


Dose Matters in Evaluation of a School-Based Adolescent Sexual Health Education Program

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ABSTRACT

BACKGROUND: Research on the effects of intervention dose on outcomes within adolescent sexual health education programming is lacking. Existing research on dose typically utilizes the number of sessions as a variable. In a school setting, there are scheduling limitations, student absences, and other logistical barriers that have the potential to affect the number of sessions for an intervention and, in turn, impact the efficacy of programming.

METHODS: This article evaluates the effectiveness of a school-based, peer-led adolescent comprehensive sexual health education program, with a focus on dose. A repeated measures MANOVA was used to evaluate the effects of individual difference variables and intervention variables on changes in participants' knowledge and attitudes across 2 time points. Additionally, paired *t*-tests were used to evaluate changes in specific behaviors.

RESULTS: Results indicated that knowledge improved following the intervention, and specifically larger doses, measured in minutes, of the intervention were associated with larger improvements in knowledge. There were no significant effects related to attitudes or behavioral outcomes.

CONCLUSIONS: This study adds to the knowledge base by including analysis of how the dose of intervention may impact youth outcomes. Implications for school health practices and research are discussed.

Keywords: adolescent sexual health education; dose/dosage; pregnancy prevention; comprehensive sex education.

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There are a variety of programs and approaches that have been developed to educate adolescents on topics of sexual and reproductive health, teen pregnancy prevention, healthy relationships, and consent. While using a medically accurate, age appropriate, comprehensive sex education curriculum is regarded as important; there is little research on the importance of intervention dose. This article focuses on data collected from an evaluation of a peer led, comprehensive sexual health education program provided in schools in 1 southwestern city, utilizing an adapted version of the *Making Proud Choices* curriculum.¹ The initial purpose of this study was to explore program effectiveness for influencing knowledge, attitudes, behaviors, and skills. This study

adds to the knowledge base by including analysis of how the dose of intervention may impact youth outcomes.

Comprehensive Sex Education

Research has indicated the importance of sexual health education programs being comprehensive in nature, as opposed to abstinence only.^{2,3} According to 1 article that reviewed sex education programming across the world, it was noted that there are common characteristics that can be identified in effective programs, including a comprehensive curriculum.⁴ Comprehensive sex education goes beyond prevention of sexual behaviors by taking on a holistic perspective,

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also addressing biological, emotional, and social development.⁵ Using a comprehensive curriculum allows youth to receive information on all aspects of their sexual health.

With a comprehensive program, not only do youth receive education on sexual health, additional advantages to participation may include improved decision making, goal planning, and resource gathering skills.⁶ Per youth self-reports, 1 study noted that their comprehensive program helped youth in several areas of their life related to sexual health and social wellbeing including goal setting, connectedness, self-growth, and knowledge.⁷ The same program had positive findings in regard to participant perceptions about intentions to engage in sexual activity and attitudes surrounding sex.⁶ Youth receiving comprehensive sex education are also less likely to report a pregnancy compared to youth receiving no sex education.²

Comparatively, there was not a significant association for youth who participated in an abstinence-only program.² In a study comparing a risk reduction sexual health education versus a risk avoidance curriculum, female youth receiving risk reduction education were less likely to initiate anal sex compared to youth in the risk avoidance group.⁸ According to Starkman and Rajani,³ there is not sufficient evidence showing successful results for abstinence-only programs in delaying sexual activities or preventing pregnancies. Similarly, Stanger-Hall et al.⁹ report that abstinence-only education may be having the opposite effect of the intended impact.

Peer Education

The existing literature demonstrates mixed results on the effectiveness of peer-led sexual health interventions.^{10,11} According to a systematic review, studies implementing peer education have been shown to increase participant knowledge and health-promoting attitudes regarding sexual health.¹² Research also suggests that program participants engaged in peer health education acknowledged that being taught by their peers, as opposed to authority figures, was beneficial for their learning of this topic.^{13,7,6} Successful programs, and even successful sessions within a program, tend to be those in which a participant finds their peer educator to be a person who is “relatable.”⁶ A qualitative study analyzing feedback from various stakeholder groups found that groups endorsed the value of using peer education; stakeholders in this study reflected that participant comfort level was higher with peer leaders as opposed to adult leaders.¹⁴

Dose of Intervention

Research on intervention dose within adolescent sexual health education programming is lacking, with only 1 study found evaluating exposure for middle

school age youth.¹⁵ In a school setting, there are scheduling limitations, student absences, and other logistical barriers that have the potential to affect the dose of an intervention and, in turn, impact the efficacy of programming. It is also important to note that there is variability in the way that dose has been measured within studies. For example, dose may be measured in time spent receiving an intervention (minutes) or number of sessions attended overall. In an evaluation conducted by the Office of Adolescent Health Teen Pregnancy Prevention Program, good attendance was commonly found in programs that were categorized as strong with regard to positive behavioral outcomes.¹⁶ Amount of time that a participant receives an intervention could influence effectiveness; 1 article reviewed brief interventions and their effect on contraceptive use.¹⁷ Although the findings provided some support for the effectiveness of brief interventions, the authors highlighted the need for more research examining the importance of dose. In particular, it was noted that dose is not often included in research that evaluates the effectiveness of interventions that specifically target youth.

Given the minimal research on dose in sexual health education programs, it can be noted that dose of receiving an intervention as a variable has been explored in other outcome studies. Intervention dose has been shown to impact participant outcomes in a variety of behavioral health domains, such as smoking cessation and maternal health programs.^{18,19} One article evaluating a parenting intervention to prevent child maltreatment specifically identified program dose as a key variable, with parent participation in more sessions associated with fewer incidences of child maltreatment.²⁰ Another article reviewing early childhood education programs found mixed results about dose; for example, there may be limitations on longer term effects of this variable.²¹ However, in the same study, it was found that increased dose of such an intervention was linked to higher rates of high school graduation.²¹ An intervention at a camp for persons with spina bifida found that greater dose (ie, participants going to the camp for multiple years) was associated with increased self-management skills.²²

The project evaluated in this study was housed in the city health department in 1 southwestern city. The project provided sexual health education to area high schools, utilizing an adapted version of the *Making Proud Choices* (MPC) curriculum.²³ The 4 high schools in this study represented those that were geographically located in zip codes with some of the highest pregnancy rates among youth in the city. The majority of youth in these schools reported to be Hispanic (80-87%), and next was African American (9-14%). The total youth census from these 4 schools ranged from 400 to 1500 youth.

As stated, the curriculum was enhanced for this project. Other studies have also made adaptations of the program to fit the environments in which the programs are being implemented.^{24,25,26} Six months prior to implementation, focus groups were held with existing peer educators to gather feedback on the curriculum, including but not limited to content, messaging, and youth friendliness of materials. Based on feedback, modules on anatomy, gender, and healthy relationships, as well as accessing clinical services were added to the intervention. Additionally, although the curriculum traditionally targets youth in middle school, it has also been used with high school age youth which was the target population in the current project.^{23,24}

Given the implementation within high schools, it was decided that using high school youth as peer educators in their own schools would be beneficial. High school personnel assisted in identifying youth who had the potential to be peer health educators (PHEs). Additionally, health department staff conducted short information sessions in English, Science, and Health classes to recruit PHEs. Any student interested in becoming a PHE was welcomed to apply. Students were selected based on application and a recommendation letter from a trusted adult, counselor, or teacher. All PHEs had permission from parent(s) or guardian(s) to participate in the program. Each PHE taught in their own school. Training for PHEs took place over each summer and consisted of up to 40 hours of instruction covering curriculum content, sexual and reproductive health topics, as well as facilitation and classroom management. PHEs were primarily the facilitators of the program; however, adult instructors provided support as needed to the youth and stepped in when required. PHEs varied by grade and background, including gender. There were 13 PHEs that participated in this project. Two (15%) identified as male. One was in 9th grade, 1 in 10th, 7 in 11th grade (54%), and 4 were seniors. The majority identified as Latinx (85% or 11 PHEs), 1 identified as black, and 1 as Hispanic and White. The PHEs reflected the gender and ethnicity of the participants (noted below).

The primary goal of this study was to evaluate the effectiveness of a peer-led curriculum and the role of intervention doses. It was hypothesized that (1) youth receiving the intervention would demonstrate significant increases in knowledge and health-promoting attitudes regarding sexual health from baseline to post-training assessments, (2) intervention (ie, dose) and participant variables (ie, age, gender) would be significantly associated with changes in sexual knowledge and attitudes between the baseline and post-training assessments, and (3) participants would report significant improvements in behavioral beliefs (ie, ability to say no) and outcomes (ie, condom use, birth control use) between the baseline and post-training assessments.

METHODS

Participants

A total of 144 high school students from 4 public high schools answered baseline survey assessments, while a total of 99 responded to post-test surveys. Youth that participated were students within classrooms where the program was chosen to take place. The program was implemented in various classes throughout the school (ie, health classes and other electives). Additionally, the program was offered through afterschool or counseling groups held on campus. Youth for these settings were recruited for participation with the assistance of school counselors and teachers. Youth in all settings were provided with information regarding the program and consent forms and could decide with their parent/guardian whether or not they would participate.

Participant demographics were collected and analyzed from the baseline survey. Of those that responded to baseline surveys, almost three-quarters identified as female (71.5%). Participants were asked to identify their race; 79.2% of participants identified as Latino/a while approximately 9.0% identified as African American/black, 5.6% identified as Other, and 4.2% identified as White. At baseline, participants ranged in age from 14 to 19 years old. The mean age of participants was 15.57 (SD = 1.26). At baseline, 4 respondents (2.8%) indicated that they were a parent. Participants were also asked about sexual activity at baseline. At baseline, 34% of participants reported that they had ever had sex, while 18.2% of participants responded that they had sex in the past 3 months. See Table 1 for summary of participant characteristics across time points.

Descriptive characteristics were compiled for each group implementation of MPC. The adapted MPC curriculum included 11 sessions of 60 minutes each. However, due to time interval constraints existing in different schools, the curriculum was often adapted for the specific environment. Therefore, the number of sessions implemented ranged from 3 to 12 sessions. The average number of sessions that groups had was 7.38 sessions (SD = 2.12). There were 16 total groups in which youth were invited to participate in the evaluation. The groups ranged in size from 8 to 44 participants, and the average number of persons in each group was 27.58 (SD = 5.99). Evaluation participants from each group ranged from 1 to 23 youth (mean = 8.93; SD = 6.80). Information regarding dose was also collected in order to determine how many sessions participants attended; 92.3% of participants attended half or more of their sessions, and 76.2% of participants attended 75% or more of their sessions. Other descriptive variables included school semester of participation (fall 2016 or spring 2017) and group

Table 1. Demographics Across Assessment Timepoints

	Baseline (N = 144)	Post-Intervention Follow-Up (N = 99)
Age, mean (SD)	15.57 (1.26)	
Ethnicity, % (n)		
Latino/a—Latinx	79.2 (114)	77.8 (77)
African American/black	9.0 (13)	8.1 (8)
White	4.2 (6)	3.0 (3)
Asian/Pacific Islander	1.4 (2)	3.0 (3)
Other	5.6 (8)	8.1 (8)
Missing	0.7 (1)	0 (0)
Gender identity, % (n)		
Female	71.5 (103)	69.7 (69)
Male	26.4 (38)	28.3 (28)
Other	0.7 (1)	1.0 (1)
Missing	1.4 (2)	1.0 (1)
Currently a parent, % (n)		
Yes	2.8 (4)	1 (1)
No	87.5 (126)	98 (97)
Missing	9.7 (14)	1.0 (1)
Ever had sex, % (n)		
Yes	34.0 (49)	29.3 (29)
No	55.6 (80)	69.7 (69)
Missing	10.4 (15)	1.0 (1)

Table 2. School and Training Characteristics

Characteristic	Frequency (n = 144)	Percent (%)
School		
School 1	14	9.7
School 2	81	56.3
School 3	5	3.5
School 4	44	30.6
Semester		
Fall 2016	101	70.1
Spring 2017	43	29.9
Group setting		
Classroom	139	96.5
Small group	5	3.5
Variable (range)	Mean	SD
Total group size (8-44)	27.58	5.99
Total dose in minutes (30-810)	534.34	198.13
Number of lessons (3-12)	7.38	2.11

format (classroom, small group). See Table 2 for a listing of these characteristics.

Instrumentation

The study employed a pre-post design assessing sexual health knowledge, attitudes, and behaviors for public high school students who participated in the peer-led curriculum groups.

Sexual Health Knowledge

Sexual health knowledge was measured by asking youth to respond to 12 statements, such as “When

used correctly, birth control is an effective way to prevent pregnancy” by marking true or false. These items covered material from the *Making Proud Choices* adapted curriculum. Correct answers were compiled in order to compare between baseline and post-surveys.

Sexual Health Attitudes

Attitudes regarding sexual health were also measured before and after youth completed the MPC curriculum. Fourteen attitude responses, such as “It is okay to pressure someone into having sex,” were measured using a Likert Scale in which participants marked items on a scale from “strongly disagree” to “strongly agree.” There was also an option for participants to mark “do not know.” Statements 2 and 7 were reverse coded for analysis. Responses of “agree” and “strongly agree” were combined into 1 variable of agreement while “disagree,” “strongly disagree,” were similarly collapsed into 1 variable of not in agreement. For all questions “do not know” was grouped into the undesired response category.

Sexual Health Behaviors

Sexual health behaviors, such as having used condoms in the last 3 months, were also measured at baseline and post-program completion to identify changes in behaviors including future planned behaviors, such as “How likely is it that you will decide to have sexual intercourse in the next three months?” Five such behavior questions were posed on the survey. Two questions asked about current sexual health behaviors and responses were on a scale from “none of the time” to “every time” with an option for participants to mark “I have never had sex.” An additional 3 questions were asked with answer choices ranging from “Very unlikely” to “Very likely” to measure future intentions.

Procedure

The study applied for Institutional Review Board (IRB) approval from both the University IRB and the school district in which the program was provided. While the university determined the study to be exempt, the independent school district research office required review and approved the study. Per the approved IRB protocol, only youth with parental consent participated in the study. Incentives of \$10 gift cards were raffled off to youth who returned their consent forms whether or not the parent or guardian consented for their youth to participate in the evaluation. Data were collected at baseline and at program completion. The length of time between the pre and posttests was approximately 3 to 12 weeks; the time frame varied depending on how many MPC sessions were completed and other factors that would

affect timely completion of the weekly sessions (eg, scheduling conflicts within the school).

Data Analysis

In order to test the hypotheses listed above, a repeated measures MANOVA was used to evaluate the effects of individual difference variables (ie, age and sex) and intervention variables (ie, overall dose of the intervention calculated as total number of minutes of intervention) on changes in participants' knowledge and attitudes across 2 time points (ie, baseline and post-intervention). Additionally, paired *t*-tests were used to evaluate changes in specific behaviors (ie, use of condoms, use of birth control, and saying no to sex, attitudes about gender norms) across 2 time points (ie, baseline and post-intervention). SPSS version 25 was used to analyze data collected in this project. It should be noted that the dose of the intervention was calculated by multiplying the number of sessions attended by a youth by the number of minutes per session. These analyses were replicated using the total number of sessions and length of sessions as measures of dose. Overall, the total number of minutes of intervention, calculated as total number of sessions \times length of sessions, was the most robust predictor and, therefore, was the variable included in these analyses.

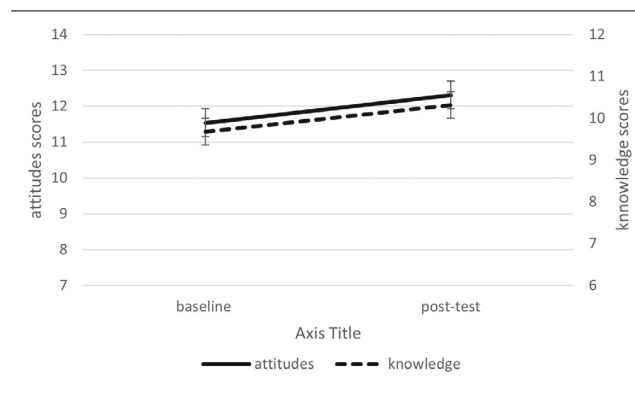
RESULTS

Preliminary analyses were used to identify any differences related to demographics between participants who completed the follow-up assessment and participants who completed only the baseline assessments. No significant differences between these groups emerged. This suggests that attrition was not more likely based on individual difference variables, including gender or ethnicity.

Effect of Intervention on Participant Knowledge and Attitudes

There was a significant between-subjects effect between knowledge scores over time and total dose of the intervention, $F(1, 67) = 4.75, p = .033$ with more total minutes of education being associated with larger increases in knowledge following the intervention. Age was also significantly associated with changes in knowledge over time, $F(1, 67) = 6.79, p = .011$ with older youth demonstrating larger changes in knowledge. There was no significant main effect of attitudes ($p = .15$) or interactions of individual difference variables (ie, age $p = .09$) and intervention variables (ie, overall dose of the intervention $p = .48$) on changes in participants' attitudes across the 2 time points (ie, baseline and post-intervention). These findings are displayed in Figure 1.

Figure 1. Knowledge and Attitudes Scores Across Timepoints



Behavioral Outcomes

Finally, there were no significant effects of the intervention on specific behavioral outcomes including the use of birth control $t(92) = -1.871, p = .065$, the use of condoms $t(94) = -1.44, p = .152$, attitudes about gender roles $t(33) = .627, p = .535$, or the ability to say no to engaging in unwanted sexual activities $t(96) = -.37, p = .712$.

DISCUSSION

The multiple constraints placed on providing school-based sexual health education can make it difficult to assess outcomes accurately. A key aspect of the study was to assess dose by the total number of minutes. Taking into consideration the variability of program length in weeks, measuring dose in minutes proved more accurate for assessing impact. Dose measured in minutes was found to be more rigorous than evaluating the number of sessions or duration of program (ie, semester-long, year-long). Since higher dose (total minutes) was associated with increase in knowledge at post-test, it may be that additional exposure overall is an important element in educational outcomes, regardless of duration of program. The fact that the total number of minutes was more robust than the number of sessions suggests that other researchers may want to include this variable in future studies. While the finding is significant for this study, replication is needed. There are a variety of methods for evaluating dose.¹⁵ Widespread inclusion of measuring dose in minutes may also allow for more comparison across programs.

Furthermore, a significant improvement in knowledge was found from baseline to post-test, and this occurred despite there being a high rate of correct responses at baseline. Unfortunately, the program did not appear to significantly impact participant's attitudes. However, the authors suggest that this outcome was due to participants already scoring high on healthy sexual attitudes at baseline. In addition, no significant change was found for intended behaviors,

a similar finding in other studies of adolescent sexual health interventions.^{12,16} Long-term follow-up with youth participants would be useful to assess actual future behavior.

Limitations

This study has some limitations. First, there was no comparison group for the intervention group. Initially, the plan was to compare peer-led groups to adult-led-only groups. However, schools involved in the adult-led groups did not agree to participate in the evaluation phase of the project. This meant that the investigators could not fully evaluate the effectiveness of the PHEs as a strategy to enhance intervention outcomes. Additionally, the study did not control for youth exploring additional information outside of project participation. Therefore, increases in knowledge may have been due to external factors along with receiving the sexual health education curriculum. Also, the study was not able to determine fidelity for quality of dose time to evaluate how these factors could have impacted knowledge gained. A fidelity monitoring attempt was implemented by the evaluation team; PHEs were provided with a survey to complete after each class so that the session quality could be monitored, however, the facilitators did not utilize the tool and no data could be gathered. Finally, while the project utilized a comprehensive sexual health education curriculum, the local school district forbade the use of condom demonstrations. Thus, the authors believe this restriction may have influenced the behavioral outcomes of the study. In the school setting, the project had to be flexible and accept restrictions to abide by school and district policies.

Conclusions

Regardless of the limitations, the study supports minimizing a gap in the research regarding dose, and specifically dose measured in minutes of intervention received. These results indicate that if a youth is being exposed to curriculum content for an increased number of minutes, rather than duration of program, then they are more likely to retain the information and be more comfortable with it.

IMPLICATIONS FOR SCHOOL HEALTH

Although adolescent pregnancy rates have been on the decline in the United States, reducing adolescent pregnancy is still an objective in Healthy People 2030.²⁷ Therefore, providing effective adolescent sexual health programming should still be a priority for schools. The finding that number of total minutes of the intervention, rather than duration of program or number of sessions, significantly predicted responses could open up possibilities for wider implementation of adolescent sexual health education programs. This

could assist schools where there may be concern about feasibility of implementing a long program.¹⁵ School personnel who are also responsible for standardized testing scores might appreciate having more choice around how to structure sexual health education without students missing course content that would affect test outcomes.

A concern from the results is the lack of significant effect on attitudes about gender roles or ability to say no to unwanted sexual advances. Despite the comprehensive nature of the MPC curriculum,²⁴ the trainers in this study had to add lessons specifically addressing these issues. Therefore, the current study serves as the first evaluation of the effectiveness of these lessons. Despite the nonsignificant findings in the current study, the importance of gender roles, sexual refusal skills, and consent highlight the need for curricula that consistently addresses these critical elements of adolescent sexual health; and are utilized in all school-based programming. The recommendation of incorporating consistent, evidence-based lessons on gender roles, consent, ability to say no also provides suggestions for further school health research.

As found in other research,^{10,16} this study indicated no significant change in sexual health behaviors. The authors recognize that policies against condom demonstrations exist in many school districts and likely contribute to these findings.¹ A recommendation is to rally support from school stakeholders to encourage a policy change that allows comprehensive education to be provided to students who have parental permission. Other advocacy measures include involvement and participation with School Health Advisory Boards or School Boards to push for local policy changes; engaging in local Parent Teacher Associations (PTAs) or other parent-led groups or organizations to gather parent support. If a broader scale policy change is not feasible, some schools may want to get creative and collaborate with local community centers for the provision of birth control lessons off of school grounds.

Human Subjects Approval Statement

The study went through 2 IRB reviews. The study was deemed exempt by the University IRB committee. The IRB protocol (#R17.17) for this study was approved by the independent school district research office.

Conflict of Interest

All authors of this article declare that they have no conflicts of interest.

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