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## Online Sexual Health Education with Rural Independent Study Charter School Students

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Online Sexual Health Education with Rural Independent Study Charter School Students

Presented to the Faculty of the School of Nursing

The George Washington University

In partial fulfillment of the  
requirements for the degree of  
Doctor of Nursing Practice

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## Abstract

### **Background:**

Sexually transmitted infections (STIs) and unwanted pregnancies continue to be public health problems in the United States. Each year there are about 20 million new STIs in the United States with about half of the infections occurring in people 15 to 24 years old (The Centers for Disease Control and Prevention, 2016).

### **Objectives:**

The purpose of this descriptive pre- and post-test study was to determine if an online STI prevention program increased knowledge about STIs, STI related resources, and lowered STI risk-taking behaviors in rural northern California students attending an alternative high school.

### **Methodology:**

“Positive Prevention *PLUS*” curriculum and pre- and post-test survey tools were provided via an online platform by a credentialed school nurse. The survey tools measured STI knowledge, STI resources, and STI risk-taking behaviors. Survey tools were completed by 17 high school students before and at the one-month follow-up after “Positive Prevention *PLUS*” training.

### **Results:**

Students who completed the curriculum significantly increased STI knowledge and knowledge of STI resources. However, there was no significant change in students’ self-reported STI risk-taking behaviors at the one-month follow-up.

### **Conclusion:**

The “Positive Prevention *PLUS*” online program demonstrated positive impacts on knowledge of STIs and STI resources in a group of rural northern California students enrolled in an alternative independent charter high school setting.

## Project Plan

### Background

Sexually transmitted infections (STIs) and unwanted pregnancies continue to be public health problems in the United States. Each year there are about 20 million of new STIs in the United States with about half of the infections occurring in people 15 to 24 years old (The Centers for Disease Control and Prevention, 2016).

In the beginning of 2014, a Rural Northern California County Public Health Department (RNCCPHD) reported STI rates were higher than the state of California (CA) averages (Rural Northern California Public Health Department, 2014). Particularly, looking at data for youth (ages 14-19), based on per 100,000 populations, chlamydia for rural northern California youth was 991.0 compared to 716.1 for CA and gonorrhea was 169.6 for rural northern California compared to CA's 99.5 (Rural Northern California County Public Health, 2014). These rates continue to increase. In 2015, chlamydia was now 1,359.9/100,000 (compared to CA 487.5/100,000) and gonorrhea was now 231.1/100,000 (CA is 139.5/100,000) (California Department of Public Health, 2017). Also, syphilis has shown a rise. The rural northern California County rate for 2015 was at 28.2/100,000 compared to CA's rate of 12.6/100,000 (California Department of Public Health, 2017).

The rural northern California high schools do not have on-site health clinics or condom distribution programs. In 2012, the only two local youth outreach programs closed their doors due to lack of funding sources. One of the programs provided an on-site youth resource center and school STI education for students in eighth and tenth grades. The other program provided STI testing for youth both at their site and through a mobile outreach van.

**Problem Statement**

With the steady rise of STIs along with the lack of STI education, testing, and prevention for rural northern California youth; a look at prevention programs aiming at lowering sexual risk-taking behaviors was needed. The independent charter school (ICS) campuses (hybrid: on-line at home with once a week one-on-one teacher instruction) for seventh (minimum of thirteen years old) through twelfth grade students in a rural northern California community were the focus for this project.

**Purpose**

The purpose of this descriptive pre- and post-test study was to determine if an online STI prevention program would increase knowledge about STIs and STI related community resources and lower STI risk taking behaviors in a group of students attending at the rural independent study charter school.

**Specific Aims**

The aim of this project was to provide an online educational STI prevention program in order: to lower risk-taking sexual behaviors, increase STI knowledge, and increase knowledge of STI related resources among students attending a rural independent study charter school.

**Questions**

Could an online school-based STI prevention program (computer module) be an effective intervention to increase STI knowledge and lower STI risk taking behaviors among students in a rural independent study charter school?

**Hypothesis**

The STI prevention program will increase STI knowledge and lower STI risk-taking behaviors among students in a rural northern California independent study charter school.

## Significance

The U.S. Department of Health and Human Services (DHHS) (2014) has established national objectives for the American people titled, Healthy People 2020 to improve health outcomes and lower health disparities. In looking at the adolescent health objectives, the following should be accomplished with regard to improving STI rates in middle and high school students: “Reduce chlamydia rates among females aged 15 to 44 years” (DHHS, 2014). Also, Healthy People 2020 aims to improve sexual health education in the classrooms with the following objectives:

- “Increase the proportion of elementary, middle, and senior high schools that provide comprehensive school health education to prevent health problems in unintended pregnancy, HIV/AIDS, and STI infection”
- “Increase the proportion of elementary, middle, and senior high schools that have health education goals or objectives which address practicing health-enhancing behaviors and reducing health risks” (DHHS, 2014, 2.7-3.5).

The exploration of alternative methods, such as online courses, to deliver sexual health education to rural youth is needed. Finding effective ways to deliver sexual health education to rural youth has the potential to lower sexual risk-taking behaviors. Students who participate in online sexual health education will potentially increase condom use, delay sexual debut (anal, oral, and vaginal sex), increase STI knowledge, and improve sexual health behaviors. An online sexual health education program has the potential to lower STI rates in this population of rural high school students.

## Literature Review

A search of the literature was conducted to find peer reviewed, studies on STI education and prevention, written in English and published between 2012-2018, among adolescents aged 13 to

19 years old who attended middle schools, high schools, alternative high schools, or therapeutic schools. Systematic reviews, meta-analysis, research support, editorial and dissertations/thesis were excluded. Also excluded were studies with adolescents in special education classes, pregnant, incarcerated, or who voluntarily dropped out of school (even if still technically enrolled). A search of the Ovid MEDLINE database yielded 134 articles with six records duplicated resulting in a combined total of 131 records screened. After reviewing article abstracts, 83 articles were excluded for not meeting the inclusion criteria (see Appendix A, PRIMSA flowchart). After full text review was completed, 11 articles were selected and evaluated using the Effective Public Health Practice Project (EPHPP) Quality Assessment tool for this literature review (see Appendix B).

Eight randomized controlled studies were identified from the literature search (Brown et al., 2013; Coyle et al., 2012; Espada, Morales, Orgiles, Jemmott, and Jemmott, 2015; Grossman, Tracy, Charmaraman, Ceder, and Erkut, 2014; LaChausse, 2016; Markam et al., 2014; Reyna and Mills, 2014; Rohrbach et al., 2015). All eight trials evaluated sexual risk reduction prevention programs in adolescents and included a combined total of 13,771 students and reported data for 8,349 students. There were drop-outs in these studies and thus the pooled findings from these studies are based on randomizing 5,919 students in the intervention group. All studies were done with a randomized controlled trial design within the past five years.

Overall, findings from these eight studies suggest that sexual risk prevention programs lower sexual risk-taking behaviors in adolescents in the school setting. Although all studies were conducted in an urban setting, studies included large student samples with diverse ethnic backgrounds in a variety of traditional and alternative school settings. The majority of studies looked at the effect of the sexual health education within twelve to eighteen months after the

intervention. There was one study that looked at long term (three years) results (Markham et al., 2014). None of these studies used an online sexual education curriculum.

The eight randomized controlled studies evaluated similar variables and outcomes with statistically significance as a result of sexual health education programs. Brown et al. (2013) and Espada et al. (2015), demonstrated an increase in STI knowledge after participation in sexual health education. Rohrback et al. (2015) reported an increase in students carrying a condom, while both Brown et al. (2013) and Grossman et al. (2014) reported an increase in condom use as a result of sexual health education. LaChausse (2016) reported a decrease in unprotected intercourse. Similarly, sexual risk reduction was reported in several studies as a result of sexual health education (Grossman et al., 2014; Espada et al., 2015; and LaChausse, 2016).

Additionally, several studies showed a reported delay in anal, oral, and vaginal sex debut (Grossman et al., 2014; LaChausse, 2016; and Markam et al., 2014). Lastly, Rohrback et al. (2015) reported an increase in using sexual health services (resources) after participating in sexual health education.

The one consistent limitation in these eight studies was the use of student self-reporting. Self-reporting is susceptible to bias and underreporting. Logistically, limitations in this collection of studies can be due to conflicting school schedules, obtaining parental consents, multiple educators, and students being lost to follow-up. Coyle et al. (2012) and Rohrbach et al. (2015) both brought up an interesting limitation of their study in that both the intervention and control groups were on the same campus and “contamination across classrooms could have diluted the effect” (p. 77). This would mean that students were aware of the intervention group due to friends being in a different class. Another interesting limitation was expressed by Reyna & Mills (2014) stating that some ethnic populations (i.e. African Americans) perceive their risk of



engaging in sexual behavior higher at baseline than other ethnic populations. Lastly, all studies, but Grossman et al. (2014), were funded with grants by government institutions. Being funded by government grant could introduce bias in having the researcher support government endorsed and funded sexual health school-based programs.

The results of this review of eight studies implies that a sexual risk behavior prevention programs in the school setting reduces sexual risk-taking behaviors including increased condom use, delayed sexual debut (anal, oral, and vaginal sex), and increased HIV/STI knowledge. Two studies by Grossman et al. (2014) and Markham et al. (2013) recommend starting sexual risk behavior prevention programs as early as middle school. Also, two studies looked at implementing programs in an alternative school setting (Brown et al., 2013; Coyle et al., 2012). Brown et al. (2013) used a therapeutic day school (classroom based) for students with emotional or behavior issues who required a school to provide mental health services. Coyle et al. (2012) did their study in a continuation high school. This continuation high school (classroom based) was a setting for students who were sent from their traditional school to the county school for “deficits in academic performance, discipline issues and/or chronic absenteeism” (Coyle et al. 2012, p. 69).

Three additional studies (non-randomized) looked at online sexual health programs (Chen & Barrington, 2017; Mustanski, Greene, Ryan, and Whitton, 2015; vanLieshout, Mevissen, deWall, and Gerjo, 2017). vanLieshout et al. (2017) evaluated an online curriculum “Long Live Love+” (LLL+) in the Netherlands. “LLL+” is a six-step intervention approach that uses theory and evidence-based research curriculum. “LLL+” has 26 learning activities over six one-hour lessons. They interviewed 60 students (ages 15-17) in the Netherlands that participated in 13 focus group discussions. Chen and Barrington (2017) interviewed 29 ninth graders in rural North

Carolina regarding their experiences with “You Can Do It Anywhere” online sexual health education. “You Can Do It Anywhere” is sixteen interactive self-paced modules. In both of these qualitative studies, students reported higher enjoyment with the online format with greater privacy and comfort levels. Lastly, Mustanski et al. (2015) evaluated, “Queer Sex Ed” (an online multimedia five session program), via pre- and post-tests from 202 youth (16 to 20-year old) participants who reported being in a same sex relationship. This pre- and post-test design study demonstrated improvements in knowledge of sexual functioning, HIV/STIs, and contraceptives. In addition, outcomes were improved with connectedness to gay community and communication skills. Limitations that could have influenced the findings in all three of these studies included student self-reporting, issues with implementation of new online sexual health curriculum for teachers, students who previously participated in classroom sexual health classes, and short-term follow-up regarding student outcomes.

Overall, there are several randomized controlled trials that have shown that sexual health education delivered face-to-face in the classroom setting was effective in lowering sexual risk-taking behaviors (i.e. using a condom, delaying sexual encounters), increased awareness of resources, and in increase in STI knowledge. However relatively few studies have explored the effectiveness of an online sexual health education program and none have been done in a rural setting.

The purpose of this descriptive pre- and post-test study was to determine if an online STI prevention program would increase knowledge about STIs and STI related community resources and lower STI risk taking behaviors in a group of students attending the rural independent study charter school.

### Theoretical Framework

Applying an evidence-based model of sexual risk reduction to adolescents in a school setting is essential. The ADAPT-ITT (see Appendix C) model is an acronym for the following: assessment, decision, adaptation, production, topical experts, integration, training, and testing (Wingood & DiClemente, 2008). In 2008, Wingood & DiClemente developed this specific framework for HIV prevention (STI reduction) with diverse adolescents in a variety of public health community settings. Rushing & Gardner (2016) applied the model to reduce sexual risk behavior to Native American teens and young adults. This model best applies for this STI initiative.

“The ADAPT-ITT model consists of 8 sequential phases that inform HIV adapting evidence-based interventions” (Wingood & DiClemente, 2008, p. 40). The eight phases are the following: assessment, decision, adaptation, production, topical experts, integration, training, and testing (Wingood & DiClemente, 2008).

To start with, in the assessment phase, the data of our local high STI rates, elevated state sexual risk behaviors, lack of youth community resources, and no current state mandated STI education with our independent charter school (ICS) students were reviewed. This data is unique to our rural community.

Decision (phase two) was completed doing a systematic literature review. This systematic review evaluated literature that was peer reviewed, including studies on STI education and prevention that were written in English and published between 2012-2018 with participants who were adolescents 13 to 19 years old who attended middle schools, high schools, alternative high schools, and therapeutic schools.

Adaptation (phase three) was completed by the rural northern California credentialed school nurse to choose “Positive Prevention *PLUS*” (2017). “Positive Prevention *PLUS*” is an evidence-based intervention and best practices for sexual risk reduction produced in 1993 by Christine Ridley (RN, Med) and Kim Robert Clark (DrPH, MPH) in partnership with the Orange County Chapter of the America Red Cross. In 1999, the California Department of Education joined the partnership to continue to develop and distribute the curriculum.

Production (phase four) was completed by the rural northern California school nurses to draft a “Positive Prevention *PLUS*” curriculum unique to our rural, independent study students. Topical experts (phase five) were identified and included the following stakeholders: school board, superintendent, principal, school nurses, teacher, parents, and students. These stakeholders approved the draft curriculum and then integration (phase six) was done to update any changes and/or recommendations. The credentialed school nurses completed a “Positive Prevention *PLUS*” training (phase seven, training).

The last phase (phase eight) of testing was to initiate the sexual risk reduction prevention education with the ICS students, which was the purpose of this project.

### **Identifying and Defining Variables**

Student’s exposure to the STI education was the independent variable. A pre- and post-test developed by the “Positive Prevention *PLUS*” curriculum (with additional demographic and STI risk questions developed by the researcher) was used to measure the dependent variables: knowledge of STIs, knowledge of STI community resources, and sexual risk-taking behaviors. The full list of variables is illustrated in the Variables Table (see Appendix D).

## Methodology

### Study Design

A quantitative (pre- and post-test) design was used in this study. This study design investigated differences in STI knowledge scores and rating of STI risk taking behaviors in a group of high school students before and after the STI education intervention. This design proved to be realistic and feasible for the credentialed school nurse (California baccalaureate prepared board-certified registered nurse) to implement.

### Study Population/Sample

The two ICS campuses are located in rural northern California. On September 27, 2018, there were 122 students enrolled in the ICS school. Of those 122 students, 31 opt-out consents were signed by the parents and students. Of the 91 students invited to the class, 33 electively enrolled. Seventeen students completed the pre- and post-tests. These students were ninth through twelfth graders (with the majority, 35% being in the 11<sup>th</sup> grade). The majority (71%) identified as Caucasian and 41% identified as heterosexual. There were more female students (71%) than male.

### Sample Size

A power analysis was conducted to determine an adequate sample size for the study. Sample size was calculated for a paired sample t-test using two tailed alpha = 0.050, beta = 0.200, effect size = 0.500, and standard deviation = 1.000, with the sample size recommendation of 31 (University California San Francisco, 2018). Assuming a 50% response rate and potential drop-outs, all enrolled students were approached to participate. The study used convenience sampling: of the middle school and high school students (13 years and older).

### **Recruitment of Subjects**

All students enrolled in the ICS school for the Fall 2018 semester were recruited. Both parents and students received opt-out consents to participate and be included as study participants. Exclusion criteria were students in special education classes, pregnant, incarcerated, or who voluntarily drop out of school (even if still technically enrolled).

The biggest two supports the credentialed school nurse had were the 2012 California law (known as AB499) that “allows minors 12 years and older to consent to confidential medical services for the prevention of sexually transmitted diseases without their parent’s consent” (California Legislative Information, 2012) and the 2015 California law (known as AB 329) that mandate all schools teach a comprehensive sexual health curriculum that includes abstinence, contraceptives, sexual and gender identity, and all legally available pregnancy outcomes (California Legislative Information, 2015).

The biggest barrier when recruiting students for this study was due to a devastating fire, declared as a national disaster, that affected rural northern California during August 2018. Many student’s families lost homes and were evacuated for weeks, leaving them without access to reliable internet services and delaying start dates for the school year. Instead of doing online recruitment, all recruitment was done via hard copy documents.

By September 2018, parents received a hard copy letter with an introduction to the sexual health education. Included was the parental opt-out consent that allowed parents to have their child opt-out of the education, thus including parents as valuable stakeholders.

By September 2018, students received a hard copy letter explaining the twelve-week sexual health education program with the pre- and post-test, topics to be covered, possible risks, and credential school nurse contact information. Students were informed that surveys will be

anonymous, only available to the credentialed school nurse and that no identifiable information will be released. Along with the introduction letter, an opt-out consent was included. This informed the student that they have the right to not participate in the study or the pre- or post-survey during anytime for any reason without penalty in grades or school standing.

### **Setting**

Independent charter school (ICS) is a public alternative school (seventh to twelfth grades) under the direction of rural northern California County Office of Education. ICS has two campuses: one is located in the heart of downtown and the other is located six miles east on the Community College campus. The classes are a hybrid online setting with students coming to class twice a week for an hour to meet with their teacher. The rest of the academic time is allowing the student to work independently online at home.

ICS students have a variety of strengths and challenges in the academic setting. ICS students exhibit the following strengths: comfortable with technology, flexible schedule, and organizational skills. The challenges for ICS students are the following: peer isolation, history of negative school experiences, and social anxieties. ICS students can be at a higher risk for sexual risk-taking behavior compared to other high school students in the traditional school setting because of more free time, less parental involvement, and increased online dating.

### **Intervention**

“Positive Prevention *PLUS*” curriculum and pre- and post-test survey tools were provided via an online platform. Students received weekly online classes for twelve weeks. The topics covered were the following: life planning, exploring friendships and other relationships, bullying and relationship violence, preventing unplanned pregnancies, making informed decisions, understanding the California safe surrender law, myths and stereotypes regarding persons with

HIV, HIV disease and AIDS, preventing sexually transmitted diseases, risk recognition and risk reduction, media and peer pressure, accessing community services, and setting goals (Positive Prevention *PLUS*, 2017). Each module included an online lesson video with a corresponding worksheet that students filled out independently and submitted online. This intervention delivery was feasible for students as they already complete a majority of their academic work in this format. Also, it provided the student with independent learning experiences for potentially uncomfortable sexual health topics.

The school nurse implemented a pre- and post-test intervention study with ICS students. Students were given an online sexual health pre-test before the beginning of the twelve-week education session. The credentialed school nurse had been trained as a sexual health educator in the “Positive Prevention *PLUS*” curriculum. The credentialed school nurse monitored student’s weekly online activity. An online post-test was conducted at the one-month follow-up post “Positive Prevention *PLUS*” training.

### **Instrumentation/Measurements**

The “Positive Prevention *PLUS*” survey tool with additional survey questions (developed by the researcher) were used to collect data in this study. Permission was obtained from the “Positive Prevention *PLUS*” authors to use the survey tool for this study. The survey collected information regarding dependent variables, demographics, and clinical characteristics of the students. The “Positive Prevention *PLUS*” survey uses 25 true-false questions and a rank order for correct condom use. Dependent variables included the following: STI knowledge, STI resources, and sexual risk-taking behavior. Demographic data included education level, gender, sexual orientation, race, and ethnicity (see Appendix E). The additional survey questions related to clinical characteristic were given with yes-no check boxes (see Appendix F). Clinical



characteristics included tobacco use, alcohol consumption, marijuana use, illegal substance use, age at first sexual encounter, total number of sexual partners, number of sexual partners in past three months, condom use with last sexual encounter, and ever been tested for a STI (including HIV).

“Positive Prevention *PLUS*” is on the federal Office of Adolescent Health’s list of evidence-based interventions effective for teen pregnancy prevention. Validity and reliability for the data collection method (survey tool) have not been reported, but one article has been published.

LaChausse (2016) did a clustered randomized controlled trial with 21 suburban California high schools. Students in the treatment group (2,483) received the 11 weeks “Positive Prevention *PLUS*” face-to-face classroom setting sexual health education. There were 1,784 students in the control group. Students in both groups completed a pre-test and the treatment group completed a six-month post-test. Results “demonstrated statistically significant impacts on delaying sexual intercourse and increasing the use of birth control”, but no effects on pregnancy rates (LaChausse, 2016, p. 591).

### **Data Collection Procedures**

It was hypothesized that the STI prevention program would increase STI knowledge and lower STI risk taking behaviors among students in an independent study charter school. A GANTT chart by Smartsheet Inc. (2018) was developed showing major tasks for this study (see Appendix G).

The pre- and post-test survey tool was given online via survey monkey one week before STI education and then one-month post STI education. The pre- and post-test survey student responses were anonymous and there were no personal identifiers (i.e. name, birthdate, or address). Survey Monkey® is a secure internet platform that is already used by our rural northern

California county district office. The pre- and post-test surveys were emailed and available online for one week to all students that did not opt-out and had volunteered to participate. The survey tool was appropriate as these students were taking the STI education online and do most of their classwork in an online platform. This gave the student an idea that the survey was "more anonymous" rather than returning via in person or post office mail. The credentialed school nurse sent out email reminders every day during the week the pre- and post-tests were due.

### **Data Analysis Plan**

SPSS 24 (a computer software program) was used to store and analyze data. Collected data was uploaded by Survey Monkey® and then double-checked by the credentialed school nurse for accuracy. Survey monkey reported that the average time students spent on the pre- and post-test survey tool was nine (9) minutes and 36 seconds. The credentialed school nurse was the only person to have access to the SPSS data. Descriptive statistics were performed on each variable with the frequency and percentages being reported. For the research hypothesis, a paired samples t-test was performed to compare pre and post education survey data.

### **Ethical Considerations**

Although the 2012 California law (known as AB499) that “allows minors 12 years and older to consent to confidential medical services for the prevention of sexually transmitted diseases (STIs) without their parent’s consent” (California Legislative Information, 2012), the credentialed school nurse obtained opt-out consent from parents. A waiver of documentation of formal consents (for parents and students) for the study was requested for this study through a review conducted by The George Washington University Institutional Review Board (IRB). The opt-out consent described the general purpose of the study, educational content, confidentiality, and the credentialed school nurse’s contact information. Students also received an opt-out

consent that described the general purpose of the study, confidentiality, and contact information. Student's completion of the pre- and post-test surveys was the indication that they agreed to participate in the study.

Confidentiality was maintained by the credentialed school nurse. No one, outside of the credentialed school nurse had access to the data. Survey monkey provided anonymous data that was uploaded into SPSS.

This study was submitted to The George Washington University's Institutional Review Board (IRB) and was approved on June 6, 2018.

### **Results**

The online "Positive Prevention *PLUS*" increased knowledge of STIs and STI resources in a group of rural northern California students attending an ICS. There was a significant effect of the online "Positive Prevention *PLUS*" program on STI knowledge, STI identification, and STI resources. There were 17 students that completed the online pre-test and one-month follow-up post-test survey tool. Student demographics are shown in Table 1, clinical considerations (smoking, alcohol, marijuana, and illegal substance) are shown in Table 2, and Table 3 shows age of first sexual encounter, total lifetime sexual partners, condom use with last sexual encounter, and previous STI testing (see Appendix H, I, and J).

At the one-month follow-up, students demonstrated an increase in overall STI knowledge ( $p < .001$ ), STI identification ( $p < .0001$ ), and STI resources ( $p < .0001$ ) (see Appendix K). There was no impact of the online "Positive Prevention *PLUS*" program on getting students to lower risk-taking behaviors (decreasing the number of anticipated partners or intention to use a condom) at the 1-month follow-up (see Appendix L). Intent to use a condom results were the same at pre-test and 1-month follow-up. At the pre-test, the intent to decrease partners

demonstrated that 58.80% of students had not had a sexual encounter (41.2% had already had a sexual partner), but that only 47.10% demonstrated intention to delay sexual encounter or decrease future sexual partners at the 1-month follow-up.

### **Discussion**

This study focused on the impact of the online “Positive Prevention *PLUS*” sexual health prevention program on STI knowledge, STI resource identification, and decreasing sexual risk-taking behavior among rural northern California students in an alternative school setting. The results suggested that the program had a statistically significant impact on both STI knowledge and STI resource identification at one-month after the program. However, the program did not have a statistically significant impact on decreasing sexual risk-taking behavior (decrease number of anticipated partners and intention to use a condom). Although the sample size was small (n=17), the results were meaningful to provide an online program with rural students in alternative school settings. In addition, these findings are consistent with previous studies of sexual health education on increasing STI knowledge and STI resources but were not consistent with previous studies to lower sexual risk-taking behaviors. Perhaps a larger sample and a longer post intervention follow-up period would yield different results.

In addition to the focused variables, the research confirmed that student who report alcohol or marijuana use in the past month reported a history of a higher mean total number of sexual partners. (see Appendix M). Also, the four students who identified sexual orientation as “questioning” reported “not having had a sexual encounter”. These findings suggest that adolescents who report substance abuse use may be at higher risk for sexually risky behaviors and adolescents who report questioning their sexual orientation may be at a stage where sexual health education could have significant impacts on preventing STIs.

### **Study Limitations**

Although the results of this online sexual health education intervention were promising, in this sample of rural students, several limitations should be noted. First, one consistent limitation to this and previous studies was the use of student self-reporting. Self-reporting is susceptible to bias and underreporting data. For example, although the surveys were online, anonymous, and confidential; students may be reluctant to report high risk behavior while living in a rural community. Secondly, a sample size of 17 students was below the recommended power analysis of 31 students. Thirdly, 58.8% of the students had not had a sexual encounter, making it difficult to examine program impacts on high risk behavior. Fourthly, as mentioned previously, the impact of a devastating forest fire in the rural community that was declared a national disaster delayed student enrollment and many students lacked access to resources (i.e. computers and WiFi). Fifthly, “Primary Prevention *PLUS*” had not set up a program to allow students to log-in directly to the education website. Students had to use the instructor’s log-in for multimedia learning videos and they are only available in English. Also, worksheets could not be completed online, so students had to print, complete, and then scan them back to the instructor. Lastly, a one-month post-test did not allow for long-term impacts of knowledge and risk-taking behavior.

### **Implications/Recommendation**

These results have implications for both health educators and researchers. The findings provided evidence that online sexual health programs are effective on increasing STI knowledge but have minimal impact on reducing sexual risk-taking behaviors at the 1-month follow-up. Researchers should focus future research with larger rural student sample sizes looking at both short and long-term data impacts. There may be a barrier to online education and lowering sexual risk-taking behaviors that require additional strategies to impact behavior changes. Thus, it is

recommended for researchers to include relationships among online program activities and behavior outcomes. This includes activity strategies for students to practice risk-reduction skills that they can use in their everyday life. Additional activities could be implemented for students who have not engaged in sexual activity or who self-identify as “questioning”. Health educators need to assess student’s computer skills prior to online sexual health prevention programs and confirm all forms are available to complete online.

### **Sustainability**

As stated before, the 2015 California law (known as AB 329) mandates all California schools to teach a comprehensive sexual health curriculum that includes abstinence, contraceptives, sexual and gender identity, and all legally available pregnancy outcomes (California Legislative Information, 2015). As our rural northern California area continues to struggle to provide sexual health resources for our youth, an online option for districts would allow districts to meet this requirement (especially in the alternative school settings).

This option would cost the district a yearly fee of \$699.00 per year for an unlimited number of students. This fee is less than the annual cost to contract for a provider to provide face-to-face classroom training. Also, it is been demonstrated that less than 10% of students, in an alternative classroom setting, come to attend the face-to-face classroom training. This online sexual health class can easily be facilitated by the district credentialed school nurse. This would provide students a trained health instructor and contact with their district credentialed school nurse to build a trusting relationship.

### **Conclusions**

Because a significant number of youths engage in sexual risk behaviors, the need for effective student programs cannot be overemphasized. Although many sexual health prevention programs

have been shown to increase knowledge, only a few have demonstrated an impact on students' high-risk behaviors. To our knowledge, no research has evaluated online sexual health prevention programs in rural areas with students in an alternative school setting. Findings from this study suggest that the "Positive Prevention *PLUS*" program is effective in the short-term increased of STI knowledge and STI resource identification.

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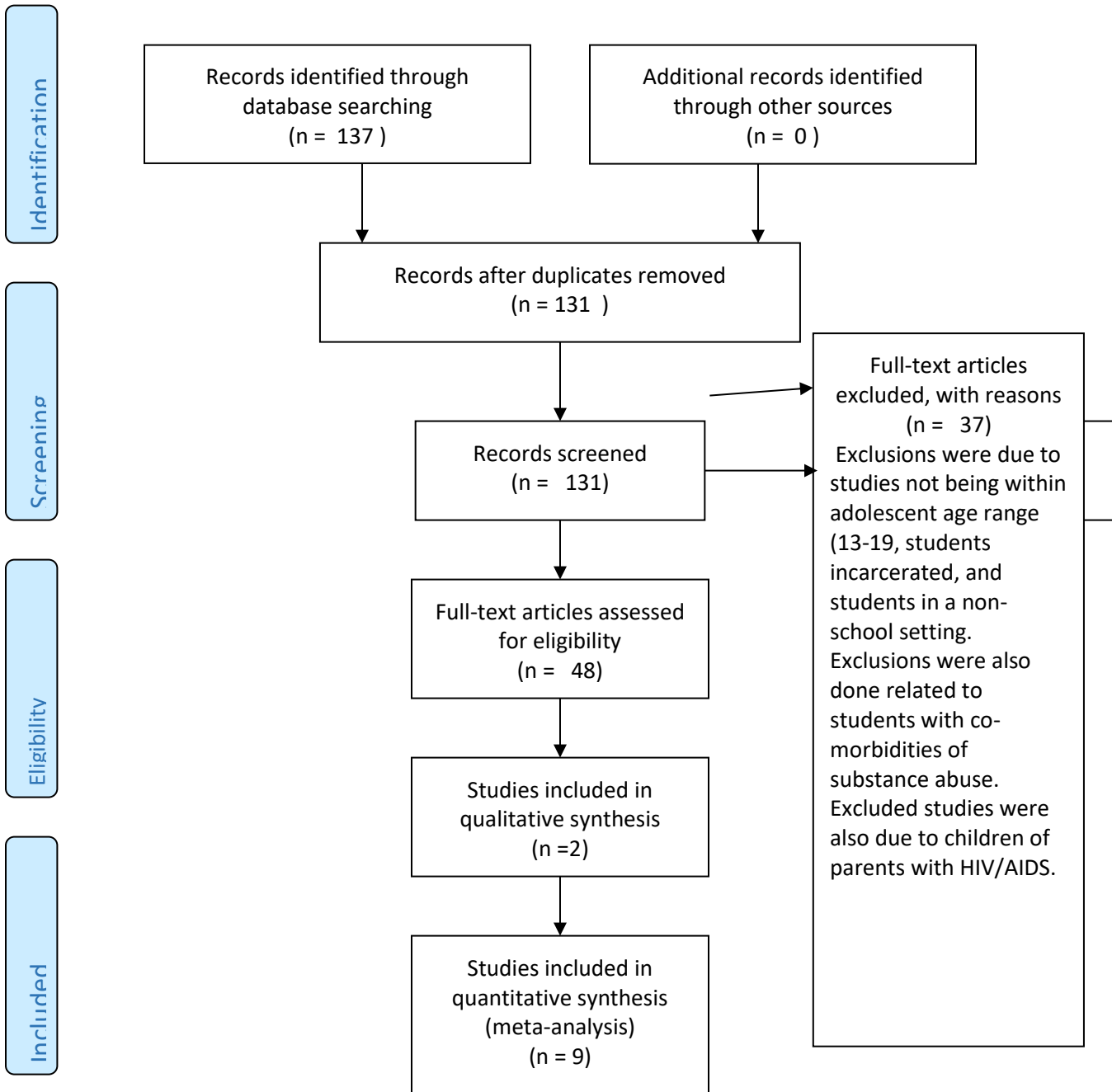
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Appendix

Appendix A

PRISMA



**Appendix B****Effective Public Health Practice Project (EPHPP) Quality Assessment Tool**

Authors	Selection Bias	Study Design	Confounders	Blinding	Data Collection Methods	Withdraws and Dropouts	Global Rating
Brown, L. K. et al. (2013).	Strong	Strong	Strong	Moderate	Moderate	Strong	<b>Strong</b>
Coyle, K. K. et al. (2012).	Strong	Strong	Strong	Moderate	Moderate	Moderate	<b>Moderate</b>
Espada, J. P. et al. (2015).	Strong	Strong	Strong	Moderate	Moderate	Moderate	<b>Moderate</b>
Grossman, J. M. et al. (2014).	Moderate	Strong	Moderate	Moderate	Moderate	Weak	<b>Moderate</b>
LaChausse, R. G. (2016)	Strong	Strong	Strong	Moderate	Moderate	Strong	<b>Strong</b>
Markam, C. M. et al. (2014).	Moderate	Strong	Strong	Moderate	Moderate	Strong	<b>Moderate</b>
Mustanski, B., Greene, G. J., Ryan, D., & Whitton, S.	Strong	Moderate	Moderate	Moderate	Moderate	Strong	<b>Moderate</b>

Reyna, V. F. & Mills, B. A. (2014).	Strong	Strong	Strong	Moderate	Moderate	Moderate	<b>Moderate</b>
Rohrbach, L. A. et al. (2015).	Strong	Strong	Strong	Moderate	Moderate	Moderate	<b>Moderate</b>

**Appendix C****The ADAPT-ITT Model**

This framework involves eight steps:

1. **Assessment** of the priorities of the population
2. **Decision** on whether or not to adapt the intervention
3. **Administration** of the intervention
4. **Production** of an adapted version of the intervention
5. **Topical experts** assist in the adaptation process
6. **Integration** of feedback from the topical experts in the adapted intervention
7. **Training** of the staff to implement the adapted intervention
8. **Testing** the adapted intervention with the population

## Appendix D

Variables Table

Variable	Type	Theoretical Definition	Operational Definition	Level of Measurement
STD prevention education (Positive Prevention PLUS)	Independent	Positive Prevention PLUS education	0=No 1=Yes	Nominal
STD knowledge	Dependent	Students can list two STDs that can be cured and two that cannot be cured	0=None listed 1=One listed 2=Two listed 3=Three listed 4=Four listed	Nominal
STD knowledge	Dependent	Students can identify STD laws, definitions, and reasons to get tested via multiple choice, true/false, fill in the blank, and matching questions	Comparison of overall knowledge scores on pre- and post-test	Ratio
Sexual risk-taking behavior (intention to use a condom)	Dependent	Reports anticipated condom use with next sexual encounter	0=No 1=Yes	Nominal
STD resources	Dependent	Student can identify three local and two internet STD resources	0=None listed 1=One listed 2=Two listed 3=Three listed 4=Four listed 5=Five listed	Nominal
Sexual risk-taking behavior (anticipated number of partners)	Dependent	Reports anticipated reduction in sexual partners	0=No reduction 1=Yes 2=Will delay first sexual encounter	Interval

Grade level	Demographic	Current level of education	1=7 <sup>th</sup> grade 2=8 <sup>th</sup> grade 3=9 <sup>th</sup> grade 4=10 <sup>th</sup> grade 5=11 <sup>th</sup> grade 6=12 <sup>th</sup> grade	Ordinal
Gender identity	Demographic	Student's birth certificate identification	1=male 2=female	Nominal
Sexual orientation	Demographic	Student's sexual identification	1=heterosexual 2=homosexual 3=bisexual 4=questioning	Nominal
Race	Demographic	Reported self-identification	1=White 2=African American 3=Asian 4=Native American 5=Other	Nominal
Ethnicity	Demographic	Reported self-identification	1=Hispanic 2=Non-Hispanic	Nominal
Smoking (tobacco)	Clinical	Tobacco (smoked or chewed) use	0=No 1=Yes	Nominal
Alcohol	Clinical	Alcohol consumption	0=No 1=Yes	Nominal
Marijuana	Clinical	Marijuana (smoked or eaten) use	0=No 1=Yes	Nominal
Illegal substances	Clinical	Illegal substance use	0=No 1=Yes	Nominal



Age at first sexual encounter	Clinical	First time student has oral, anal, or vaginal sex	0=Have not had a sexual encounter 1=Less than 10 years old 2=11 – 15 years old 3=Greater than 15 years old	Ordinal
Number of total lifetime sexual partners	Clinical	Total number of sexual partners	0= Have not had a sexual encounter 1=One 2=Two 3=Three 4=four or more	Ordinal
Number of sexual partners in past three months	Clinical	Number of sexual partners in past three months	0=Zero 1=One 2=Two 3=Three 4=Four or more	Ordinal
Used condom with last sexual encounter	Clinical	Used a condom with last sexual encounter	0=No 1=Yes	Nominal
Ever been tested for a STD	Clinical	Ever been tested for a STD (including HIV)	0=No 1=Yes	Nominal

**Appendix E****Additional Survey Questions: Demographics**

1. What is your current grade level?
  - 7<sup>th</sup>
  - 8<sup>th</sup>
  - 9<sup>th</sup>
  - 10<sup>th</sup>
  - 11<sup>th</sup>
  - 12<sup>th</sup>
  
2. What is your gender identity at birth?
  - Male
  - Female
  
3. What is your sexual orientation?
  - Heterosexual
  - Homosexual
  - Bisexual
  - Questioning
  
4. What is your race?
  - White
  - African-American
  - Asian
  - Native-American
  - Other
  
5. What is your ethnicity?
  - Hispanic
  - Non-Hispanic

**Appendix F****Additional Survey Questions: Clinical**

1. Have you tried tobacco products (smoked, vaped, or chew)?
  - i. No
  - ii. Yes
2. Have you tried alcohol?
  - o No
  - o Yes
3. Have you tried marijuana (smoked or eaten)?
  - o No
  - o Yes
4. Have you tried any other illegal substances?
  - i. No
  - ii. Yes
5. What was the age you had your first sexual encounter (vaginal, oral, or anal)?
  - i. Have not had a sexual encounter
  - ii. 10 years old or younger
  - iii. 11-15 years old
  - iv. 16 years or older
6. What is the number of your total lifetime sexual partners
  - i. None
  - ii. 1
  - iii. 2
  - iv. 3
  - v. 4 or more
7. Did you use a condom with your last sexual encounter?
  - i. Have not had a sexual encounter
  - ii. No
  - iii. Yes
8. Have you ever been tested for a sexually transmitted disease (STD)?
  - i. No
  - ii. Yes
9. Can you name two STDs that can be treated with antibiotics?
  - i. \_\_\_\_\_

ii. \_\_\_\_\_

10. Can you name two STDs that cannot be cured?

i. \_\_\_\_\_

ii. \_\_\_\_\_

11. Can you identify three local resources on where to get tested for a STD?

i. \_\_\_\_\_

ii. \_\_\_\_\_

iii. \_\_\_\_\_

12. Can you identify two internet resources for STD information?

i. \_\_\_\_\_

ii. \_\_\_\_\_

13. Do you intend to use a condom with your next sexual encounter?

i. No

ii. Yes

14. Do you plan to reduce your number of sexual partners in the future?

i. Have not had a sexual encounter, but plan to delay my first sexual encounter

ii. No

iii. Yes

**Appendix G****GANTT Chart**

<b>Task Name</b>	<b>Start Date</b>	<b>End Date</b>	<b>Duration</b>
<b>DNP Project</b>	<b>06/01/18</b>	<b>05/18/19</b>	<b>351d</b>
IRB application	05/18/18	06/06/18	20d
Parent consents	08/20/18	09/10/18	22d
Student recruitment	09/10/18	09/30/18	20d
Student consents	09/10/18	09/30/18	20d
Welcome email with pre-test survey	10/01/18	10/06/18	6d
Positive Prevention PLUS online sexual health intervention	10/07/18	12/30/18	85d
Post-test survey	1/23/18	1/31/18	7d
Data entry, data cleaning, & data analysis	10/01/18	02/08/19	131d
First draft of DNP project paper	02/08/19	02/17/19	10d
Final draft of DNP project paper	02/18/19	03/24/19	35d
Complete DNP electronic project poster	03/24/19	04/07/19	15d
Final DNP project to GW Himmelfarb Health Sciences Research Commons, DNP Project Repository	03/24/19	04/22/19	30d
Submit permanent URL to Blackboard	04/22/19	05/05/19	14d
DNP Poster Presentation	05/77/19	05/17/19	1d

## Appendix H

## Participant Demographics

	<b>Students (N=17)</b>
<b>Current Grade Level</b>	
9 <sup>th</sup> Grade	17.65% (3)
10 <sup>th</sup> Grade	17.65% (3)
11 <sup>th</sup> Grade	35.29% (6)
12 <sup>th</sup> Grade	29.41% (5)
<b>Gender (Identified at Birth)</b>	
Male	29.41% (5)
Female	70.59% (12)
<b>Sexual Orientation</b>	
Heterosexual	41.18% (7)
Homosexual	5.88% (1)
Bisexual	29.41% (5)
Questioning	23.53% (4)
<b>Race/ Ethnicity</b>	
White or Caucasian	70.59% (12)
African-American	17.65% (3)
Asian	0.00% (0)
Native American	11.76% (2)
Other	0.00% (0)
Non-Hispanic	100% (17)

## Appendix I

## Clinical Consideration Substance Risk-Taking

<b>Substance Use</b>	<b>Students (17)</b>
<b>Tobacco (smoked, vaped, chew)</b> No Yes	70.59% (12) 29.41% (5)
<b>Alcohol</b> No Yes	52.94% (9) 47.06% (8)
<b>Marijuana (smoked or eaten)</b> No Yes	64.718% (11) 35.29% (6)
<b>Other Illegal Substances</b> No Yes	82.35% (14) 17.65% (3)

## Appendix J

## Clinical Consideration Sexual Risk-Taking

	<b>Students (N=17)</b>
<b>Age of First Sexual Encounter (vaginal, oral, or anal)</b>	
Have not had a sexual encounter	58.82% (10)
10 years old or younger	5.88% (1)
11-15 years old	17.65% (3)
16 years old or older	17.65% (3)
<b>Total Lifetime Partners</b>	
None	58.82% (10)
1	5.88% (1)
2	11.76% (2)
3	5.88% (1)
4 or more	17.65% (3)
<b>Condom with Last Sexual Encounter</b>	
Have not had a sexual encounter	52.82% (10)
No	11.76% (2)
Yes	29.41% (5)
<b>Ever Tested for STD</b>	
No	64.71% (11)
Yes	35.29% (6)



## Appendix K

## Outcome Measures: STI Knowledge and Resources

Students (N=17)	Pretest Mean (SD)	Posttest Mean (SD)	t value	P value (2-tailed t test)
<b>Overall STI Knowledge (Range = 0-25)</b>	21.59 (2.03)	24.71 (0.58)	-6.44	<.0001
<b>STI Identification (Range 0-4)</b>	1.76 (0.83)	3.76 (0.44)	-10.43	<.0001
<b>STI Resource Identification (Range = 0-5)</b>	1.71 (0.92)	4.41 (0.87)	-11.32	<.0001

## Appendix L

## Outcome Measures: STI Risk Taking Behaviors

Students (N=17)	Pretest	Posttest
<b>STI Risk-Taking (condom use)</b>	<b>Used a condom with last sexual encounter:</b>  No sexual encounter 52.82%  Yes 29.41%  No 11.76%	<b>Intent to use condom with next sexual encounter:</b>  Yes or plan to use with first sexual encounter 35.29%  No 64.71%
<b>STI Risk-Taking (number of sexual partners)</b>	<b>Reported total number of sexual partners:</b>  No sexual encounter 58.80%  One 5.90%  Two 11.80%  Three 5.90%  Four or more 17.6%	<b>Intent to decrease number of future sexual partners:</b>  Yes or plan to delay sexual encounter 41.18%  No 52.82%

## Appendix M

**Additional Findings Posttest Data**  
**Students who report alcohol and marijuana use had higher number of sexual partners.**

<b>Students (N=17)</b>	<b>Number of Sexual Partners for those answering "yes" Mean (SD)</b>	<b>Number of Sexual Partners for those answering "no" Mean (SD)</b>	<b>t value</b>	<b>P value (2-tailed t test)</b>
<b>Alcohol use in past month</b>	2.38 (1.685)	0.11 (0.333)	-3.736	0.001
<b>Marijuana use (smoked or eaten) in past month</b>	3.17 (0.983)	0.09 (0.302)	-9.795	<.0001