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Effectiveness of Comprehensive Sexual Health Education in 9th Graders of Hawai'i's Public Charter School

Sarah J Thompson, BS[1], Darian L Finley, BS[1], Brooke J Chmiel, BS[1], Chakameh Akhavan, BA[1], Kalena N Spinola, BS[1], Michelle E Balshin, BA, BS[1], Keahealailani M Takushi, BS[1], Surekha Appikatla, MPH[1], Sharon K Hiu, DO[1]

[1] School of Osteopathic Medicine of Arizona, A.T. Still University

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Abstract

Current results from the Hawai'i public high schools' Youth Risk Behavior Survey indicate that students continue to engage in risky sexual behaviors that may lead to sexually transmitted infections or unplanned teen pregnancies. This prompted a collaborative work between A.T. Still University-School of Osteopathic Medicine in Arizona 2nd year medical students and educators at a public charter school in Hawai'i to create a comprehensive sexual health education series. The series highlighted the importance of medically accurate knowledge to make informed decisions and promote personal health and wellness. It included lessons on: (1) reproductive anatomy, puberty, and menstruation, (2) pregnancy, family planning, and healthy relationships, (3) contraception, and (4) sexually transmitted infections (STI). Each lesson had a pre-presentation survey, the presentation, an interactive activity, a question and answer session, and a post-presentation survey. All post-presentation surveys showed a statistically significant increase in student knowledge (P<.001) indicating that medically accurate information can be effectively delivered to high school students. Students also reported that the activities with the lessons were educational and fun, as it taught them about their bodies, prevention of STI and unintended pregnancies, and the available resources for sexual health care and family planning. Collectively, the students had positive feedback on the lesson series.

Abbreviations and Acronyms

ATSU-SOMA: A.T. Still University-School of Osteopathic Medicine in Arizona
JABSOM: John A. Burns School of Medicine
MSM: men who have sex with men
PCS: public charter school
STD: sexually transmitted disease
STI: sexually transmitted infection
YRBS: Youth Risk Behavior Survey

Background

Implementing an effective and comprehensive sexual health education program in Hawai'i public schools is crucial for providing students the information needed to make responsible decisions about their sexual health. Prior to June 16, 2015, sexual health education in Hawai'i public schools was strictly abstinence-based and had to be from 1 of the 7 Hawai'i Department of Education approved curricula.[1] Abstinence-only based programs continue to receive federal funding despite their failure to reduce sexually transmitted infections (STI) and teen pregnancy, and despite evidence that Americans support a more comprehensive approach to sexual health education.[1] The current standard for sexual health education in the Hawai'i Board of Education Policy 103-5 requires comprehensive sexual health education to be offered at Hawai'i public schools. This includes, but is not limited to, education on healthy relationships, sexual health and sexuality, abstinence and contraceptive use, and methods of contraception to prevent pregnancy and STI.[1]

The need for a comprehensive sexual health education program which aims to prevent STI and unplanned pregnancy while also promoting bodily autonomy for Hawai'i students is becoming increasingly important. Based on the 2013, 2015, and 2017 High School Youth Risk Behavior Surveys (YRBS) in Hawai'i, 60% of male students who had sexual contact with males (MSM) did not use a condom during their last sexual intercourse, and 50% of non-MSM high school students (males who had sexual contact with only females) did not use a condom during the last sexual intercourse.[2] While these statistics show that Hawai'i's youth are engaging in risky behaviors that can lead to unplanned pregnancy or STI transmission, it is also worth noting that Hawai'i's youth also engage in these behaviors at a higher rate than the national average which is measured at 41% of youth who did not use a condom during their last sexual intercourse.[1] Additionally, teen pregnancy rates have historically been high in Hawai'i, especially in rural areas. In 2010, Hawai'i ranked 10th in the US for the highest teen pregnancy rate at 65 per 1,000 women ages 15-19, compared to 57 per 1,000 women ages 15-19 nationally.[3] National analyses show a correlation between young parenthood and homelessness.[4] Teen mothers struggle with graduating from high school and face many financial and emotional obstacles when supporting themselves and their children.[5] Lower teen pregnancy rates have been found in states offering comprehensive sex education programs that include education on abstinence, but do not emphasize it as the only method or most preferred option.[1]

Findings about high-risk sexual behaviors from Hawai'i's youth make it imperative to provide comprehensive sexual health education programs in public schools especially in rural areas where there are higher rates of unplanned teen

pregnancy and STI. Without action or a curriculum mandate, schools and students may lack the resources necessary to offer effective sexual health education classes. Thus, this project aimed to construct and implement a comprehensive evidence-based sexual health education program that can equip students with the necessary knowledge to make educated choices when it comes to their sexual health.

Methodology

Due to the shared desire of the faculty and administration at a public charter school (PCS) to implement an extensive and comprehensive sexual health education program into the 9th grade health curriculum, this program was designed with consideration for current sexual health trends exhibited by Hawai'i's youth based on data collected from the 2013, 2015, and 2017 YRBS.[2] Prior to the program, all students were given take-home consent forms to discuss with their parents or legal guardians. The consent also covered participation in anonymous surveys from which parents or legal guardians could opt-out. Parents or legal guardians could withdraw their child/children from the program. Signed forms indicated parental consent and had to be received by the school prior to starting the first lesson. Participating students could opt out anytime they felt uncomfortable. Study design was given non-jurisdiction determination through the A.T. Still University Arizona Institutional Review Board (IRB Protocol #2024-012).

All 71 9th grade students were recruited into the program; however, only 50 students were enrolled in a health class during the time of implementation and were therefore eligible to participate. Of these, 48 students opted into the program and 2 students opted out. This curriculum was initially implemented in the Fall semester of 2023 with 10th grade students at the PCS using the same lesson plans, presentations, and pre- and post-survey questions described below. The current project was conducted in the Spring semester of 2024 with 9th grade students. All 48 participating students attended Lesson 1; however, attendance decreased to 42 students for Lessons 2–4 due to absences on the planned days. The participants were divided into 2 classrooms. Each classroom had at least 2 presenters who were 2nd year medical students from A.T. Still University-School of Osteopathic Medicine in Arizona (ATSU-SOMA). The series was designed to encompass four, 1-hour long class periods that began with a brief introduction of the presenters, as well as a reminder of classroom rules and expectations. This was followed by a 10-minute anonymous pre-presentation survey to gauge prior knowledge or interest on the respective subject matter. Lessons 1, 2, and 4 were previously developed by a project team member for high school health courses and modified by the project team, while Lesson 3 was created by the project team. All information included in lesson plans were confirmed with information found in academic journal articles and UpToDate.[6] Questions on pre-participation surveys were worded to be objective with overt correct answers. Survey questions were created by the project team based on the topic of the lesson (**Table 1**). This was followed by a 20-minute PowerPoint presentation that emphasized the goals and objectives of the specific lesson. Students then participated in a 15-minute engaging activity tailored to the specific topic, followed by a brief question and answer (Q & A) session. Extra time throughout the series was also allocated for additional questions from the students. At the end of each session, students received a small token of appreciation, such as a snack or health-themed sticker, to acknowledge their participation.

The content of the 4 lessons are summarized here:

Lesson 1: *Reproductive Anatomy, Puberty, and Menstruation*

> The program emphasized the importance of creating a safe space for learning about sex and health while providing students with a standard foundation of knowledge regarding the reproductive system. Topics covered male and female reproductive anatomy, physiology, pubertal changes, and menstruation, including the use of different menstrual products. Students completed an anatomical diagram depicting important structures of the reproductive system and discussed how menstruation and puberty may affect them.

Lesson 2: *Pregnancy, Family Planning, and Healthy Relationships*

> Pregnancy was discussed, including its physiological processes, associated mental and physical changes, and potential complications. Students participated in an interactive family planning simulation that put them in different socioeconomic scenarios with a budget allowing them to experience financial responsibility and parenting. It concluded by addressing consent and healthy relationships.

Lesson 3: *Contraception*

> The lesson included a review of pregnancy, covering conception and an overview of labor and spontaneous vaginal delivery. Types of contraceptives and pregnancy termination were also introduced. Students simulated the anatomical changes of labor and delivery using a balloon and ping pong ball. The balloon represented the uterus, its opening the cervix, and the ping pong ball the fetal head. Local resources for family planning were provided to students.

Lesson 4: *Sexually Transmitted Infections*

> The lesson focused on STI presentation and symptoms, prevention, and treatment. Students participated in a simulation activity that showed STI transmission, and how monogamy, abstinence, and contraception can lower infection rate. Students received information about local resources for STI testing and treatment. It ended with a review of all the sessions and allowed students to ask questions.

Sessions concluded with a 10-minute anonymous post-presentation survey which included the same pre-participation survey questions to assess changes in acquired knowledge. Post-presentation surveys included 1-2 free response questions meant to gain insight on the students'

Table 1. Pre- and Post-Survey Questions and Responses for a Sexual Health Education Curriculum, Hawai'i, 2024

Question	Pre-survey % Correct	Post-survey % Correct	*P*-value[a]
Lesson 1 - Reproductive Anatomy, Puberty, and Menstruation (n=48)			
MATCH the following male reproductive structures (term to definition).	42	67	*.020*
MATCH the following female reproductive structures (term to definition).	27	69	*<.001*
List THREE changes that may occur during puberty for MALES.	65	79	*.281*
List THREE changes that may occur during puberty for FEMALES.	63	77	*.039*
Why does menstruation happen and what are common symptoms females might experience?	31	38	*.067*
List TWO different forms of menstrual products.	58	90	*<.001*
		All answers correct	***<.001***
Lesson 2 - Pregnancy, Family Planning, and Healthy Relationships (n=42)			
What are TWO early signs of a pregnancy?	81	95	*.033*
What is a healthy relationship and how does it differ from an unhealthy relationship?	45	52	*.173*
List ONE complication of teenage pregnancy.	62	88	*<.001*
What are the additional costs parents need to think about when having a child?	60	74	*.083*
Approximately, how much does raising a child cost (from birth to age 18)?	5	60	*<.001*
		All answers correct	***<.001***
Lesson 3 - Contraception (n=42)			
What is contraception?	43	88	*<.001*
What are TWO uses of contraceptives?	19	38	*.014*
List THREE forms of contraceptives	36	69	*<.001*
List TWO options available for an unplanned pregnancy?	50	64	*.183*
		All answers correct	***<.001***
Lesson 4 - Sexually Transmitted Infections (n=42)			
What is an STI and what makes it different from an STD?	57	76	*.029*
What is ONE reason why STI education is important?	74	93	*.019*
List TWO things you can do to decrease your risk of getting an STI.	57	88	*.005*
Why is STI testing important?	71	88	*.018*
		All answers correct	***<.001***

[a]Paired sample *t*-test
STI=sexually transmitted infection

feelings about the lesson. The lesson 4 post-presentation survey included a reflective question inquiring about the sexual health education series as a whole.

Pre-presentation and post-presentation surveys were anonymous and were directly distributed and collected by the classroom teachers. Individual responses were not matched; instead, the analysis focused on group-level changes in knowledge. All students were expected to complete the surveys unless their parent or legal guardian opted to have their child's survey information excluded from data collection. Data de-identifying procedures were not needed since the collected materials were anonymous.

Pre- and post-presentation survey data were analyzed to assess the changes in the perceived knowledge in the sexual health education series. Each content-based question was graded separately by 2 ATSU-SOMA students who were given the same answer key. The averages of both assigned grades were then used to determine the final score used for data purposes. A third-party teacher from the PCS was also present for any assistance with illegible answers. The utmost effort was made to decipher student answers. If no verdict was reached, the answer would be marked as incorrect and given a 0. The total number and the percentage of correct answers were then calculated and compared for the pre-presentation vs. post-presentation surveys to assess for gained knowledge. Percentages were used to account for the possibility of absent students when comparing data between the different lessons. The survey data were compiled and analyzed using Microsoft Excel Version 2602 (Microsoft Corporation, Redmond, WA) and SPSS Version 29 (IBM Corp., Armonk, NY). Descriptive statistics, including frequencies and percentages, were calculated for all the questions. Paired samples *t-*test was used to compare the students' change in perceived knowledge from pre-survey to post-survey with a set statistical significance at $P<.05$. Answers to free response questions for each lesson were

logged and analyzed for key words and common themes. Participation in these surveys was not used for any grade assignment by the health teacher and was strictly used for data collection.

Data

There were 48 participants for lesson 1 and 42 participants for lessons 2, 3, and 4.The percentage of students who attained a perfect score (all correct) on each question was examined. Data analysis demonstrated that students showed an increase in perceived knowledge across all questions in all 4 lessons, with few questions showing drastic change compared to others, described in detail below (**Table 1**). Paired sample *t*-tests confirmed that the mean overall scores increased from pre- to post-survey for all lessons, along with the change being statistically significant, for all 4 lessons ($P<.001$).

There was a significant increase in students' overall mean knowledge scores (n=48) on reproductive anatomy, puberty and menstruation (Lesson 1, $P<.001$), with significant increases in knowledge in 4 of 6 topic areas: male reproductive structures (41% to 67%, $P=.020$), female reproductive structures (27% to 69%, $P<.001$), female puberty changes (63% to 77%, $P=.039$), and menstrual products (58% to 90%, $P<.001$) (**Table 1**).

There was a significant increase in students' (n=42) overall mean knowledge scores on pregnancy, family planning and healthy relationships (Lesson 2, $P<.001$), with significant increases in knowledge in 3 of 5 topic areas: early signs of pregnancy (81% to 95%, $P=.033$), teenage pregnancy complications (62% to 88%, $P<.001$), and cost of raising a child (5% to 60%, $P<.001$) (**Table 1**).

There was a significant increase in students' (n=42) overall mean knowledge scores on contraception (Lesson 3, $P<.001$), with significant increases in knowledge in 3 of 4 topic areas: contraception definition (43% to 88%, $P<.001$), uses of contraceptives (19% to 38%, $P=.014$), and contraceptive forms (36% to 69%, $P<.001$) (**Table 1**).

There was a significant increase in students' (n=42) overall mean knowledge scores on sexually transmitted infections (Lesson 4, $P<.001$), with significant increases in knowledge in 4 of 4 topic areas: STI versus STD definition (57% to 76%, $P=.029$), importance of STI education (74% to 93%, $P=.019$), ways to decrease STI risk (57% to 88%, $P=.005$), and importance of STI testing (81% to 88%, $P=.018$) (**Table 1**).

Some of the open-ended questions showed that this lesson helped students understand more about their bodies, how to stop teen pregnancies, and be protected against STIs. Valuable insights were gleaned from responses to the open-ended questions conducted at the end of each session. A common theme was that the activities associated with the lessons were educational and fun, which allowed better engagement and understanding. For example, one student from Lesson 1 shared, "I learned that there is a lot to learn about my body that I don't know," reflecting the extent to which these sessions can teach students about their own sexual anatomy. Another student reported that Lesson 2 influenced their perspective on parenthood, reinforcing a desire to avoid early parenthood during high school. In another response, a student expressed, "I like sexual education because I want to be able to be safe in the future mentally and physically," demonstrating the possible impact of Lesson 3 on students' sense of empowerment and future wellbeing. Similarly, after Lesson 4, a student noted, "in my opinion, what I like about the sexual health education program is we are learning how to be protected and what to do if you get something transmitted to you during sex," showing the real-life applicability of these lessons. These sentiments were echoed by others who shared that the program helped them to learn more about their own bodies and gain a clearer understanding of STI and unintended pregnancies prevention, and the available options and resources for family planning.

Discussion

This sexual health education series for 9th grade students at the PCS was accepted positively by both students and faculty, and showed an overall significant increase ($P<.001$) in student knowledge for each lesson. The survey responses also suggest that this series of lessons was successful in educating and engaging students about sexual health in which they gained a deeper understanding about topics ranging from sexual anatomy to prevention of STI and unintended pregnancies. Students felt better prepared to make informed decisions, and a greater ability to protect themselves and seek help when necessary. Students seem to resonate with the practical applications such as how to protect oneself from STI and what to do with a potential health concern, suggesting programs that incorporate real-life scenarios can likely increase students' sense of confidence and competence in managing their sexual health.

Overall, the survey feedback highlights the success of the program in achieving its educational objectives. The findings align with existing literature that emphasizes the importance of comprehensive sexual education to shape adolescents' information base and to empower them to make responsible decisions.[7]

Implications

The initiative was designed in the hope of serving as a blueprint for Hawai'i schools lacking a comprehensive sexual health education curriculum. The expectation is that these schools may construct programs with similarly engaging lessons that highlight bodily autonomy and health literacy in hopes to equip students with the knowledge needed to make educated decisions about their own health, and ultimately reduce rates of STIs and teen pregnancies in Hawai'i. Early sexual health education is critical, as adolescents begin forming behaviors that influence their long-term health before puberty. Providing medically accurate lessons about STIs, unintended pregnancy, and bodily autonomy equips students with the knowledge and skills needed to make informed decisions about their own health, ultimately supporting efforts to reduce teen pregnancy and STI rates in the community.[8]

When it comes to implementing sexual health curriculum into classrooms, one of the biggest obstacles is teacher preparedness. For example, in Chicago public schools, it was found that teachers lacked available preparation time to create sexual health curricula and often felt discomfort and difficulty with delivering the material.[9] Due to the nature of the material, it is also important that sexual health education is taught by educators who are knowledgeable, skilled and comfortable addressing a wide-range of sexual health topics.[10] This sexual health series can be adapted to a community-based project similar to the Hawai'i Community Comprehensive Sexuality Education Project, developed by the University of Hawai'i John A. Burns School of Medicine (JABSOM) in 2021, which aimed to promote sexuality education in elementary and high schools through evidence-based information.[7] With their program, medical students and resident physicians facilitated roundtable discussions with students and educators, providing lesson plans selected by participating schools. That model served as a training opportunity for medical trainees to develop skills in delivering sexual health information, while simultaneously educating students.

Similarly to JABSOM's program, the curriculum described in this study was also developed by medical students to ensure medical accuracy; however, it is organized into a standardized, lesson-based format suitable for classroom implementation. Instructional materials, including PowerPoint slides and classroom activities, can be shared with educators for independent use. In future implementations, medical students could initially teach the lessons to students with the intent to model instruction for classroom educators, who could then continue to deliver the curriculum and share it with other teachers once they are comfortable with the material. This would allow for sustainability of school-based sexual health education while maintaining medical accuracy without requiring a health care professional to facilitate instruction.

Study limitations

Survey design. The surveys designed for this initiative were not intended to be used for longitudinal study. In the future, it would be beneficial to gather data with a pre-survey prior to the first lesson and a comprehensive post-survey at the end of the last lesson.

Lesson design. Despite the great depth of information that was covered, the lessons created and chosen for the study were not all-encompassing of sexual health education, as there was only time to lecture on 4 core subjects. In addition to covering the discussed topics in more detail, this curriculum could be expanded by including discussions on gender identity, media's effect on sexual health choices, sex trafficking, and diverse relationships such as asexual, non-monogamous, or polyamorous relationships. Additionally, the current lessons could also be adjusted in the future to also make it less heteronormative and more inclusive of the lesbian, gay, bisexual, transgender, queer, and other sexual and gender minority community. Prior research shows that many of the provided sexual health education curricula lack topics such as these, and as a result, students may feel ignored if they do not identify as heterosexual.[11]

Conclusion

Overall, the project showed promising success as an effective sexual health education series as all 4 lessons had a statistically significant increase in student knowledge from pre-survey to post-survey responses. It is hoped that Hawai'i schools that lack a comprehensive sexual health education curriculum can use these lessons as a blueprint for constructing their own sexual health programs that prioritize bodily autonomy and health literacy with the goal of providing students with the knowledge needed to make educated decisions about their own sexual health.

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Conflict of Interest and Disclosures

None of the authors identify any conflict of interest.

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