A Comparison of the Effectiveness of School-Based Sex Education Programs: A Meta-
Analysis

by

Dominique Brown

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Abstract

The purpose of this meta-analytic review was to examine the most effective school-based sexual education approach to reduce adolescent risky sexual behaviors and its subsequent health consequences. Past research studies have shown that the health and social consequences of unprotected sexual activities among adolescents have led to increased rates of unintended teenage pregnancy, sexually transmitted diseases (STDs), and human immunodeficiency virus (HIV) in the United States and has become a major public health concern. Many theories have been used to develop intervention methods to reduce these rates. The primary socialization theory (PST) looks at family, peer groups, and schools as primary sources to obtain behavioral norms for adolescents. The theory proposes that these early associations can be influential to adolescent sexual behavior patterns. It emphasizes the importance of school programs to establishing social and sexual norms among adolescents. The research questions in this study were developed to examine the efficiency of existing school-based programs, in response to the theory and extant knowledge. Several studies that examined the effects of different school interventions were analyzed and a number of independent variables were examined in connection to the findings. Results suggested that school intervention programs, examined for this paper, had no effect on the sexual activities of adolescents. Comprehensive sex education appeared to be more effective in decreasing adolescent pregnancy, birth, and STD rates. It was recommended that future studies examine the role early social constructs play in developing behavior norms and values in adolescents. Combined efforts that include modification to education, legislation, and social norms will be required to address this multi-factorial health issue.
Introduction

The United States has the highest rates of teenage pregnancy and sexually transmitted diseases (STD) among developed countries (Stanger-Hall, 2011). According to the Office of Adolescent Health, adolescents between the ages of 15 and 24 comprise nearly half of the 20 million new cases of STD's every year. Today, four in every ten sexually active teenage girls are expected to have contracted an STD that can lead to infertility and even death. Identifying the appropriate response to reduce adolescent pregnancy, STD, and HIV rates have been motivated by these statistics. There has been widespread support by the public for schools to provide sex education. Despite this support, the issue of the most effective type of school-based sex education continues to be a major topic of debate in the United States. Evidence to date suggests that well-designed school-based prevention programs can significantly reduce adolescent sexual risk behaviors. It remains an open question, however, as to whether abstinence only or comprehensive sexuality education is most effective in reducing unintended pregnancy and STD rates among adolescents.

Background of the Study

Over the last two decades, the federal government has supported school-based abstinence-only education programs. Federal support of such programs began in the early 1980's, under the Reagan Administration, with limited funding through the Adolescent Family Life Act (AFLA). The federal government provided funding for abstinence-only-until-marriage programs through three different funding streams, the AFLA, followed by the Title V abstinence-only-until-marriage program, and lastly the Community-Based Abstinence Education (CBAE) program. It wasn't until after the enactment of the welfare reform, and specifically during the
Bush Administration, that funding for these programs grew dramatically (Siecus, n.d.). This policy was motivated by a strong belief that teaching safe sex methods would only promote early sexual engagements among adolescents. However, with the election of President Obama, there was a considerable shift in the way the federal government had decided to address sex education. The Obama Administration and Congress eliminated two discretionary federal funding streams for abstinence-only programs: the CBAE grant program and the abstinence-only-until-marriage section of the AFLA. Furthermore, Congress allowed the Title V abstinence-only-until-marriage program to expire in 2009, but this program was renewed in March 2010 as part of the health care reform package. Despite the renewal of the Title V program, society had just witnessed a shift in the way the federal government supported school-based sex education programs.

In December 2009, President Obama signed the Consolidated Appropriations Act of 2010, which became the first federal funding for more comprehensive approaches to sex education in schools (Siecus, n.d.). In 2010, following months of debate and negotiations, President Obama signed into law the health care reform legislation, the Patient Protection and Affordable Care Act. The Personal Responsibility Education Program (PREP) was among one of the new provisions of the act. Through this new provision, the Family and Youth Services Bureau (FYSB) was able to award grants to State agencies that educated adolescents on both abstinence and contraception to prevent unintended pregnancy and sexually transmitted diseases, including HIV/AIDS. The new provision supported school-based programs that provided medically accurate and age-appropriate sex education to help reduce the risk of unintended pregnancy, STDS, and HIV/AIDS.
However, many issues continue to surround the topic of school-based sexual education programs. Controversy persists as to whether abstinence-based only or comprehensive sex education should be taught in schools (Zabin & Hirsch, 1988). Those in support of abstinence-only programs argue that comprehensive sex education promotes sexual promiscuity and sends mixed signals to adolescents. While those in support of comprehensive sex education defend their position by arguing that accumulating evidence proves that abstinence-only education programs are ineffective in preventing unintended teenage pregnancy and does not reduce the risk of STDs and HIV infections among adolescents in the United States (Stanger-Hall & Hall, 2011).

Studies show that in the United States sexually active adolescents experience high rates of sexually transmitted infections (STI) (Staras, Cook, & Clark, 2009). As mentioned earlier, it is estimated that almost half of the 20 million STIs that occur annually in the United States exists within the 15-24 age bracket. According to Stanger-Hall and Hall (2011), there is also an approximate 26.6 births for every 1,000 adolescent females ages 15-19. Unfortunately, many of these infections and unintended pregnancies are the result of adolescents not having acquired knowledge on healthy sexual behaviors and practices. With current federal funding allowing for two different types of school-based sex education programs, individual states have the ability to decide which sex education curriculum would best reduce the high rates of STDs, HIV, and unintended pregnancies among resident adolescents. Therefore, there is a great need to identify the most effective school-based approach to tackling this issue.
Problem Statement

Ineffective school based sex education has been a problem facing society for the last few decades. Adolescent pregnancy, STD, and HIV infections continue to be a consequence of the inadequate implementation of effective sex education curricula in the school system. Stanger-Hall and Hall (2011) found that compared to other developed countries, the United States had the highest rates of teenage pregnancy. The same authors found there to be a strong correlation between the high rates of teenage pregnancy in the United States and the type of sex education curriculum taught to young people. In addition, about 9.1 million sexually transmitted infections (STIs) occur every year in adolescents under 25 (Advocates for Youth, 2008). Therefore, identifying the most effective sex education curriculum is necessary in an effort to reduce the adolescent pregnancy and STI rates and to assist young people in making healthier decisions about sex and adopting healthier sexual behavior patterns.

Purpose of the Study

The purpose of this study was to identify the school-based sex education method that is most effective in reducing risky sexual behaviors among adolescents. This study was a non-experimental quantitative review. As a meta-analysis, it combined and interpreted results from a series of peer-reviewed published studies.

Research questions

This study attempted to address and explore the following questions:

1. What is the most effective school-based intervention to reduce the high rates of STDs, HIV, and unintended pregnancy among adolescents?
2. What is the most effective school-based intervention to reduce the sexual activities of adolescents?

**Definitions**

The following terms are used in this paper. For better clarity and comprehension, I have provided definitions to terms applicable to this paper.

**Socioeconomic status** in this study will refer to a student's household income and familial social status.

**Disparities** will refer to the inequalities in adequate and accessible health care a student may face as a result of residence, educational attainment, race, ethnicity, and annual family income (Brady & Matthews, 2001).

**Abstinence-only programs** will refer to school-based programs that promote abstinence as the only option to avoid STDs, HIV, and unintended pregnancy.

**Comprehensive sex education** will refer to school-based programs that teach students about contraceptives and practicing safer sex.

**Theoretical Framework**

A theoretical framework focuses on the relationship between two or more variables. In this study, where the relationship between multiple variables is important, the primary socialization theory was used to explain the relationship between the independent and dependent variables associated with adolescent sexual risk-taking behaviors. Primary socialization is a theory rooted in sociology where it suggests that children and adolescents learn norms and values through the process of primary socialization (Francis & Thorpe, 2010). This theory looks at family, peer groups, and schools as the primary sources of sex education for adolescents. It
suggests that these early associations influence adolescent sexual behavioral patterns and sculpt their norms. This theory also identifies a correlation between schools as primary socialization constructs and adolescent sexual behaviors (Francis & Thorpe, 2010). The independent and dependent variables of adolescent behaviors will be discussed further in the literature review.
Literature Review

One of the major challenges facing society has been identifying effective school-based sex education programs to assist young people in gaining the appropriate awareness, skills, and comprehension to make healthier decisions regarding their sex life. The impact of different types of sexual education programs among youth has been the principal focus of a number of previous studies. The identification of the most effective sex education curriculum implemented in the school system has remained imperative to researchers because of the unique position schools are in when it comes to reaching and influencing a number of young people to reduce sexual risk-taking behaviors (Kirby, 2002). For many years, sex education stressed abstinence in its school-based programs. In recent years, evidence has suggested that a more effective approach was needed to reduce sexual risk-taking behaviors in adolescents. Identifying the most efficient method to address the current rates of STDS and adolescent pregnancy in the United States is significant to reducing the potential adverse health and social ramifications of risky sexual behaviors. This review of literature will analyze key factors that have been found to impact adolescent sexual behavior patterns and the health concerns that are the result of ineffective sexuality education.

Factors That Influence Risky Sexual Behaviors

Many factors contribute to the teenage pregnancy and birth rate in the United States (Stanger-Hall & Hall, 2011). According to Stanger-Hall and Hall (2011), several of these determinants include, level of emphasis on abstinence in state laws and policies, socioeconomics, educational attainment, and ethnic makeup. In this study, all states were used with the exception of North Dakota and Wyoming to determine if the level of abstinence education was positively
correlated with teen pregnancy and birth rates. Results indicated that the emphasis of abstinence on state laws and policies in the United States did not provoke abstinent behavior among youth. Quite the contrary was found in the study. Teenagers were found to be more likely to become pregnant in states that provided a higher level of abstinence education. There was, however, a negative correlation between the average household income and level of abstinence. Socioeconomic status (SES) was found to be greatly associated with the risk of pregnancy within the adolescent population. Although, SES, which is measured by familial income and educational attainment, is associated with being a risk factor for both adolescent pregnancy and STD infections, the impact of poverty is still not well understood as it relates to sexual behaviors. The study also found that teen pregnancy rates differed across the three largest ethnic groups: white, black and Hispanic. Abstinence education was found to be positively correlated with all ethnic bodies. Across all nationalities teenage pregnancy averaged 62.5 per 1000 girls throughout the 48 states studied.

The current rate of teenage pregnancy continues to be a concern for the federal government. The government has allowed individual states, however, to take primary control over the sex education curriculum taught in their respective schools. Studies have shown that states have been inconsistent in the implementation of standards for abstinence curriculum in school-based sex education within the United States. States have broadly varied in their approaches to the requirements of abstinence emphasis in school-based sex education programs. Liberman and Su (2012) explored how different states have responded to the current rates of teenage pregnancy, STDs, and HIV and the impact of the different abstinence programs. This study showed that abstinence programs that did not stress the A-H abstinence only until marriage
guidelines, which were guidelines that followed an eight-point federal statutory definition of abstinence education, had a longer impact on sexual behaviors than programs that did place emphasis on the A-H abstinence guidelines. Similar findings led to some states opting out of federally funded programs in order to develop abstinence programs they felt would have the most significant impact.

Some state mandates have included that school-based sex education include abstinence as the primary approach with optional instruction on condoms and contraception. While others have required schools to develop programs that focus exclusively on abstinence. Liberman and Su (2012) emphasized that despite the variation of state standards on abstinence, teens continue to report engaging in risky sexual behaviors that can result in unintended pregnancy, STDs, and HIV. Past research has identified that highly effective sex education programs has a significant influence on multiple behaviors, beliefs, and behavioral outcomes among adolescents.

According to Bleakley, Hennessy, and Jordan (2009) the behavioral and normative beliefs about sex stem from a number of sources among adolescents. The most frequent sources reported were friends, teachers, mothers, and media. The authors of this study assessed the influence of how adolescents attained their sexual knowledge and values. Parents were recognized as the most common source that adolescents used to obtain information on STDs and HIV. According to the study, an adolescent's peers were believed to help shape the sexual norms when engaging in sexual behaviors, like the frequency of condom use. Different sources were found to disseminate messages about sex in a different way and were found to influence adolescents differently. Mass media was found to play a major role in the way adolescents viewed sexual behaviors, teen pregnancy, contraceptive use, and accepted sexual norms.
Bleakley, Hennessy, and Jordan (2009) considered the degree to which these sources were related to various theoretical determinants of sexual behavior. In the study, the Integrative Model of Behavior Change used theoretical constructs from several theories of behavior change. The theoretical constructs were based on the Theories of Reasoned Action and Planned Behavior, the Health Belief Model, and the Social Cognitive Theory. The model examined the relationship between behavior and intentions. Although intentions can be influenced by environmental factors and an individual's lack of skills to perform, intention to perform a behavior is largely dependent on an individual's favorableness to perform the behavior, an individual's perceived norms and beliefs about the behavior, and an individual's belief that they have the ability to perform the behavior despite barriers.

The implications of this study suggest that adolescents rely on multiple sources of information to learn about sex. Collectively all of these sources influence beliefs about sexual norms and influences an adolescent's engagement in sexual intercourse. As a result, the same authors emphasize the necessity for parents, teachers, and schools to intervene and participate in responsibly informing and educating youth about sex. Bleakley, Hennessy, and Jordan (2009) explained that effective sexuality education in schools taught beyond the physical and emotional consequences of sexual intercourse, it included a conscious effort to encourage healthy attitudes, norms, and values about sex to adolescents.

Kirby (2002) identified implementation of a more comprehensive, all inclusive curriculum as an effective approach to teaching sex education within the school system. As a result of most youth being enrolled in school for many years prior to sexual initiation, schools were determined to have the unique ability to reduce sexual risk-taking behaviors among
adolescents. Kirby (2002) examined the relationship between adolescent sexual risk-taking and an adolescent's school involvement, the characteristics of the school, and the enrollment of programs that did and did not address sexual behaviors. Evidence from this study suggested that students involved in school were associated with less sexual risk taking behaviors. In the United States, studies have shown that youth who dropped out of school were more likely to engage in earlier sexual activity, not use protection, become pregnant, and give birth. Additionally, this study revealed that adolescents that lacked school involvement, had not planned to attend college, and were less attached to school were associated with greater risk taking behaviors than those who were more involved in school.

As Stanger-Hall and Hall (2011) emphasized previously, socioeconomics play a significant role in sexual risk taking behaviors among adolescents. Kirby (2002) determined that schools that served students who resided in lower socioeconomic regions and socially disorganized communities were found to be more likely to retain youth that became pregnant. This study also established that female teens were more likely to become pregnant when the schools they attended had higher percentages of students receiving free lunch, higher school dropout rates, and high rates of school vandalism.

Despite the seemingly synonymous correlation found between poverty and youth sexual risk taking, Kirby (2002), examined numerous studies that produced mixed results on the relationship between STD and HIV education programs and adolescent contraceptive behavioral patterns. Some studies have determined that sex education that taught about STDs and HIV delayed early sexual activity, while others have indicated that it accelerated sexual engagement. Most studies, however, have consistently found that school-based programs that taught about
STDs and HIV delayed the initiation of sex, reduced the frequency and number of sexual partners for those who were in engaging in sex already, and increased contraceptive use among adolescents.

Cavazos-Rehg, Krauss and Bierut (2012) examined the relationship between sexuality education with the birthrates of adolescents. Increased adolescent birth-rates were found to be associated with state sexuality education practices. The strong influence of school-based sex education is also noted by Boonstra (2009) who suggested that policymakers support a more comprehensive approach to sex education in order to equip adolescents with the information and skills needed to behave safely. A program focused in a comprehensive approach to sex education is described as a program that teaches about age appropriate and medically accurate sex information, and a program that stresses the importance of abstinence, while still providing details about the health benefits and side effects of contraceptive and condom use. According to Boonstra (2009) evidence to date suggests that an all inclusive education is more effective in getting youth to delay sexual activity when compared to abstinence-only programs.

According to the Centers for Disease and Control Prevention (CDC), in 2012, a total of 305,388 babies were born to young women between the ages of 15 and 19 with a live birth rate of 29.4 per 1,000 (2014). This current birth rate is considered a record low for adolescents in the United States and has been attributed to the increased use of birth control. In addition, it is estimated that more than half of all new HIV infections occur in individuals before they reach 25 and most are the result of unprotected sexual intercourse (APA, 2005). According to AIDS experts, many new infections are the result of young people not having the knowledge or skills to
protect themselves. Evidence has identified a strong correlation between comprehensive approaches and responsible and healthy decision making regarding adolescent sexual behaviors.

**Characteristics of an Effective Sex Education Intervention**

Research has suggested that peers have a significant influence on the sexual norms among adolescents. This strong influence has provoked the development of a number of peer led interventions in an effort to educate adolescents on prevention measures to reduce risky sexual behaviors. Burke, Pedersen and Williamson (2012) reported data that supported comprehensive approaches led by adolescents themselves. Results indicated that peer led comprehensive approaches to sex education encouraged youth to engage in safer sex practices as represented by the findings that showed that youth were more likely to receive contraceptives and less likely to receive antenatal care because of fewer pregnancies. Medley, Kennedy, and Sweat (2009) also evaluated the effectiveness of peer education. In their systematic review and Meta analysis of peer interventions, one commonality found in interventions considered successful, was the quality of the educators and the content of the educational material used.

Regardless, of the age of the instructor, experts have identified essential characteristics of effective sex education and STD prevention education programs (Advocates for Youth, 2006). Research suggests that effective sex education programs are found to offer age and culturally appropriate information about sexual health, are developed in cooperation with members of the target population, provide medically accurate information about both abstinence and contraceptive methods, have clear goals for prevention, and focus on specific health behaviors related to the goals (Advocates for Youth, 2006).
Establishing specific health behaviors to address the sexual risk-taking patterns of adolescents requires program developers to know the characteristics of the population of interest. Staras, Cook, and Clark (2009) elaborated on that and suggested that sexual partner characteristics were also important to consider. In their study, the authors assessed the characteristics of the sexual partners of adolescents and STD diagnosis. Characteristics of sexual partners included: age, STD diagnosis, other partners, and alcohol and drug problems. Using an exact logistic regression to estimate odds ratio for sexual partner characteristics and adjusting for demographics, results found that sexual partner characteristics were positively correlated with STD diagnosis. Adolescents were found to be at an increased risk to STDs when partners were infected or had other partners.

This is why it is imperative that school-based sex education programs use their platform as community-based organizations (Jemmott III, Jemmott, Fong, Morales, 2010), to provide interventions that are both compelling and effective in reducing the health and social consequences of unprotected sexual engagements among adolescents. According to Jemmott III, Jemmott, Fong, and Morales (2010) adolescents who participated in comprehensive HIV/STD risk reduction programs implemented by community based organizations were reported less likely to engage in sexual risk behaviors when compared to adolescents who did not. Overall, both abstinence-only and comprehensive based sex education programs help delay the onset of sexual activity, however, comprehensive sex education programs, according to psychologist Mary Jane Rotheram, of the University of California, "are the most effective in keeping sexually active adolescents disease free" (APA, 2005). Additionally, because the primary goal of both programs are to help reduce adolescent sexual risk-taking behaviors and the
subsequent health and social consequences of unprotected sex like STDs, HIV, and unintended pregnancy, an approach that addresses today's adolescents is required. The analysis of multiple studies have demonstrated that providing effective school-based sexual education requires that medically-accurate and age-appropriate information is taught to youth that addresses healthy decision making and the unintended consequences of unprotected sexual activities.
Methodology

The methods I used in this meta-analysis followed the same guidelines as other properly developed research projects. The first step was to define the research questions. I then researched previous studies that focused on abstinence and comprehensive approaches to sexuality education in schools. Of the studies found, 14 studies met the required criteria and only 4 of these were selected. Relevant studies were then combined for greater statistical power and more detailed estimates of results.

Assumptions

Possible assumptions included:

- A decrease in STD/HIV and adolescent birth rates were the result of one type of school-based program.
- Surveys used in studies included in this meta-analysis were answered honestly by students.
- Surveys used in studies included in this meta-analysis were designed to adequately assess the students’ knowledge of what they had learned in their sex education program.

Delimitations

This study was delimited to adolescents enrolled in school. This study excluded school aged teenagers not currently attending school.

Data Analysis

There were two methods of quantitative data analysis used in several of the studies used in this research paper. The results were analyzed using both descriptive and inferential statistics. Many of the results were analyzed descriptively and allowed for results to be viewed collectively. For each study included in the meta-analysis, I calculated effect size with 95%
confidence intervals. I also analyzed each variable independently for effect size and effects measured with 95% confidence intervals. I pooled effect sizes using the Meta-Easy software program. I used tables and figures to report on my results.
Results

Data Collection

I conducted a quantitative meta-analysis to examine the most effective school-based intervention to reducing the health consequences of adolescent risky sexual behaviors. Studies included in this meta-analysis had to meet the following criteria: published in a peer-reviewed journal less than five years ago; presented post-intervention results, and involved school-based sex education interventions for adolescents in high school. Search criteria included the terms: Sex education, Abstinence-only education, School-based sex education, and Comprehensive sex education programs. Studies that examined and reported on interventions designed for adolescents enrolled in junior-high school or college were excluded from this study. Community based interventions for out of school youth and interventions that did not use comprehensive and abstinent style approaches to sex education in classroom settings were also excluded from this review. The number of studies analyzed in addition to inclusion and exclusion criteria for this meta-analysis are presented in Figure 1.
I examined the results from each of the four included studies using meta-analysis software to examine the relationship between the type of school-based education approach and adolescent sexual risk-taking behaviors. This was done by obtaining and condensing statistics from the four included studies. The statistical data was then analyzed both collectively and separately according to variable categories. Table 1 presents the sample size, variables, and effects measured of the studies included in the meta-analysis.
Table 1

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Date</th>
<th>Sample Size</th>
<th>Variables</th>
<th>Effects Measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stanger-Hall &amp; Hall</td>
<td>2011</td>
<td>500</td>
<td>Abstinence level pregnancies</td>
<td>Difference in Means</td>
</tr>
<tr>
<td>Stanger-Hall &amp; Hall</td>
<td>2011</td>
<td>500</td>
<td>Abstinence level births</td>
<td>Difference in Means</td>
</tr>
<tr>
<td>Liberman &amp; Su</td>
<td>2012</td>
<td>1143</td>
<td>Intervention sexual activity</td>
<td>Difference in Means</td>
</tr>
<tr>
<td>Cavazos-Rehg, Krauss, &amp; Bierut</td>
<td>2012</td>
<td>500</td>
<td>Abstinence level teen births</td>
<td>Difference in Means</td>
</tr>
<tr>
<td>Sheer, et.al.</td>
<td>2013</td>
<td>973</td>
<td>Intervention sexual activity</td>
<td>OR</td>
</tr>
</tbody>
</table>

The first study, conducted by Stanger -Hall and Hall (2011) examined the relationship between the pregnancies and births of students and the level of abstinence taught in schools. Data on teen pregnancies and births were retrieved from national reports of 48 states. Stanger-Hall and Hall found that the level of abstinence education was positively correlated with teen pregnancies and births. The second study, conducted by Liberman and Su (2012) examined the impact a classroom-based abstinence education curriculum had on students' attitudes and behaviors. The sample size included 1,143 ninth graders. There were 756 students included in the intervention group and 387 included in the control. Data demonstrated the significant impact the classroom-based intervention had on student abstinent attitudes and beliefs by the end of the school year. A prospective cohort was conducted in the third study by Cavazos-Rehg, Krauss, and Bierut (2012) where the authors examined the impact of sexuality education practices on adolescent birthrates. The state sexual education practices were taken from the Centers for Disease Control and Prevention School Health Profiles Survey. Findings from the study found that the increase of
sexuality education in the school curriculum was positively correlated with lower adolescent birthrates. The final study, Sheer et. al (2013) assessed the outcomes of a comprehensive sex education program using an experimental randomized effectiveness trial. Data was collected at the pretest and three and six month follow-ups with a sample of teenagers that were randomly selected and assigned to treatment and control groups. There were 973 eligible students from 10 randomized schools, 549 participants were then included in the treatment group and 424 in the control group. The results indicated that the comprehensive education program was not effective but found that gender and alcohol uses were stronger predictors of teenage sexual activity.

**Results**

To find the results, I entered identifying data on the four included studies into the Meta-Easy program. Measures of the four studies included intervention and control sample sizes, means, standard deviations, odds ratios, p-values, and t-vales. Input of this data allowed me to obtain the confidence intervals and effect sizes for each of the included studies. I was also given combined effect sizes and confidence intervals. Stanger -Hall and Hall (2011) included two different variables and for that reason was analyzed twice to determine the effect size of each variable examined. The results of these analyses are outlined in Table 2 and Figure 2 where the effect sizes and confidence intervals for each study are illustrated.
Table 2

*Independent Effects of Included Studies*

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Study Design</th>
<th>Variables</th>
<th>Effect Measured</th>
<th>Effect Size</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stanger-Hall &amp; Hall</td>
<td>Cohort</td>
<td>Abstinence level pregnancies</td>
<td>Difference in Means</td>
<td>4.2034</td>
<td>3.4226 4.9843</td>
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<td></td>
<td>Cohort</td>
<td>Abstinence level births</td>
<td>Difference in Means</td>
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<td>4.1315 5.6933</td>
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<td>Liberman &amp; Su</td>
<td>RCT</td>
<td>Intervention sexual activity</td>
<td>Difference in Means</td>
<td>0.1625</td>
<td>0.0391 0.2860</td>
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<tr>
<td>Cavazos-Rehg, Krauss, &amp; Bierut</td>
<td>Cohort</td>
<td>Abstinence level teen births</td>
<td>Difference in Means</td>
<td>0.8327</td>
<td>0.0480 1.6173</td>
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<tr>
<td></td>
<td>RCT</td>
<td>Intervention sexual activity</td>
<td>OR</td>
<td>0.2626</td>
<td>1.0248 0.4996</td>
</tr>
</tbody>
</table>

*Figure 2: Forest Plot of Included Studies*
Based on the effect sizes, the studies included in the meta-analysis presented different results about the most effective approach to reducing adolescent risky sexual behaviors. The combined effect sizes and confidence intervals are presented in Table 3.

Table 3

<table>
<thead>
<tr>
<th>Combined Effects</th>
<th>Variable</th>
<th>Combined Sample Size</th>
<th>Effect Measured</th>
<th>Combined Effect Size</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Abstinence level pregnancy</td>
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<td>Difference in Means</td>
<td>4.2034</td>
<td>3.4226 4.9843</td>
</tr>
<tr>
<td></td>
<td>Abstinence level teen births</td>
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<td>Intervention Sexual Activity</td>
<td>2116</td>
<td>Difference in Means</td>
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<td>0.0391 0.2860</td>
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<td>Combined Effects</td>
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<td>Difference in Means</td>
<td>0.3796</td>
<td>0.2619 0.4973</td>
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</tbody>
</table>

The combined effect sizes of 4.2034 and 2.4562 for abstinence level pregnancies and births were found to be significant. This finding suggests that the type of school-based sex-education program is positively correlated with the rates of adolescent pregnancy and births. The combined effect size of 0.0877 for intervention sexual activity suggests that school-based interventions do not have a significant impact on the sexual activities of adolescents.
Discussion

In this meta-analysis, I synthesized research on the effects of school-based abstinence sex-education programs compared with school-based comprehensive sex education programs to compare the effectiveness of each intervention in reducing adolescent risky sexual behaviors. This review found that school-based sex education is an effective intervention for reducing the high rates of adolescent pregnancy and births, but no individual study included in this meta-analysis found significant effects on sexual activities regardless of the intervention approach used. This finding is noteworthy given that many believe the comprehensive-based intervention approach may be responsible for increasing adolescent sexual activities.

Interventions generating the most significant impact seemed to have several factors in common. First, effective interventions examined the role that other independent variables played in the frequency of sexual activities among adolescents. These other variables included race, ethnicity, familial and peer influences, political climate of the state, SES, religious participation, and gender. Additionally, studies that used a more comprehensive approach to teach sexuality education also tended to produce significant decreases in pregnancies, births, and STDs among adolescents. These findings were consistent with the primary socialization theory where emphasis is placed on the importance of family processes on adolescents' affiliation with deviant behaviors. The findings of the studies demonstrated the positive correlation between the influences of family, peer, and other early social constructs with the frequency of risky sexual activities.

In Stanger-Hall and Hall (2011), results indicated a significant relationship between abstinence-only education teenage pregnancy and birth rates. The implication of the finding is
that the occurrence of teenage pregnancies and births are positively correlated with the measure of abstinence education. The outcome of this finding supports that of Cavazos-Rehg, Krauss, and Bierut (2012) that adolescent birthrates are firmly associated with the degree of sexuality education taught in schools. The findings of both studies were significant and corroborated the argument that schools, as an early social institution, play a critical role in facilitating the access of adolescents to necessary sexuality education and reproductive health services. These findings also confirmed that comprehensive sex education is more effective in reducing the risky sexual behaviors of adolescents.

The results of Sheer et. al (2013) and Liberman and Su (2012) were not statistically significant enough to confirm the study hypothesis. Hypotheses related to decreases in sexual activity being dependent on the type of school-based intervention were not supported. The result of no significant difference in sexual activity whether an intervention taught abstinence-only or comprehensive school-based sex education, by implications show that although students enrolled in schools where comprehensive sex education was taught seem to be more knowledgeable in their sexual health awareness than their counterparts, there was little effect on sexual activity among these students. The findings of Sheer et. al (2013) supported the primary socialization theory as it indicated that other variables such as religious participation, familial and peer influences, gender, and use of alcohol were stronger predictors of the future intentions of adolescents than was the type of school-based intervention.

**Abstinence level pregnancies.** Of the studies included in the meta-analysis, one study measured abstinence level pregnancies. The study measured the influence of abstinence education levels related to teenage pregnancies. The standardized mean difference comparing
those who received the intervention to those who did not was 14.46 (95% CI: 3.7770-5.3388) meaning those who received the intervention were less likely to become pregnant than those who did not.

**Abstinence level births.** Two studies measured abstinence level births. Both studies examined the impact of abstinence education to adolescent birthrates. The first study, conducted by Stanger-Hall & Hall (2011) found abstinence level education to be significantly associated with adolescent birthrates. The second study conducted by Cavazos et.al, (2012) had a standardized mean difference of 5.39 (95% CI: 0.0480-1.6173). This indicated that there was a minor effect but it was not so significant. Both studies did find that poverty and race were significant variables that influenced the birthrates of adolescents.

**Intervention Sexual Activity.** Two studies measured intervention sexual activities. Liberman and Su (2012) had a mean difference of 0.23 (95% CI: 0.0391- 0.2860) the effect was also small but significance was found because of the sample size. The second study that examined this variable was conducted by Sheer et. al (2013). The authors conducted a randomized control trial to determine the effectiveness of a comprehensive sex education program for at risk youth. This study measured the efficacy using odds ratio (OR=1.61, 95% CI 1.0248- -0.4996) the OR indicated that the intervention was not significant. However, both studies found that gender was a significant variable.

Interventions producing the most significant effects in reducing adolescent risky sexual behaviors and subsequent consequences seemed to have several characteristics in common. The interventions considered successful examined variables like race, gender, and SES that extended beyond the school institution. The findings of this research project also seemed to support the
primary socialization theory (PST) which suggests that primary socialization sources (school, peers, and family) are the instrument through which adolescents learn attitudes and behaviors about sexuality. Thus, some of the study hypotheses were confirmed whereas others were not.

**Limitations**

This meta-analysis contributes to public health body of knowledge and has clear implications about effective intervention approaches, but this study is not without limitations. This study used published research and it may be subject to a number of selection biases introduced to the included studies as well as to this current research. These potential sources of bias include publication bias, search bias, and sampling bias in the original studies. It is also possible that my search strategy excluded suitable studies as I was not able to access certain journal articles which led to selection bias of the included studies for the meta-analysis. There were also a limited number of quantitative studies that used the same outcomes and risks associated with those outcomes which reduces the totality of my study's sample size. In addition, the number of studies for each variable is quite small which affects the validity of the effect size estimates. Furthermore, I recognize that the combined effect sizes presented in this meta-analysis were derived from intervention programs implemented in high-schools and they may not be applicable to adolescents in junior-high school and college.

**Recommendations**

The results of this meta-analysis outline the critical role schools play in facilitating educational services and interventions to teach adolescents healthy attitudes and behaviors associated with sexuality. Since political climates were found to be influential in the rates of adolescent pregnancy, STD, and HIV, future researchers should look into policy changes in
states that see the highest rates of unintended pregnancy and STDs among adolescents. In addition, although many studies have already determined that accessibility and availability are reasons why race, ethnicity, and SES may be intervening variables in the efficacy of sex education measures, other independent variables were also found to be strong predictors for the frequency of sexual activities. Perhaps future research can further examine the role early social constructs play in developing behavior norms and values within sub-cultures and communities. Additionally, future research can look into identifying why gender difference is a stronger predictor of sexual activities than school-based interventions. The social determinants of risky sexual behaviors need to be further investigated through large nationwide studies that begin before adolescents enter high school. Finally, the strengths of the present meta-analysis can be helpful for directing future primary research toward improving the theoretical understanding in this field.

Implications

To prevent the high rates of STD, HIV, and unintended pregnancy among adolescents, successful school interventions need to include more holistic and informal approaches that include modification to state laws where interventions have proved ineffective. Successful school interventions should also include approaches that seek to change negative perceptions of safer sex practices, sexuality discussions, and overall social norms about adolescent sexuality. Early social influences have an important role in shaping sexual behavior norms. Parents' involvement in a child's life as well as the degree to which they discuss sexuality is influential in later sexual risk-taking behaviors among adolescents. An adolescent's peers, teachers, and religious affiliations also have an important role in establishing behavior norms and values with
regard to sexual activities. Since this issue is multi-factorial, a multi- method prevention approach is required.

Conclusions

School-based sex interventions are an essential tool for the prevention of unintended pregnancies, STDs, and HIV. Based on the results obtained from the studies included in this meta-analysis, it was determined that there is a need for a more comprehensive approach to sexuality education in schools throughout the United States. School-based interventions alone however should not be relied on to reduce the risky sexual behaviors of adolescents. There is a need to explore modification to legislation and other factors that contribute to the increase in adolescent sexual activities. Findings of this meta-analysis support the practice of implementing comprehensive-based interventions into schools that provide a better understanding of the other independent variables that predict adolescent sexual risk-taking behaviors. Future interventionists need to assess more than the increase in student sexual knowledge when evaluating program efficacy. Instead future interventionists need to focus on developing strategies that will be most successful in modifying sexual risk-taking behaviors in adolescents. Future interventionists should focus on implementing school-based interventions that include systematic plans for increasing STD and HIV awareness while considering the other social circumstances that adolescents face. Unless strong efforts are made to improve the quality of the research being conducted and future interventions, we will not see the decrease in adolescent STD, HIV, and unintended pregnancy rates in the way that we want to see.
References


assessment of cost, quality and outcomes for five HIV prevention youth peer education programs in Zambia


