)	8 (37.0)	12 (15.8)	
No	396 (83.3)	294 (85.2)	27 (63.0)	75 (84.2)	
Contraceptive method used					
Most reliable					
Depo-medroxyprogesterone acetate	4 (0.7)	2 (0.3)	1 (3.7)	1 (0.9)	
Reliable					
Oral contraceptive pill	71 (16.0)	53 (14.5)	7 (33.4)	11 (14.9)	
Least reliable					
Condom only	261 (56.4)	193 (57.8)	16 (32.9)	52 (60.7)	
Withdrawal	14 (2.8)	10 (3.0)	0	4 (3.3)	
Rhythm method	1 (0.2)	1 (0.5)	0	0	
Jelly/cream	1 (0.3)	1 (0.4)	0	0	
Emergency contraception	1 (0.3)	1 (0.4)	0	0	
No method used					
Have never used a method	10 (2.1)	9 (2.4)	1 (4.4)	0	
Did not use a method at coital debut	108 (21.1)	79 (20.9)	10 (25.7)	19 (20.2)	

* Reliable method use=use of a most reliable or reliable method, as defined in Table 1.

§ n=unweighted sample number.

education and those who had no formal sex education in terms of sexual behavior variables.

Between the formal sex education groups, adolescent females who received MO were more likely to report any type of sex (oral, anal, vaginal) ($p=.020$), vaginal intercourse ($p=.003$) and be tested for an STI ($p=.012$) than the other two formal sex education groups. There was no difference between the sex education groups in terms of treatment for an STI. Because these findings indicated that the MO group might just be a higher risk group in general and this could influence conclusions drawn, the sex behavior variables

were examined more thoroughly. Although a greater proportion of the MO group reported engaging in vaginal sex, any type of sex and being tested for STIs, in additional analyses adjusting for important sociodemographic variables including age, race, health insurance status, school enrollment and place of residence, the differences in proportions between the three groups were no longer significant ($p=.46$, vaginal sex; $p=.17$, any sex; $p=.08$, STI testing).

There continued to be no association between type of formal sex education and contraceptive method use at coital debut in the final multiple logistic regression model.

Table 4

Characteristics associated with use of a reliable contraceptive method at coital debut^a

Characteristic	Adjusted OR	95% CI	p Value
Formal sex education category			.033
Comprehensive	Reference	Reference	
Methods only	4.28	(1.44–12.75) ^b	
Abstinence only	1.16	(0.48–2.80) ^b	
Parents talked about sex topics			.042
Yes	2.28	(1.03–5.03) ^b	
No	Reference	Reference	
Frequency of marijuana use			.054
Several times per year	0.90	(0.42–1.91) ^b	
Several times per month or per week	2.28	(1.09–4.76) ^b	
Never	Reference	Reference	
Age at coital debut ^c	1.30	(0.95–1.77) ^b	.129

Adjusted odds ratios and 95% confidence intervals (reference=no reliable method used or no method used).

^a Among female adolescents age 15–19 years reporting formal sex education prior to coital debut.^b Adjusted for age at interview, place of residence, current school enrollment, health insurance status and race.^c Age is evaluated as a continuous variable.

Compared to the AM group, the odds of contraceptive use at coital debut in the MO group was 0.93 (95% CI 0.38–2.26) and in the AO group was 1.13 (95% CI 0.53–2.40). However, there was a significant association between type of formal sex education and reliable contraceptive method use at coital debut in the final multiple logistic regression model ([Table 4](#)). The odds of reliable contraceptive method use in the MO group was about four times the odds of reliable contraceptive method at coital debut in the AM group [OR=4.28 (1.44–12.75)] and about three times the odds of reliable method use in the AO group [OR=3.141 (1.012–11.518) (using AO as the reference category)]. Parental discussion of sex topics doubled the odds that a reliable contraceptive method was used at coital debut in our sample of female adolescents who had formal sex education prior to coitarche [OR=2.28 (1.03–5.03)]. Compared to those who never use marijuana, frequent marijuana use, several times per month or per week, doubled the odds of reliable method use at coital debut, when adjusting for all other factors [OR=2.28 (1.09–4.76)].

4. Discussion

In this study, when all methods of formal sex education were considered together, adolescents exposed to a formal sex education intervention were no more likely to use any contraceptive method at coital debut than those who reported no formal education. Obviously, the content and objectives of different educational strategies differ. However, interestingly and significantly, there was a significant association between type of formal sex education and reliable contraceptive method use at coital debut. Those who received information about birth control methods only were more likely to use a reliable contraceptive method at coital debut, compared to those who received comprehensive sex education and those who received abstinence-only sex education. This association remained after adjustment for other factors. The discovery that those who received comprehensive formal sex education were less likely to use a reliable method at coital debut suggests that, in this sample, abstinence-only messaging cancels out, or dilutes, the potential beneficial effects that information about birth control methods might convey. Only adolescents who reported receiving just birth control method information were more likely to choose a reliable contraceptive method at coital debut.

The finding that abstinence-only messaging might be injurious to adolescents deserves pause. Formal sex education is meant to provide teens with information and skills necessary to make educated, informed decisions with regard to their sexuality [\[4\]](#). Therefore, programs that do not result in teens electing to use reliable contraceptive methods when they have decided to engage in sexual activity could be considered harmful. It is known that nonuse or inconsistent birth control method use can lead to such consequences as unintended pregnancy and STIs [\[2\]](#).

The present analysis also revealed that parental discussion of sex topics increases the likelihood that a reliable contraceptive method will be used. While findings of other studies suggest that parents are not widely used by their adolescent children as sources of information or advice about sexual health due to embarrassment and discomfort, the present study results suggest that the sex conversation between parents and teens may serve to promote healthier sexual behaviors, such as use of a reliable birth control method at first sexual intercourse [\[12–14\]](#).

From this study and others, we know that adolescents most often select a coitus-dependent method, such as condoms, at first sex [\[15\]](#). Correct and consistent condom use is an excellent way to protect against STIs and should be encouraged. However, condoms are less reliable at preventing unintended pregnancy, with a typical use failure rate (defined as the percentage of women who become pregnant during their first year of use) of 17%; younger age (<30 years), poor and low-income and black women experience higher condom failure rates [\[16\]](#). More effective methods exist that require little in terms of user compliance (e.g., intrauterine devices, contraceptive implants, contraceptive vaginal ring, contraceptive transdermal patch) and are safe and appropriate for teens, but require a medical provider visit to secure [\[17\]](#). The popularity of condoms can be attributed to their easy over-the-counter availability [\[17\]](#). Greater access to contraceptive and reproductive health services for teens may be another important issue.

A study by Manlove et al. [\[18\]](#) found an association between hormonal method use and increased consistency of contraceptive use among adolescent females. These methods may be the most effective methods to promote for sexually active teenagers, but as revealed here, only a small proportion of teenagers in our sample report having used these methods at coital debut. If the current formal sex education (dominated by the abstinence-only message) results in the dilution of the birth control messaging, then promotion of these more reliable methods is limited and sexually active teens may be more vulnerable to unintended pregnancy.

A similar, recent study used data from the NSFG, Cycle 6 database to look at the association between sex education and use of birth control at first sex [\[4\]](#). However, Mueller et al. [\[4\]](#) did not look at the separate effects of abstinence-only messaging and birth control methods information as distinct factors in formal sex education that could influence contraceptive use at first sex. Instead, types of formal sex education were combined together, and they found no association among adolescent females between receipt of formal sex education and birth control use at first sex. The present study sought to examine the components of formal sex education separately (abstinence only and information about birth control methods) and determine whether having either one or the other, or both, influences contraceptive use at the first episode of sexual intercourse.

There are limitations that are inherent to this analysis. While attempt was made to account for temporality, the

cross-sectional design of this study prevents the conclusion that any associations are due to causal relationships. Information and/or recall bias may have occurred since information about the outcomes and the exposure variable of interest were self-reported. Selection bias due to parental selection of type of formal sex education a respondent was enrolled in may have affected the results. Another limitation of the present study is that condom use cannot be delineated accurately due to the way contraceptive method use was classified in the database. The proportion of respondents who used condoms only is known, but dual-method use cannot be accounted for, as respondents who used more than one method were classified by the most effective method used. The small sample size of the methods-only group is another potential limitation. However, a significant difference in reliable contraceptive method use between groups was found, indicating that power for this comparison was adequate.

The NSFG, Cycle 6 was not designed to evaluate the effectiveness of formal sex education programs and therefore conclusions about specific programs cannot be made. Also, there is a lack of a formal education programming model that provides information about birth control methods only. Most sex education programs are classified as either abstinence only or comprehensive, so it is difficult to know the exact type of formal sex education programming that respondents reporting information about birth control methods only actually had. Nevertheless, those adolescents who perceived and reported that they received sex education that contained only information about birth control methods were more likely to use a reliable method of contraception at coital debut. And this take-away message may prove to be the most important aspect of formal sex education and one that deserves more attention.

The task of examining sex education programming is an important one. As stated previously, most teens have become sexually active by age 19 years, making school-based sex education important [1]. Without information and skill building regarding contraceptive use, teens are put at risk for contraceptive nonuse or inconsistent use, and unintended pregnancy and/or sexually transmitted infections. The findings of the present analysis seem to suggest that abstinence-only messaging, when included in formal sex education, dilutes birth control information and that current sex education programming should be reexamined. The findings are substantial because the large sample size and high quality of the NSFG permitted incorporation of several potential confounders into our model.

There is still much work to be done to discover better ways of providing sexuality education and this type of data analysis cannot substitute for prospective trials which would specifically evaluate formal sex education programs. However, these findings contribute to our understanding of factors that

affect adolescent contraceptive use in this country. It is only through a thorough understanding of these factors that we will be able to properly address this important public health problem and improve the health of adolescents.

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