

# Contraceptive knowledge, prevalence of contraception use, and the association between sex education and contraceptive knowledge among university students in Michigan, USA

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## ABSTRACT

**Background:** The danger of sexual activities among adolescents is worrisome worldwide. This study aimed to delineate total contraception knowledge of university students and the prevalence of contraceptive use, in addition to the association between sex education in school and the students' contraception knowledge. **Materials and Methods:** A school-based cross-sectional study was carried out. **Results:** The mean total level of contraceptive knowledge was  $16.53 \pm 2.38$ , which ranged from 5 to 18. In response to which method was the most suitable for the youngsters, 36.3% responded pills, 49.2% condoms, 6.3% injection, 0.7% withdrawal, 0.5% periodic abstinence, and 5.9% other. Adjusted to sociodemographic characteristics and other confounders, students with a history of sex education in school tended to have a higher level of contraceptive knowledge than those without [AOR: 1.06; 95% CI: 0.15, 2.64]. Moreover, adjusted to the characteristics of one-night stands, students with a high level of contraceptive knowledge agreed that one-night stands were OK compared with those without the knowledge [AOR: 0.65; 95% CI: 0.16, 1.13]. **Conclusion:** Although the total contraceptive knowledge was satisfactory, more attention should be paid to male students' education. Modern and long-term effective contraceptive methods had better be included in the training program.

**Keywords:** Contraception use, contraceptive knowledge, sex education, university students, USA

## Introduction

Even though adolescent pregnancy rates in the USA have been falling recently,<sup>[1]</sup> the rate of younger women's unintended pregnancy (18–24 years) is higher than that in other industrialized countries.<sup>[2]</sup>

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Adolescent pregnancy is associated with rising maternal and neonatal morbidity and mortality, in addition to poorer educational, economic, and social consequences for teen parents and their children.<sup>[3,4]</sup> The majority of adolescent and young adult pregnancies tend to be unintended, with a large number of adolescents and young adults being particularly at high risk of using contraception inconsistently or incorrectly.<sup>[5]</sup>

Various types of sexuality education are offered in high school or university settings. Abstinence-based sex education considers pregnancy prevention by avoiding sexual intercourse.<sup>[6]</sup> On the

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contrary, comprehensive sex education includes training a variety of topics, such as human development, relationships, sexual/reproductive health, sexual behavior, and cultural sensitivities surrounding sexual relations, all of which aim at developing students' skills and attitudes toward healthy relationships.<sup>[7]</sup> A number of studies have investigated how sex education and contraception use can be related to "first intercourse".<sup>[6,8]</sup> Sex education offered to first-timers often goes further beyond knowledge about all aspects of sexuality, including information about family planning and reproduction (fertilization, conception, and development of the embryo and fetus to childbirth).

How to use contraception varies widely among "sexually active adolescents" worldwide, and the related literature suggests that behavioral, cultural, social, and health system factors influence contraception use.<sup>[9]</sup> Even though sexuality education has been shown to be effective in reducing adolescent pregnancy, research on the relation between sex education and contraceptive use has found mixed results.<sup>[10]</sup>

Female college students are in danger of unintended pregnancy due to unprotected and unplanned sex and multiple sexual partners.<sup>[11]</sup> Among student women who experience unwanted pregnancy have severe and long-lasting consequences, such as a declined likelihood of college completion.<sup>[12]</sup> Other side effects include reduced potential lifetime earnings and lower overall health and well-being.<sup>[13]</sup> College attendance plays a significant part in the life course since it has potential biopsychosocial benefits as well as drawbacks that can alter women's future health.<sup>[14]</sup>

In terms of their educational careers, college women might desire to delay childbirth. Nonetheless, only 56% of college women claimed using contraception during the last vaginal sex. Moreover, when using a type of contraception, college women were more likely to use oral contraceptive pills or male condoms, rather than more effective methods, such as long-acting reversible contraception (LARC).<sup>[15]</sup> LARC that includes intrauterine devices (IUD) and the subdermal hormonal implant is able to provide effective pregnancy prevention for 3–10 years. Those in the younger age group (18–40-year-olds) with younger partners (18–40-year-olds) were educated beyond a high school diploma with no history of unwanted pregnancy (58%) and also were less likely to use LARC.<sup>[16]</sup>

Studies reveal that men are generally more willing to accept potential future male-focused methods of reversible contraception. However, there is not much research on college men's attitudes and knowledge of currently accessible methods. Little research has been conducted on contraception from males' perspective<sup>[17]</sup> that is of great importance, since they often have a better safe-sex negotiation power. Healthy People Initiatives 2020 is aimed at raising family planning service use among men. Utilizing the service seemed impossible without improving sex education. An Australian study into 14–24-year-olds found that young men had significantly less knowledge of contraception

than young women, and also, their attitude towards contraception was less favorable.<sup>[18]</sup> Males' knowledge of contraception can also impact females' knowledge of how to use it. A US study revealed that men's lack of knowledge about LARC would negatively impact using it by their partners, and raising awareness about LARC could increase its usage and decrease unintended pregnancies.<sup>[19]</sup>

The present survey considered three objectives: to determine 1) the total score of contraception knowledge; 2) the prevalence of contraceptive use; and 3) the association between sex education and contraception knowledge among university students.

## Materials and Methods

### Study design and setting

This was a cross-sectional survey of students attending Central Michigan University (CMU) in Michigan, USA.

Ethics: The study was approved by IRB (no: 1031916-3) committee at Central Michigan University.

### Sampling procedure and study population

In this study, a simple random sampling technique was used to choose students from the Registrar's Office listing at a large Midwestern university which has a population of approximately 27,000 on-campus and online students. Random sampling was performed using a list of students enrolling at the university as a framework. Healthy students were not included due to the fact that they were more aware of health concepts and as a result might dilute study results. The appropriate sample size according to a computerized sampling technique and Rao soft software was 379 participants, based on the university student population.<sup>[20]</sup> The sample comprised 808 students because. On account of expecting a 20% nonresponse rate, the sample size was adjusted to 474 students using  $N = n/(1-q)$ , in which  $N$  is the adjusted sample size (474),  $n$  is the calculated sample size (379), and  $q$  is the expected percentage of nonresponse.<sup>[21]</sup> The power calculation was conducted at the end of the study recruitment to ensure the sample was of the appropriate size to meet the study objective. According to an online calculator selected from Power and Sample Size.com,<sup>[22]</sup> the power and alpha in this study were 0.80 and 0.001, respectively.

### Data collection and measures

The study used an adapted World Health Organization self-administered questionnaire.<sup>[23]</sup>

Consent: All study participants were consent to take part in the study.

Ethics: The study was approved by IRB (no: 1031916-3) committee at Central Michigan University.

The questionnaire included the following questions:

Sociodemographic questions.

“What is your gender?”, “What is your educational level?”, “Are you currently working?”, “What is your monthly income?”, “What is your religion?”, and “What is your relationship status?”

### Contraceptive knowledge

Part of the WHO questionnaire was allocated to measuring knowledge of contraceptive methods. Based on the guidelines of this questionnaire, knowledge of contraception and supply sources was a precondition for adopting pregnancy-protection means. Questions presented to the students were to analyze each of the 1) main methods that young people were likely to use, and 2) less appropriate methods for youths (sterilization, IUD, implant) and uncommon methods, such as jellies or foams. While knowledge of individual methods (and sources) was of interest, the data were summarized in the analysis as the level of knowledge about the number of contraceptives familiar to study subjects. The details are presented in the following.

Main methods young people were likely to use: Questions were on pills, injection, condoms, emergency pills, withdrawal/periodic/abstinence, and others. Each contraceptive type had a knowledge-based question in which a prompt was given. For instance, a prompt about pill stated: Women can take a pill on a daily basis. This type of questions included Yes (coded 1) and No (coded 0) responses. They were also asked about the source of accessing the contraception (Yes = 1, No = 0), and finally, for each contraceptive method, they were asked whether they were aware of how the method was used (Yes = 1/No = 0).

Less appropriate methods for youths: The question on other contraceptive methods less appropriate for the young included: Have you heard of IUD? (Yes/No), Have you heard of implant (Yes/No), Have you heard of jelly or foam (Yes/No), Have you heard of female fertilization? (Yes/No), Have you heard of male sterilization? (Yes/No), and Have you heard of other contraception methods? (Yes/No). These were coded as 1 for Yes and zero for No. The total score of contraceptive knowledge was analyzed by adding the above-mentioned questions.

### Ever contraceptive use

Which methods of contraception have you or a sexual partner ever used? (pills, injections, condoms, emergency pills, withdrawal, period, abstinence, and other).

Type of contraception used was also asked. What preventive methods did you use during the first sexual intercourse? (pills, injections, condoms, emergency pills, withdrawal, period, abstinence, and other).

These questions along with sociodemographic ones were fed into Qualtrics software<sup>[24]</sup>, and an anonymous survey link was made. The link was provided in the email, through which students could log into Qualtrics to sign the study consent form

before the survey. The study was approved by the Institutional Review Board (IRB) at Central Michigan University. A flyer with information about the study was distributed throughout the university by email. Subjects who participated in the survey were given pizza coupons as an incentive in order to complete the questionnaire.

### Data management and analysis

Data were extracted from Qualtrics anonymously, and statistical analysis was done using IBM SPSS Statistics, version 25.0 (IBM Corp., Armonk, NY, USA) released in 2016. A Pearson Chi-square analysis and logistic regression were performed to measure the relationship between sociodemographic factors and discussing sexual matters with fathers, mothers, sisters, and/or brothers. Multivariate regression was conducted to determine adjusted odds ratios (OR) and their 95% confidence intervals (CI) to adjust substantial variables to potential confounders.

## Result

### Descriptive analysis

Sociodemographic characteristics are shown in Table 1.

The majority of participants were female (68.8%), and over 68% of students were undergraduates. The participants were 14 to 33 (24.06 ± 9.61) years old, with more than sixty percent of them having a religion. Over two-thirds of the participants were employed, and only 22% earned more than \$1000. The vast majority of participants (95.4%) were single and more than 69% of them always used practice-ever contraceptive [Table 1].

### Contraception knowledge

The mean total level of contraceptive knowledge was 16.53 ± 2.38, which ranged from 5 to 18 [Figure 1]. In

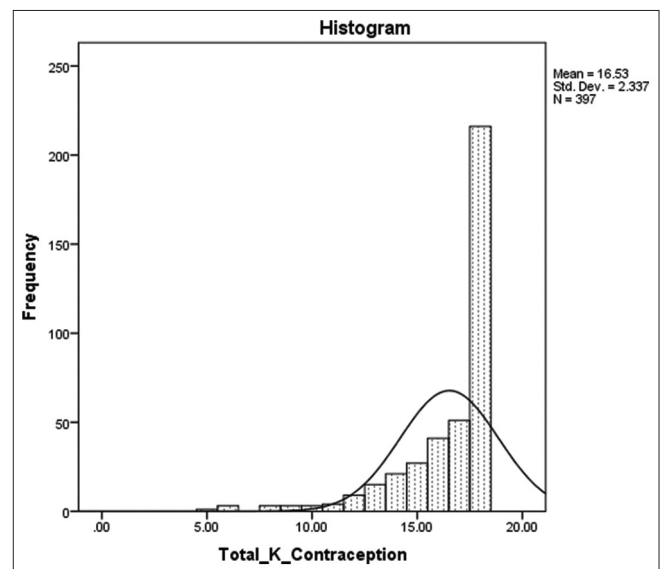


Figure 1: Histogram of total contraceptive knowledge among university students (n = 397)

response to which method they thought could be the most suitable contraceptive method for the young, 36.3% responded pills, 49.2% condoms, and the remaining subjects noted injection (6.3%), in addition to withdrawal (0.7%), periodic abstinence (0.5%), and other (5.9%).

When students were asked whether they had heard of some less appropriate methods for youths, only 39.2% claimed that they had heard of hormonal IUDs, 37.6% of implants, 15.4% of jelly or foam, 39% of female sterilization, and 39.7% of male sterilization.

### Ever contraceptive use

More than 69% of the students responded positively to the question of ever using contraception, while 30.6% did not. Questions on using contraceptive methods by a participant or her/his partner provided the following information.

Condoms stood out as the most commonly used contraceptive method (69.6%). More than 14% of the participants noted that they used pills (14.4%). Other contraception methods used were withdrawal (4.6%), injection (0.5%), periodic abstinence (0.5%), and 10% used others that were inclusive of IUD (5.1%), spermicidal, implants, patch, no sex, or sex with the same gender (each less than 0.1%).

Seventy-four percent of students discussed contraception use before their first intercourse, while 11.9% did it after. Finally, 14.1% of them never discussed contraception with their sexual partners. Whether to use a contraceptive method was decided only in 17.4% of cases, while a 75.2% of the participants noted a joint decision. The other party (girl/boyfriend) made the decision of using contraception in 5.5% of cases. Only 1.7% of the cases did not use any contraception due to celibacy.

### Sex education and knowledge

There was a significant difference between those with sex education in school and those without ( $16.69 \pm 2.07$  versus  $15.62 \pm 3.47$ ,  $P = 0.01$ , Mann–Whitney test). Males were less knowledgeable than females ( $15.37 \pm 3.25$  vs.  $16.82 \pm 1.95$ ,  $P = 0.001$ , Mann–Whitney test).

Table 2 illustrates the relationship between sex education and sociodemographic features, knowledge, and practice of contraceptive that CMU students used.

There was a borderline relationship between the age of the participants and sex education in school ( $P = 0.06$ ). Students who received sex education during their school years were on average  $25.51 \pm 8.68$  years old compared to students who did not ( $23.65 \pm 7.45$ ). There was a relation between educational level and sex education in school. There were almost twice as many graduates as undergraduates (13.1% versus 7.9%,  $P = 0.03$ ) among the participants who did not receive any sex education [Table 2].

**Table 1: Sociodemographic characteristics (n=924)**

Variables	n (%)
Age (Mean±SD)	24.06±9.61
Gender	
Male	167 (18.1)
Female	636 (68.8)
Education	
Undergraduate	549 (68.2)
Graduate	256 (31.8)
Work	
Yes	520 (68.8)
No	236 (31.2)
Income	
\$1000 or less	721 (78.0)
More than \$1000	203 (22.0)
Are you a religious person?	
Yes	471 (60.7)
No	305 (39.3)
Relationship status	
Single	601 (95.4)
No single	29 (4.6)
Practice-ever contraceptive use	
Always	327 (69.4)
Never/sometimes	144 (30.6)

About 50% of data were missing for most variables

**Table 2: Comparing the relationship between sex education and socio-demographic characteristics, knowledge, and practice of contraceptive use**

	Sex education - n=65	Sex education + n=616	P
Age (Mean±SD)	23.65±7.45	25.51±8.68	0.06
Gender			
Male	14 (9.7%)	485 (90.5%)	0.95
Female	51 (9.5%)	131 (90.3%)	
Education			
Undergraduate	37 (7.9%)	434 (92.1%)	0.03
Graduate	28 (13.1%)	185 (86.9%)	
Work			
Yes	42 (9.2%)	413 (90.8%)	0.77
No	18 (8.5%)	193 (91.5)	
Income			
\$1000 or less	31 (8.1%)	354 (91.9%)	0.30
More than \$1000	18 (9.7%)	167 (90.3%)	
Are you a religious person?			
Yes	41 (9.8%)	377 (90.2%)	0.73
No	24 (9.0%)	242 (91.0%)	
One-night stands are OK			
Agree	19 (13.8%)	119 (86.2%)	0.05
Don't agree	21 (7.7%)	252 (92.3%)	
Relationship status*			
Single	53 (8.9%)	542 (91.1%)	0.56
No single	2 (7.4%)	25 (92.6%)	
Contraception knowledge	15.63±3.47	16.69±2.07	0.05

\*Fisher exact test

Among those with no sex education in school, approximately 13.8% agreed that one-night stand sexual activity was alright, compared to 86.2% of those with school sex education ( $P = 0.05$ ). The total score of knowledge of contraception was significantly higher among those with sex education in school than those without ( $P = 0.5$ ).

### Regression models

Table 3 provides data on adjusted and unadjusted odds ratios (and 95% CI) for the relationship between sex education in school and contraceptive knowledge of university students. Adjusted for sociodemographic characteristics and other confounders, those with a history of sex education in school were more likely to have a higher level of contraceptive knowledge than those without [AOR: 1.06; 95% CI: 0.15, 2.64], which was similar to the unadjusted RR [AOR: 1.06; 95% CI: 0.33, 1.80].

There was no remarkable correlation between age and contraceptive knowledge of university students [AOR: 0.02; 95% CI: -0.03, 0.07]. Males were less knowledgeable than females in this regard [AOR: -1.44; 95% CI: -2.00, -0.88]. Adjusted to confounders, on the other hand, students with sex education in school showed less likelihood of agreeing with a one-nightstand sexual relationship. [AOR: 0.65; 95% CI: 0.16, 1.13].

### Discussion

The study aimed to survey the total score of contraception knowledge among university students. It was also to determine the prevalence of ever and first-time contraceptive uses. Finally, it attempted to find a relation between sex education in school and contraception knowledge among them.

**Table 3: The relationship of sex education in school and contraceptive knowledge of university students (n=803)**

	Unadjusted RR (95%CI)	Adjusted RR (95%CI)
Sex education		
Yes	1.06 (0.33, 1.80)	1.06 (0.15, 2.64)
No	1	1
Age (Mean±SD)	0.04 (0.01, 0.07)	0.02(-0.03, 0.07)
Gender		
Male	-1.44(-2.00, -0.88)	-1.03(-1.57, -0.48)
Female	1	1
Education		
Undergraduate	-0.51(-1.03, 0.01)	-0.45(-1.02, 0.12)
Graduate	1	1
Work		
Yes	0.32(-0.15, 0.78)	0.35(-0.13, 0.83)
No	1	1
Income		
\$1000 or less	0.45(-0.05, 0.94)	0.01(-0.58, 0.60)
More than \$1000	1	1
Are you a religious person?		
Yes	0.02(-0.45, 0.49)	-0.13(-0.59, 0.32)
No	1	1
Relationship status*		
Single	0.59(-0.65, 1.84)	0.46(-0.88, 1.81)
No single	1	1
One-night stands are OK		
Agree	0.78 (0.29, 1.27)	0.65 (0.16, 1.13)
Don't agree	1	1

### Contraception knowledge

The mean total level of contraceptive knowledge was found to be 16.53 ± 2.38, ranging from 5 to 18. The contraceptive knowledge of males was less than that of females [AOR: -1.44; 95% CI: -2.00, -0.88]. The finding was in concordance with the study by Zama Mkhonta *et al.*<sup>[25]</sup> and Oke Neville *et al.*<sup>[26]</sup> where more than 50% of the participants had great knowledge of contraceptives,<sup>[27]</sup> with girls being more knowledgeable on most topics except for pregnancy risks. On the other hand, Maria Bolshakova *et al.*<sup>[28]</sup> and Christy Vijay, *et al.*<sup>[29]</sup> presented that 60% of their study subjects lacked information about modern contraceptive methods other than condoms, which was inconsistent with the findings of the present study. These studies also suggested that males' knowledge was less than that of females'.

CMU students' views on the most suitable contraceptive methods for youths were in agreement with that of others.<sup>[30]</sup> According to the participants, the most appropriate methods of contraception were: 49.2% condoms, 36.3% pills, 6.3% injection, 0.7% withdrawal, 0.5% periodic abstinence, and 5.9% other. Winn *et al.*<sup>[30]</sup> 1995 found that the most popular contraception methods were condoms, withdrawal, and periodic abstinence, respectively. It appears that pills were not that popular nearly two decades ago. On the other hand, according to Demissie *et al.*,<sup>[31]</sup> 2019, the primary contraceptive methods used by students were birth control pills, and condoms, respectively.

According to CMU students', the less appropriate methods for youths were: 39.2% IUDs, 37.6% implants, 15.4% jelly or foam, 39% female sterilization, and 39.7% male sterilization. This was somewhat inconsistent with the findings of Dobry *et al.*<sup>[32]</sup> in which 50% of adolescents said that IUD were less appropriate for adolescents. In their study, Kokanali *et al.*<sup>[33]</sup> found that oral contraceptive pills (7.1%), and intrauterine devices (IUDs; 2.9%) were not used much, with implants and injections not being used at all.

### Ever contraception use

More than 69% of students responded to the question of ever using contraception positively, while 30.6% did not. This was similar to the results of a cross-sectional study by Brunner Huber and Ersek. in which, among sexually active young women, 77.1% reported using contraception.<sup>[34]</sup> Decat *et al.*<sup>[35]</sup> conducted research on 299 sexually active boys and girls, out of whom 43% and 54% reported contraceptive use, respectively. Sweya *et al.* in a cross-sectional study into undergraduate female students found that the majority (93.8%) of the participants had knowledge of contraception and in addition 43.6% of sexually active females reported they had already used contraceptives, with 162 (40.4%) being current contraceptive users.<sup>[36]</sup>

Practicing safe sex early on brings health benefits. In a note summary, Martinez *et al.* noted that teen childbearing brought about negative consequences to the physical, psychological, and economic well-being of young mothers and their children. Therefore, knowledge of how to avoid this can empower both women's and men's sex lives.<sup>[37]</sup>

## Sex education and contraception use

The finding revealed that there was a significant relation between sex education in school and contraceptive knowledge at university level. This was in agreement with the results of Hersh *et al.* 2019,<sup>[38]</sup> in which 60.6% of the participants received comprehensive sex education in school. In other words, such education was associated with the level of knowledge in a university setting. Likewise, William Marsiglio and Mott<sup>[39]</sup> revealed that older sexually active girls with a previous course on sexual health were remarkably more likely to have knowledge of contraception and use an effective contraceptive method (73%) than those who had never done a course (64%,  $P = 0.05$ ).

Even though sex education is commonly practiced in public US schools, it is not clear how comprehensive such education is. According to a study carried out in the United States, all participants (99.0%) aged 18 or younger were provided with sex education on at least one topic (physiology, STD, condom use). In addition, 92.0% acknowledged that the most commonly reported lessons during sex education were on condom use, with birth control being the least common subject discussed during sex education (41.6%).<sup>[10]</sup>

Higher education students tend to be of different cultural and religious backgrounds and, when at university, they experience living independently for the first time and are likely to engage in a vast range of high-risk sexual activities, including temporary sexual relationships known as one-night stands.<sup>[40]</sup> It is, as a result, vital to ensure whether they are equipped with the necessary knowledge of how to prevent unwanted pregnancies. School sex education helps them to gain such knowledge, albeit it is not clear if it is comprehensive enough.

The CDC analyzed data collected from 1,037 teen girls and 1,088 teen boys aged 15 to 19. It targeted teens who would engage in sexual activity before turning 20. According to the findings, teens today are less involved in sexual activity than they were in 1988 (when CDC conducted a similar study). Twenty-five years ago, 14 percent of teen girls, and 22 percent of teen boys used to have more sex than they do now. When having sex for the first time, teenagers tend to use contraceptives, such as condoms. Likewise, 22 percent of the girls use emergency contraception as opposed to eight percent of them in the late 80s.

It was also found that young women who failed to use any birth control during their first sex were five times more likely to have a teen birth by the age of 17 in comparison with those who did not ( $P = 0.05$ ).<sup>[41]</sup>

This means that additional education opportunities at university would further protect the young and ensure a safe and secure environment for them to concentrate on their studies rather than challenging the consequences of unwanted pregnancy or infections with STIs. Central Michigan University, like other American universities, tends to promote such educational opportunities through occasional campaigns, called the annual

“Wear One” campaign. As a condom distribution program, it provides local businesses with free condoms and education on sexually transmitted infections (STIs) services, including testing and treatment. The students are provided with a Wear One condom bag for free during the campaign. The Wear One campaign was developed to make free condoms available, raise awareness, and promote condom use willingness among individuals aged 18–24. It aims to decrease sexually transmitted infections STIs and unplanned pregnancies by removing obstacles to condom use, such as cost, embarrassment, and inaccessibility. One such occasion is the current COVID-19 Pandemic during which students have been less likely to access free condoms and other contraceptive methods. Future studies could work on this hypothesis.

## Consent

All study participants were willing to participate in this study.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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