

PROGRAM EVALUATION

Chinese adolescents' sexual and reproductive health education: A quasi-experimental study

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Abstract

Objective: This study investigated the effectiveness of an interactive sexual and reproductive health education program in aspects of knowledge, attitudes, and self-efficacy among adolescents.

Design: Quasi-experimental study underpinned by social cognitive theory.

Sample: A stratified cluster sample of 469 students from the two-branch middle school in a city in eastern China who were assigned to the experimental ($n = 233$) and control ($n = 236$) groups.

Measurements: Students' sexual knowledge, attitudes, and refusal self-efficacy were assessed before (T0), immediately after (T1), and 1 month after the intervention (T2), respectively.

Intervention: Students in the experimental group received two 40-min sessions of the educational program while the control group received the usual mode of sexual and reproductive health education.

Results: Compared with the control group, students in the experimental group acquired more sexual knowledge ($p < .01$), and developed more positive sexual attitudes ($p < .05$) and stronger sexual self-efficacy ($p < .05$) across the study period.

Conclusions: The proposed sexual and reproductive health education program incorporating various interactive activities was effective and could be used for school-based implementation led by nurses and other health care workers.

KEYWORDS

adolescent, health education, program evaluation, reproductive health, sexuality

1 | BACKGROUND

Rapid social and economic development produces abundant resources for adolescents to grow and complete physical and psychosocial maturity rapidly. Adolescents now enter sexual maturity earlier than previous generations. Their attitudes toward sex

have become more liberal, compounding problems related to sexual and reproductive health (SRH), including unplanned pregnancy, abortion, and sexually transmitted infections (STIs) (Liang et al., 2019). In 2014, 2 million adolescents around the world were found to have AIDS, while the number of adolescent HIV cases in the Asia-Pacific region rising substantially in the past decade (United Nations Children's Fund, 2018). The most recent statistics

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reveals an astonishing growth of AIDS cases among youth of 15 to 24 years old in China, increasing from 6.0% in 2007 to 28.7% in 2015 (He et al., 2018).

Globally, it was estimated by the World Health Organization that approximately 12 million girls of 15 to 19 years and 1 million girls under 15 years give birth every year in developing countries, causing roughly 3.9 million unsafe abortions among those aged 15 to 19 years (WHO, 2018). Pregnancy and childbirth among adolescents is a major factor contributing to maternal mortality and morbidity. In China, recent evidence shows an increasing pregnancy rate among adolescents, with half of the abortions occurring among unmarried adolescents (Xiao & Chen, 2017).

Sexual and reproductive health education is an important form of health promotion action to optimize adolescent health and development (Garzón-Orjuela et al., 2020). Using an appropriate theoretical framework in such education is critical in development and effectiveness of any intervention (Albarracín et al., 2005). Social cognitive theory or social learning theory is a widely referred conceptual framework for SRH educational interventions, stressing the interaction among personal (e.g., knowledge, self-efficacy), environmental (e.g., exposure to risky situations), and behavioral influences (e.g., dating relationships) (Bandura, 2004). Several SRH education programs for adolescents have demonstrated encouraging positive outcomes using social cognitive theory. Interventions with positive outcomes for adolescents have been documented in Africa, Nepal, Spain, and the United States (Acharya et al., 2017; Espada et al., 2017; Mmbaga et al., 2017; Peskin et al., 2015; Winskell et al., 2018).

However, in places like mainland China, which are characterized by a sexually conservative/suppressive culture under the prolonged influence of Confucianism, SRH education remains implicit or circumvented. Educational efforts often resort to cartoons or other “quiet” methods, or the education is handled in private environments or within families (Liang & Bowcher, 2019). A large majority of adolescents in mainland China do not receive any formal SRH education or have access to essential SRH services. This was mainly caused by the incompatibility between SRH and the contextual demands on the virtue or noble system of morality, including sexual propriety in public social interfaces (Zhao et al., 2019). Without adequate education, adolescents may have difficulties in tackling SRH-related matters, including sexual temptations and risky sexual behaviors, face-to-face, online, or virtually. Different teaching and learning modalities (e.g., expert lectures, leaflet distribution) have been attempted to deliver SRH education programs for school adolescents in mainland China (Chen et al., 2016). However, these programs seldom clarified the guiding framework to link educational contents and expected outcomes through delivery modes, or have they provided standard materials for replication or wider dissemination.

Considering Chinese culture about sexual propriety, we developed the interactive SRH education program by referring to others' success in delivering SRH educational intervention under the guidance of the social cognitive theory (Acharya et al., 2017; Espada et al., 2017; Mmbaga et al., 2017; Peskin et al., 2015; Sommart & Sota, 2013; Winskell et al., 2018). This study examined the

effectiveness in improving adolescents' sexual knowledge, attitudes, and self-efficacy. We hypothesized that adolescents who receive the interactive SRH education program would have better sexual knowledge (primary outcome), more positive attitudes, and stronger sexual self-efficacy (secondary outcomes) compared with those who engage in usual mode of SRH education, that is, self-study of the same written and audiovisual materials.

2 | METHODS

2.1 | Study design

The quasi-experimental controlled trial was conducted in a two-branch middle school in a place exemplifying the large majority middle-size cities in mainland China according to the TREND guidelines (Des Jarlais et al., 2004).

2.2 | Setting and sample

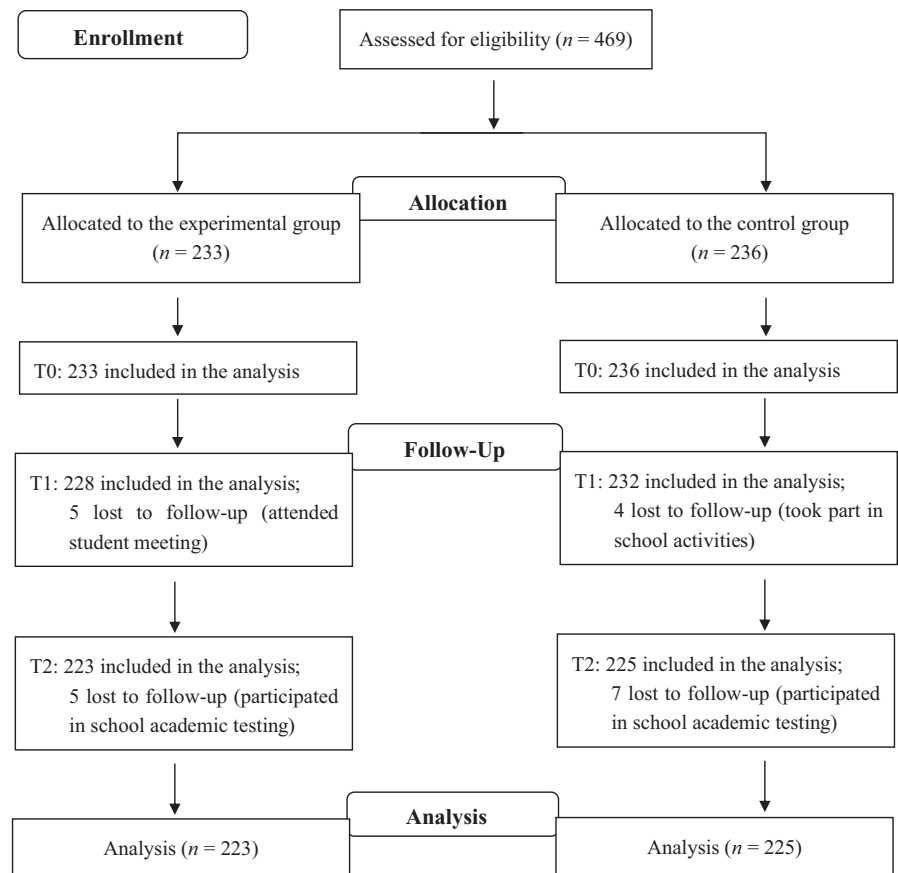
The target city in Shandong Province in eastern China had a sexually conservative culture and was experiencing urbanization at a slower pace compared with metropolitan or municipal cities (Yan et al., 2017). A stratified cluster sampling strategy was used to recruit participants. As estimated by G*Power 3.1 (Faul et al., 2007), to detect an effect size of 0.5 (Cohen's *d*) at a type I error rate of 0.05, and with a two-sided t-test having a power of 0.80, 128 participants needed to be recruited, with 64 in each of the study groups (size ratio of experimental to control group = 1:1). Given an average class size of 60 students, 2 of 20 classes were selected in each grade (Grades 7 and 8), depending on their availability during self-study sessions in the afternoon, from each of the two school branches, respectively. The coin toss method was used to decide whether to assign students in the smaller-numbered class to the experimental or control group. Student participants were blinded to the group assignment, but the nurses who delivered the intervention were not blinded.

Participants were aged 10 to 19 years in the selected classes, and able to communicate and read in Chinese. Parental consent to participate voluntarily was obtained. Excluded were those who had severe mental or communication problems or other SRH education experiences according to class supervisors' screening. The recruitment and reasons for dropping out were recorded in the flow chart (Figure 1).

2.3 | Ethical considerations

This study was approved by the institutional ethical committee (No. 2017-R-106) in compliance with the principles outlined in the Declaration of Helsinki. With the support of the middle school executive management committee, informed consent forms were sent to the school principal, class supervisors, recruited students,

FIGURE 1 Flow chart on participant recruitment and dropout



and their parents to obtain their respective written consent. Permission to use the instruments was obtained from original developers.

2.4 | Instruments

A *sociodemographic information sheet*, including items about age, gender, parents' education, smoking, drinking, and SRH-related experience, and the following three instruments were selected given their appropriateness for middle school students, national applicability, and convincing content validity established through the expert panel approach.

The *Sexual Knowledge Scale* (primary outcome measure) has 27 true/false statements assessing knowledge of reproductive physiology ($n = 11$), pregnancy and birth control ($n = 8$), and awareness of sexual harassment and assault ($n = 8$) (Yeh & Chen, 2012). The total score (0–27) is the sum of the correct answers' scores, with higher scores indicating a better understanding of sexual knowledge. The internal reliability (Cronbach's alpha, α) was 0.88.

The *Sexual Attitudes Questionnaire* (secondary outcome measure) contains 11 questions using a mixed 2-point (three questions), 3-point (five questions), or 4-point (three questions) scoring scheme to capture various attitudes toward different sexual behaviors (e.g., student romance, one-night stands, prostitution, sexual propriety, and HIV/AIDS in a partner) (Wu, 2007). The total

score ranges from 11 to 33, with higher scores indicating more positive attitudes. The internal reliability (Cronbach's alpha, α) was 0.74.

The *Sexual Self-Efficacy Scale* (secondary outcome measure) used three presumed sexual situations to assess the degree of certainty of refusing or saying “no” to each of the following situations: watching a pornographic video, sharing a kiss with one's best friend of the opposite sex, and acquaintance sexual aggression (Zuo et al., 2017). A 5-point Likert scale ranging from “1 = certainly cannot” to “5 = certainly can” was used, with higher scores indicating stronger refusal self-efficacy. The internal reliability (Cronbach's alpha, α) was 0.83.

2.5 | SRH education

2.5.1 | The intervention

The SRH educational program was constructed with reference to social cognitive theory (Bandura, 2004). Multiple components addressed determinants of the sexual behavioral change process related to knowledge, attitudes, and self-efficacy, presented in a supportive social environment in the school setting. The participatory strategy, advocated by the World Health Organization, infused not only SRH knowledge and skill development but also psychosocial well-being into planned teaching and learning activities (Lopez et al., 2016).

The topical contents (Table 1) for the proposed SRH education program were outlined according to the national standard and guidelines for SRH education for primary and secondary schools in China (China Sexology Association, 2017; National Health Commission of the People's Republic of China, 2011; The Central People's Government of the People's Republic of China, 2017) and further consolidated by referring to a comprehensive literature review (Salam et al., 2016). Following the PRISMA guide (Shamseer et al., 2015), we conducted a literature review and compared the contents, delivery modes, and outcome measures in the identified studies guided by social cognitive/learning theories (Acharya et al., 2017; Espada et al., 2017; Mmbaga et al., 2017; Peskin et al., 2015; Sommart & Sota, 2013; Winskell et al., 2018). We then selected the most feasible and corresponding standardized materials in Chinese (i.e., textual supporting materials) as well as the most accepted delivery modes to ensure consistency and future wide dissemination of the proposed intervention (Peskin et al., 2015; Sommart & Sota, 2013). Concise statements about adolescent SRH were derived from the textual materials, expressed in neutral and plain language, and enriched with selected cartoons and embedded videos in the form of Microsoft PowerPoint slides for classroom delivery (Marie Stopes International China, 2017).

A five-expert panel evaluated the interactive SRH education program to determine the appropriateness and adequacy of topical contents in slides and supporting textual materials, structure of contents, and modalities of delivery for classroom teaching. Three health professionals working in SRH-related specialties focused their evaluation on the contents, while the deputy school principal in charge of student matters and one class supervisor played a more

important role in evaluating the organization of the teaching and learning activities.

The theoretical lectures were interwoven with case scenarios, group discussions, quizzes (i.e., competitively answered questions to assess the acquisition of important concepts), and an audiovisual demonstration to engage students in dynamic activities stimulating physical, cognitive, social, and emotional responses (the educational components in Table 1). Such synchronized multiple sensory stimuli are very effective in attracting children—from infants to adolescents—to commit to active learning (Levine & Munsch, 2016).

The interactive SRH education program was pilot tested in a class of 58 students in Grade 8 in one of two school branches on November 20, 2017. Minor revisions were made to the administration of the self-report questionnaire (i.e., providing more guidance) and knowledge quiz game (i.e., explaining the rule of “answer with reasoning” more clearly).

For students in the experimental group, two 40-min sessions of an interactive SRH education program were delivered face-to-face in the classroom during the self-study session in the late afternoon. The first session focused on basic SRH knowledge, while the second session targeted communication, decision making, and gender matters. Each session started with a 20-min lecture, followed by a knowledge quiz game and group discussion, and then moving to a video (Table 1). Sessions 1 and 2 were implemented 1 week apart. Two registered nurses (RNs) delivered the SRH education program in collaboration with school facilitators, separately for boys and girls. This same-sex student arrangement was consistent with the usual practice for education related to sexual topics to reduce embarrassment or other discomforts entailed by mixed-sex social interactions.

Session	Topical contents	Mode of delivery	Duration (Min)
1	Adolescence and basic SRH knowledge	Lecture	20
	Case scenario	Group discussion ^a (foci: pubertal changes and gender issues)	7
	STIs (including HIV/AIDS)	Knowledge quiz game ^b	3
	Puberty and diseases	Video ^b	10
2	Communication and decision making about sexuality	Lecture (foci: skills for peer relationships, sexual refusal, and sexual assault prevention)	20
	Case scenario	Group discussion ^a (foci: skills to tackle sexual assault)	13
	Sexual assault	Video ^b	7

TABLE 1 Contents of the sexual and reproductive health education program

Note: SRH, sexual and reproductive health; STIs, sexually transmitted infections.

^aTopical contents for discussion originated from the national guideline for adolescent health education developed by the China Family Planning Association (China Family Planning Association, 2014).

^bVideo and knowledge quiz game were used from materials created by Marie Stopes International China for Participatory Training on Adolescent Sexual Health Education (Marie Stopes International China, 2017).

To ensure the faithfulness of the implementation, these two RNS had experience in health education and were trained for the delivery of the proposed SRH education program before the pilot test, using the predesigned supporting materials that were based on the teaching protocol.

2.5.2 | The comparison activity

Students in the control group only received basic health education; that is, they were provided self-study textual/slides and audiovisual materials that were the same as those used with the intervention group. No interpersonal interactions, the essential component of participatory learning, were incorporated to facilitate students' self-study.

2.6 | Data collection and analysis

From November 22, 2017, to January 10, 2018, students were guided to complete the study instruments in the classroom before the intervention (T0), immediately after the intervention (T1), and 1 month after the intervention (T2). Data were analyzed using SPSS 25.0 (IBM Corp., Armonk, NY). Mean, standard deviation, and frequency analyses were conducted to describe the background characteristics. Independent *t*-tests, chi-square tests, and Fisher's exact tests were used to compare participants' characteristics and SRH-related measures between the two groups at baseline. Group differences in the educational effects on SRH-related outcomes across the three time points were examined using repeated-measures analysis of variance (ANOVA). The significance level was set at 0.05 (two-sided).

3 | RESULTS

Of the 469 recruited participants, 95.5% ($N = 448$; experimental group: $N = 223$; control group: $N = 225$) completed the study. Twenty-one students dropped out at T1 or T2 because of other school engagements (Figure 1), resulting in an attrition rate of 4.5% (21/469).

3.1 | Participants' baseline characteristics

Participants in the experimental and control groups were comparable with respect to their sociodemographic characteristics, SRH-related experience, and outcome measures (Tables 2 and 3). Overall, students were aged 11 to 15 years, with nearly the same number of female and male participants. Few reported potentially risk experience of smoking, drinking, sex, or romance. More than half of the respondents reported that their parents' education was above junior high school level.

3.2 | Effects on SRH knowledge

Repeated-measures ANOVA revealed significant group differences in the effects of the program on sexual knowledge ($F = 21.51$, $p < .01$; Table 3). The sexual knowledge score increased significantly ($p < .001$) across the study period (Table 3, Figure 2) for both groups. However, the control group exhibited a significant decrease between T1 and T2 ($p = .046$ and $< .05$), which was not observed in the experimental group ($p = .204$ and $> .05$, Figure 2).

3.3 | Effects on sexual attitudes

Students in the experimental group showed a significantly greater improvement (i.e., higher mean score and larger positive change) in sexual attitudes than did those in the control group ($F = 13.91$, $p < .01$, Table 3). The sexual attitudes score increased significantly ($p < .05$) across the study period in the experimental group, but not in the control group ($p > .05$, Figure 2).

3.4 | Effects on sexual self-efficacy

A significant group difference was revealed in the increase in sexual self-efficacy across the three measurement points ($F = 9.65$, $p < .01$, Table 3). The sexual efficacy score increased significantly across the study period in the experimental group ($p < .05$), but not in the control group, which showed a slight increase without any statistical significance ($p > .05$, Figure 2).

4 | DISCUSSION

Consistent with other studies (Harper et al., 2018; Peskin et al., 2015), this SRH educational intervention demonstrated positive effects on middle school students' SRH-related knowledge that emerged immediately after the intervention, which persisted 1 month later. The effectiveness of SRH-related knowledge among adolescents might be influenced by two conditions. First, the educational materials in our study were prepared in simple, plain language and integrated colorful cartoons and animation videos in a way consistent with usual formats or styles. Second, a variety of participatory strategies (i.e., quiz game [alternatively knowledge cognitive competition], group discussions, and audiovisual tools) catered to adolescents' inclination for more dynamic and less abstract learning stimuli (Levine & Munsch, 2016). This design made it easy to disseminate the established SRH education program to more middle school students.

Positive changes to sexual attitudes were more noticeable among students in the experimental group, although there was a decrease in the scores 1 month after the intervention, suggesting that reinforcement strategies should be attempted to increase or sustain attitudinal changes. In fact, not all SRH education programs

TABLE 2 Participants' background characteristics at baseline

Variables	Total (n = 469)	Experimental group (n = 233)	Control group (n = 236)	p
Age (years), Mean (SD)	12.77 (0.65)	12.80 (0.66)	12.75 (0.64)	.422
Gender, n (%)				
Female	233 (49.7)	115 (49.4)	118 (50.0)	.889
Male	236 (50.3)	118 (50.6)	118 (50.0)	
Mother's education, n (%)				
Below primary school	24 (5.1)	10 (4.3)	14 (5.9)	.193
Primary school	50 (10.7)	22 (9.4)	28 (11.9)	
Junior high school	146 (31.1)	84 (36.1)	62 (26.3)	
Vocational/senior high school	184 (39.2)	84 (36.1)	100 (42.4)	
University or above	65 (13.9)	33 (14.2)	32 (13.6)	
Father's education, n (%)				
Below primary school	9 (1.9)	4 (1.7)	5 (2.1)	.789
Primary school	21 (4.5)	8 (3.4)	13 (5.5)	
Junior high school	159 (33.9)	78 (33.5)	81 (34.3)	
Vocational/senior high school	202 (43.1)	105 (45.1)	97 (41.1)	
University or above	78 (16.6)	38 (16.3)	40 (16.9)	
Smoking, n (%)				
Never	452 (96.4)	225 (96.6)	227 (96.2)	1.000
Little	12 (2.6)	6 (2.6)	6 (2.5)	
Sometimes	3 (0.6)	1 (0.4)	2 (0.8)	
Often	2 (0.4)	1 (0.4)	1 (0.4)	
Drinking, n (%)				
Never	405 (86.4)	204 (87.6)	201 (85.2)	.067
Little	42 (9.0)	23 (9.9)	19 (8.1)	
Sometimes	21 (4.5)	5 (2.1)	16 (6.8)	
Often	1 (0.2)	1 (0.4)	-	
Ever had a romantic relationship, n (%)				
No	451 (96.2)	225 (96.6)	226 (95.8)	.651
Yes	18 (3.8)	8 (3.4)	10 (4.2)	
Intimate behaviors, n (%)				
Hold hands	48 (10.2)	20 (8.6)	28 (11.9)	.178
Hug	19 (4.1)	6 (2.6)	13 (5.5)	
Kiss	1 (0.2)	-	1 (0.4)	
Touch	3 (0.6)	1 (0.4)	2 (0.8)	
None	398 (84.9)	206 (88.4)	192 (81.4)	

Note: The t-test was used for age comparison, while the chi-square test or Fisher's exact test was used for other comparisons.

TABLE 3 Results of the repeated-measures ANOVA for sexual and reproductive health-related outcomes ($N = 448$)

Outcome measures	Repeated-measure statistics Mean (SD)			Within-group comparison		Between-group comparison		Interaction effect	
	T0	T1	T2	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Sexual knowledge				181.27	<.01 ^a	21.51	<.01 ^a	85.71	<.01 ^a
Experimental group	12.31 (6.31)	18.84 (6.32)	19.18 (5.70)						
Control group	13.37 (6.28)	15.04 (7.00)	14.28 (7.37)						
Sexual attitudes				3.80	.024 ^a	13.91	<.01 ^a	3.91	.021 ^a
Experimental group	26.28 (2.79)	27.10 (3.68)	27.06 (3.44)						
Control group	25.73 (3.64)	25.70 (4.20)	25.75 (4.21)						
Sexual self-efficacy				13.03	<.01 ^a	9.65	.002 ^a	7.03	.01 ^a
Experimental group	4.43 (0.96)	4.77 (0.57)	4.72 (0.74)						
Control group	4.40 (0.93)	4.42 (0.99)	4.50 (0.91)						

SD, standard deviation; T0, before intervention; T1, immediately after intervention; T2, 1 month after intervention.

^a $p < .05$.

for adolescents have generated positive attitudinal outcomes. Frida et al. and's (2011) program failed to improve sexual attitudes despite being able to improve sexual knowledge and behaviors among adolescents, unlike our SRH education program and those tested by others (Constantine et al., 2015; Krugu et al., 2018). According to social psychology, attitudes are the intrinsic psychological tendencies for an individual toward people and things. They are shaped by various factors over a long period (Lu, 2011). Therefore, SRH educational interventions should be implemented for a longer period to bring about and sustain positive changes to adolescents' sexual attitudes.

Like others' work, our SRH education program resulted in an increase in sexual self-efficacy. Constantine et al., (2015) tested SRH courses in 10 secondary schools in the United States and found that students receiving education had higher self-efficacy in managing risky situations (e.g., knowing how to say 'no' to sex). Peskin et al., (2015) reported that middle school students showed improvements in sexual self-efficacy after receiving an SRH education program. In our study, the sexual self-efficacy score decreased to a great deal 1 month after the intervention (i.e., T2), which might be caused by the rarity of encouraging or reinforcing social interactions at in participants' proximal environments including school and home settings, where parents and teachers used to keep close eyes on their conduct. Weak self-control, a sign of low willpower, may also play a role in the reduction of the positive changes caused by the SRH program (Spano, 2004). Given the impact of the perpetual sexual conservative context, posteducation reinforcement should be integrated into the program to sustain adolescents' efficacy in refusal decision making in various risky situations (Leung et al., 2019).

To keep consistent with the contextual or cultural conservativeness in the local society, we placed female and male students in separate rooms and used sex-sensitive teaching materials. Given students' tight schedule and heavy study load, strong school and

parental support was key to students' participation in the SRH education program; otherwise, none of the students would attend non-academic focused education. The involvement of school managers, including the principal, was critical to the success of this SRH program. They coordinated and facilitated all arrangements, including the selection of time slots, venues for the SRH education, and engagement of school facilitators, which helped create a supportive social environment for this school-based sexual health promotion endeavor.

4.1 | Strengths and limitations

The present study examined the effectiveness of developing an interactive SRH education program that took into consideration the cultural context and participants' developmental characteristics (i.e., preference for simple and interesting materials and participatory teaching and learning activities). This program demonstrated encouraging positive outcomes in SRH-related knowledge, attitudes, and self-efficacy skills. However, we did not assess actual romantic or sexual behaviors given that very few students had or would report such experiences. There might have greater positive effects on sexual knowledge, attitudes and self-efficacy if the intervention lasted for a longer period (i.e. more than two 40-min sessions) or reinforcement strategies (e.g. more social media based interactions) were implemented.

Two deliverers of the SRH education program were not blinded to the group assignment of students, the delivery and assessment of the intervention might be compromised. Additionally, academic engagement and success were primary concerns for the school and families in the local society. Students in Grade 9 were not involved because they were occupied by focused study for the city-wide examinations for an entry to an ideal high school, while limited resources influenced the access to other middle

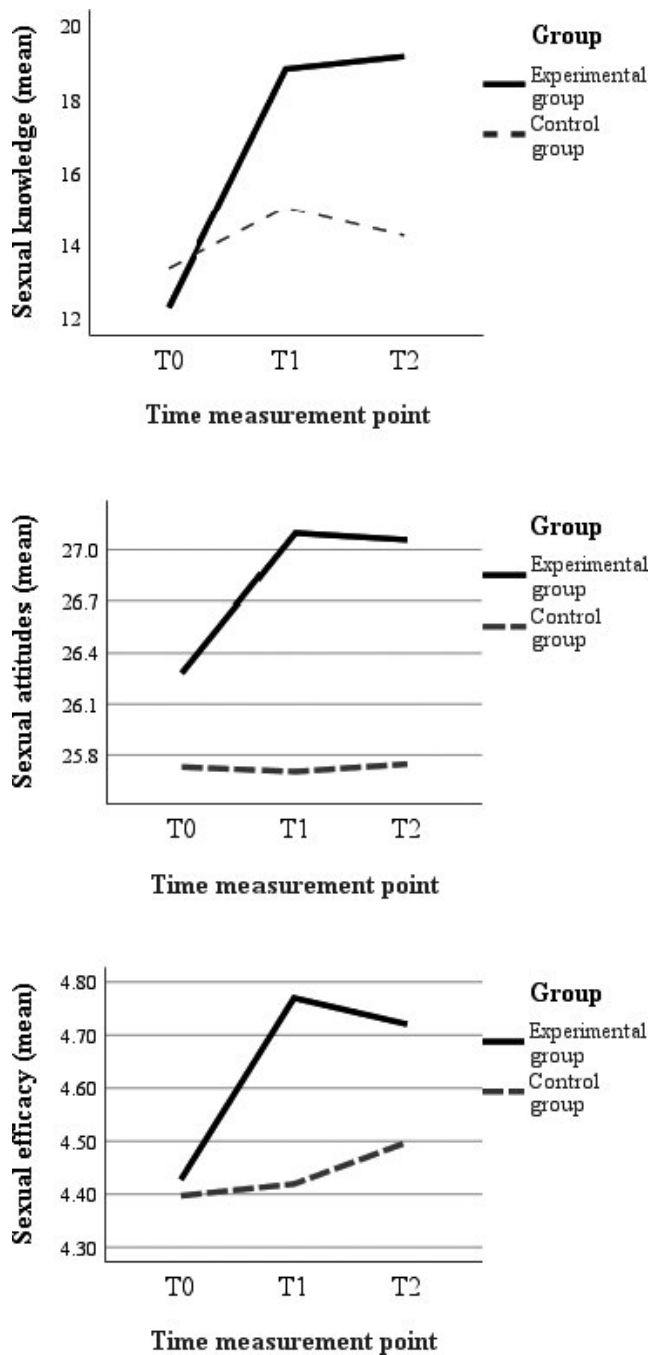


FIGURE 2 Sexual knowledge, attitudes, and efficacy score changes by group over time

schools, which threatens the generalizability of this study should be cautious.

4.2 | Implications for public health nursing

This interactive SRH education program was constructed and implemented to reflect the social, cultural, managerial, and developmental concerns over adolescent sexuality in alignment with sexual propriety and social appropriateness. It utilized internationally

recognized, culturally adapted, and gender- as well as developmental stage appropriate strategies aforementioned. The teaching materials and associated delivery methods as used in our SRH education program might be applicable to other contexts with a similar cultural background surrounding sexual conservativeness. More engaging technologies might be adopted to further improve the outcomes like what others did (Peskin et al., 2015; Winskell et al., 2018).

In our study it was nurses who delivered the SRH education program, which consolidates nurses' roles in public health nursing in face of the severe shortage of doctors in school and community settings. School-based SRH education is beneficial to youth growth and health service development for any country. School nurses may make full use of educational opportunities to apply what they learned to increase the impact in SRH among adolescents.

5 | CONCLUSION

This interactive SRH education program was effective at improving middle school adolescents' sexual knowledge, attitudes, and self-efficacy across a 1-month period. The educational contents and implementation protocol were in harmony with the local sexually conservative culture and usual educational practice regarding sensitive topics. The SRH interventional study is an encouraging attempt suggesting promising approaches to school health promotion and disease prevention with a cultural impact.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

DATA AVAILABILITY STATEMENT

Data will be available upon request.

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