ABSTRACT

EVANS, REINA. Examining the Influence of Sexual Health Interventions on the Sexual Cognitions and Behaviors of Youth: A Three Study Dissertation. (Under the Direction of Dr. Laura Widman).

Sexual health is essential to overall happiness and wellbeing throughout the lifespan and is a critical component of healthy youth development. Unfortunately, youth are at risk for experiencing negative sexual health outcomes—e.g., STI/HIV contraction, unplanned pregnancy, sexual disfunction, decreased sexual self-esteem. As a result, a number of interventions have been developed to decrease sexual risk taking and promote sex-positive outcomes among youth. Yet, critical gaps remain. The purpose of this three-study dissertation was to fill these gaps and contribute to the effort to improve sexual health interventions for youth in the United States. In the first study (Chapter 2), our team conducted a meta-analysis to examine the association of sexual health interventions with sexual health outcomes in Black adolescents. We found that across 29 studies reporting on 11,918 Black adolescents, there was a significant weighted mean association of sexual health interventions with improvements in abstinence, condom use, sexual health intentions, sexual health knowledge, and sexual health self-efficacy. In the second study (Chapter 3), our team examined the role of adolescent sex education in sexual satisfaction among LGB+ and heterosexual young adults. We found that more comprehensive family-based sex education was associated with higher communication satisfaction for all participants. In addition, more comprehensive school-based sex education had a stronger association with sexual contentment and communication satisfaction in young adulthood for heterosexual participants than LGB+ participants. Finally, in the third study in this dissertation (Chapter 4), we examined the efficacy of STD testing public health messages tailored to youths’ regulatory focus. We found that among youth who are prevention-focused (i.e., generally, more focused on potential negative outcomes rather than potential positive outcomes), a promotion-focused video message
was more effective at decreasing STD testing stigma compared to a prevention-focused video message. Together, these studies demonstrate the complexities of the relationship between sexual health interventions and improvements in both sexual risk taking (e.g., decreased condom use) and sex-positive outcomes (e.g., greater satisfaction with sexual communication). There is certainly evidence from both studies included in this dissertation and the literature on sexuality, as a whole, that we should disseminate evidence-based, comprehensive sexual health programing to youth as these interventions can improve their wellbeing. Future research is needed to develop and evaluate interventions that target community, institutional, and societal barriers to sexual health for youth as well as interventions that take a more sex-positive approach to teaching youth about sexuality.
Examining the Influence of Sexual Health Interventions on the Sexual Cognitions and Behaviors of Youth: A Three Study Dissertation

by
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A dissertation submitted to the Graduate Faculty of North Carolina State University in partial fulfillment of the requirements for the degree of Doctor of Philosophy

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DEDICATION

This dissertation is dedicated to my sister, my mom, and my granny—three generations of women fighting for more equitable environments for young people to live, learn, and grow.

And to Danny. Thank you for grounding my unruly doubts, supporting my dreams, and your unwavering faith that I could do this.
BIOGRAPHY

Reina Evans was born and raised in New Orleans, Louisiana. She attended St. Edward’s University in Austin, Texas and graduated from the Honors Program in 2017 with a Bachelor of Science in Behavioral Neuroscience under the advisement of Dr. Katharine Goldey. The summer after graduating, Reina joined the Teen Health Lab, under the mentorship of Dr. Laura Widman, in the Applied Social and Community Psychology Program at North Carolina State University. Her research broadly focuses on promoting young people’s sexual wellbeing through evaluating sexual health interventions and examining the influence of parents and families.
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CHAPTER 1

Introduction

Sexual health is essential to overall happiness and wellbeing throughout the lifespan and is a critical component of healthy youth development. The World Health Organization defines sexual health as a state of physical, mental, and social well-being with respect to sexuality (World Health Organization, 2020)—a multifaceted construct with two important dimensions. The first dimension of sexual health is the absence or reduction of sexual risk: having “safe sexual experiences” (World Health Organization, 2020). With respect to this sexual health dimension, youth who reduce the risks of being sexually active by using contraception consistently and correctly and getting tested regularly for STDs/HIV, are healthier than youth who don’t engage in these behaviors. In addition, with recent medical innovations in HIV-prevention for young people, now, youth who are at high risk can take PrEP (Pre-exposure prophylaxis) to reduce their risk of acquiring HIV (Allison et al., Under Review). Youth who exhibit these behaviors are less likely to have an STD or untreated HIV and less likely to have an unplanned pregnancy (CDC, 2016a, 2017c, 2019b; Fonner et al., 2016). Importantly, this leaves them more likely to benefit from other positive life outcomes. For example, youth who do not experience unplanned pregnancy are more likely to finish high school and less likely to be unemployed or incarcerated (CDC, 2017a). Much of the research on sexual health to date has emphasized the reduction of sexual risk; leaving, the other crucial dimension of sexual health relatively understudied.

The second dimension of sexual health among youth is focused on the promotion of more sex-positive outcomes—those related to sexual pleasure and agency. In their definition of sexual health, the World Health Organization discusses the importance of taking “a positive and
respectful approach to sexuality.” With this approach, comes the assumption that having sex during adolescence and young adulthood is developmentally normal and can be a healthy behavior for some young people (Harden, 2014). In fact, sex-positive outcomes related to sexual pleasure, including sexual self-efficacy (Zimmer-Gembeck, 2013), sexual self-esteem (Oattes & Offman, 2007), and sexual satisfaction (Carcedo et al., 2020), are associated with improved psychological functioning and relational well-being among youth (Harden, 2014). Both dimensions of sexual health are linked with overall physical and mental health throughout the lifespan and, importantly, these two dimensions of sexual health are related to one another. For example, elements of sexual dissatisfaction have been linked to sexual risk taking (Higgins et al., 2009)—adults who cite contraception as a barrier to sexual arousal are less likely to use condoms consistently.

Unfortunately, despite the known life-long benefits of reducing sexual risk and promoting sex-positive outcomes, youth in the United States experience significant deficits with respect to both of these dimensions of sexual health. Although youth (ages 15-24) make up only a quarter of the sexually active population, they account for half of all new STDs each year in the United States (CDC, 2018c). In addition, youth are the least likely to get tested for HIV in a timely manner and, thus, current estimates suggest around 50% of HIV-positive youth do not know they have HIV (Hall et al., 2015; Ocfemia et al., 2018). With respect to more sex-positive outcomes, one study with college students from four different universities across the United States found that only 32% of youth report they are “very satisfied” with respect to their physiological and psychological sexual satisfaction (Higgins et al., 2011). In another study with adolescents and young adults (ages 16-21), only 50% of youth reported that they did not have a significant sexual problem (e.g., erectile dysfunction, low sexual desire; O'Sullivan et al., 2014).
Even with decades of intervention research and public health initiatives (for reviews, see Denford et al., 2017; Evans, Widman, et al., 2020a, 2020b; Noar et al., 2009; Widman et al., 2019), there still remains important work to be done to improve youth’s sexual health. This has prompted the in-depth study of factors that facilitate and create barriers to sexual health among youth—factors which can be organized and understood using Ecological Systems Theory.

**Understanding Factors that Influence Sexual Health using the Socio-Ecological Model**

Ecological systems theory posits that human development, cognition, and behavior are all impacted by factors at individual, interpersonal, community, institutional, and structural levels (Bronfenbrenner, 1995). Within the sexual health literature, most studies have focused on the impact of individual and interpersonal-level factors on sexual risk reduction and the promotion of sex-positive outcomes. For example, with respect to the individual level, sexual health knowledge, attitudes, and self-efficacy are all related to increased condom use among youth (Asare, 2015; Turchik & Gidycz, 2012). As a result, many of these cognitions have been incorporated into health behavior change theories (e.g., Theory of Planned Behavior, Information, Motivation, Behavior Skills Model; Ajzen, 1985; Fisher, 2011, 2012; Fisher et al., 2006) and targeted in sexual health interventions (Tyson et al., 2014). Interpersonal factors, including parental communication and peer pressure, influence sexual risk taking among youth (Van de Bongardt, 2015; Widman et al., 2016b). For example, in one study with a national sample of parents of adolescents from the United States, 97% of parents reported talking about at least one topic related to sexuality with their teen (Evans, Widman, Kamke, et al., 2020). It is encouraging to see recent studies reporting such high rates of parent-child sexual communication as this communication is linked to increased condom and contraception use among youth (Flores & Barroso, 2017; Widman et al., 2016b; Widman et al., 2019). Other interpersonal factors, such
as relationship status (Milstein et al., 2020), are associated with sex-positive outcomes—with college students in a committed or emotionally-involved relationship reporting more sexual pleasure and satisfaction than those in “hook up” sexual relationships.

Community, institutional, and structural factors shape the sexual behavior and health of youth, as well. Many factors at these levels (e.g., racism, access to health care, heterosexism) effect youth differently based on their race, sexuality, and gender; thus, it is imperative that we recognize the particularly unyielding role that factors at these levels can play in the marginalization and corresponding sexual health risk of sexual and gender minority youth, Black youth, and young women. At the community level, LGBT+ youth are less likely to receive sexual health information from their clinicians and school-based sex education classes that is relevant to their sexual experiences compared to cis-gender, heterosexual youth (Bodnar & Tornello, 2019; Estes, 2017; Haley et al., 2019; Pingel et al., 2013). This can have harmful consequences, as high-quality sexual health education in schools and in clinical environments is related to decreased rates of unplanned pregnancy and STD contraction (Manlove, 2015). At the institutional-level, Black youth experience significant barriers to receiving high-quality health care due to multi-level factors such as residential segregation, unemployment, and racism in the health care system (Prather et al., 2018). This can have particularly detrimental effects on sexual health because access to health care (e.g., via Medicaid expansion) is related to contraception use and STD/HIV testing (Gai & Marthinsen, 2019). At the structural level, belief in traditional gender norms can have harmful consequences—especially for young women—as a stronger belief in these norms leaves women more likely to experience unwanted sexual activity and poorer sexual satisfaction outcomes (Quinn-Nilas & Kennett, 2018; Sanchez et al., 2012).
Purpose

As a result of these findings, which identify potential barriers and facilitators to sexual health, new interventions can and have been developed to target some of these factors in an effort to further decrease sexual risk taking and promote more sex-positive outcomes among youth. Yet, critical gaps in the literature remain. First, while Black adolescents experience high rates of negative sexual health outcomes (e.g., HIV contraction) and some interventions exist to specifically target sexual health among these youth, a meta-analysis is needed to organize our understanding: to synthesize the research on sexual health interventions for Black adolescents and identify which strategies are working to inform future prevention efforts. Second, despite research highlighting the importance of sex-positive cognitions and behaviors, studies are needed to examine the influence sexual health interventions for youth can have on these outcomes. If sexual health interventions have the capacity to influence not just sexual risk but also, sex positive outcomes, this finding may charter a novel path for adolescent and young adult sexual health promotion. And, finally, many STD-testing public health campaigns are moving to social media platforms—to meet youth where they are—making it possible to tailor these messages to youth’s individual characteristics. Yet, few studies have examined the efficacy of tailoring these campaigns to youth’s unique personality and motivational traits. The purpose of this dissertation is to fill these gaps and to continue to better our understanding of the ways in which factors at each level of the Socio-Ecological Model can be leveraged as part of sexual health interventions to improve the sexual health of youth in the United States. In three separate studies, our team evaluated the relationship between sexual health interventions and youth sexual risk taking or sex-positive outcomes. See Figure 1 for an illustration of how a number of factors considered in this dissertation are situated within the Socio-Ecological model.
Figure 1. This dissertation considers factors that influence adolescent and young adult sexual health at all levels of the Socio-Ecological Model. Note. This model was originally adapted from the Centers for Disease Control and Prevention (CDC, 2019d) and then further adapted from Desmarais & Lowder (2020).

The second chapter of this dissertation will include Study 1, “Association of Sexual Health Interventions with Sexual Health Outcomes in Black Adolescents: A Systematic Review and Meta-analysis” (Evans, Widman, et al., 2020a). The authorship team on this paper includes myself (Reina Evans) as well as Laura Widman, McKenzie N. Stokes, Hannah Javidi, Elan C. Hope, and Julia Brasileiro. This paper was recently published in JAMA Pediatrics on April 20th, 2020 (impact factor as of 2019 = 13.9). In this study, we systematically reviewed the literature on sexual health interventions for Black adolescents and meta-analyzed their overall efficacy on three behavioral outcomes (abstinence, condom use, number of sex partners), two biological
outcomes (pregnancy, STD contraction) and three psychological outcomes (intentions, knowledge, and self-efficacy). We found, across 29 studies, with a total of 11,918 Black adolescents (pooled, weighted $M_{\text{age}} = 12.4$), sexual health interventions are effective at increasing abstinence and condom use and improving psychological outcomes. Results from this study have been disseminated through news media outlets, including the U.S. News and World Report, Futurity, and Reuters.

The third chapter of this dissertation will include Study 2, “The Role of Adolescent Sex Education in Sexual Satisfaction among LGB+ and Heterosexual Young Adults” (Evans, Widman, & Goldey, 2020). The authorship team on this paper includes myself as well as Laura Widman, and Katherine Goldey. This paper was recently published in the American Journal of Sexuality Education on May 25th, 2020 (impact factor as of 2016 = 0.7). In this study, we examined the association between adolescent family- and school-based sex education with current sexual satisfaction among college students ($M_{\text{age}} = 19.2$). We found that comprehensive school-based sex education has a stronger association with sexual satisfaction for heterosexual participants than for LGB+ participants. This study raised important concerns related to the inclusiveness of current comprehensive sex education practices for individuals from marginalized sexual identity groups (e.g., lesbian, gay, and bisexual youth) and the long-term effects this may have on the sexual satisfaction of LGB+ youth.

The fourth chapter of this dissertation includes Study 3, “Examining the Efficacy of STD Testing Public Health Messages Tailored to Youths’ Regulatory Focus.” The authorship team for this study includes myself as well as Laura Widman, Hannah Javidi, and Nikolette Lipsey. In this study, we examined one potential strategy for improving the efficacy of STD testing public health campaigns among youth: tailoring the public health messages to youth’s regulatory focus.
People have a dominant regulatory focus and tend to be either more concerned with the risks of unhealthy choices (prevention-focused) or the benefits of healthy choices (promotion-focused).

When someone is targeted with a health message that matches their regulatory focus, the message is more effective; yet, to date, no studies have evaluated messages tailored to youths’ regulatory focus in the domain of STD testing. The current study was designed to fill this gap. With a national online sample of 380 sexually active youth (ages 16-24), we examined whether matching STD testing video messages to youths’ regulatory focus strengthens the efficacy of the message. First, we hypothesized that prevention-focused youth who received a prevention-focused video message would have better STD testing cognitions (i.e., less stigmatizing attitudes, greater self-efficacy to get tested, and greater intentions to get tested) compared to prevention-focused youth who received a promotion-focused message. Second, we hypothesized that promotion-focused youth who received a promotion-focused video message would have better STD testing cognitions compared to promotion-focused youth who received a prevention-focused message. However, our hypotheses were not confirmed by our results for this study. Instead, we found that among prevention-focused youth, those who had watched the promotion-focused video had less stigmatizing attitudes compared to those youth who watched the prevention-focused video. There were no significant differences between the groups in our other outcomes: STD testing self-efficacy and STD testing intentions. Though more research in this area is needed to confirm the generalizability of these results, it is possible that public health professionals should consider tailoring their messages aimed at increasing STD testing among youth to be more promotion-focused. Our target journal outlet for this study is the Journal of Experimental Psychology: Applied (impact factor = 1.7).
CHAPTER 2

Association of Sexual Health Interventions with Sexual Health Outcomes in Black Adolescents: A Systematic Review and Meta-analysis

**Importance:** Black adolescents are at increased risk of contracting HIV/STIs and experiencing unplanned pregnancy. Although sexual health interventions aimed at decreasing these risks exist, evidence linking sexual health interventions to Black adolescents’ sexual behavior has not been synthesized.

**Objective:** This meta-analysis examined the associations between sexual health interventions and three behavioral outcomes: abstinence, condom use, and number of sex partners; as well as two biological outcomes: pregnancy and STI contraction; and three psychological outcomes: sexual health intentions, sexual health knowledge, and sexual health self-efficacy. Potential moderators of intervention success were explored.

**Data Sources:** A systematic search was conducted of studies published through January 2019 using PubMed, PsycINFO, and CINAHL databases and relevant review articles.

**Study Selection:** Studies were included if they: included a U.S.-based sample of Black adolescents; evaluated a sexual health intervention using experimental/quasi-experimental designs; included a behavioral outcome; and were published in English.

**Data Extraction and Synthesis:** Standardized mean difference and 95% confidence intervals were extracted and meta-analyzed using random-effects models.

**Main Outcomes and Measures:** Behavioral outcomes were abstinence, condom use, and number of sex partners. Biological outcomes were pregnancy and STI contraction. Psychological outcomes were sexual health intentions, knowledge, and self-efficacy.

**Results:** Across 29 studies reporting on 11,918 Black adolescents, there was a significant
weighted mean association of sexual health interventions with improvements in abstinence \( (d = .14, 95\% \text{ CI } [.05, .24]) \) and condom use \( (d = .25, 95\% \text{ CI } [.11, .39]) \). There was no significant mean association of these interventions on number of sex partners, pregnancy, or STI contraction; however, sexual health interventions were significantly associated with improvements in the psychological outcomes: sexual health intentions \( (d = .17, 95\% \text{ CI } [.05, .30]) \), knowledge \( (d = .46, 95\% \text{ CI } [.30, .63]) \), and self-efficacy \( (d = .19, 95\% \text{ CI } [.09, .28]) \).

Intervention effects were consistent across factors such as participant gender and age, as well as intervention dose.

**Conclusions and Relevance:** Overall, sexual health interventions are associated with improvements in sexual well-being among Black adolescents. There is an urgent need for wide scale dissemination of these programs to address racial disparities in sexual health across the U.S.

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Introduction

Black adolescents in the United States are at increased risk for experiencing negative sexual health outcomes (CDC, 2018d; U.S. Department of Health & Human Services, 2016). Compared to white adolescents, Black adolescents are twice as likely to have a baby before age 20 (U.S. Department of Health & Human Services, 2016) and more likely to contract sexually transmitted infections (STIs), including HIV (CDC, 2018d). Importantly, teen pregnancy is related to negative life outcomes, such as high school drop-out, incarceration, and unemployment (CDC, 2017a) and costs the United States around $21 billion dollars each year (CDC, 2015a). In addition, long-term, untreated infection with HIV/STIs can result in infertility and death (CDC, 2017c). With accurate information and skills, as well as access to STI testing and birth control, Black adolescents can be better equipped to avoid these negative outcomes (Gause et al., 2018; Goodman et al., 2017).

Ecological systems theory suggests that Black adolescents may experience interpersonal, community-level, and systemic barriers to practicing healthy sexual behavior (Bronfenbrenner, 1995). Poverty (Kaiser Family Foundation, 2017), stress from discrimination and racism (Jackson et al., 2016; Lanier, 2017), and lack of access to health care differentially impact Black adolescents (Adams et al., 2018; Haider et al., 2013; Leech, 2019; Parekh et al., 2018), and can lead to poor general and reproductive health outcomes (Benner et al., 2018; Crichton et al., 2015; Haider et al., 2013; W. J. Hall et al., 2015; Penman-Aguilar et al., 2013). Thus, it is critical to examine the effectiveness of interventions aimed at reducing sexual health disparities among this racial group.

The unique context of Black adolescents’ sexual decision making and experiences has guided the development of a number of interventions that have emerged over the past few
decades. Many programs primarily target individual-level factors that impact Black youth’s sexual health—such as knowledge, self-efficacy, and self-respect (Markham et al., 2012). A few programs target family-level factors, such as parental communication in Black families (DiIorio et al., 2007; C. DiIorio et al., 2006; Kogan et al., 2012). A community-level factor, cultural narratives that affect safe sex practices, was also the target for one sexual health program (Sznitman, Stanton, et al., 2011). Most of these programs vary in their efficacy for impacting sexual health outcomes. Intervention differences, as well as other sources of clinical and methodological heterogeneity may be responsible for these mixed results (Clark et al., 2005; Dancy et al., 2006; DiClemente et al., 2014; DiIorio et al., 2007).

Given the heterogeneity and discrepancies in study findings, the purpose of the current study is to provide a much-needed meta-analysis—to synthesize the effectiveness of primary prevention, sexual health programs for Black adolescents and understand what intervention strategies are most effective. For the purpose of this study, sexual health interventions were defined as primary prevention programs that included some component directly aimed at encouraging abstinence or safer sexual behavior (e.g. condom use) in order to reduce HIV/STIs and unplanned pregnancy. There are systematic reviews of sexual health interventions for Black adolescents and these have helped to identify available interventions and the need for culturally-tailored and accessible programs (Harris & Cheney, 2018; Lauricella et al., 2016; Lee et al., 2014; Maness & Buhi, 2013). Although there are several meta-analyses that evaluate the effectiveness of adolescent sexual health interventions (Mirzazadeh et al., 2018; Morales et al., 2018; Soe et al., 2018), and a few meta-analyses that evaluate the effectiveness of programs for Black individuals without a focus on adolescents, the unique barriers experienced by Black adolescents in the U.S. warrant an analysis of how current programming functions for these
adolescents in particular. To our knowledge, there is no recent meta-analysis on sexual health interventions for Black adolescents. With racial disparities in sexual well-being still alarmingly high, there is a need to understand why some interventions are effective while others fail Black adolescents.

The first goal of this study is to systematically review the literature on sexual health interventions for Black adolescents and meta-analyze their overall efficacy on three behavioral outcomes related to sexual health: abstinence, condom use, and number of sexual partners; and two biological outcomes: pregnancy and STI contraction (CDC, 2016a; Jones et al., 2017). We also evaluate intervention effects on three psychological outcomes known to influence sexual health behavior (Bandura, 2011; Fishbein & Ajzen, 2011): sexual health intentions, sexual health knowledge, and sexual health self-efficacy.

The second goal is to identify components that contribute to the success of sexual health interventions in decreasing sexual risk behavior among Black adolescents. We will consider potential moderating variables of intervention effectiveness, including demographic characteristics (e.g., gender, age), intervention characteristics (e.g., cultural tailoring, dose), and methodological characteristics (e.g., length of follow-up).

In this meta-analysis, we use the term Black to refer to people in the United States who are descendants of Black racial groups of Africa, including descendants of enslaved Africans (U.S. Census Bureau, 2018). When referring to specific empirical work, we use the terminology of the original authors.
METHOD

Search Strategy

In January 2019, we conducted a comprehensive search of PsycINFO, CINAHL, and PubMed databases to extract relevant studies published through January 31st, 2019. We used the following key words: youth, adolesc* or teen*; sexual health or safe* sex or sexually transmitted disease or sexually transmitted infection or STD or STI or HIV or AIDS or pregnancy or reproductive health or condom* or contracept* or unprotected sex or abstinence; intervention or program or education or prevention or promotion or trial; latino* or latina* or latinx* or minorit* or ethnic* or hispanic or african american* or black* or race or racial or biracial. Additional studies were located by examining prior reviews and meta-analyses (Cardoza et al., 2012; Harris & Cheney, 2018; Lauricella et al., 2016; Lee et al., 2014; Lee et al., 2013; Maness & Buhi, 2013; Metzger et al., 2013; Soe et al., 2018; Sutton et al., 2014), and references of included articles. This initial search produced 3069 unique articles.

Selection Criteria

Studies were included if they met the following criteria: 1) included a U.S.-based sample; 2) sampled Black adolescents (i.e., at least 95% of the sample was Black; mean sample age ≤ 18 and no participant older than 24); 3) evaluated the effects of a primary prevention, sexual health intervention (studies with already pregnant youth or STI-positive youth were excluded because of their focus on secondary prevention; Smith et al., 1997; Thurman et al., 2008); 4) evaluated program effects using an experimental or quasi-experimental design; 5) included at least one of our behavioral or biological outcome measures; 6) were published in English; and 7) provided sufficient statistics to calculate effect sizes. When a study had a sample with multiple racial-ethnic groups, but included subgroup analyses that evaluated intervention effects among only
Black participants, the results of the subgroup analyses were included (Markham et al., 2012; Peskin et al., 2015). For studies with multiple follow-up points, we used the longest-term follow-up with adequate data to calculate effect sizes as the most conservative estimate of treatment effects. When multiple studies reported findings using the same data, the study reporting results for the longest-term follow-up, with adequate data to calculate effect sizes, was included. All other studies using the same data were excluded (Stanton et al., 1996; Sznitman, Vanable, et al., 2011). For studies with more than one intervention group, we selected the sexual health intervention that was most comprehensive. When studies included more than one indicator for an outcome (e.g., multiple indicators of condom use), we used a random number generator to select one to reduce possible bias related to outcome selection.

These selection criteria resulted in a final sample of 29 articles (see eFigure 1 in the supplement). From these articles, we calculated 22 independent effect sizes for abstinence, 26 for condom use, 10 for number of sex partners, 4 for pregnancy, 4 for STI contraction, 14 for sexual health intentions, 11 for sexual health knowledge, and 15 for sexual health self-efficacy. More information about these outcome variables, including how they were evaluated in primary studies, can be found in eTable 1 in the supplement.

**Data Extraction**

Two authors independently coded each of the primary studies. The following data were extracted: 1) demographic and sample characteristics; 2) intervention characteristics; and 3) methodological characteristics. The mean percentage agreement across all coding categories was 92%. Discrepancies between coders were resolved through group discussion until a consensus was reached. Risk of bias was calculated for each primary study (Higgins et al., 2011).
**Calculation of Effect Sizes**

As the indicator of effect size, the standardized mean difference, Cohen’s $d$, was used. Cohen’s $d$ can be interpreted as small (.20), medium (.50), or large (.80; Cohen, 1992). When $d$s and confidence intervals were not reported, other statistics that could be converted to $d$s were calculated using Comprehensive Meta-Analysis V3 (Borenstein et al., 2009) and the Practical Meta-Analysis Effect Size Calculator (Wilson, 2018). Study authors were contacted and data were requested when no statistics in the study could be converted to a $d$. Higher values indicate the sexual health intervention group performed better than the control for abstinence, condom use, sexual health intentions, sexual health knowledge, and sexual health self-efficacy. Lower values indicate that the sexual health intervention group performed better than the control for number of sex partners, pregnancy, and STI contraction.

**Analyses**

Random effects meta-analytic procedures were used for the primary analyses across all independent effect sizes to allow for the possibility of differing variances across studies (Lipsey & Wilson, 2001). To examine whether significant heterogeneity existed among effect sizes, the $Q$ statistic and $I^2$ were used. For hypothesized categorical moderators, effect sizes and 95% confidence intervals were calculated, then compared using the $Q_b$ statistic. Groups for categorical moderator variables must have included at least two studies to be considered in analyses. For categorical moderation analyses, mixed effects models were utilized to allow for the possibility of differing variances across subgroups. Random effects meta-regression was used to test continuous moderators. The $Q$-value model statistic was used to determine whether there was significant moderation for these models. Analyses were conducted using Comprehensive Meta-Analysis V3 (Borenstein et al., 2009).
RESULTS

Study Characteristics

A summary of the studies included in this meta-analysis is presented in Table 1. A total of 11,918 Black adolescents (weighted mean age = 12.43) were included across 29 studies. Studies identified their participants as African American (26) and Black (3). Most studies targeted mixed-gender samples; however, 10 included only girls and 3 included only boys.

Eighteen studies evaluated interventions with cultural tailoring. Twelve studies described using community-based participatory research methods to develop/adapt the programs. In addition, 9 programs included components aimed at promoting racial socialization—messages about what it means to be Black in today’s society (Hughes, 2006). Only 1 program was abstinence-only, while 27 programs were comprehensive. Intervention dose varied across studies, with 5 studies including less than 3 hours of training and 4 with more than 20 hours. Five studies specified that all participants received the full dose. Interventions were primarily delivered in schools (9), community centers (11), or clinics (6). Many programs included partner sexual communication skills training (18) and condom use skills training (18). Eight programs included parents in intervention activities.

Risk of Bias

Risk of bias was calculated for each primary study (eTable 2 in the supplement). Most (90%) studies had low risk of bias for random sequence generation and 67% had low risk of bias for incomplete outcome data. However, risk of bias pertaining to selective reporting was unclear for many studies.
**Behavioral Outcomes**

*Abstinence.* Individual study effect sizes for abstinence ranged from $d = -0.48$ (95% CI [-1.77, .81]) to $d = 0.71$ (95% CI [-0.02, 1.44]), with an overall weighted mean effect size across studies of $d = 0.14$ (95% CI [.05, .24]; $p = .004$) that was significant (Figure 1). On average, sexual health interventions have a small, significant effect on abstinence among Black adolescents (Table 2). There would have to be 60 additional non-significant studies for the combined $p$-value to exceed .05 (fail-safe $N = 60$).

There was significant heterogeneity among studies for the abstinence outcome ($Q = 34.90$, $df = 21$, $p = .03$, $I^2 = 39.83$); thus, we examined moderators of intervention success (see Table 3 and eTable 3 in the supplement). Intervention setting and study publication year moderated the association between sexual health interventions and abstinence. School-based interventions ($d = 0.25$, 95% CI [.10, .39]; $p = .001$) had a stronger association with improvements in abstinence than interventions in community centers ($d = 0.04$, 95% CI [-.07, .16]; $p = .47$). In addition, interventions published in older studies had stronger associations with improvements in abstinence than interventions in studies published more recently (coefficient = -.01, 95% CI [-.03, -.001], $p = .03$).

*Condom use.* Individual study effect sizes for condom use ranged from $d = -0.27$ (95% CI [-1.04, .51]) to $d = 0.82$ (95% CI [.29, 1.35]), with an overall weighted mean effect size across studies of $d = 0.25$ (95% CI [.11, .39]; $p < .001$) that was significant (Figure 2). On average, sexual health interventions have a small, significant effect on condom use among Black adolescents (Table 2). There would have to be 292 additional non-significant studies for the combined $p$-value to exceed .05 (fail-safe $N = 292$).
There was significant heterogeneity among studies for the condom use outcome ($Q = 104.14, df = 25, p < .001, I^2 = 75.99$); thus, we examined moderators of intervention success (see Table 3 and eTable 3 in the supplement). Publication year moderated the association, such that interventions published in older studies had stronger associations with improvements in condom use than those in studies published recently (coefficient = -.02, 95% CI [-.04, -.01], $p = .01$). No other significant moderators were identified.

**Number of Sex Partners.** The overall weighted mean effect size for number of sex partners across studies was $d = -.06$ (95% CI [-.25, .13]; $p = .54$). This was a small and non-significant effect (see eFigure 2 in the supplement and Table 2).

**Biological Outcomes**

Only four studies assessed pregnancy and STI contraction as intervention outcomes. The overall weighted mean effect size across studies was small and non-significant for both outcomes: pregnancy, $d = -.16$ (95% CI [-.41, .09]; $p = .20$), and STI contraction, $d = -.07$ (95% CI [-.43, .30]; $p = .73$). See eFigure 3 and eFigure 4 in the supplement and Table 2.

**Psychological Outcomes**

Sexual health interventions were efficacious in promoting all three psychological outcomes: sexual health intentions ($d = .17$, 95% CI [.05, .30]; $p = .01$), sexual health knowledge ($d = .46$, 95% CI [.30, .63]; $p < .001$), and sexual health self-efficacy ($d = .19$, 95% CI [.09, .28]; $p < .001$). Effect sizes ranged from small to moderate.

**DISCUSSION**

This meta-analysis synthesized almost 30 years of research on the effectiveness of sexual health interventions among Black adolescents in the United States. Overall, results from 29 studies with 11,918 Black adolescents show these programs have been successful. Sexual health
interventions are significantly associated with improvements in abstinence, condom use, sexual health intentions, sexual health knowledge, and sexual health self-efficacy. With rates of HIV/STIs and unplanned pregnancy especially high among Black adolescents (CDC, 2018d; U.S. Department of Health & Human Services, 2016), there is an urgent need to address factors that may lead to improvements in sexual decision-making among this racial group. This meta-analysis shows that sexual health interventions are an important part of the solution to this health crisis, as these programs can promote healthy sexual behavior and psychological outcomes among Black adolescents. These findings were consistent across factors such as participant gender, age, and intervention dose.

We found that sexual health interventions for Black adolescents were associated with improvements in sexual health intentions, sexual health knowledge, and sexual health self-efficacy—psychological outcomes that may lead to positive behavior change (Bandura, 2011; Fishbein & Ajzen, 2011; Sheeran et al., 2016). Most of the studies we included assessed behavior change after only 12 months (at most), at which point many adolescents may not have become sexually active, making behavior change in sexual situations more difficult to detect. Fortunately, if this effect of interventions on psychological outcomes persists, it is expected based on health behavior theory that when adolescents do start to become sexually active, intervention effects on psychological outcomes will lead to healthier sexual decision making (Fishbein & Ajzen, 2011).

No significant association emerged between sexual health interventions and experiences of pregnancy or STI contraction among Black adolescents. However, with only four studies reporting each biological outcome, caution is warranted in interpreting this finding. While it is time- and resource-intensive to collect biological outcomes, such as pregnancy and HIV/STIs,
additional work is needed to determine whether current intervention strategies are effective at preventing these outcomes (Juras et al., 2019; Morales et al., 2018). Once more studies evaluate the effectiveness of interventions on biological outcomes, another meta-analysis will be warranted to evaluate the long-term success of primary prevention sexual health programs.

There was significant variability in the association between sexual health interventions and adolescent abstinence and condom use. Two significant moderators were identified: intervention setting and study publication year. Programs delivered in schools had a stronger association with abstinence than those delivered in community centers. Targeting adolescents with school-based sexual health education makes sense as adolescents spend the majority of their waking hours at school (Office of Adolescent Health, 2018), thus these programs can reach a large number of teens. Only 24 states require sex education to be taught in schools, despite the fact that 96% of parents in the U.S. support school-based sex education (Guttmacher Institute, 2019a; Parenthood, 2014). Implementing evidence-based (e.g. comprehensive) sexual health programming in more schools, may promote abstinence and reduce racial disparities in sexual health outcomes (Hall, 2016).

Interventions published in older studies had a stronger association with improvements in condom use among Black adolescents than those published in more recent years. It is possible that over time adolescents have become more likely to use other forms of contraception aside from condoms, particularly IUDs, as their primary form of birth control (Lindberg, 2018; Ross, 2013). Alternate methods (e.g., IUDs, the pill, injectables) have become more accessible and cost-effective within the past decade (Becker, 2015). Hormonal birth control use is effective at preventing pregnancy but associated with decreased condom use (Brown et al., 2011; Steiner et al., 2016)—a behavior pattern which is problematic because hormonal contraceptives and IUDs
do not protect against HIV/STIs (CDC, 2018b). This suggests future interventions should incorporate components aimed at increasing dual contraception use to prevent pregnancy as well as HIV/STI contraction. In addition, future studies should consider evaluating the impact of hormonal contraceptive use on adolescents’ change in condom use in response to sexual health programming.

**Limitations and Future Directions**

While conducting this meta-analysis, some important issues and future directions related to intervention design and reporting became clear. First, there was variability across studies in the measures used to evaluate sexual health outcomes. For example, in evaluating condom use, some studies asked about condom use exclusively during “vaginal intercourse” (DiClemente et al., 2004; DiClemente et al., 2009), whereas others asked about condom use during “vaginal, oral, and anal sex” (Sznitman, Stanton, et al., 2011). In addition, the time frame participants were asked to report on varied. For example, in evaluating abstinence, some studies asked participants about lifetime sexual activity (DiIorio et al., 2007; Colleen DiIorio et al., 2006), while others asked whether participants had become sexually active following their participation in the intervention (Clark et al., 2005). Standardization of the methods used to assess adolescent sexual health outcomes would lead to more meaningful syntheses of research in the future.

Second, we hoped to more thoroughly report and analyze the participant characteristics that could influence intervention effectiveness. However, inconsistent and brief reporting of participant characteristics (e.g., SES, sexual orientation) across studies made this difficult. In addition, many of the studies we reviewed for inclusion reported race with large “other” categories with no explanation of who was included in this group. This made the racial composition of samples difficult to determine. We encourage researchers to utilize online
supplemental materials or spaces such as the open science framework or clinicaltrials.gov to provide additional detail about their study design and participants. This would assist with data reproducibility and ensure thorough and high-quality synthesis of study characteristics and findings in future meta-analyses.

Third, many of the sexual health programs evaluated in this study demand adolescents’ time and resources; thus, only five of 29 evaluations reported that all adolescents received the full program dose. This is quite concerning. Emerging literature on intervention science highlights the importance of evaluating the appropriateness and feasibility of health programming to maximize the sustained success of evidence-based interventions (Proctor et al., 2011). While some studies included in this review evaluated fidelity (DiClemente et al., 2004; DiClemente et al., 2009; Jemmott, 1998; Kogan et al., 2012), participant satisfaction (DiClemente et al., 2004; DiClemente et al., 2009; Jemmott et al., 1992; Jemmott, 1998; St. Lawrence et al., 1995), session attendance (DiIorio et al., 2007; Jemmott III, 2010; Morrison et al., 2007; Peskin et al., 2015), and/or attrition (Dancy et al., 2006; DiClemente et al., 2014; DiClemente et al., 2004; Jemmott III, 2010; Jemmott, 1998; Kogan et al., 2012), more comprehensive intervention evaluations are needed to understand why Black adolescents may not receive the full program dose. Researchers developing or implementing sexual health interventions for Black adolescents would be wise to reduce barriers to activity/session attendance.

Fourth, technology-based interventions may aid in improving the accessibility and fidelity of sexual health programming (Allison et al., 2012; Hightow-Weidman et al., 2015; Rapoff, 2013). However, almost all of the interventions included in this meta-analysis were primarily delivered in person with only 3 reaching adolescents through computer-based
programming (Howard et al., 2011; Klein & Card, 2011; Peskin et al., 2015). This highlights an important avenue for future program development. If technology-based programs are developed, adolescents may be able to complete effective sexual health interventions on demand—wherever and whenever is most convenient.

Fifth, although risk factors effecting Black health exist at all levels of the socio-ecological model (Bronfenbrenner, 1995; Lightfoot & Milburn, 2009), most interventions identified in this meta-analysis focused on impacting adolescent sexual health at the individual-level. Individual-level predictors (i.e. knowledge, self-efficacy, and intentions), are certainly important to the promotion of safer sexual decision making; however, interpersonal (Van de Bongardt, 2015), community-level (Haider et al., 2013; Leech, 2019; Parekh et al., 2018), institutional (Jackson et al., 2016; Lanier, 2017), and structural (Kaiser Family Foundation, 2017) barriers to the sexual health of Black adolescents must also be addressed. Some studies had components aimed at increasing parental communication (Dancy et al., 2006; Stanton et al., 2004) and challenging cultural narratives (Sznitman, Stanton, et al., 2011)—which may be especially helpful (Svanemyr, 2015). A few of the interventions in this meta-analysis were conducted with adolescents attending a clinic (DeLamater et al., 2000; DiClemente et al., 2004; DiClemente et al., 2009; Howard et al., 2011; Roye et al., 2007; St. Lawrence et al., 1995) and two programs provided short term sexual health services (e.g., an STI test; DiClemente et al., 2014; DiClemente et al., 2009); however, none of the interventions we identified evaluated a component that facilitated adolescent access to long-term sexual health care services (e.g. birth control counseling; regular STI testing). Programs that connect Black adolescents to accessible sexual health services are urgently needed.
Conclusion

Results from this meta-analysis reveal that sexual health interventions are associated with more abstinence, condom use, sexual health knowledge, sexual health self-efficacy, and sexual health intentions. More thorough reporting of participant characteristics as well as details regarding intervention design and implementation may facilitate future research synthesis. This meta-analysis provides a synthesis of previous intervention efforts and important future directions for researchers, practitioners, and community members invested in improving the sexual health and well-being of Black adolescents. Black adolescents in the U.S. are disproportionally affected by adolescent pregnancy and HIV/STIs; thus, the field must prioritize the development of effective sexual health programming for Black adolescents.
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<th>Authors</th>
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<tr>
<td>Clark et al., 2005</td>
<td>N = 221 7th graders in a suburban town near a southeastern metropolitan area; mean age = 12.6 y, range = 12-14 y; 221 (100%) female; 217 (98%) African American; 74 (33%) had vaginal sex</td>
<td>10 in-person, school-based sessions</td>
<td>Exercises tailored to African-American participants (e.g., examples of African Americans who have left legacies). African American facilitators.</td>
<td>PST</td>
<td>Abstinence; intentions</td>
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<tr>
<td>Dancy et al., 2006</td>
<td>N = 262 low-income African American inner city adolescent females in Chicago; mean age = 12.4 y, range = 11-14 y</td>
<td>6 (2-hour) in-person sessions taught in a community center by mothers to their daughters with homework activities and an abstinence agreement</td>
<td>Intervention developed in collaboration with low-income African American mothers and daughters. Focus groups with this population used to understand factors that leave African American adolescent females at risk for HIV. Program developed using formative interviews with public health workers and health care providers at the local clinic, a discussion with Black teen peer sex educators, and interviews and focus groups with Black male adolescents attending the clinic. Among other things, the intervention was culturally appropriate and addressed the misperception that African American youth are not at risk for STDs/AIDS. Presented by a trained health educator and young African American woman.</td>
<td>SEM, BIM, COM</td>
<td>Abstinence; intentions; knowledge; self-efficacy</td>
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<tr>
<td>Delamater et al., 2000</td>
<td>N = 562 African American males attending a municipal STD clinic; mean age = 17.8y, range = 15-19y</td>
<td>1 (14-minute) in-person, clinic-based session</td>
<td>Program informed by qualitative research with adolescents from the study clinic. Sessions fostered a sense of cultural pride and emphasized diverse factors contributing to STD/HIV risk (e.g., sociocultural factors, structural factors). Facilitated by trained African American women health educators.</td>
<td>SRM, SEM</td>
<td>Condom; sex partners; intentions; knowledge; self-efficacy</td>
</tr>
<tr>
<td>Diclemente et al., 2004</td>
<td>N = 522 sexually experienced African American girls from community health agencies in the southern U.S.; mean age = 16 y, range = 14-18 y; 522 (100%) had vaginal intercourse</td>
<td>4 (4-hour) in-person, clinic-based sessions</td>
<td>Program informed by qualitative research with adolescents from the study clinic. Sessions fostered a sense of cultural pride and emphasized diverse factors contributing to STD/HIV risk (e.g., sociocultural factors, structural factors). Facilitated by trained African American women health educators.</td>
<td>SCT, TGP</td>
<td>Condom; pregnancy; STI; knowledge; self-efficacy</td>
</tr>
<tr>
<td>Diclemente et al., 2009</td>
<td>N = 715 African American adolescent females in Atlanta, GA; mean age = 17.8 y, range = 15-21 y; 715 (100%) had vaginal intercourse</td>
<td>2 (4-hour) in-person, clinic-based sessions and 4 follow-up phone calls. Participants given vouchers for their male sexual partners to access STD testing/treatment</td>
<td>Program informed by qualitative research with adolescents from the study clinic. Sessions fostered a sense of cultural pride and emphasized diverse factors contributing to STD/HIV risk (e.g., sociocultural factors, structural factors). Facilitated by trained African American women health educators.</td>
<td>SCT, TGP</td>
<td>Condom; STI; knowledge; self-efficacy</td>
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<tr>
<td>Diclemente et al., 2014</td>
<td>N = 188 African American adolescent girls in juvenile detention in Atlanta, GA; mean age = 15.3 y, range = 13-17 y; 188 (100%) had vaginal intercourse</td>
<td>3 (1.5-hour) in-person counseling sessions in detention facility and participants’ homes</td>
<td>Program adapted from existing curriculum that was culturally-congruent. Collaborated with Teen Advisory Board and Community Advisory Board to revise and pilot multiple drafts of the program. Program addresses unique needs of African American detained girls. Sessions foster cultural pride and emphasize diverse factors contributing to adolescents' HIV/STI risk.</td>
<td>CBT, TGSTM</td>
<td>Condom; sex partners; STI; knowledge; self-efficacy</td>
</tr>
<tr>
<td>Dilorio et al., 2006</td>
<td>N = 582 adolescents from Boys and Girls Clubs of Metro Atlanta; mean age = 12.2 y, range = 11-14 y; 230 (39.5%) female; 570 (98%) African American; 524 (90%) had vaginal intercourse</td>
<td>7 (2-hour) in-person, sessions in a community center for mothers and daughters with videos and 7 take-home activities</td>
<td>No tailoring reported.</td>
<td>SCT</td>
<td>Abstinence; condom; intentions</td>
</tr>
<tr>
<td>Dilorio et al., 2007</td>
<td>N = 277 adolescent boys from Boys and Girls Clubs of Metro Atlanta; mean age = 12.8 y, range = 11-14 y; 262 (96%) African American; 66 (24%) had sexual intercourse</td>
<td>6 (2-hour) in-person sessions in a community center for fathers and 1 (2-hour) session for teens and fathers with a participant manual and 6 take-home activities</td>
<td>No tailoring reported.</td>
<td>SCT</td>
<td>Abstinence; condom; intentions</td>
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<tr>
<td>Dixon et al., 2000</td>
<td>N = 65 African American adolescent girls living in low-income neighborhoods in Durham, NC; mean age = 16.2 y, range = 14-19 y; 29 (45%) had sexual intercourse</td>
<td>13 (4-hour) in-person, sessions in a community center with fieldtrips</td>
<td>Program was designed to prevent pregnancy using an Afrocentric approach. It incorporates an exploration of culture (e.g., fieldtrips to African Museum of Art) and emphasizes cultural pride.</td>
<td>Not reported</td>
<td>Abstinence; condom; pregnancy</td>
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<tr>
<td>Fang et al., 1998</td>
<td>N = 382 African American adolescents living in three different public housing facilities in a large Eastern city; mean age = 11y, range = 9-15y; 141 (37%) had sexual intercourse</td>
<td>7 (1.5-hour) in-person sessions in a community center, 1 daylong session at a rural campsite, and 6 (2.5 hour) monthly booster sessions</td>
<td>No tailoring reported.</td>
<td>SCT, PMT</td>
<td>Abstinence; condom; intentions</td>
</tr>
<tr>
<td>Haggerty et al., 2007</td>
<td>N = 331 8th grade students in Seattle Public Schools; 161 (49%) female; mean age = 13.7y; 163 (49%) African American, 168 (51%) white</td>
<td>7 (2-2.5-hour) in-person, school-based sessions for parents and teens with take-home workbooks activities and videotaped program for parents</td>
<td>No tailoring reported.</td>
<td>SDM, SCRT, SLT, DAT</td>
<td>Abstinence</td>
</tr>
<tr>
<td>Howard et al., 1990</td>
<td>N = 536 8th graders from an Atlanta hospital’s low-income patient population; 530 (99%) Black; 131 (25%) had sexual intercourse</td>
<td>5 in-person, school-based sessions. Each session was the length of a classroom period.</td>
<td>No tailoring reported.</td>
<td>SIM</td>
<td>Abstinence; pregnancy</td>
</tr>
<tr>
<td>Howard et al., 2011</td>
<td>N = 254 school age, African American, female teenagers who visited a family planning clinic</td>
<td>1 (5-minute) clinic-based presentation on a computer</td>
<td>No tailoring reported.</td>
<td>Not reported</td>
<td>Condom</td>
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<tr>
<td>Jemmott et al., 1992</td>
<td>N = 157 Black males in 10th-12th grade recruited from outpatients at a medical clinic in West Philadelphia, PA; mean age = 14.6y</td>
<td>1 (5-hour) in-person, school-based session including video tapes and exercises</td>
<td>Program materials were pilot tested and selected to provide accurate information in ways that would be interesting to inner-city Black male adolescents (e.g. video narrated by Black male and included multiethnic case). All materials were culturally appropriate.</td>
<td>TRA</td>
<td>Abstinence;</td>
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<td>condom; sex partners; intentions; knowledge</td>
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<tr>
<td>Jemmott et al., 1998</td>
<td>N = 659 young, inner-city African American 6th-7th grade adolescents in Philadelphia, PA; mean age = 11.8y; 349 (53%) female; 166 (26%) had sexual intercourse</td>
<td>8 (1-hour) in-person, school-based sessions</td>
<td>Intervention activities developed using focus groups with participants who reflected the study population. The curriculum was designed to encourage participants to be proud of themselves and their community and was delivered by African American facilitators.</td>
<td>SCT, TRA, TPB</td>
<td>Abstinence; condom; intentions; knowledge; self-efficacy</td>
</tr>
<tr>
<td>Jemmott et al., 2010</td>
<td>N = 662 African American middle students from urban public schools in the Northeastern U.S.; mean age = 12y, range = 10-15y; 354 (54%) female; 153 (23%) had sexual intercourse</td>
<td>3 (4-hour) in-person, school-based sessions</td>
<td>No tailoring reported.</td>
<td>SCT, TRA, TPB</td>
<td>Abstinence; condom; sex partners</td>
</tr>
<tr>
<td>Klein et al., 2011</td>
<td>N = 178 African American teenage females in the San Francisco Bay Area; mean age = 15.8y, range = 14-18y; 93 (52%) had sex</td>
<td>2 (1-hour) computer sessions plus in-person discussions at a research facility</td>
<td>Program was developed for African American teenage females to enhance ethnic and gender pride and raise awareness of HIV risk factors prevalent among African American teenage females. Some activities included discussion of positive aspects of being an African American young woman and introductions to African American culture through art.</td>
<td>SCT, TGP</td>
<td>Abstinence; condom; knowledge; self-efficacy</td>
</tr>
<tr>
<td>Kogan et al., 2012</td>
<td>N = 502 African American adolescents in rural counties in Georgia; mean age = 16y, range = 15-16y, 261 (51%) female</td>
<td>5 in-person sessions for caregivers and 5 for youth, 5 family sessions, and an optional 20 min condom skills unit. All activities in a community center.</td>
<td>Program materials were developed for African American preadolescents and addressed unique risk factors that African American adolescents encounter. Sexual health curriculum and condom skills unit were based on materials adapted from a program for African American adolescent women (Sisters Informing Healing Living and Empowering). Program facilitated by African American group leaders.</td>
<td>Not reported</td>
<td>Condom; self-efficacy</td>
</tr>
<tr>
<td>Li et al., 2002</td>
<td>N = 383 African American youth from recreation centers serving public housing communities in Baltimore, MD; mean age = 11.3y, range = 9-15y; 170 (44%) female; 136 (36%) had sexual intercourse</td>
<td>8 (90-minute) in-person sessions in a community center followed by 6 monthly boosters</td>
<td>No tailoring reported.</td>
<td>PMT, SCT</td>
<td>Abstinence; condom</td>
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Note: PMT = Perceived Multidimensional Theory; TRA = Theory of Reasoned Action; SCT = Social Cognitive Theory; TGP = Theory of Gender Pronorms; TPB = Theory of Planned Behavior; condom = condom use; abstinence = abstinence from sexual intercourse; intentions = sexual intentions; knowledge = knowledge about sexual topics; self-efficacy = self-efficacy for condom use.
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<td>Markham et al., 2012</td>
<td>N = 1258 predominantly African American and Hispanic 7th graders from urban middle schools; mean age = 12.6y; 752 (60%) female; 494 (39%) African American, 609 (48%) Hispanic, 153 (12%) other; 138 (12%) had any sex</td>
<td>24 (50-minute) in-person, school-based sessions with computer activities and 6 homework assignments</td>
<td>The majority of facilitators of the intervention were African American or Hispanic. Otherwise, no tailoring was reported.</td>
<td>SCT, TPB</td>
<td>Abstinence; condom; sex partners; intentions; knowledge; self-efficacy</td>
</tr>
<tr>
<td>Morrison et al., 2007</td>
<td>N = 402 youth in a multicultural city, Seattle, WA; mean age = 12.7y, range = 12-15y; 253 (63%) female; 149 (37%) African American, 56 (14%) Asian/Pacific Islander American, 64 (16%) mixed race, 36 (9%) white, 8 (2%) Latino, 12 (3%) other races/identities, 32 (8%) African immigrants, 20 (5%) Asian immigrants, 12 (3%) Latino immigrants, 8 (2%) immigrants of mixed backgrounds or from various backgrounds; 88 (22%) had vaginal sex</td>
<td>8 (2-hour) in-person sessions in a community center and 1 (2-hour) booster session</td>
<td>Intervention adapted from program that was developed for African American youth. Intervention was adapted using focus groups with young people from the target audience. As a result, some new topics were added and old topics dropped. The program aimed to be inclusive of diverse family types. Facilitators were recruited from the community.</td>
<td>PMT</td>
<td>Abstinence; condom; intentions; self-efficacy</td>
</tr>
<tr>
<td>Murry et al., 2011</td>
<td>N = 332 African American 11-year olds residing in rural counties in Georgia; mean age = 11.2y, range = 11y; 178 (54%) female</td>
<td>7 (2-hour) in-person sessions in a community center—first hour of sessions just for teens and second hour for both teens and parents</td>
<td>Program developed for rural African American families with diverse family structures using focus groups with African American community members. Program targeted enhancement of family protective processes such as adaptive racial socialization strategies and adaptive behaviors to use when encountering racism. All facilitators were African American and videos featured a famous African American actor.</td>
<td>SLT, PBT, CFT</td>
<td>Abstinence; condom</td>
</tr>
<tr>
<td>Peskin et al., 2015</td>
<td>N = 1,374 8th graders from schools in a large, urban school district in southeast Texas; mean age = 14.3y; 811 (59%) female; 238 (17%) African American, 1012 (74%) Hispanic, 124 (9%) other race/ethnicity; 275 (20%) had vaginal, oral, or anal sex</td>
<td>13 (35-45-minute) school-based, computer lessons</td>
<td>No tailoring reported.</td>
<td>SCT, LSP</td>
<td>Abstinence; condom; sex partners; intentions; knowledge; self-efficacy</td>
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<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roye et al., 2007</td>
<td>N = 400 Black and Latina teenage women; mean age = 18y, range = 15-21y; 180 (45%) Black, 220 (55%) Latina; 400 (100%) had vaginal sex</td>
<td>1 (15-20 minute) in-person clinic-based session; 2 videos (21 minutes total)</td>
<td>Program informed by qualitative and quantitative studies with Black and Latino teens from a similar neighborhood. Three focus groups of minority adolescents, informed final video editing so it reflected learning needs of the target population. The videos included HIV-positive Black and Latino youth.</td>
<td>SCT, TRA, HBM</td>
<td>Condom</td>
</tr>
<tr>
<td>Shepherd et al., 2017</td>
<td>N = 612 African American adolescents in the southern U.S.; mean age = 12.87y, range = 12-14y; 309 (51%) female; 153 (25%) were sexually experienced</td>
<td>8 (90-minute) in-person, school-based sessions</td>
<td>Program designed to reduce risky sexual behaviors and improve safe-sex skills among African American adolescents with components such as “AIDS and African Americans” and “Wrap-up—African proverb.”</td>
<td>TPB</td>
<td>Abstinence; self-efficacy</td>
</tr>
<tr>
<td>St. Lawrence et al., 1995</td>
<td>N = 246 African American adolescents; mean age = 15.3y, range = 14-18y; 177 (72%) female</td>
<td>8 (90-120-minute) in-person, clinic-based sessions</td>
<td>No tailoring reported.</td>
<td>IMB, SLT</td>
<td>Abstinence; condom; sex partners; self-efficacy</td>
</tr>
<tr>
<td>Stanton et al., 2004</td>
<td>N = 817 African American youth from low-income, urban community sites; median age = 14y, range = 13-16y; 472 (58%) female</td>
<td>8 (1.5-hour) in-person sessions in a community center with homework and 4 (90-minute) booster sessions for teens; 1 (20-minute) video for parents</td>
<td>No tailoring reported.</td>
<td>SCT, PMT</td>
<td>Abstinence; condom; pregnancy</td>
</tr>
<tr>
<td>Sznitman et al., 2011</td>
<td>N = 1,383 African American adolescents in two northeastern and two southeastern mid-sized U.S. cities; mean age = 15.2y, range = 14-17y, 791 (57%) female</td>
<td>Media campaign (15-months) including 3 (30-second) television ads and 8 (60-second) radio ads. An average of 3 TV ads and 3 radio ads played per month.</td>
<td>Formative research included semi-structured interviews with low-income African American adolescents in the cities where the intervention took place to create a culturally sensitive communication program, as well as, an adult community advisory board to make suggestions about media content. Ads placed on channels and during programming hours that were popular among African American adolescents and all radio and television ads featured hip-hop music and African American adolescent actors.</td>
<td>Not reported</td>
<td>Condom; sex partners; STI; intentions; self-efficacy</td>
</tr>
<tr>
<td>Authors</td>
<td>Youth Sample</td>
<td>Intervention Description</td>
<td>Description of Cultural Tailoring</td>
<td>Theory</td>
<td>Outcomes</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>--------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Wechsberg et al., 2017</td>
<td>N = 237 sexually active, substance-using African American females; mean age = 17.6y, range = 16-19y; 237 (100%) had vaginal intercourse</td>
<td>3 individual sessions, 1 group session, and one-on-one time with interventionist after sessions. All activities in-person and in a community center.</td>
<td>Used teen advisory board, focus group discussions, in-depth interviews, pre- and post-testing, community advisory board, and an expert panel to modify program content, format, and delivery. Intervention tailored to experiences of female African American teens. Program included brief stories from young African American women.</td>
<td>ETF. AAAF</td>
<td>Condom; sex partners</td>
</tr>
</tbody>
</table>

*Note.* Outcomes are those reported by authors and synthesized in this meta-analysis; abstinence = abstinence/delayed sexual activity; condom = condom use; sex partners = number of sexual intercourse partners; pregnancy = incidence of pregnancy; STI = STI contraction; knowledge = sexual health knowledge; self-efficacy = sexual health self-efficacy; intentions = intentions to be abstinent/practice safer sex

*a* Basic demographic information for adolescents (i.e. gender, age, race, percent sexually active, geographic location) are reported for all studies that included this information.

*b* Outcomes for subsample including only Black participants were used in all analyses in which this study was included.

Table 2
Main Effects of Sexual Health Interventions on Black Adolescent Sexual Health Outcomes

<table>
<thead>
<tr>
<th>Variable</th>
<th>Weighted Mean Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>k</td>
</tr>
<tr>
<td><strong>Behavioral Outcomes</strong></td>
<td></td>
</tr>
<tr>
<td>Abstinence</td>
<td>22</td>
</tr>
<tr>
<td>Condom Use</td>
<td>26</td>
</tr>
<tr>
<td>Number of Sex Partners</td>
<td>10</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>4</td>
</tr>
<tr>
<td>STI Contraction</td>
<td>4</td>
</tr>
<tr>
<td><strong>Psychological Outcomes</strong></td>
<td></td>
</tr>
<tr>
<td>Sexual Health Intentions</td>
<td>14</td>
</tr>
<tr>
<td>Sexual Health Knowledge</td>
<td>11</td>
</tr>
<tr>
<td>Sexual Health Self-Efficacy</td>
<td>15</td>
</tr>
</tbody>
</table>

*Note.* Higher values indicate the sexual health intervention group performed better than the control for abstinence, condom use, sexual health intentions, sexual health knowledge, and sexual health self-efficacy. Lower values indicate that the sexual health intervention group performed better than the control for number of sex partners, pregnancy, and STI contraction.
### Table 3. Intervention Impact on Abstinence and Condom Use: Weighted Mean Effect Sizes by Categorical Moderator Variables

<table>
<thead>
<tr>
<th>Gender</th>
<th>Abstinence</th>
<th>Between Groups</th>
<th>Condom Use</th>
<th>Between Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$k$</td>
<td>$d$ (95% CI)</td>
<td>$p$</td>
<td>$k$</td>
</tr>
<tr>
<td>Girls Only</td>
<td>5</td>
<td>.21 (-.05, .47)</td>
<td>.12</td>
<td>8</td>
</tr>
<tr>
<td>Boys Only</td>
<td>4</td>
<td>.17 (-.07, .41)</td>
<td>.17</td>
<td>3</td>
</tr>
<tr>
<td>Mixed Gender</td>
<td>13</td>
<td>.12 (-.002, .25)</td>
<td>.05</td>
<td>15</td>
</tr>
<tr>
<td>Cultural Tailoring$^a$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tailored</td>
<td>10</td>
<td>.18 (.02, .35)</td>
<td>.03</td>
<td>16</td>
</tr>
<tr>
<td>Not Tailored</td>
<td>12</td>
<td>.12 (-.003, .25)</td>
<td>.06</td>
<td>10</td>
</tr>
<tr>
<td>Racial Socialization Component$^b$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Included</td>
<td>5</td>
<td>.15 (-.07, .37)</td>
<td>.19</td>
<td>9</td>
</tr>
<tr>
<td>Not Included</td>
<td>17</td>
<td>.14 (.03, .25)</td>
<td>.01</td>
<td>17</td>
</tr>
<tr>
<td>Intervention Completion$^c$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completed Full Intervention</td>
<td>2</td>
<td>.29 (-.11, .69)</td>
<td>.16</td>
<td>5</td>
</tr>
<tr>
<td>Did Not Complete Full Intervention</td>
<td>10</td>
<td>.15 (.02, .27)</td>
<td>.02</td>
<td>13</td>
</tr>
<tr>
<td>Parental Involvement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parents Involved</td>
<td>7</td>
<td>.09 (-.07, .24)</td>
<td>.27</td>
<td>6</td>
</tr>
<tr>
<td>Parents Not Involved</td>
<td>15</td>
<td>.18 (.05, .30)</td>
<td>.005</td>
<td>20</td>
</tr>
<tr>
<td>Intervention Dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 hours or less</td>
<td>7</td>
<td>.26 (.06, .46)</td>
<td>.01</td>
<td>12</td>
</tr>
<tr>
<td>11-20 hours</td>
<td>10</td>
<td>.06 (-.06, .19)</td>
<td>.32</td>
<td>10</td>
</tr>
<tr>
<td>More than 20 hours</td>
<td>5</td>
<td>.20 (.01, .38)</td>
<td>.04</td>
<td>4</td>
</tr>
</tbody>
</table>
Studies that included a description of substantial intervention components developed or adapted specifically for Black adolescents were considered “Tailored” for the “Cultural Tailoring” moderator.

Studies that included a description of program components aimed at sending messages to Black adolescents about the meaning of their race in the context of society were coded as “Included” for the “Racial Socialization Component” moderator (Hughes, 2006).

Studies where all participants completed all program components were coded as “All Completed” for the “Intervention Dose Completion” moderator.

Table 3 Continued

<table>
<thead>
<tr>
<th>Setting</th>
<th>k</th>
<th>d (95% CI)</th>
<th>p</th>
<th>Q_b</th>
<th>p</th>
<th>k</th>
<th>d (95% CI)</th>
<th>p</th>
<th>Q_b</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>School</td>
<td>10</td>
<td>.25 (.10, .39)</td>
<td>.001</td>
<td>4.81</td>
<td>.03</td>
<td>6</td>
<td>.29 (.03, .55)</td>
<td>.03</td>
<td>.42</td>
<td>.81</td>
</tr>
<tr>
<td>Community-center</td>
<td>10</td>
<td>.04 (-.07, .16)</td>
<td>.47</td>
<td>6</td>
<td>.24 (.03, .44)</td>
<td>.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinic</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>.34 (.11, .57)</td>
<td>.004</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*a* Studies that included a description of substantial intervention components developed or adapted specifically for Black adolescents were considered “Tailored” for the “Cultural Tailoring” moderator.

*b* Studies that included a description of program components aimed at sending messages to Black adolescents about the meaning of their race in the context of society were coded as “Included” for the “Racial Socialization Component” moderator (Hughes, 2006).

*c* Studies where all participants completed all program components were coded as “All Completed” for the “Intervention Dose Completion” moderator.
Figure 1. Forest Plot for Abstinence Outcome

<table>
<thead>
<tr>
<th>Study Name</th>
<th>No. Participants in Analyses</th>
<th>$d$ (95% CI)</th>
<th>Effect Size $d$ and 95% CI for Abstinence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clark et al., 2005_Female</td>
<td>47</td>
<td>-0.48 (-1.77, 0.81)</td>
<td></td>
</tr>
<tr>
<td>Clark et al., 2005_Male</td>
<td>53</td>
<td>0.71 (-0.02, 1.44)</td>
<td></td>
</tr>
<tr>
<td>Dancy et al., 2006</td>
<td>165</td>
<td>0.32 (0.004, 0.64)</td>
<td></td>
</tr>
<tr>
<td>DiLorio et al., 2006</td>
<td>355</td>
<td>-0.01 (-0.27, 0.26)</td>
<td></td>
</tr>
<tr>
<td>DiLorio et al., 2007</td>
<td>240</td>
<td>-0.03 (-0.32, 0.27)</td>
<td></td>
</tr>
<tr>
<td>Dixon et al., 2000</td>
<td>65</td>
<td>0.67 (0.11, 1.24)</td>
<td></td>
</tr>
<tr>
<td>Fang et al., 1998</td>
<td>263</td>
<td>0.12 (-0.15, 0.40)</td>
<td></td>
</tr>
<tr>
<td>Haggerty et al., 2007</td>
<td>79</td>
<td>0.42 (-0.10, 0.94)</td>
<td></td>
</tr>
<tr>
<td>Howard et al., 1990</td>
<td>365</td>
<td>0.40 (0.14, 0.67)</td>
<td></td>
</tr>
<tr>
<td>Jemmott et al., 1992</td>
<td>115</td>
<td>0.30 (-0.07, 0.67)</td>
<td></td>
</tr>
<tr>
<td>Jemmott et al., 1998</td>
<td>337</td>
<td>0.23 (-0.07, 0.53)</td>
<td></td>
</tr>
<tr>
<td>Jemmott et al., 2010</td>
<td>180</td>
<td>0.09 (-0.23, 0.42)</td>
<td></td>
</tr>
<tr>
<td>Klein et al., 2011</td>
<td>84</td>
<td>0.24 (-0.78, 1.25)</td>
<td></td>
</tr>
<tr>
<td>Li et al., 2002_Female</td>
<td>170</td>
<td>-0.04 (-0.34, 0.27)</td>
<td></td>
</tr>
<tr>
<td>Li et al., 2002_Male</td>
<td>213</td>
<td>0.11 (-0.16, 0.37)</td>
<td></td>
</tr>
<tr>
<td>Markham et al., 2012</td>
<td>255</td>
<td>0.53 (0.13, 0.94)</td>
<td></td>
</tr>
<tr>
<td>Morrison et al., 2007</td>
<td>142</td>
<td>-0.08 (-0.49, 0.33)</td>
<td></td>
</tr>
<tr>
<td>Murry et al., 2011</td>
<td>301</td>
<td>-0.03 (-0.28, 0.23)</td>
<td></td>
</tr>
<tr>
<td>Peskin et al., 2015</td>
<td>154</td>
<td>-0.17 (-0.66, 0.32)</td>
<td></td>
</tr>
<tr>
<td>Shepherd et al., 2017</td>
<td>303</td>
<td>-0.001 (-0.37, 0.37)</td>
<td></td>
</tr>
<tr>
<td>St. Lawrence et al., 1995</td>
<td>225</td>
<td>0.38 (0.07, 0.69)</td>
<td></td>
</tr>
<tr>
<td>Stanton et al., 2004</td>
<td>340</td>
<td>-0.17 (-0.41, 0.07)</td>
<td></td>
</tr>
</tbody>
</table>

Legend: Forest plot displaying effect sizes and 95% confidence intervals for abstinence. Positive effects indicate that sexual activity was reduced in intervention participants relative to controls.
**Figure 2.** Forest Plot for Condom Use Outcome

<table>
<thead>
<tr>
<th>Study Name</th>
<th>No. Participants in Analyses</th>
<th>$d$ (95% CI)</th>
<th>Effect Size $d$ and 95% CI for Condom Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delamater et al., 2000</td>
<td>120</td>
<td>0.27 (-.09, 0.63)</td>
<td></td>
</tr>
<tr>
<td>DiClemente et al., 2004</td>
<td>460</td>
<td>0.66 (0.34, 0.98)</td>
<td></td>
</tr>
<tr>
<td>DiClemente et al., 2009</td>
<td>605</td>
<td>0.25 (0.07, 0.44)</td>
<td></td>
</tr>
<tr>
<td>DiClemente et al., 2014</td>
<td>136</td>
<td>-0.16 (-0.54, 0.22)</td>
<td></td>
</tr>
<tr>
<td>DiIorio et al., 2006</td>
<td>93</td>
<td>0.77 (-0.13, 1.67)</td>
<td></td>
</tr>
<tr>
<td>DiIorio et al., 2007</td>
<td>78</td>
<td>0.82 (0.29, 1.35)</td>
<td></td>
</tr>
<tr>
<td>Dixon et al., 2000</td>
<td>65</td>
<td>0.31 (-0.34, 0.96)</td>
<td></td>
</tr>
<tr>
<td>Fang et al., 1998</td>
<td>100</td>
<td>0.62 (0.13, 1.12)</td>
<td></td>
</tr>
<tr>
<td>Howard et al., 1990</td>
<td>109</td>
<td>0.46 (0.03, 0.89)</td>
<td></td>
</tr>
<tr>
<td>Jemmott et al., 1992</td>
<td>43</td>
<td>0.74 (0.12, 1.36)</td>
<td></td>
</tr>
<tr>
<td>Jemmott et al., 1998</td>
<td>410</td>
<td>0.67 (0.48, 0.87)</td>
<td></td>
</tr>
<tr>
<td>Jemmott et al., 2010</td>
<td>76</td>
<td>-0.11 (-0.70, 0.47)</td>
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</tr>
<tr>
<td>Klein et al., 2011</td>
<td>82</td>
<td>0.07 (-0.36, 0.50)</td>
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</tr>
<tr>
<td>Kogan et al., 2012</td>
<td>502</td>
<td>-0.01 (-0.22, 0.20)</td>
<td></td>
</tr>
<tr>
<td>Li et al., 2002</td>
<td>80</td>
<td>0.30 (-0.14, 0.74)</td>
<td></td>
</tr>
<tr>
<td>Markham et al., 2012</td>
<td>105</td>
<td>-0.09 (-0.47, 0.30)</td>
<td></td>
</tr>
<tr>
<td>Morrison et al., 2007</td>
<td>142</td>
<td>-0.08 (-0.49, 0.33)</td>
<td></td>
</tr>
<tr>
<td>Murry et al., 2011</td>
<td>219</td>
<td>0.35 (-0.49, 1.19)</td>
<td></td>
</tr>
<tr>
<td>Peskin et al., 2015</td>
<td>79</td>
<td>0.35 (-0.10, 0.81)</td>
<td></td>
</tr>
<tr>
<td>Roye et al., 2007</td>
<td>44</td>
<td>0.22 (-0.43, 0.88)</td>
<td></td>
</tr>
<tr>
<td>Shepherd et al., 2017</td>
<td>26</td>
<td>-0.27 (-1.04, 0.51)</td>
<td></td>
</tr>
<tr>
<td>St. Lawrence et al., 1995</td>
<td>225</td>
<td>0.16 (-0.11, 0.42)</td>
<td></td>
</tr>
<tr>
<td>Stanton et al., 2004</td>
<td>151</td>
<td>0.14 (-0.27, 0.55)</td>
<td></td>
</tr>
<tr>
<td>Sznitman et al., 2011 ≤15yrs</td>
<td>1,003</td>
<td>-0.14 (-0.26, -0.01)</td>
<td></td>
</tr>
<tr>
<td>Sznitman et al., 2011 &gt;15yrs</td>
<td>514</td>
<td>0.54 (0.37, 0.72)</td>
<td></td>
</tr>
<tr>
<td>Wechsberg et al., 2017</td>
<td>237</td>
<td>-0.01 (-0.31, 0.29)</td>
<td></td>
</tr>
</tbody>
</table>

**Legend:** Forest plot displaying effect sizes and 95% confidence intervals for condom use. Positive effects indicate that condom use was increased in intervention participants relative to controls.
Supplementary Online Content

**Table 1.** Definition and Example Variables from Primary Studies for each Behavioral, Biological, and Psychological Outcome

**Table 2.** Risk of Bias Assessment

**Table 3.** Meta-regression to Test Continuous Moderators of Association between Interventions and Abstinence and Condom Use

**Figure 1.** Study Flow Diagram

**Figure 2.** Forest Plot for Number of Sex Partners Outcome

**Figure 3.** Forest Plot for Pregnancy Outcome

**Figure 4.** Forest Plot for STI Contraction Outcome
## eTable 1. Definition and Example Variables from Primary Studies for each Behavioral, Biological, and Psychological Outcome

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstinence</td>
<td>Abstinence from sex, which may include oral, anal, and/or vaginal sex, for a certain period of time.</td>
<td>Ever had sexual intercourse. Had sexual intercourse in the last 6 months.</td>
</tr>
<tr>
<td>Condom Use</td>
<td>Use of a condom during sexual encounters (oral, anal, and/or vaginal) over a certain period of time.</td>
<td>Consistent condom use during vaginal, anal, and oral sex in the past 90 days. Ever had sexual intercourse without a condom. Condom use at last sex.</td>
</tr>
<tr>
<td>Number of Sex Partners</td>
<td>Number of people a participant has had oral, anal, and/or vaginal sex with during a certain period of time</td>
<td>Number of coital partners during the previous 3 months. Had multiple sex partners in the last 3 months. Number of vaginal sex partners.</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>Whether or not a participant has been pregnant (and/or gotten someone else pregnant).</td>
<td>Self-reported pregnancy. Ever pregnant, at least once. Been pregnant or gotten a girl pregnant.</td>
</tr>
<tr>
<td>STI Contraction</td>
<td>Whether or not a participant tested positive for any STI or a specific STI (e.g. chlamydia).</td>
<td>Tested positive for any bacterial STI. Tested positive for chlamydia.</td>
</tr>
<tr>
<td>Sexual Health Intentions</td>
<td>Intentions to remain abstinent or practice safer sexual behavior (e.g. use a condom).</td>
<td>Intentions to delay sexual intercourse until marriage. Intentions to engage in risky sexual behaviors in the next 3 months (reverse coded). Intentions to remain abstinent until the end of high school.</td>
</tr>
<tr>
<td>Sexual Health Knowledge</td>
<td>Knowledge of sexual health which may be general or specific to a sexual health topic (e.g. STI knowledge).</td>
<td>HIV/STI knowledge. Condom knowledge. AIDS knowledge.</td>
</tr>
<tr>
<td>Sexual Health Self-Efficacy</td>
<td>Self-efficacy to remain abstinent or practice safer sexual behavior (e.g. use a condom or refuse sex).</td>
<td>Self-efficacy to use condoms. Self-efficacy to refuse sex. Condom self-efficacy.</td>
</tr>
</tbody>
</table>
### eTable 2. Risk of Bias Assessment

<table>
<thead>
<tr>
<th></th>
<th>Random Sequence Generation</th>
<th>Incomplete Outcome Data</th>
<th>Selective Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clark et al., 2005</td>
<td>-</td>
<td>+ 36%</td>
<td>?</td>
</tr>
<tr>
<td>Dancy et al., 2006</td>
<td>-</td>
<td>+ 9%</td>
<td>-</td>
</tr>
<tr>
<td>Delameter et al., 2000</td>
<td>-</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Diclemente et al., 2004</td>
<td>-</td>
<td>+ 12%</td>
<td>?</td>
</tr>
<tr>
<td>Diclemente et al., 2009</td>
<td>-</td>
<td>+ 16%</td>
<td>-</td>
</tr>
<tr>
<td>Diclemente et al., 2014</td>
<td>-</td>
<td>+ 9%</td>
<td>?</td>
</tr>
<tr>
<td>Dilorio et al., 2006</td>
<td>-</td>
<td>+ 10%</td>
<td>?</td>
</tr>
<tr>
<td>Dilorio et al., 2007</td>
<td>-</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Dixon et al., 2000</td>
<td>+</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Fang et al., 1998</td>
<td>-</td>
<td>+ 31%</td>
<td>?</td>
</tr>
<tr>
<td>Haggerty et al., 2007</td>
<td>-</td>
<td>+ 8%</td>
<td>?</td>
</tr>
<tr>
<td>Howard et al., 1990</td>
<td>+</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Howard et al., 2011</td>
<td>-</td>
<td>+ 57%</td>
<td>?</td>
</tr>
<tr>
<td>Jemmott et al., 1992</td>
<td>-</td>
<td>+ 4%</td>
<td>?</td>
</tr>
<tr>
<td>Jemmott et al., 1998</td>
<td>-</td>
<td>+ 7%</td>
<td>?</td>
</tr>
<tr>
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<td>-</td>
<td>+ 16%</td>
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<tr>
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<td>-</td>
<td>+ 9%</td>
<td>?</td>
</tr>
<tr>
<td>Kogan et al., 2012</td>
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<td>+ 12%</td>
<td>?</td>
</tr>
<tr>
<td>Li et al., 2002</td>
<td>-</td>
<td>+ 54%</td>
<td>?</td>
</tr>
<tr>
<td>Markham et al., 2012</td>
<td>-</td>
<td>+ 24%</td>
<td>-</td>
</tr>
<tr>
<td>Morrison et al., 2007</td>
<td>-</td>
<td>+ 11%</td>
<td>?</td>
</tr>
<tr>
<td>Murry et al., 2011</td>
<td>-</td>
<td>+ 8%</td>
<td>?</td>
</tr>
<tr>
<td>Peskin et al., 2015</td>
<td>-</td>
<td>+ 13%</td>
<td>-</td>
</tr>
<tr>
<td>Roye et al., 2007</td>
<td>-</td>
<td>+ 45%</td>
<td>?</td>
</tr>
<tr>
<td>Shepherd et al., 2017</td>
<td>+</td>
<td>+ 26%</td>
<td>?</td>
</tr>
<tr>
<td>St. Lawrence et al., 1995</td>
<td>-</td>
<td>+ 8%</td>
<td>?</td>
</tr>
<tr>
<td>Stanton et al., 2004</td>
<td>-</td>
<td>+ 39%</td>
<td>?</td>
</tr>
<tr>
<td>Sznitman et al., 2011</td>
<td>-</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Wechsberg et al., 2017</td>
<td>-</td>
<td>+ 13%</td>
<td>?</td>
</tr>
</tbody>
</table>

**Note.** Risk of bias was based on Cochrane Collaboration’s Tool for Assessing Risk of Bias (see http://handbook-5-1.cochrane.org/). We used the following guidelines to inform our assessment:

- Random sequence generation = high risk was determined when the study did not use random assignment to study conditions. Incomplete outcome data = high risk of bias was determined if more than 30% of participants in the full sample dropped out or were lost to follow-up. Selective reporting = Low risk was determined if the study was pre-registered and/or included a clinicaltrials.gov identifier. High risk of bias was determined if any outcomes were reported in the methods that were not fully reported in the results. A number of articles reported full results from all variables that were described in the methods; however, these studies did not specifically address whether any data was gathered that was not reported.
**eTable 3. Meta-regression to Test Continuous Moderators of Association between Interventions and Abstinence and Condom Use**

<table>
<thead>
<tr>
<th></th>
<th>Abstinence</th>
<th></th>
<th></th>
<th>Condom Use</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Studies, No.</td>
<td>Coefficient</td>
<td>(95% CI)</td>
<td>z-value</td>
<td>Q</td>
<td>p</td>
</tr>
<tr>
<td>Participant Age</td>
<td>21</td>
<td>.05</td>
<td>(-.02, .12)</td>
<td>1.37</td>
<td>1.87</td>
<td>.17</td>
</tr>
<tr>
<td>Year of Study Publication</td>
<td>22</td>
<td>-.01</td>
<td>(-.03, -.001)</td>
<td>-2.15</td>
<td>4.61</td>
<td>.03</td>
</tr>
<tr>
<td>Length of Follow-Up</td>
<td>21</td>
<td>-.005</td>
<td>(-.01, .001)</td>
<td>-1.57</td>
<td>2.47</td>
<td>.12</td>
</tr>
</tbody>
</table>
eFigure 1: Study Flow Diagram

3,638 articles identified through database searching

63 additional articles identified through other sources

3,069 articles after duplicates removed

2,775 articles excluded after title and abstract review

294 full-text articles assessed for eligibility

265 full-text articles excluded
1 not U.S.-based
21 did not meet age criteria
95 did not meet RCT criteria
16 did not evaluate a sexual health component
97 did not meet race criteria
19 no behavioral outcome
12 contained duplicate data
4 data not available from authors

29 articles included in meta-analysis
### Figure 2. Forest Plot for Number of Sex Partners Outcome

<table>
<thead>
<tr>
<th>Study Name</th>
<th>No. Participants in Analyses</th>
<th>d (95% CI)</th>
<th>Effect Size d and 95% CI for Sex Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delamater et al., 2000</td>
<td>125</td>
<td>-0.16 (-0.51, 0.20)</td>
<td></td>
</tr>
<tr>
<td>DiClemente et al., 2014</td>
<td>171</td>
<td>0.12 (-0.18, 0.42)</td>
<td></td>
</tr>
<tr>
<td>Jemmott et al., 1992</td>
<td>115</td>
<td>-0.58 (-0.95, -0.20)</td>
<td></td>
</tr>
<tr>
<td>Jemmott et al., 2010</td>
<td>226</td>
<td>-0.09 (-0.49, 0.32)</td>
<td></td>
</tr>
<tr>
<td>Markham et al., 2012</td>
<td>124</td>
<td>0.47 (0.08, 0.87)</td>
<td></td>
</tr>
<tr>
<td>Peskin et al., 2015</td>
<td>78</td>
<td>-0.04 (-0.49, 0.41)</td>
<td></td>
</tr>
<tr>
<td>St. Lawrence et al., 1995</td>
<td>225</td>
<td>-0.67 (-0.94, -0.40)</td>
<td></td>
</tr>
<tr>
<td>Sznitman et al., 2011_15 or younger</td>
<td>1,003</td>
<td>-0.06 (-0.18, 0.07)</td>
<td></td>
</tr>
<tr>
<td>Sznitman et al., 2011_older than 15</td>
<td>514</td>
<td>0.10 (-0.08, 0.27)</td>
<td></td>
</tr>
<tr>
<td>Wechsberg et al., 2017</td>
<td>237</td>
<td>0.33 (-0.01, 0.67)</td>
<td></td>
</tr>
</tbody>
</table>

**Legend:** Forest plot displaying effect sizes and 95% confidence intervals for number of sex partners. Negative effects indicate that the number of sex partners was reduced in intervention participants relative to controls.
**eFigure 3: Forest Plot for Pregnancy Outcome**

<table>
<thead>
<tr>
<th>Study Name</th>
<th>No. Participants in Analyses</th>
<th>d (95% CI)</th>
<th>Effect Size d and 95% CI for Pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>DiClemente et al., 2004</td>
<td>460</td>
<td>-0.17 (-0.66, 0.33)</td>
<td></td>
</tr>
<tr>
<td>Dixon et al., 2000</td>
<td>65</td>
<td>-0.81 (-1.72, 0.11)</td>
<td></td>
</tr>
<tr>
<td>Howard et al., 1990_Female</td>
<td>238</td>
<td>-0.21 (-1.01, 0.60)</td>
<td></td>
</tr>
<tr>
<td>Stanton et al., 2004</td>
<td>340</td>
<td>-0.07 (-0.40, 0.26)</td>
<td></td>
</tr>
</tbody>
</table>

*Legend: Forest plot displaying effect sizes and 95% confidence intervals for pregnancy. Negative effects indicate that pregnancy was reduced in intervention participants relative to controls.*
**eFigure 4: Forest Plot for STI Contraction Outcome**

<table>
<thead>
<tr>
<th>Study Name</th>
<th>No. Participants in Analyses</th>
<th>Effect Size $d$ and 95% CI for STI Contraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>DiClemente et al., 2004</td>
<td>460</td>
<td>-0.98 (-1.92, -0.03)</td>
</tr>
<tr>
<td>DiClemente et al., 2009</td>
<td>605</td>
<td>-0.25 (-0.49, -0.02)</td>
</tr>
<tr>
<td>DiClemente et al., 2014</td>
<td>171</td>
<td>0.21 (-0.22, 0.62)</td>
</tr>
<tr>
<td>Sznitman et al., 2011</td>
<td>1,520</td>
<td>0.21 (-0.003, 0.42)</td>
</tr>
</tbody>
</table>

*Legend:* Forest plot displaying effect sizes and 95% confidence intervals for STI contraction. Negative effects indicate that STI contraction was reduced in intervention participants relative to controls.
CHAPTER 3

The Role of Adolescent Sex Education in Sexual Satisfaction among LGB+ and Heterosexual Young Adults

Comprehensive sex education from schools and parents can reduce adolescent sexual risk. Little is known about the associations between adolescent sex education and sexual satisfaction among young adults—particularly lesbian, gay, bisexual, and other sexual minority (LGB+) young adults. We examined how adolescent sex education (comprehensive versus abstinence-only) was associated with young adult sexual satisfaction (sexual contentment and sexual communication satisfaction). More comprehensive school-based sex education had a stronger association with sexual contentment and communication satisfaction in young adulthood for heterosexual participants than LGB+ participants. More comprehensive family-based sex education was associated with higher communication satisfaction for all participants.

American Journal of Sexuality Education, 2020
Introduction

Sex education has been shown to promote safer sexual behavior in a range of environments. For example, sex education from both schools and families increases the likelihood that youth will consistently use contraception (Chin et al., 2012; Kirby & Laris, 2009; Widman et al., 2016a). Further, women who receive sex education are more likely to get regular sexually transmitted infection (STI) testing and less likely to experience an unplanned pregnancy (e.g., Bourke et al., 2014). Although the importance of sex education has been well-documented, there is continued conflict regarding the extent of material that should be covered at home, by parents, and/or as part of a formal, in-class sex education curriculum (Schalet, 2014).

When it comes to school-based sex education, youth in the United States may receive either abstinence-only sex education or comprehensive sex education (Chin et al., 2012; Kirby & Laris, 2009). Abstinence-only sex education typically teaches that abstaining from sexual behaviors before marriage is the only viable option and that non-marital sexual activity will have negative social, psychological, and physical effects (Alford, 2001).

Comprehensive sex education typically teaches that abstinence is the safest sexual decision, but it also provides youth with medically accurate information about human sexuality, contraception, and STIs (Breuner et al., 2016). Comprehensive sex education may also cover topics such as masturbation, reproductive rights, and sexual orientation (Alford, 2001; Breuner et al., 2016). A nationwide study in 2014 by the Centers for Disease Control and Prevention (CDC, 2015b) found that 72% of high schools in the United States taught students about preventing pregnancy, around 60% covered the effectiveness of contraception, and only 35% taught students how to use a condom. Comprehensive coverage of sexuality topics was even more rare in middle schools across the United States, with 38% of middle schools teaching about preventing
pregnancy, 26% about contraception, and only 10% about how to use a condom. This is likely a reflection of insufficient or absent sex education policy. While 39 states require some form of sexual health education (or HIV-specific education), only 17 states require that this education is medically accurate. In addition, only 22 states require sex education or HIV-education to include information about condoms/contraception (Guttmacher Institute, 2019b).

Despite the consistent lack of bipartisan political support for and relative rarity of comprehensive sex education in the United States (Hall et al., 2016), research shows that adolescents who are provided comprehensive school-based sex education are less likely to engage in risky sexual behavior and less likely to experience an unplanned pregnancy than those who receive abstinence-only sex education or no sex education at all (Chin et al., 2012; Kirby & Laris, 2009; Kohler, 2008). In a meta-analysis of public data taken from all 50 U.S. states, which accounted for socioeconomic status, educational attainment, ethnicity, and availability of Medicaid waivers for family planning services, there was a positive correlation between abstinence-only education and teen birth rates across the nation (Stanger-Hall & Hall, 2011). Information from these studies shows that abstinence-only sex education is ineffective at preventing teen pregnancy and may actually be a contributing factor to poorer sexual health outcomes (Chin et al., 2012; Stanger-Hall & Hall, 2011).

The aforementioned studies demonstrate the ways in which school-based sex education can affect adolescent sexual health and risk-taking behaviors—however, research shows that family-based sex education can also be crucial to healthy sexual development and sexual safety (Coakley et al., 2017; Estrada, Lee, et al., 2017; Sieving et al., 2017). For example, family-based sexual health interventions that encouraged parent-child communication about sex significantly reduced instances of condomless sex (Estrada, Tae Kyoung, et al., 2017; Widman et al., 2019).
Further, adolescents whose parents talk to them about pregnancy, menstruation, STIs, and birth control have fewer sex partners and are more likely to have spoken with their past sexual partners about HIV prevention before intercourse, compared to adolescents whose parents have not talked to them about these topics (Crosby et al., 2009). Adolescents who communicate about a greater variety of sexual health topics with their parents are more likely to communicate about sexual health with their dating partners, which in turn is linked with more frequent condom use (Widman et al., 2014). Additionally, when parents were randomly assigned to briefly communicate with their teen about HIV prevention, teens who received the intervention reported higher condom use skills and self-efficacy (Wang, 2014). Unfortunately, despite the benefits of comprehensive communication about sex between parents and children, not all parents have comprehensive conversations with their teens about sex. More than 20% of parents have not talked to their teens about safe sex and nearly 60% have not talked about sensitive topics like masturbation (Evans, Widman, Kamke, et al., 2020).

While the existing body of research suggests that comprehensive sex education from schools and families can decrease risk of unplanned pregnancy and STIs in high school, it is less clear what effects prior sex education may have as people transition to young adulthood. Life Course Theory contends that experiences during childhood and adolescence, among them, education, affect people’s developmental trajectories and thus shape individuals throughout the lifespan (Elder, 1998). According to this paradigm, the differential sex education students receive during middle and high school does not just impact their sexual behavior during adolescence; instead, this experience may set the stage for sexual behavior throughout adulthood. Indeed, there is some preliminary research to suggest that experiences with formal sex education during adolescence may be related to safe sex attitudes and behaviors into the college years
(Santelli, 2018; Walcott et al., 2011). College students who receive comprehensive school sex education during adolescence have more positive attitudes toward safe sex and greater HIV knowledge (Walcott et al., 2011). Additionally, those who receive instruction about how to refuse sex during high school are less at risk for sexual assault during college (Santelli, 2018), and those who receive instruction on peer pressure and condom negotiation skills are more likely to consistently use condoms (Walcott et al., 2011).

During adolescence and young adulthood, people become sexually curious and may seek out new sexual experiences (Kar et al., 2015). National studies suggest that while 41% of high school students in the United States have had sexual intercourse (Kann et al., 2016), as many as 67% of college students have had oral sex and/or vaginal sex, and 24% of college students have had anal sex (American College Health Association, 2018). In addition, during adolescence and young adulthood many young people become more aware of their sexual orientation, an important aspect of sexual identity development (Allen, 2016). For LGB+ individuals, sexual identity development is a process during which people realize they are attracted to individuals of the same sex and may eventually “come out” as LGB+ to others (Mustanski et al., 2014). Key milestones within this process often occur during adolescence and young adulthood. For example, many LGB+ individuals initiate sexual activity with members of their same sex when they are 13-18 years old. In addition, many people disclose their identity as LGB+ to others for the first time when they are 15-19 years old (Mustanski et al., 2014). As the sexual lives, identities, and relationships of young adults develop, the effects of their differing sex education experiences may also evolve.
Is There a Link between Content of Sex Education and Young Adult Sexual Satisfaction?

While avoidance of sexual risk is an important component of adolescent health, sexual satisfaction has been shown to be an important part of adult health and happiness (Fisher et al., 2015; Peleg-Sagy & Shahar, 2012). For example, measures of sexual pleasure and satisfaction are correlated with feelings of autonomy, self-esteem, relationship satisfaction, and empathy in women (Fisher et al., 2015; Fortenberry, 2013). Additionally, feelings of sexual dissatisfaction may be linked to increased sexual risk taking (Fortenberry, 2013; Higgins et al., 2008)—making sexual satisfaction a physical health priority. When individuals experience markedly lower feelings of arousal, pleasure, and sexual satisfaction due to their use of pregnancy and STI prevention methods (Higgins et al., 2008), they may be more likely to engage in riskier sexual behavior, without contraception (Fortenberry, 2013).

Fortunately, many young adults do report feeling sexually satisfied. In a large sample of college students from across the U.S., 84% of students reported currently feeling at least somewhat physiologically sexually satisfied and 79% of students reported currently feeling at least somewhat psychologically sexually satisfied (Higgins et al., 2011). More recent studies reveal a similar pattern of generally high sexual satisfaction among young adults (Milhausen, 2015; Ritter et al., 2018). Yet these numbers also indicate that not all young adults are satisfied. Better understanding the correlates of sexual satisfaction may help those who are dissatisfied receive treatment and avoid the negative mental and physical health consequences described above. Specific factors related to sexual satisfaction among adolescents and young adults are relatively under-researched compared to factors related to sexual risk, such that much less has been done to mitigate effects of sexual dissatisfaction in the form of policy or public health
programs (Fortenberry, 2013). However, by bettering sexual satisfaction, it is possible that other interrelated, positive mental and physical health outcomes can be addressed.

One key factor related to sexual satisfaction among college students could be the information and attitudes about sex that they learned from their schools and their families through communication about sexual and other health behaviors. If schools can promote a more accurate understanding of social and sexual norms, students may be more likely to experience sexual satisfaction during young adulthood (Stephenson, 2009). If parents can create healthy environments for adolescents to feel comfortable communicating about sex and sexuality, then perhaps these learned communication skills can be used to facilitate healthier romantic relationships once adolescents have reached adulthood (Widman et al., 2014). Research shows that better communication about sex with sexual/relationship partners can lead to higher feelings of sexual satisfaction in adults (MacNeil, 2009; Montesi et al., 2013; Timm & Keiley, 2011).

**Sexual Identity and Sex Education Outcomes**

While sex education is clearly important for preparing adolescents to make safer, healthier sexual decisions, the literature suggests sex education may affect heterosexual and LGB+ youth differently (Bodnar & Tornello, 2019; Schalet, 2014). This may be because sex education methods are rarely inclusive enough to adequately benefit individuals who are not heterosexual (Arbeit et al., 2016; Feinstein et al., 2018; Mustanski et al., 2015). While parents may be open to communicating with their heterosexual teens about sex, some research suggests that parents are more likely to omit sexuality education if they are unsure of their child’s sexual orientation or if they know their child is not heterosexual (Feinstein et al., 2018; Mustanski et al., 2015). Additionally, a study with bisexual female youth found that participants showed a lack of
openness with their families regarding sex and sexuality when they perceived that their families stigmatize bisexuality (Arbeit et al., 2016).

School sex education may also be falling short of meeting the needs of LGB+ youth. Heterosexual young adult women report receiving sex education before becoming sexually active more often than bisexual or lesbian young adult women (Bodnar & Tornello, 2019). In this study, there was also a stronger association between poor sexual health outcomes (e.g., unplanned pregnancy) and sex education for sexual minority women compared to heterosexual women. Thus far, only 10 states have adopted policies that require school sex education to include some content that is inclusive of LGB+ individuals (Guttmacher Institute, 2019b). In qualitative research, LGB+ young adults report receiving sex education that revolved around the experiences of their heterosexual peers (Estes, 2017). For example, interviews with young sexual minority men show that information about sexual behavior between same-sex individuals is mostly left out of in-school sex education, and members of this group often search for resources online (Pingel et al., 2013). A number of recent online interventions have been developed to provide further educational support to LGB+ youth to fill this gap (Chiasson et al., 2009; Mustanski et al., 2015). While there is evidence that tailored online interventions effectively promote positive health outcomes for LGB+ youth, standard school sex education programs may be falling short of meeting the needs of LGB+ adolescents. It is unknown whether any disparities in the effects of adolescent sex education on well-being for LGB+ individuals extend into adulthood, although the possibility seems likely.

Current Study

To address several gaps in the literature, the purpose of this study was to investigate how different types of adolescent sex education (school-based versus family-based and abstinence-
only versus comprehensive) are related to sexual satisfaction in young adulthood while controlling for other factors related to sexuality (gender, partner type, religiosity, and partnered sexual activity). In this study, we define school sex education broadly, as information about sexuality received at school, in a classroom setting and family sex education is the information about sexuality received from parents or guardians. The second purpose was to investigate how the type of sex education received in adolescence might impact youth differently based on their sexual identity. We hypothesized that in a young adult population, participants who reported more comprehensive forms of sex education as adolescents, regardless of whether from schools or families, would report higher levels of sexual satisfaction than participants who reported abstinence-only sex education as adolescents. Additionally, we hypothesized that positive associations between comprehensive sex education and sexual satisfaction would be stronger for heterosexual students than for LGB+ students. Finally, we hypothesized that LGB+ participants would rate their school and family sex education as less relevant to their sexual experiences than heterosexual students would, as suggested by some past research (Arbeit et al., 2016; Pingel et al., 2013; Schalet et al., 2014). We also explored whether LGB+ participants were more likely than heterosexual participants to report perceiving their school and family sex education to be less relevant to all sexual orientations. Clarifying the relationship between prior sex education and sexual satisfaction in young adulthood could inform the way sex education is developed and promoted through social policy, in order to increase young people’s life-long health and happiness.
Method

Participants

Participants were undergraduate students enrolled in psychology courses at a large public university in the southeastern United States. While 396 students initiated the survey, data from 24 participants were excluded due to excessive missing data (missing over 80% of data). Additionally, three participants (who noted previously in the survey that they \textit{had} received school or family sex education) were deleted because they did not complete the measure for school sex education and family sex education. One participant was deleted because they did not disclose any information about their partnered sexual activity and therefore could not be included in any of our primary analyses. Participants over the age of 30 ($n = 3$) were excluded as age outliers, and five participants were excluded for identifying as a non-binary gender (because we did not have enough power to examine this gender group separately).

The final sample included 360 participants, ages 18-30 ($M_{\text{age}} = 19.22$ years, $SD = 1.51$). Regarding participant gender, 56\% of participants were women. To measure sexual identity, we asked participants, “Which best describes your sexual orientation?” [options: “Straight/Heterosexual,” “Mostly Straight/Heteroflexible,” “Gay/Lesbian/Homosexual,” “Mostly Gay/Lesbian/Homoflexible,” “Bisexual,” “Pansexual,” “Questioning,” “Other (please specify)”].

For the purpose of comparative analyses, we then classified participants as either heterosexual (85.8\%) or LGB+ (14.2\%), which included gay/lesbian, bisexual, heteroflexible, pansexual, and questioning students. In addition, we asked participants to select the option that best described their relationship status with their most recent dating or sexual partner [options: “married/in a civil union/engaged,” “boyfriend/girlfriend/romantic partner, and it is at least somewhat serious,” “dating or seeing someone romantically, but we haven’t yet defined the relationship or made it
official,” “dating, seeing, and/or having a romantic or sexual relationship with one or more people, but none are very serious (e.g., hook-up, friends with benefits, casual dating, etc.),” “other (please specify)”]. For the purpose of analyses, participants who selected the first two of these options (46.9%) were grouped together as in a committed relationship, and all others (including those who had never had a dating or sexual partner) were grouped together as not in a serious relationship (53.1%). Regarding religion, 23.1% of participants identified as non-religious and 76.9% identified as religious. Regarding race/ethnicity, 9.4% of participants identified as Asian, 11.4% as Black, 3.9% as Hispanic, 80% as White, and 3.6% of participants identified as other race/ethnicities. Most (53.9%) of the participants were freshmen, 26.4% were sophomores, 12.2% were juniors, and 6.1% were seniors. There were no significant differences in gender, age, sexual identity, religion, or partner type (ps ranged from .085 -.528) between those participants excluded for the reasons listed in the above paragraph and those included in our final sample. However, those participants deleted from the sample were more likely to be White than those included in the final sample, \( t(39.73) = 4.83, p < .001. \)

**Procedure**

Data were collected from a non-probability convenience sample as part of a larger online survey assessing “College Student Priorities for Sexual Health Programming on Campus.” (No data from this sample have been published elsewhere.) After receiving approval from the University IRB, the anonymous survey was administered via Qualtrics software. Participants received partial course credit for completing the study. We included measures evaluating the comprehensiveness of sex education in middle and high school and current sexual satisfaction, as well as a measure of the relevance of school and family sex education. Consent was collected online prior to participants’ initiation of the survey.
Measures

Background and Demographics

We gathered information on participants’ race, gender, sexual identity, religion, partner type, and sexual history. Specifically, in addition to the demographic items used to describe our participants above, we asked participants to answer the following question with regards to their sexual history: “Have you had sex (oral, anal, or vaginal) at least once in the past 6 months?” Participants were categorized as being sexually active in the past 6 months if they reported having partnered sex at least once within the time frame.

Sexual Satisfaction

Participants were asked to answer 10 questions about their sexual satisfaction, in which they rated their satisfaction on a number of different relational and physical factors using a five-point Likert scale (“1” = strongly disagree to “5” = strongly agree). This validated scale was taken from the “Revised Sexual Satisfaction Scale for Women”—though all items are worded so as to be equally relevant regardless of gender (Joharchi & Clark, 2014). No changes had to be made to any items to make the scale relevant to people of all gender identities. Within this measure there were two subscales—Contentment [e.g., “I feel content with how often I presently have sexual intimacy (kissing, intercourse, etc.) in my life”] and Sexual Communication [e.g., “My partner and I do not discuss sex openly enough with each other, or do not discuss sex often enough” (reverse coded)]. Sexual Communication items referred to a partner, and participants were asked to consider their current or most recent sexual partner. Higher scores on both subscales indicated more satisfaction (Cronbach’s alpha for Contentment = .89 and Communication = .84).
Sex Education

We determined the type of sex education participants received during adolescence, both from school and from family. This measure was devised by our team using descriptions of abstinence-only and comprehensive education published by Advocates for Youth (Alford, 2001). The full scale is shown in Table 1. Two sets of 12 identical items were used to evaluate participants’ school-based and family-based sex education separately. For each item, participants were given two statements, one reflecting abstinence-only sex education practices and principles and another reflecting comprehensive sex education practices and principles, and participants were asked to choose the one statement that best reflected their experience across the middle and high school years. Statements in this measure align with qualities of comprehensive and abstinence-only sex education, as they are described by the scientific community (Breuner et al., 2016; Kramer, 2019; Stanger-Hall & Hall, 2011). In the survey instructions for school-based sex education, participants were asked to consider the information they received “at school, in a classroom setting,” during middle and high school. For family-based sex education, participants were asked to consider the information they received from their “parents or guardians,” during middle and high school. We then calculated two ratio scores (comprehensive answers divided by total answers), one for school sex education and the other for family sex education. Each score ranged from 0 to 1, where 0 indicated that a participant had selected the more comprehensive option to describe their sex education in 0 out of 12 items, and 1 reflected that a participant had selected the comprehensive sex education option in 12 out of 12 items. Scores could fall between 0 and 1 depending on the number of comprehensive sex education items chosen (e.g., 6/12 would be 0.5). Internal consistency for both school and family sex education was strong (Cronbach’s alpha for school = .87; Cronbach’s alpha for family = .90).
Prior to questions evaluating school and family sex education, we asked participants whether they had received any information about sex from these sources at all (i.e., “Did you receive any sex education or general information about sexual topics from your middle school or high school? This refers to any information you might have received at school, in a classroom setting about abstinence (not having sex), puberty, pregnancy, condoms/contraception, STDs, or any other sexual topic.”). If the participant indicated that they did not receive any sex education from their school, then they were not asked to answer any of the items evaluating the comprehensiveness of their school sex education. Similarly, if they indicated they did not receive any information about sex from their family, then they were not asked to answer any of the items evaluating the comprehensiveness of their family sex education.

Relevance of Sex Education

Participants answered identical items assessing the relevance of the information they received from both their school and family sex education to their own sexual experiences and interests (e.g., “How much do you believe this information was relevant to your sexual encounters?”). For both school and family sex education each participant was asked to rate how true six statements were using a 4-point Likert scale (“1” = Not at all to “4” = Very much). Scores on the first five items were averaged (Cronbach’s alpha = .94). The sixth item was analyzed separately because it asked participants to comment on the relevance of the sex education they received to all sexual orientations generally, rather than to their own experiences or interests (i.e., “How much do you believe this information was inclusive of all sexual orientations?”). Each score ranged from 1 to 4, where 1 indicates that a participant had totally irrelevant sex education, and 4 reflects that a participant had totally relevant sex education.
**Analysis Plan**

To test how the comprehensiveness of school and family sex education were associated with sexual satisfaction variables (contentment and communication), we ran four regression models: model 1 with school sex education as the independent variable and contentment as the outcome variable; model 2 with family sex education as the independent variable and contentment as the outcome variable; model 3 with school sex education as the independent variable and communication as the outcome variable; and model 4 with family sex education as the independent variable and communication as the outcome variable. In Step 1 of each model, we examined main effects controlling for gender, religion, sexual activity status, and partner status given the known relationship between each of these variables with content of prior sex education and reports of sexual satisfaction and communication (Emmers-Sommer et al., 2018; Mark et al., 2015). Participants who reported they never had a sexual or relationship partner \( n = 85 \) were excluded from analyses with sexual communication as the outcome. Then, in the second step of each model, we included the two-way interaction between comprehensiveness of sex education and sexual identity. Where there were significant interactions, we performed follow up tests to examine whether or not the simple slopes were significant.

Finally, independent samples \( t \)-tests were used to compare LGB+ and heterosexual students’ perceived relevance of school and family sex education.

**Results**

**Study Descriptives**

65.6% of participants had partnered sex in the last 6 months. Scores on sexual contentment ranged from 1-5 \( (M = 3.69, SD = 1.0) \). Scores on sexual communication satisfaction ranged from 1.75-5 \( (M = 4.28, SD = 0.85) \). Comprehensiveness of school and family
sex education ranged from 0-1 (school sex education $M = 0.67$, $SD = 0.29$; family sex education $M = 0.69$, $SD = 0.31$). School and family sex education were moderately correlated, $r = .366$, $p < .001$. Scores on the relevance of school and family sex education ranged from 1-4 (school sex education relevance $M = 2.38$, $SD = 0.87$; family sexual education relevance $M = 2.85$, $SD = 0.88$). For the single item measuring perceived relevance of school and family sex education to members of all sexual orientations, scores ranged from 1-4 (school sex education $M = 2.13$, $SD = 0.98$; family sex education $M = 2.43$, $SD = 1.10$).

8.1% of participants ($n = 29$) reported that they did not receive any information about sexual topics from their middle school or high school (i.e., school sex education). 30.3% of participants ($n = 109$) reported that they did not receive any information from their parents or guardians about sex/sexuality (i.e., family sex education). Of the 29 participants who did not receive any school sex education, five identified as LGB+ and 24 as heterosexual. Thus, 46 LGB+ participants and 285 heterosexual participants received school sex education. Of the 109 participants who did not receive any family sex education, 20 identified as LGB+ and 89 as heterosexual. Thus, 31 LGB+ and 220 heterosexual participants received family sex education.

**Sex Education x Sexual Identity on Sexual Contentment**

The first two regression analyses tested how the interaction between sexual identity and comprehensiveness of sex education was associated with contentment (see Tables 2 and 3). The full model including school sex education explained 25.9% of the variance in contentment, $F(6, 324) = 16.10$, $p < .001$. The full model including family sex education explained 18.8% of the variance in contentment, $F(6, 244) = 8.04$, $p < .001$.

There was no significant main effect of school or family sex education on sexual contentment. However, there was a significant interaction between school sex education and
sexual identity on contentment. Specifically, as seen in Figure 1, comprehensive school sex education was associated with higher levels of sexual contentment among heterosexual participants than among LGB+ participants. Follow up analyses revealed, among heterosexual participants, more comprehensive school sex education was related to greater levels of contentment ($B = .41, SE = .19, p = .028$). However, there was no significant association among LGB+ participants. For contentment, there was no significant interaction between family sex education and sexual identity.

*Sex Education x Sexual Identity on Sexual Communication*

The next set of regression analyses tested how the interaction between sexual identity and comprehensiveness of sex education was associated with satisfaction with sexual communication (see Tables 2 and 3). For model 3, including school sex education, the full model explained 21.6% of the variance in communication, $F(6, 249) = 9.74, p < .001$. For model 4, including family sex education, the full model explained 22.2% of the variance in communication, $F(6, 190) = 7.71, p < .001$.

There was no significant main effect of comprehensiveness of school sex education on communication. However, there was a significant interaction between school sex education and sexual identity on communication. Specifically, as shown in Figure 2, comprehensive school sex education was associated with higher levels of sexual communication for heterosexual participants than LGB+ participants. Follow up analyses revealed the relationship between comprehensiveness of school sex education and satisfaction with communication was not significant among just heterosexual participants or among just LGB+ participants. Additionally, there was a significant main effect of comprehensiveness of family sex education on communication, such that more comprehensive family sex education was associated with higher
sexual communication. There was not a significant interaction between family sex education and sexual identity status on communication satisfaction.

**Sexual Identity and Relevance of Sex Education**

An independent samples \( t \)-test was conducted to compare heterosexual and LGB+ participants on their reports of relevance of school and family sex education to their own sexual interests and experiences. Heterosexual participants had significantly higher scores on relevance of school sex education \( (M = 2.43, SD = 0.86) \) compared to LGB+ participants \( (M = 2.06, SD = 0.91) \), \( t(329) = 2.71, p = .007 \). Heterosexual participants also had significantly higher scores on relevance of family sex education \( (M = 2.94, SD = 0.83) \) compared to LGB+ participants \( (M = 2.20, SD = 1.00) \), \( t(249) = 4.53, p < .001 \). In other words, heterosexual students reported their family and school sex education to be more relevant to their sexual interests and experiences than LGB+ students did.

We also conducted an independent samples \( t \)-test to compare heterosexual and LGB+ participants on their reports of the relevance of their school and family sex education to all sexual orientations. Heterosexual participants had significantly higher scores on perceived relevance of their school sex education to all sexual orientations \( (M = 2.21, SD = 0.98) \) compared to LGB+ participants \( (M = 1.65, SD = 0.90) \), \( t(329) = 3.61, p < .001 \). Heterosexual participants also had significantly higher scores on perceived relevance of their family sex education to all sexual orientations \( (M = 2.50, SD = 1.07) \) compared to LGB+ participants \( (M = 1.90, SD = 1.19) \), \( t(249) = 2.89, p = .004 \). In other words, heterosexual participants perceived their family and school sex education to be more relevant to all sexual orientations than LGB+ students did.
Discussion

A convincing body of research suggests that in order to decrease rates of unwanted teen pregnancy and STIs, schools should provide comprehensive sex education that takes into account diverse cultural values while providing accurate, developmentally-appropriate information (Kohler, 2008; Stanger-Hall & Hall, 2011). Life Course Theory also contends that these experiences may not just shape the sexual behavior of adolescents during their current developmental stage, but also impact their long-term sexual development and, therefore, later sexual experiences (Elder, 1998). Indeed, some studies find that sex education during adolescence may impact young adult sexual behavior, including condom use (Santelli, 2018; Walcott et al., 2011); however, few studies have evaluated the relationship between adolescent sex education and positive aspects of adult sexuality. Might adolescent sex education also be linked with later sexual satisfaction, an important component of adult sexual health and happiness?

We found that more comprehensive adolescent school-based sex education is more strongly related to higher sexual satisfaction – both sexual contentment and sexual communication satisfaction – for heterosexual college students than for LGB+ college students. This discrepancy in the association between sex education and sexual satisfaction may exist because the sex education received during middle and high school is not as relevant to the sexual interests and experiences of LGB+ students. Additionally, heterosexual students seem to be less aware of this discrepancy, as they were more likely than LGB+ students to report that their sex education was relevant to all sexual orientations.

Life Course Theory contends that if sexual minority individuals do not receive adequate health education as adolescents, then this could affect their developmental trajectory and later
adult sexual behavior (Elder, 1998). If differential experiences with adolescent sex education are linked with disparities in LGB+ young adult sexual satisfaction, then this could have wide-reaching physical and mental health consequences. For example, adults who report lower levels of sexual satisfaction are more likely to also report experiencing symptoms of depression, anxiety, and poor physical health (Flynn et al., 2016). Disparities in the health of LGB+ individuals have been identified across the United States. Nearly three-quarters of new HIV diagnoses in 2016 were among sexual minority individuals (CDC, 2017b). Further, a recent meta-analysis found that rates of suicidality and depression are higher among sexual minority youth, compared to heterosexual youth (Marshal et al., 2011).

The physical and mental health of LGB+ individuals is a national concern, and previous research strongly suggests that improvements in the inclusivity of school and family sex education during middle and high school could help. When sexual minority populations do not receive inclusive sex education, they are more likely to report negative mental health symptoms (e.g., anxiety, depression; Keiser et al., 2019), potentially because the lack of relevant sex education contributes to a school climate that is perceived as unaccepting of sexual minority youth (McCarty-Caplan, 2013). Given the range in age at which LGB+ individuals may begin to identify as LGB+ and/or come out to others (Pew Research Center, 2013), some adolescents who are attracted to individuals of the same sex may not openly identify as LGB+. Many sexual minority young people will delay coming out until adulthood to avoid negative reactions from their families (Diamond et al., 2012) or to avoid victimization in environments that stigmatize LGB+ individuals (Hatzenbuehler & Pachankis, 2016). Thus, a lack of inclusive sexuality education may not just fail LGB+-identified adolescents, but also sexual minority adolescents who have not yet come out.
While our results show that more comprehensive family sex education is associated with higher satisfaction with sexual communication for both heterosexual and LGB+ youth, more comprehensive school sex education only predicted sexual satisfaction for heterosexual participants, suggesting that school sex education may contribute to (and thus have the potential to help reduce) disparities in well-being by sexual identity. The Gay, Lesbian, and Straight Education Network suggests that to truly be LGBT-inclusive, sex education must fully incorporate LGBT people and issues into the curriculum—not just in a “special topics” section (Greytak & Kosciw, 2013). However, further research is still needed to identify more effective and inclusive methods of school-based sex education so that members of all identity groups can benefit equally from their middle and high school sex education. In addition, some states do not mandate any sex education and the vast majority of states (40) do not require schools to provide sex education that is relevant to the lives of non-heterosexual students (Guttmacher Institute, 2019b). An important first step in reducing mental and physical health disparities may be to recognize the unique experiences of LGB+ youth and pass legislation that requires their sexual health education needs to be met. Access to comprehensive, inclusive, destigmatizing sexuality education is a human right (Future of Sex Education Initiative, 2012; Sexuality Information and Education Council of the United States, 2018).

In addition to informing future sex education research and policy, findings from this study can be used to inform the practices of clinicians who work with LGB+ youth and young adults. While many clinicians are aware of a gap in sexual health knowledge that may exist for youth when sex education from parents and schools is not present, clinicians may not be as aware of deficits in both knowledge and satisfaction that may still exist even when youth report getting some information from these sources. Further, previous research suggests that clinicians
may be making similar mistakes to those of parents and schools and failing to address the unique needs of LGB+ youth (Arbeit et al., 2016).

**Limitations and Future Directions**

Our method of measurement was limited by our ability to only collect data from this convenience sample at one time point. Future studies should examine the relationship between comprehensiveness of middle and high school sex education—as well as other important components of sex education (e.g., dose; quality; characteristics of the educator)—and young adult sexual satisfaction longitudinally and using additional sampling methods. Because we asked participants to retrospectively report on their adolescent sex education, recall bias is a limitation of this study that should be addressed in future longitudinal work. In addition, our measure of sex education asked participants to choose between two statements, which may have been less accurate for participants who felt that both or neither statements accurately described their sex education. Longitudinal research on this topic might also provide an opportunity to investigate the utility of sex education during college or young adulthood. It seems possible that receiving sex education during college could positively impact sexual satisfaction and mitigate previous deficits in middle and high school sex education. Future longitudinal studies should also consider whether satisfaction with sexual communication mediates the relationship between sex education and sexual contentment.

In addition, we included partnered sexual activity status in all of our models but only assessed oral, anal, and vaginal intercourse in the past 6 months—other studies may wish to evaluate sexual acts that were not assessed in this study to get a more holistic understanding of participants’ sexual behavior. This includes, but is not limited to, partnered, manual sexual behaviors (Barnett et al., 2017) as well as solitary sexual behaviors (Herbenick et al., 2017).
Similarly, our measures of sexual satisfaction focused on satisfaction with partnered sexual activity. Future studies may wish to explore other dimensions of sexual satisfaction—such as satisfaction with solitary sexual behaviors. Also, in designing this study we decided to control for some variables related to sexual wellbeing (e.g., partner type, sexual activity); however, other potentially important control variables, perhaps especially relevant to LGB+ youth, include minority stress (Kuyper & Vanwesenbeeck, 2011; Meyer, 2003), experiences of sexual violence (Kilimnik & Meston, 2019), and family support (Newcomb, 2019)—thus, in the future, researchers evaluating the relationship between sex education and sexual satisfaction may wish to consider these as well as the role of gender as a moderator. Finally, researchers should use this study as grounds to begin focusing on the long-term effects of sex education and recognize the potential of sexual health interventions to impact the health and happiness of people throughout the lifespan.

This study found that there were discrepancies in how school sex education was associated with sexual satisfaction based upon sexual identity. While we found interactions between school sex education and sexual identity, we found no interaction between family sex education and sexual identity. This might be because almost one third of participants in our sample, including 39% of LGB+ participants, reported that they received no sex education from their families at all and these participants had to be excluded from analysis. In the future, studies evaluating family sex education in college samples may wish to recruit a larger number of participants—in particular, LGB+ participants—in anticipation of the fact that many young adults may not have received sex education from their families. In addition, this finding highlights the need for interventions that increase the frequency of communication about sex between teens and their parents. While there are many interventions aimed at increasing sexual
health communication between parents and adolescents (Estrada, Lee, et al., 2017; Sieving et al., 2017), few are specifically tailored to the unique needs of LGB+ youth (Santa Maria et al., 2015). Inclusive family sex education interventions will likely have a positive impact on young adults’ sexual relationships, given that more comprehensive family sex education was associated with better sexual communication with partners across sexual identities in our study, yet a substantial portion of participants reported not receiving any sex education from their families.

Additionally, the current study found that there were discrepancies in the relevance of sex education based upon sexual identity. Future studies should investigate which topics are missing from school and family sex education from the perspective of LGB+ youth and young adults. More should be done to understand what barriers there are to discussing these topics from the perspective of schools and families. This could lead to the development of interventions that are better suited to equip parents and teachers with the skills and support they need to address topics that are relevant to adolescents of all sexual identities. For example, school administration may block teachers from receiving information about how to address LGB+ issues for fear of community backlash or because they do not believe this information is needed in their community (Payne & Smith, 2018). Interventions could aim to better educate community members and school staff about the needs of LGB+ youth in their schools if they wish to eliminate these more structural barriers to inclusive sex education. Importantly, as LGB+ individuals are far from a homogenous group, future studies with more LGB+-identified participants should also examine the differences in experiences of sex education across individuals in this group.

Finally, experimental studies are needed in this area to determine the causal relationship regarding the effects of sex education on sexual satisfaction. Such work could help to eliminate
the sexual identity disparities that exist in the way individuals benefit from their sex education. This could allow researchers, practitioners, and policy makers to aid in implementing more inclusive methods of sex education that can contribute to all peoples’ later sexual satisfaction, relational health, and overall happiness.
### Table 1

**Measure to Assess Comprehensiveness of School and Family Sex Education**

<table>
<thead>
<tr>
<th></th>
<th><strong>Formal Sex Education:</strong></th>
<th>or</th>
<th><strong>Formal Sex Education:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Taught that sexuality is a natural, normal, healthy part of life.</td>
<td>or</td>
<td>Taught that sexual expression outside of marriage will have harmful social, psychological, and physical consequences.</td>
</tr>
<tr>
<td>2</td>
<td>Taught that abstinence from sexual intercourse is the most effective method of preventing unintended pregnancy and sexually transmitted diseases, including HIV.</td>
<td>or</td>
<td>Taught that abstinence from sexual intercourse before marriage is the only acceptable behavior.</td>
</tr>
<tr>
<td>3</td>
<td>Provided values-based education and offered students the opportunity to explore and define their individual values as well as the values of their families and communities.</td>
<td>or</td>
<td>Taught only one set of values as morally correct for all students.</td>
</tr>
<tr>
<td>4</td>
<td>Included a wide variety of sexuality related topics, such as human development, relationships, interpersonal skills, sexual expression, sexual health, and society and culture.</td>
<td>or</td>
<td>Limited topics to abstinence-only-until-marriage and to the negative consequences of pre-marital sexual activity.</td>
</tr>
<tr>
<td>5</td>
<td>Included accurate, factual information on abortion, masturbation, and sexual orientation.</td>
<td>or</td>
<td>Omitted topics such as abortion, masturbation, and sexual orientation.</td>
</tr>
<tr>
<td>6</td>
<td>Provided positive messages about sexuality and sexual expression, including the benefits of abstinence.</td>
<td>or</td>
<td>Used fear tactics to promote abstinence and limit sexual expression.</td>
</tr>
<tr>
<td>7</td>
<td>Taught that proper use of latex condoms, along with water-based lubricants, can greatly reduce, but not eliminate, the risk of unintended pregnancy and of infection with sexually transmitted diseases (STDs) including HIV.</td>
<td>or</td>
<td>Discussed condoms only in terms of failure rate; often exaggerated condom failure rates.</td>
</tr>
<tr>
<td>8</td>
<td>Taught that consistent use of modern methods of contraception can greatly reduce a couple's risk for unintended pregnancy.</td>
<td>or</td>
<td>Provided no information on forms of contraception other than failure rates of condoms.</td>
</tr>
<tr>
<td>9</td>
<td>Included accurate medical information about STDs, including HIV; taught that individuals can avoid STDs.</td>
<td>or</td>
<td>Often included inaccurate medical information and exaggerated statistics regarding STDs, including HIV; suggested that STDs are an inevitable result of premarital sexual behavior</td>
</tr>
<tr>
<td>10</td>
<td>Taught that religious values can play an important role in an individual's decisions about sexual expression; offered students the opportunity to explore their own and their family's religious values.</td>
<td>or</td>
<td>Often promoted specific religious values.</td>
</tr>
<tr>
<td>11</td>
<td>Taught that a woman faced with an unintended pregnancy has options: carrying the pregnancy to term and raising the baby, or carrying the pregnancy to term and placing the baby for adoption, or ending the pregnancy with an abortion.</td>
<td>or</td>
<td>Taught that carrying the pregnancy to term and placing the baby for adoption is the only morally correct option for pregnant teens.</td>
</tr>
</tbody>
</table>
Table 1 Continued

<table>
<thead>
<tr>
<th>Formal Sex Education:</th>
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<tbody>
<tr>
<td>12</td>
</tr>
</tbody>
</table>

Note: Directions for Participants were, “Choose the statement that most accurately describes your middle and high school, formal sex education. Please note, this refers to ONLY the information you received at school, in a classroom setting. You will have an opportunity to describe other sources you may have received sex education from later in this survey.” The statements provided to participants to assess family-based sex education were identical to those above. The directions for items evaluating family-based sex education were: “Choose the statement that most accurately describes your middle and high school, informal sex education. Please note, this refers to ONLY the information you received from your parents or guardians. You will have an opportunity to describe other sources you may have received sex education from later in this survey.” Statements that denote comprehensive sex education are shown here on the left to increase readability, but options did not consistently appear in this order for participants. Each item received 1 point if the participant endorsed the comprehensive sex education option. Then, a ratio of comprehensive answers to total answers was taken, such that final scores ranged from 0-1.
Table 2
Regression Analysis Examining the Interaction between Sexual Identity and School Sex Education on Contentment and Satisfaction with Sexual Communication among Participants Who Received School Sex Education

<table>
<thead>
<tr>
<th></th>
<th>Contentment</th>
<th>Satisfaction with communication</th>
<th></th>
<th></th>
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<td></td>
<td>(n = 331)</td>
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<tr>
<td></td>
<td>B (SE)</td>
<td>Zero-order correlation</td>
<td>Semi-partial correlation</td>
<td>ΔR²</td>
<td>B (SE)</td>
<td>Zero-order correlation</td>
<td>Semi-partial correlation</td>
<td>ΔR²</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Step 1: Main effects</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Gender</td>
<td>-0.43</td>
<td>0.10***</td>
<td>-0.19</td>
<td>-0.21</td>
<td>-0.38</td>
<td>0.10***</td>
<td>-0.23</td>
<td>-0.22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religious</td>
<td>0.21</td>
<td>0.11*</td>
<td>0.14</td>
<td>0.10</td>
<td>0.07</td>
<td>0.11</td>
<td>0.05</td>
<td>0.04</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Partner type</td>
<td>0.68</td>
<td>0.10***</td>
<td>0.40</td>
<td>0.32</td>
<td>0.53</td>
<td>0.10***</td>
<td>0.31</td>
<td>0.30</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Partnered sex (in past 6 months)</td>
<td>-0.37</td>
<td>0.11**</td>
<td>-0.27</td>
<td>-0.16</td>
<td>-0.54</td>
<td>0.13***</td>
<td>-0.24</td>
<td>-0.24</td>
<td></td>
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<tr>
<td>Sexual identity</td>
<td>0.14</td>
<td>0.15</td>
<td>0.10</td>
<td>0.05</td>
<td>-0.02</td>
<td>0.16</td>
<td>0.002</td>
<td>-0.01</td>
<td></td>
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<tr>
<td>School sex ed</td>
<td>0.24</td>
<td>0.17</td>
<td>0.05</td>
<td>0.07</td>
<td>0.13</td>
<td>0.17</td>
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<td>Step 2: Interaction</td>
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</tr>
<tr>
<td>Gender</td>
<td>-0.44</td>
<td>0.10***</td>
<td>-0.22</td>
<td>-0.40</td>
<td>0.10***</td>
<td>-0.23</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Religious</td>
<td>0.23</td>
<td>0.11*</td>
<td>0.10</td>
<td>0.09</td>
<td>0.11</td>
<td>0.05</td>
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<tr>
<td>Partner type</td>
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<td>0.10***</td>
<td>0.33</td>
<td>0.53</td>
<td>0.10***</td>
<td>0.31</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
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<td>0.11**</td>
<td>-0.16</td>
<td>-0.51</td>
<td>0.13***</td>
<td>-0.22</td>
<td></td>
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</tr>
<tr>
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<td>0.10</td>
<td>0.16</td>
<td>0.03</td>
<td></td>
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</tr>
<tr>
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<td>-0.06</td>
<td>-0.59</td>
<td>0.38</td>
<td>-0.09</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>School sex ed x sexual identity</td>
<td>0.92</td>
<td>0.43*</td>
<td>0.06</td>
<td>.10</td>
<td>0.90</td>
<td>0.43*</td>
<td>0.01</td>
<td>0.12</td>
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</table>

Table 3

Regression Analysis Examining the Interaction between Sexual Identity and Family Sex Education on Contentment and Satisfaction with Sexual Communication among Participants Who Received Family Sex Education

<table>
<thead>
<tr>
<th></th>
<th>Contentment (n = 251)</th>
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<th>Satisfaction with communication (n = 197)</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>B (SE)</td>
<td>Zero-order correlation</td>
<td>Semi-partial correlation</td>
<td>AR²</td>
<td>B (SE)</td>
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<tr>
<td>Step 1: Main effects</td>
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<tr>
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<td>-0.16</td>
<td>-0.17</td>
<td>0.187</td>
<td>-0.43 0.11***</td>
</tr>
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<td>0.12</td>
<td>0.10</td>
<td>0.07 0.12</td>
<td>0.06</td>
</tr>
<tr>
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<td>0.28</td>
<td>0.42 0.11***</td>
<td>0.24</td>
</tr>
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<td>-0.59 0.14***</td>
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<td>0.04</td>
<td>0.02</td>
<td>0.09 0.18</td>
<td>0.05</td>
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<tr>
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<td>-0.04</td>
<td>-0.01</td>
<td>0.50 0.18**</td>
<td>0.13</td>
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<td>Step 2: Interaction</td>
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<td></td>
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<tr>
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<td>-0.17</td>
<td>-0.17</td>
<td>-0.44 0.11***</td>
<td>-0.25</td>
</tr>
<tr>
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<td>0.10</td>
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<td>0.05</td>
</tr>
<tr>
<td>Partner type</td>
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<td>0.28</td>
<td>0.41</td>
<td>0.41 0.12**</td>
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<tr>
<td>Partnered sex (in past 6 months)</td>
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<td>-0.17</td>
<td>-0.58</td>
<td>-0.58 0.14***</td>
<td>-0.27</td>
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<tr>
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<td>0.01</td>
<td>0.16</td>
<td>0.16 0.19</td>
<td>0.05</td>
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<td>0.16</td>
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</tr>
<tr>
<td>Family sex ed x sexual identity</td>
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<td>-0.06</td>
<td>-0.03</td>
<td>0.54 0.50</td>
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</tbody>
</table>

Figure 1. The association between school sex education during middle/high school and rating of sexual contentment in young adults for heterosexual and LGB+ participants. 
*Note*: Scores on this measure ranged from 1-5. “Low” and “High” Comprehensive Sex Education represent one standard deviation below and above the mean, respectively.

Figure 2. The association between school sex education during middle/high school and rating of satisfaction with communication in young adults for heterosexual and LGB+ participants. 
*Note*: Scores on this measure ranged from 1-5. “Low” and “High” Comprehensive Sex Education represent one standard deviation below and above the mean, respectively.
CHAPTER 4

Examining the Efficacy of STD Testing Public Health Messages Tailored to Youths’ Regulatory Focus

In the U.S., youth account for nearly 50% of new STD cases each year. When youth are tested for STDs, they can receive treatment, yet only 25% of sexually active youth have ever been tested. One potential strategy to increase testing is to target youth with public health messages tailored to their regulatory focus. People have a dominant regulatory focus and tend to be either more concerned with the risks of unhealthy choices (prevention-focused) or the benefits of healthy choices (promotion-focused). Theoretically, when someone is targeted with a message that matches their regulatory focus, the message will be more effective; yet, no studies have evaluated this in the domain of STD testing. With a sample of 380 sexually active youth (M_age=20.2; 51.6% male), we examined whether matching STD testing messages to youths’ regulatory focus strengthens the efficacy of the message for improving STD testing stigma, self-efficacy, and intentions. We evaluated participants’ regulatory focus then assigned them to watch either a prevention-focused or promotion-focused video encouraging STD testing. Among prevention-focused youth, those who watched the promotion-focused video had less stigmatizing attitudes towards STD testing than those who watched the prevention-focused video. Interventionists should consider making STD testing messages for youth promotion-focused.

Keywords: regulatory focus, sexual health, STDs/HIV, youth, intervention
Introduction

Youth in the United States are at high risk for contracting STDs, including HIV. Although youth, ages 15-24, account for only 25% of the sexually active population, they account for nearly 50% of new STD cases each year (CDC, 2018c). Furthermore, rates of STDs are increasing across the United States. In 2018, 62% of new chlamydia cases and 43% of gonorrhea cases occurred among youth. Biologically female youth, and Black and Latinx youth, are especially at risk (CDC, 2018c).

When youth are regularly tested for STDs, youth with STDs can be identified for treatment. This is extremely important for two reasons. First, when STDs are treated, the risk that youth will spread STDs to others is eliminated—a key step in stopping the epidemic (Planned Parenthood, 2020). Second, when youth get quickly connected to care and receive timely treatment for their STDs, they are less likely to suffer from both short and long-term health consequences (e.g. sores on the genitals, infertility, cervical cancer; Planned Parenthood, 2020).

Despite the known benefits of testing, STD testing rates among youth are low—in part, because youths’ motivation to get tested is low. The CDC recommends that sexually active youth get tested at least once a year (2015c). Yet, only a quarter of sexually active female youth and 10% of sexually active male youth have ever been tested for STDs (Cuffe et al., 2016). With respect to HIV specifically, youth are the least likely to get tested in a timely manner, of any age group (Ocfemia et al., 2018). Estimates show that 50% of youth living with HIV have not been tested and do not know they are HIV-positive (Hall et al., 2015; Ocfemia et al., 2018).

Public Health Campaigns for STD Testing

To address this public health crisis, many public health campaigns have been developed and disseminated with the aim of increasing STD testing among youth. For decades, these health
campaigns have reached youth through mass communication-methods (e.g., billboards, TV messages)—with many evaluations showing these strategies are effective at increasing STD testing (for a review, see Noar et al., 2009). Unfortunately, these methods have historically yielded low rates of audience exposure to campaign messages (Noar et al., 2009). To remain in the public eye and keep up with changing technology trends, recent STD testing campaigns have shifted to using social media platforms to disseminate their messages (CDC, 2019c; Friedman et al., 2016)—perhaps due to the nearly ubiquitous use of social media by youth (97% of teens and 90% of young adults are active on social media; Pew Research Center, 2018; 2019).

With this shift, there is a new opportunity for public health campaigns to gain information about each viewer and provide tailored content. Rather than appealing to the masses, campaigns have an opportunity to tailor their content to the individual (Facebook, 2020; YouTube, 2020). On social media, advertisers gain information about users’ preferences by asking users directly (e.g., through quick surveys), accessing their Google search history, and collecting information about their demographics to tailor content and appeal to viewers in the most effective and personalized ways (Facebook, 2020; YouTube, 2020)—and to maximize their effectiveness, public health campaigns could be doing this too.

Now that the information and technology needed to tailor public health campaigns is widely accessible, more research is needed on what kinds of tailoring may be helpful. A few promising studies have shown that tailoring sexual health interventions to participants’ gender, relationship status, and sexual behavior may improve their effectiveness (Hosek et al., 2015; Lustria, 2016). However, no study to our knowledge has developed or tested a sexual health intervention that is tailored to participants’ regulatory focus.
Regulatory Focus and Health Promotion

Regulatory Focus Theory (RFT) asserts that there are two motivational systems, or, regulatory foci, that influence the ways in which people make decisions and work towards accomplishing their goals (Higgins, 1998). These two distinct foci are prevention-focus and promotion-focus. According to RFT, each person has a dominant regulatory focus: the motivational system (prevention or promotion) that is strongest and most active for a person—and thus has the greatest influence over how they will pursue their goals. Someone with a prevention-focus is more concerned with ensuring their safety and preventing negative outcomes (Higgins, 1998; Higgins, 2012). They pursue goals through vigilant means—taking care not to make any mistakes that would lead them to suffer from an unpleasant or undesired outcome (Higgins et al., 2001). Alternatively, someone who is promotion-focused is more concerned with achieving pleasurable, positive outcomes. They pursue goals through eager means—actively working to “achieve desired end-states” and maximize success (Higgins et al., 2001; Ludolph & Schulz, 2015). While regulatory focus can be situationally primed, a substantial literature suggests that people are highly motivated by their chronic regulatory focus: the trait motivational focus that is most dominant and, thus, accessible to a person throughout their lives and across situations (Haws et al., 2010; Higgins, 1998; Motyka et al., 2014).

Messages (e.g., advertisements, interventions) can have a regulatory focus, and emphasize prevention or promotion, as well. For example, a message could either highlight the risks of not making a certain decision (prevention-focused) or the benefits of making the decision (promotion-focused). According to decades of research on RFT, if someone is targeted with a message that matches their regulatory focus, the message is more effective (for reviews see Ludolph & Schulz, 2015; Motyka et al., 2014).
Although RFT was initially developed and tested in a marketing context, recently researchers have successfully utilized this theory to improve health outcomes of interest. Applying RFT to a health context, people may either be more preoccupied with the risks of making unhealthy choices (prevention-focused) or with the benefits of making healthy choices (promotion-focused). Research on healthy eating (Cesario et al., 2004), vaccinations (Park, 2012), physical activity (Ines, 2013), and smoking cessation (Kim, 2006) has shown that when people are targeted with a health message that matches their regulatory focus, they are more likely to comply with the message and make healthy decisions (Ludolph & Schulz, 2015). For example, in one study with high school students, adolescents who were shown a brief anti-smoking message that matched their regulatory focus had more negative attitudes towards smoking and lower intentions to smoke compared to adolescents who were shown an anti-smoking message that did not match their regulatory focus (Kim, 2006). Although such research supporting the efficacy of tailoring health messages using RFT exists, no study that we know of has applied this tailoring strategy to the sexual health intervention domain.

In the current study, we aimed to fill this gap in the literature on RFT as well as address a pressing public health concern—rising rates of STD contraction among youth—by examining whether tailoring public health messages to youth’s regulatory focus increases their efficacy for improving STD testing cognitions (i.e., decreasing stigma towards STD testing, increasing self-efficacy to get tested, and increasing intentions to get tested). In addition, we examine gender and race as moderators in our analysis to confirm that, if this tailoring strategy works, it is working for youth who are most vulnerable to STD contraction: biologically female youth and Black and Latinx youth. In a national sample of sexually active youth in the U.S., we investigate the following research questions:
1. *Are STD-testing health campaign messages more efficacious at changing sexually active youth’s STD-testing cognitions when the message is tailored to youth’s regulatory focus?*

   We predict that youth who received STD testing messages matched to their regulatory focus will have greater self-efficacy and intentions to get tested, as well as less stigmatizing attitudes towards testing, compared to youth who received STD testing messages that do not match their regulatory focus. More specifically, prevention-focused youth who received a prevention-focused message will have better STD testing cognitions compared to prevention-focused youth who received a promotion-focused message. Promotion-focused youth who received a promotion-focused message will have better STD testing cognitions compared to promotion-focused youth who received a prevention-focused message.

2. *Is tailoring health video messages to participants regulatory focus an efficacious strategy across groups of sexually active youth most at-risk for STD contraction?*

   This is an exploratory research question prompted by the high rates of STDs among biologically female youth and Black and Latinx youth. Female youth have a biological susceptibility to STDs (CDC, 2018e). While for Black and Latinx youth, this disparity in STD contraction parallels other health issues (e.g., cardiovascular disease, diabetes; CDC, 2018a; Graham, 2015) and is due to a concentration of risk factors experienced by Black and Latinx communities, including discrimination, barriers (e.g., language, financial) to accessing affordable, high quality health care, and a corresponding distrust in the health care system (CDC, 2018d, 2020). Thus, it is imperative that when developing STD testing intervention strategies, researchers are especially cognizant of the efficacy of programs among these youth.
**Method**

The study procedures outlined below were approved by the North Carolina State University Institutional Review Board. All analyses reported in this manuscript are preregistered at (https://osf.io/zt7ea/?view_only=2c6108b75f2144a68d554964dd8f1054).

**Participants**

We recruited a national, U.S.-based sample of sexually active youth online. All participants were recruited using Qualtrics Panels, a company that recruits people online to participate in surveys (Qualtrics, 2019). We used a screener survey to ensure participants met the inclusion criteria and understood the consent form. To qualify to participate, youth had to be 16-24 years old, identify as White, Black, or Latinx, and live in the U.S. Only participants who were White, Black, or Latinx qualified to participate in the study because of our planned analyses to compare results by race/ethnicity. In addition, youth had to report having had anal or vaginal sex in their lifetime, as these youth are most at-risk for having an STD, including HIV (Patel et al., 2014). Finally, to qualify for this study, youth had to provide informed consent and pass a brief consent form comprehension check with four multiple choice questions about the study risks and expectations.

Attention checks (e.g., “What color is a stop sign?”) were included throughout the survey to ensure participants were paying attention and providing quality data (Beymer et al., 2018; Evans, Widman, Kamke, et al., 2020; Muise et al., 2017). All participants were compensated by Qualtrics Panels with an incentive based on the length of the study and their preferred incentive type. Some examples of possible incentives include airline miles, gift cards, and sweepstake entrances.
393 participants completed all study measures and passed all attention checks. For the purpose of the current analyses, we excluded 13 participants who did not have a dominant regulatory focus (i.e., they had a score of “0” on our regulatory focus measure; see Measures section below for further information). Thus, our final analytic sample for this study included 380 youth \((M_{\text{age}} = 20.23, SD = 2.49, \text{range} = 16-24)\). 178 participants were women (176 cisgender women, 2 transgender women), 197 were men (194 cisgender men, 3 transgender men), and 5 participants identified as nonbinary or another gender identity (i.e., agender, gender fluid). In addition, 51.6% of participants \((n = 196)\) were assigned male sex at birth and 48.4% \((n = 184)\) were assigned female sex. With respect to race/ethnicity, 36.1% of the sample \((n = 137)\) identified as White, while 35.0% \((n = 133)\) identified as Black and 28.9% \((n = 110)\) as Hispanic/Latino/a. Most participants identified their sexuality as 100% heterosexual \((n = 269, 70.8\%)\) or mostly heterosexual \((n = 45, 11.8\%)\). In addition, 8.7% \((n = 33)\) identified as bisexual, 3.4% \((n = 13)\) identified as pansexual, 2.4% \((n = 9)\) identified as gay/lesbian, and 1.3% \((n = 5)\) identified as mostly gay/lesbian. While 42.6% \((n = 162)\) of participants were currently residing in the Southern U.S., 16.6% \((n = 63)\) were living in the Northeast, 18.4% \((n = 70)\) were in the West, and 22.4% \((n = 85)\) were in the Midwest.

**Study Design**

All study activities were completed remotely, on participants’ personal devices, using the Qualtrics interface. Youth who met our inclusion criteria were invited to review our consent form. We received a waiver of parental consent; thus, all participants (including 16- and 17-year-old participants) were recruited directly. Waivers of parental consent are becoming increasingly common for minimal risk, online studies that examine adolescent sexuality as the parental
consent process may pose additional risk for adolescents whose parents may have negative attitudes towards their sexuality (Bauman et al., 2020; Flores et al., 2019).

At the beginning of the study, all participants who qualified for the study and consented to participate completed a pretest survey. Next, participants were randomly assigned to either receive an STD testing video message that was prevention-focused or an STD testing video message that was promotion-focused. Thus, in this study, there were four groups: 1) prevention-focused youth who received the prevention-focused STD testing video, 2) prevention-focused youth who received the promotion-focused STD testing video, 3) promotion-focused youth who received the prevention-focused STD testing video, and 4) promotion-focused youth who received the promotion-focused STD testing video. Groups 1 and 4 received a video that was matched to their regulatory focus while groups 2 and 3 received a video that was not matched to their regulatory focus. Once participants viewed the video, they completed the immediate post-test survey. Upon completion of the posttest survey, participants were thanked for their participation and received sexual and mental health resources in case they had questions or concerns about STD testing or other health issues.

Measures

In the pretest survey, participants completed measures to evaluate their demographics, sexual behavior, regulatory focus, and STD testing cognitions. In the posttest survey, participants again completed the measures to evaluate their STD testing cognitions.

Demographics. Participants reported their age, race/ethnicity, gender, sexual identity, where they lived (e.g., rural vs. urban, state), household income, and sex assigned at birth. Race/ethnicity was assessed with one item (“What is your race/ethnicity? Choose all that apply.”) with the following answer options: “White,” “Black,” “Hispanic/Latino/a,”
“Asian/Pacific Islander,” “Native American/Alaska Native,” “Middle Eastern,” or “Another race/ethnicity (please indicate).” Sex assigned at birth was assessed with one item, asking participants what sex they were assigned at birth with the following answer options: “male,” “female,” “intersex.”

**Sexual Behavior**

Participants reported whether they had anal or vaginal sex in the past year, whether they had been tested for STDs/HIV in their lifetime, and whether they were in an exclusive relationship with one sexual/relationship partner.

**Regulatory Focus**

To assess participants' chronic regulatory focus, we used 14 items from the Promotion/Prevention Scale (Lockwood et al., 2002). We dropped four items from the original 18-item scale that refer to “academic achievement” due to their irrelevance for participants who were no longer in school, as has previously been done in studies with adult samples (Haws et al., 2010). All items were assessed on a 9-point Likert-type scale from 1 = *not at all true of me* to 9 = *very true of me*. Seven items assessed the extent to which participants were prevention-focused (e.g., “In general, I am focused on preventing negative events in my life”). Seven items assessed the extent to which participants were promotion-focused (e.g., “In general, I am focused on achieving positive outcomes in my life”). Items on each subscale were averaged. To determine participants’ dominant, chronic regulatory focus, scores on the prevention subscale were subtracted from scores on the promotion subscale (Lockwood et al., 2002; Zhao & Pechmann, 2007). People with positive scores were categorized as promotion-focused and those with negative scores were categorized as prevention-focused (van Kleef et al., 2005).
**STD Testing Stigma**

This outcome was assessed with 10 adapted items from the HIV-Antibody Testing Attitude scale (Boshamer & Bruce, 1999). Items such as, “Anyone who is tested for STDs is dirty”, were rated on a 5-point Likert-type scale from 1 = *strongly disagree* to 5 = *strongly agree*. Items were averaged with higher scores indicating participants have more stigmatizing attitudes (pretest Cronbach’s α = .78; posttest Cronbach’s α = .84).

**STD Testing Self-Efficacy**

This outcome was assessed with 4 adapted items from the HIV Testing Self-Efficacy Scale (Jamil et al., 2017). Items such as, “How confident are you that you could get tested for STDs, including HIV, at least once per year” were rated on a 5-point Likert-type scale from 1 = *not at all confident* to 5 = *completely confident*. Items were averaged with higher scores indicating participants have more self-efficacy to get tested (pretest Cronbach’s α = .85; posttest Cronbach’s α = .86).

**STD Testing Intentions**

This outcome was assessed with the following item: “How likely is it that you will try to get tested for STDs, including HIV, in the next year?” (Armitage & Conner, 2001; McGarrity & Huebner, 2014). Participants were asked to rate this item on a Likert-type scale from 1 = *not at all likely* to 7 = *extremely likely*. Higher scores indicate greater intentions to get tested.

**Stimuli: Public Health Videos Encouraging STD Testing**

Participants were randomly assigned to watch either the prevention-focused or promotion-focused STD testing video message created by our research team using video animation software. See Figure 1 for screenshots of both programs. Both messages were approximately three minutes long and included information from public health campaign
materials from the CDC and Planned Parenthood (CDC, 2019a; Liddon et al., 2019; McFarlane et al., 2015; Planned Parenthood, 2020). Both videos included components aimed at increasing awareness about the prevalence of STDs among youth, provided information to youth about how they can get tested, and emphasized why they should get tested. The section on why youth should get tested was very different across the two videos—as this was the component that most thoroughly reflects the regulatory focus tailoring. In the prevention-focused video, this section emphasized the severity of the consequences if youth do not get tested. These consequences included short term consequences (e.g., sores on the genitals) and long-term consequences (e.g., cervical cancer) as well as the risk that youth could spread STDs to their sexual partners.

Conversely, the promotion-focused video emphasized the great extent of the benefits youth would experience if they do get tested. These benefits included knowing that they are STD-free and the corresponding feelings of relief and happiness that they may feel. Another benefit emphasized in the promotion video was the possibility of curing or treating STDs if youth do have them.

In both videos, youth received information about how to get tested, including a clickable link to the CDC’s online testing locator to find free, fast, and confidential testing. In addition, the videos include material meant to destigmatize STD contraction and testing, including a quote from Planned Parenthood about what having an STD means: “It doesn’t mean you are a dirty or bad person. You’re just a pretty normal human who got an infection…” These elements of the videos as well as many others aimed to change adolescents’ self-efficacy, stigma, and intentions to get tested.

Prior to this study, we conducted a pilot test to ensure the messages were perceived by our target audience as being tailored to the appropriate regulatory focus. Written versions of
these messages were tested with 417 youth (ages 18-25, $M_{age} = 23.53$, $SD = 1.54$; 56.1% women; 74.6% White, 10.3% Black, 9.6% Hispanic/Latino/a) recruited on Amazon’s Mechanical Turk. We asked participants to read one of the messages (prevention or promotion) and rate their agreement using a 9-point Likert scale on two items to examine the prevention-focus of each message (e.g., “In general, this message focuses more on the consequences of making poor health decisions than the benefits of making good health decisions”) and two items to examine the promotion-focus of each message (e.g., “Overall, this message is more about achieving health goals than avoiding health problems”). The prevention message was rated significantly higher on prevention-focus items ($M = 5.89$, $SD = 2.10$) compared to the promotion message ($M = 3.91$, $SD = 2.08$; $t(415) = 9.69$; $p < .001$). In addition, the promotion message was rated significantly higher on promotion-focus ($M = 6.26$, $SD = 1.52$) compared to the prevention message ($M = 4.54$, $SD = 2.17$; $t(372.58) = -9.39$; $p < .001$). Thus, we determined the regulatory focus tailoring was salient to youth in our target audience. The full videos are available from the first author upon request.

Analysis Plan

To address our research questions, we tested for differences in our dependent variables, STD cognitions, at posttest across the four conditions: 1) prevention-focused youth who receive the prevention-focused STD testing video ($n = 49$), 2) prevention-focused youth who receive the promotion-focused STD testing video ($n = 40$), 3) promotion-focused youth who receive the prevention-focused STD testing video ($n = 141$), and 4) promotion-focused youth who receive the promotion-focused STD testing video ($n = 150$). Note that the sample sizes between groups are different because only 23.4% of the youth in our sample were prevention focused.
In a series of preliminary chi-square tests, we tested for pretest differences across the four groups in the following variables which are related to risk for STDs and could confound the analyses: anal or vaginal sex in the past year (0 = did not have anal or vaginal sex in the past year; 1 = had anal or vaginal sex in the past year), lifetime testing for STDs/HIV (0 = has not ever been tested for STDs/HIV; 1 = has been tested for STDs/HIV), and relationship status (0 = not in an exclusive relationship; 1 = in an exclusive relationship). Using a series of ANOVAs, we also tested for pretest differences in our outcomes. Specifically, we examined if there were differences in outcomes across prevention-focused youth who receive the prevention video compared to prevention-focused youth who receive the promotion video. We also examined if there were differences across promotion-focused youth who received the promotion video compared to promotion-focused youth who received the prevention video. If there were any potentially confounding differences across groups in these variables, including pretest scores on our outcome variables, we planned to control for them in subsequent analyses.

To address our first research question, whether youth who receive STD testing messages matched to their regulatory focus have greater self-efficacy and intentions to get tested and less stigmatizing attitudes towards testing compared to youth who receive STD testing messages that are not matched to their regulatory focus, we examined whether there were differences in our dependent variables at posttest across the four conditions: 1) prevention-focused youth who receive the prevention-focused STD testing video, 2) prevention-focused youth who receive the promotion-focused STD testing video, 3) promotion-focused youth who receive the prevention-focused STD testing video, and 4) promotion-focused youth who receive the promotion-focused STD testing video. We ran a MANOVA to determine differences across the four groups in our
three outcome variables at posttest (STD testing stigma, self-efficacy, and intentions). Results were decomposed using Tukey post-hoc tests.

To address our second research question, to examine whether the efficacy of tailoring STD-testing messages to youth’s regulatory focus is moderated by biological sex or race/ethnicity, we ran two additional MANOVAs. The first included biological sex (binary variable with 0 = male and 1 = female) as an interaction term with condition (the four described above) as the predictor and STD testing cognitions as our outcomes. The second included race/ethnicity as an interaction term (categorical variable with 0 = Black, 1 = Latinx, 2 = White) with condition as the primary predictor and STD testing cognitions as our outcomes. Again, we planned to use Tukey post hoc tests to decompose any significant models.

**Power analysis**

We used GPower to determine the sample size needed to detect effects for our primary analyses—comparing the four conditions on our outcome variables (Faul et al., 2007). With an estimated effect size of $f = .22$ (Motyka et al., 2014), $p = .05$, and power of .9, we calculated that we needed 150 youth in our sample to detect effects. However, because it was possible that groups would not be equal due to more than 50% of youth identifying as one of the two regulatory foci (prevention or promotion), we planned to recruit 390 youth.

**Results**

See Table 1 for more information about the characteristics of the sample. Only 23.4% of our sample ($n = 89$) was prevention-focused and 76.6% was promotion-focused ($n = 291$). Though all of our participants had had anal or vaginal sex and were therefore at some risk for contracting STDs/HIV, only 175 participants (44.5%) had ever been tested for STDs or HIV. At pretest, before watching the STD testing videos, the mean score for STD testing stigma among
all youth in our sample was 2.11 ($SD = 0.62$), indicating that on average, participants “disagree” with stigmatizing statements. At pretest, the mean score for STD testing self-efficacy was 3.66 ($SD = 0.89$), indicating that on average, participants were “very confident” that they could get tested for STDs. The mean score for STD testing intentions was 4.15 ($SD = 2.06$), indicating that on average, participants expressed that they were neutral on whether or not it was likely that they would get tested for STDs. At posttest, after watching the STD testing videos, the mean score for STD testing stigma among all youth in our sample was 1.88 ($SD = 0.62$) and the mean score for STD testing self-efficacy was 3.83 ($SD = 0.85$). Although scores improved slightly for both STD testing stigma and self-efficacy, there was no difference in the meaning of the average score on these measures at post-test. The mean score for STD testing intentions was 4.82 ($SD = 1.98$), indicating that on average, participants were slightly likely to get tested for STDs.

Prior to running our primary analyses, we conducted preliminary analyses to see if there were differences across conditions in variables that could confound our findings. We found that there were no significant differences across groups in whether participants had had sex in the past year, $X^2(3, n = 380) = 7.26, p = .06$, whether participants had ever been tested for STDs, $X^2(3, n = 380) = 1.05, p = .79$, and whether participants were in an exclusive relationship with one person, $X^2(3, n = 380) = 6.98, p = .07$. We also found no pretest differences across groups in STD testing self-efficacy, $F(3,376) = 0.49, p = .69$, or STD testing intentions, $F(3,376) = 0.38, p = .77$. Our model for pretest differences in STD testing stigma was significant, $F(3,376) = 3.02, p = .03$. However, post hoc tests revealed that the only significant differences were between the promotion-focused group that got a prevention-focused video and the prevention-focused group that got the prevention-focused video. As there were no differences across conditions in sexual/relationship and outcome variables at pretest that would impact the
interpretation of our results, we proceeded with running our primary analyses as planned, without any additional covariates.

To examine whether STD testing health campaign messages were more efficacious at changing sexually active youth’s STD testing cognitions when the message was tailored to youth’s regulatory focus, we ran a MANOVA with condition as the independent variable and three outcome variables (STD testing stigma, self-efficacy, intentions). Table 2 shows the means and standard deviations of all outcomes at pretest and posttest for each of the four conditions. There were significant differences among the four conditions in STD testing stigma at posttest, $F(3,376) = 7.18, p < .001$. Among prevention-focused youth, those participants who received the prevention-focused message had more stigmatizing attitudes towards STD testing than youth who received the promotion-focused message ($p < .001$). This indicates that watching the promotion-focused video rather than the prevention-focused video was more efficacious at decreasing stigmatizing attitudes for prevention-focused youth. There were not significant differences among the four conditions in STD testing self-efficacy, $F(3,376) = 1.67, p = .17$ or STD testing intentions, $F(3,376) = 1.02, p = .39$, at posttest. We also ran these analyses controlling for pretest scores on all outcomes and participant age; however, the same pattern of results emerged. Therefore, we elected to report results from the preregistered, more parsimonious model.

Our second aim was to examine whether the efficacy of tailoring STD testing video messages to participants’ regulatory focus was moderated by sex or race/ethnicity. When we examined sex as a moderator of this relationship, we found the models were not significant for any of our outcomes: STD testing stigma, $F(3,372) = 0.73, p = .54$, STD testing self-efficacy, $F(3,372) = 1.08, p = .36$, or STD testing intentions, $F(3,372) = 2.37, p = .07$. Thus, there was no
differences in the efficacy of tailoring STD testing video messages to youths’ regulatory focus across male and female participants. Similarly, when we examined race/ethnicity as a moderator, we found the models were not significant for any of our outcomes: STD testing stigma, \(F(6,368) = 1.78, p = .10\), STD testing self-efficacy, \(F(6,368) = 1.10, p = .36\), or STD testing intentions, \(F(6,368) = 0.55, p = .77\). There were no differences in the efficacy of tailoring STD testing video messages across White, Black, and Hispanic/Latino/a participants.

**Discussion**

Youth account for nearly 50% of new STD cases in the U.S. each year (CDC, 2018c). Ensuring youth get tested for STDs is a necessary step towards making sure they are treated—a key to stopping the STD epidemic (Planned Parenthood, 2020). Yet STD testing rates are low: less than 25% of sexually active youth have ever been tested (Cuffe et al., 2016). To increase STD testing among youth, public health campaigns have taken to platforms like Facebook and Twitter—aiming to decrease stigma around STD testing as well as increase youths’ self-efficacy and intentions to get tested. One potential strategy to improve the effectiveness of these public health campaigns is to tailor them to youths’ regulatory focus (prevention or promotion; Higgins, 1998; Higgins, 2012; Ludolph & Schulz, 2015). Prior to this study, no study, that we know of, has applied Regulatory Focus Theory (RFT) to the sexual health intervention literature. In this study, we address this gap by examining whether prevention-focused youth randomly assigned to watch a brief prevention-focused video message encouraging STD testing are more likely to have improved STD testing cognitions (i.e., stigma, self-efficacy, intentions) compared to prevention-focused youth who watch a promotion-focused video. Additionally, we examined whether promotion-focused youth randomly assigned to watch a brief promotion-focused video message encouraging STD testing are more likely to have improved STD testing cognitions than
promotion-focused youth who watch a prevention-focused video. We expected that youth who received the video matched to their regulatory focus (e.g., prevention-focused youth who watched the prevention video) would have better outcomes than youth who received the discordant message (e.g., prevention-focused youth who watched the promotion video).

We did not find evidence that matching an STD testing message to youths’ regulatory focus changed their intentions to get tested or their self-efficacy to get tested; however, we found that the focus of the STD testing message had implications for prevention-focused youths’ STD testing stigma. Surprisingly, we found that, contrary to our predictions, prevention-focused youth who watched the promotion-focused STD testing video had less stigmatizing attitudes towards STD testing than prevention-focused youth who watched the prevention-focused video. And, for promotion-focused youth, there was no significant difference in the stigmatizing attitudes of youth who watched the prevention video compared to promotion video. While these results are perplexing, considering their inconsistency with prior work using RFT in public health campaigns, they perhaps point towards the destigmatizing nature of promotion-focused messages about STD testing—which focus less on traditional messaging around the dangers of not getting tested (e.g., increased symptomology; potential to spread STDs to others) and instead focus on the benefits of getting tested. Potentially, this is most important for prevention-focused youth who have a more risk-focused, catastrophizing process for planning and decision making (Elliot et al., 2006; Hamstra et al., 2011; Higgins, 1998; Higgins, 2012). If the promotion-focused message makes originally prevention-focused youth more promotion-focused with respect to STD-testing, then maybe this corresponding increase in promotion-focus is what leads to decreased stigmatization of STD testing. However, it is important to note that this connection between promotion-focus and STD testing stigma has not yet been empirically tested. Clearly,
more studies are needed on the relationship between regulatory focus and STD testing cognitions and behavior to better understand these findings.

Though these findings should be replicated to determine their generalizability and reproducibility, if researchers continue to find that promotion-focused STD testing messages decrease stigmatization of STD testing among prevention-focused youth (more so than prevention-focused messages), this could have important implications for sexual health interventions aimed at encouraging STD testing. Health behavior theories (e.g., Theory of Planned Behavior; Ajzen, 1985) as well as empirical literature on STD testing, suggest that youth who have more negative, stigmatizing attitudes about STD testing are less likely to get tested (Cunningham et al., 2009; Wong et al., 2012). Thus, it is important that interventions maximize their effectiveness at deceasing youths’ stigmatizing attitudes toward STD testing. If making STD testing interventions and public health messaging more promotion-focused then makes the messages more effective for prevention-focused youth, this could be an important next step for improving public health messaging around STD—including HIV—prevention. Perhaps, we should be offering promotion-focused public health messaging to all youth. However, health behavior theories also assert that decreasing stigma alone is not the most effective strategy for improving STD testing behavior—instead, it is also important to increase youths’ self-efficacy to get tested as well as their intentions to get tested in the future (Ajzen, 1985).

Unfortunately, we did not find that tailoring STD testing video messages to youths’ regulatory focus made the messages more efficacious at increasing youths’ self-efficacy and intentions to get tested—and this relationship (or, lack thereof) did not differ by sex or race/ethnicity. This is in contrast to a large body of literature which had found this method of tailoring to be efficacious for improving health cognitions (e.g., self-efficacy, intentions) for
other health behaviors (e.g., smoking cessation, healthy eating, exercise, vaccination; for reviews, see Ludolph & Schulz, 2015; Motyka et al., 2014). Though researchers have applied RFT to interventions to improve other health behaviors for over a decade, this is the first study to apply RFT to improving the efficacy of a sexual health intervention. So perhaps, though RFT is applicable to many health interventions, it is not applicable in the same way to sexual health interventions. There are many factors that may explain why sexual health is a unique health domain—especially for youth—and, therefore, does not operate in the same way as other health domains. For example, there are sex education laws and policies in place that govern the type and amount of information that youth get about their sexual health (Guttmacher Institute, 2019b). In addition, youth may perceive the need to hide information about their sexual health from their parents in a way that is unique from some other health domains (e.g., healthy eating, exercise; Malacane & Beckmeyer, 2016). Though, before making sweeping assumptions about the bounds and applicability of RFT to sexual health, this study must be replicated, especially in light of some study limitations.

There are limitations which should be considered when interpreting the results from this study as well as determining next steps for applying RFT to sexual health interventions. First, though we originally planned for some inequalities in the number of youth who had a dominant prevention- vs promotion-focus, there were far fewer prevention-focused youth in our study than we anticipated. Although our power analysis revealed we had sufficient power to detect effects for our primary analysis, we may not have had sufficient power for our secondary moderator analyses. Therefore, results from these analyses—which suggest there were no differences by sex or race/ethnicity in the efficacy of tailoring the STD testing messages using regulatory focus—
should be interpreted with caution. It will be important for future studies, with larger samples of prevention-focused youth to determine whether these findings replicate. Similarly, conceptual replications of this study with other samples and other sexual health issues (other than STD testing) would help to determine the generalizability of these results. Perhaps tailoring using regulatory focus would be more effective if the target sexual health behavior was condom use or sexual communication. In addition, the sample for this study was limited to White, Black, and Latinx youth. Thus, we can only speak towards these populations and more studies are needed to examine this research question among youth of other races/ethnicities and people of other ages.

Finally, in this study we attempted to use regulatory focus to tailor an individual-level intervention aimed at changing individuals’ cognitions. There are certainly other factors at the interpersonal, community, and society-levels (e.g., distrust in the healthcare system, poverty, parent and peer stigma) that impact whether youth will get tested for STDs (CDC, 2020; Hajizade-Valokolaee, 2016); thus, in the future it may be helpful for researchers to examine whether interventions aimed at addressing these factors could be bettered by applying RFT. For example, if interventions provided to parents aimed at bettering their communication with their children about sex, were to take a more promotion-focused perspective, might this decrease their STD testing stigma, and might this then improve their ability to communicate with their children in non-stigmatizing ways? In addition, focusing on community and societal barriers to sexual health is especially important because even if youth do experience improvements in their STD testing cognitions and even if youth do get tested, there are a number of societal barriers that may still stand in the way of youth returning to get tested again or may stand in the way of youth receiving treatment for STDs they do have.
Regulatory focus theory (RFT) has been used to understand decision making—including health decision making—since it’s conception in 1997 (Higgins et al., 1997). Though it is helpful in understanding human behavior for many health domains, it may be limited in the extent to which it can be applied to sexual health and decision making. However, this is the first study, that we know of, to apply RFT to mechanisms of sexual health interventions so more must be done to understand how this theory operates (or fails to operate) in the sexual health domain.
## Table 1
Sample Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Prevention-focused youth</th>
<th>Promotion-focused youth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Received prevention-</td>
<td>Received promotion-</td>
</tr>
<tr>
<td></td>
<td>focused video n = 49</td>
<td>focused video n = 40</td>
</tr>
<tr>
<td>Age, mean(SD)</td>
<td>20.06 (2.26)</td>
<td>20.73 (2.60)</td>
</tr>
<tr>
<td>Sex assigned at birth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>24 (49.0)</td>
<td>75 (53.2)</td>
</tr>
<tr>
<td>Female</td>
<td>25 (51.0)</td>
<td>66 (46.8)</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>21 (42.9)</td>
<td>48 (34.0)</td>
</tr>
<tr>
<td>Black</td>
<td>17 (34.7)</td>
<td>46 (32.6)</td>
</tr>
<tr>
<td>Hispanic/Latino/a</td>
<td>11 (22.4)</td>
<td>47 (33.3)</td>
</tr>
<tr>
<td>Has been tested, STDs</td>
<td>24 (49.0)</td>
<td>60 (42.6)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woman</td>
<td>22 (44.9)</td>
<td>65 (46.1)</td>
</tr>
<tr>
<td>Man</td>
<td>23 (46.9)</td>
<td>75 (53.2)</td>
</tr>
<tr>
<td>Transgender woman</td>
<td>1 (2.0)</td>
<td>-</td>
</tr>
<tr>
<td>Transgender man</td>
<td>2 (4.1)</td>
<td>-</td>
</tr>
<tr>
<td>Nonbinary or another gender</td>
<td>1 (2.0)</td>
<td>1 (0.7)</td>
</tr>
<tr>
<td>Sexual Identity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100% heterosexual or mostly</td>
<td>36 (73.4)</td>
<td>121 (85.8)</td>
</tr>
<tr>
<td>heterosexual</td>
<td></td>
<td>128 (85.3)</td>
</tr>
<tr>
<td>Bisexual</td>
<td>8 (16.3)</td>
<td>8 (5.7)</td>
</tr>
<tr>
<td>100% gay/lesbian or mostly</td>
<td>1 (2.0)</td>
<td>5 (3.5)</td>
</tr>
<tr>
<td>gay/lesbian</td>
<td></td>
<td>6 (4.0)</td>
</tr>
<tr>
<td>Pansexual</td>
<td>3 (6.1)</td>
<td>5 (3.5)</td>
</tr>
<tr>
<td>Unsure/questioning</td>
<td>1 (2.0)</td>
<td>1 (0.7)</td>
</tr>
<tr>
<td>Where do you live?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A large city</td>
<td>15 (30.6)</td>
<td>50 (35.5)</td>
</tr>
<tr>
<td>A suburb near a city</td>
<td>26 (53.1)</td>
<td>59 (41.8)</td>
</tr>
<tr>
<td>A rural area</td>
<td>8 (16.3)</td>
<td>32 (22.7)</td>
</tr>
<tr>
<td>Household income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $20,000</td>
<td>11 (22.4)</td>
<td>39 (27.7)</td>
</tr>
<tr>
<td>$20,000-$60,999</td>
<td>30 (61.3)</td>
<td>69 (48.9)</td>
</tr>
<tr>
<td>$61,000-$100,000</td>
<td>4 (8.2)</td>
<td>21 (14.8)</td>
</tr>
<tr>
<td>Greater than $100,000</td>
<td>4 (8.2)</td>
<td>11 (7.8)</td>
</tr>
</tbody>
</table>
Table 2

<table>
<thead>
<tr>
<th></th>
<th>Prevention-focused youth</th>
<th>Promotion-focused youth</th>
<th>Test of between group differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Received prevention-focused video</td>
<td>Received promotion-focused video</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$n = 49$</td>
<td>$n = 40$</td>
<td>$n = 141$</td>
</tr>
<tr>
<td><strong>Pretest scores</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STD testing stigma</td>
<td>2.33</td>
<td>0.64</td>
<td>2.05</td>
</tr>
<tr>
<td>STD testing self-efficacy</td>
<td>3.60</td>
<td>0.74</td>
<td>3.55</td>
</tr>
<tr>
<td>STD testing intentions</td>
<td>4.37</td>
<td>1.86</td>
<td>3.93</td>
</tr>
<tr>
<td><strong>Posttest scores</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STD testing stigma</td>
<td>2.23</td>
<td>0.73</td>
<td>1.75</td>
</tr>
<tr>
<td>STD testing self-efficacy</td>
<td>3.58</td>
<td>0.82</td>
<td>3.88</td>
</tr>
<tr>
<td>STD testing intentions</td>
<td>4.94</td>
<td>1.78</td>
<td>4.40</td>
</tr>
</tbody>
</table>

Note. The STD testing stigma and STD testing self-efficacy scales ranged from 1-5. The STD testing intentions scale ranged from 1-7.

*Tukey post-hoc tests showed that there was a significant difference in STD testing stigma at pretest between the promotion-focused group that received a prevention-focused video and the prevention-focused group that received the prevention-focused video. There were no other significant differences between groups in STD testing stigma at pretest.

**Tukey post-hoc tests showed that prevention-focused youth who received the prevention-focused video had more stigmatizing attitudes towards STD testing than prevention-focused youth who received the promotion-focused video.
Figure 1. Screenshots from the STD testing video messages.
CHAPTER 5

Sexual health interventions in the United States: Where do we go from here?

Improving youths’ sexual health must be a priority. In the United States (U.S.), though youth make up just 25% of the sexually active population, they account for nearly 50% of all new STD cases (CDC, 2018c). In addition, it is estimated that only 50% of HIV-positive youth have ever been tested for HIV—leaving around half of HIV-positive youth unaware of their infection and thus unable to access treatment and take additional safety measures to prevent spreading HIV to their sexual partners (Hall et al., 2015; Ocfemia et al., 2018). Further, many youth experience low sexual self-esteem and low sexual satisfaction which is related to decreased relational and mental health (Carcedo et al., 2020; Harden, 2014; Oattes & Offman, 2007). To improve youths’ sexual health researchers have worked for decades to develop, implement, and evaluate sexual health interventions. The overarching goal of this dissertation was to contribute to this research effort.

In three studies our team evaluated the ways in which sexual health interventions influence the sexual health cognitions and behaviors of youth in the U.S. In the first study of this dissertation, we found that across 29 studies, with 11,918 Black adolescents, sexual health interventions are effective at increasing abstinence and condom use (Evans, Widman, et al., 2020a). Importantly, school-based interventions are especially effective at promoting abstinence among Black adolescents. In the second study of this dissertation, our team found that a history of more comprehensive school-based sex education was associated with greater sexual satisfaction for heterosexual young adults than for sexual minority young adults (Evans, Widman, & Goldey, 2020). In addition, a history of more comprehensive family-based sex education was associated with greater satisfaction with sexual communication in romantic
relationships among young adults. In the final study of this dissertation, we found that among youth who are prevention-focused (i.e., generally, more focused on potential negative outcomes rather than potential positive outcomes), a promotion-focused video message was more effective at decreasing STD testing stigma compared to a prevention-focused video message (Evans et al., In prep).

All in all, these studies demonstrate the complexities of the relationship between sexual health interventions and improvements in both sexual risk taking (e.g., decreased condom use) and sex-positive outcomes (e.g., greater satisfaction with sexual communication). There is certainly evidence from both studies included in this dissertation and the literature on sexuality, as a whole (Evans, Widman, et al., 2020b; Haberland & Rogow, 2015; Johnson et al., 2011; Widman et al., 2019), that we should disseminate evidence-based, comprehensive sexual health programming to youth as these interventions can improve their wellbeing. However, there are limitations to some of the strategies employed in standard sexual health interventions which point to important areas for improvement. Here, I highlight two broad areas for improvement and provide examples of specific research directions which may help to improve sexual health intervention development, implementation, and evaluation in the U.S.

**Addressing community, institutional, and structural barriers to sexual health for youth**

First, researchers, practitioners, and interventionists must consider how they can address barriers to sexual health that exist outside of an individual youths’ reasonable control. In Chapter 1 of this dissertation, readers were provided a description of barriers at the community, institutional, and structural levels of society that detract from youths’ sexual health and wellbeing. Here, I discuss the current research on and criticality of developing and adapting interventions so that they may break down these barriers which stand in the way of sexual health
for all youth. In our meta-analysis on sexual health interventions for Black adolescents (Chapter 2 of this Dissertation; Evans, Widman, et al., 2020a), our team identified three interventions that included components aimed at breaking down these systemic barriers to sexual health (out of 29 studies; DiClemente et al., 2014; DiClemente et al., 2009; Sznitman, Stanton, et al., 2011). For example, one intervention included 15 months of media campaigning (e.g., television and radio ads) aimed at changing adolescents’ sexual health behavior by transforming cultural narratives around sexual risk in the town they live in (Sznitman, Stanton, et al., 2011). In short, this study found that the mass media campaign was effective at reducing number of sex partners and frequency of unprotected sex among youth who at baseline tested positive for STDs. In another study, an intervention was implemented that included a component aimed at helping adolescents access sexual health care: female adolescents participating in the intervention received free STD testing/treatment and they received information and vouchers so that their current sexual partners could also get tested and receive treatment (DiClemente et al., 2009). Researchers found that this intervention effort was efficacious at decreasing future STD contraction and increasing condom use.

These studies are among a few others that point towards a promising new avenue for optimizing the effectiveness of sexual health interventions for youth: target factors at multiple levels of influence (DiClemente et al., 2014; Sellers et al., 1994). Unfortunately, a limitation of most sexual health interventions currently available to youth is that the vast majority are focused on changing just the individual youth (e.g., their attitudes, self-efficacy, knowledge; for reviews, see Evans, Widman, et al., 2020a; Johnson et al., 2011), and occasionally their family as well (for a review, see Widman et al., 2019). And though these interventions, on average, prove to be effective, they also often elicit just small changes in youth’s behavior—many meta-analyses
show that pooled effect sizes for the influence of interventions on sexual behavior are small (Evans, Widman, et al., 2020a, 2020b; Haberland & Rogow, 2015; Widman et al., 2019). Perhaps incorporating intervention components that target barriers at multiple levels of influence will give these programs the boost they need to elicit greater positive changes in important sexual health behaviors like condom use, STD/HIV testing, and receipt of treatment for STDs/HIV. This may be especially beneficial for some groups of marginalized youth at high risk for STD/HIV contraction and unplanned pregnancy (e.g., Black youth, sexual and gender minority youth, youth who engage in transactional sex, girls and young women) as these youth are largely “at-risk” because of barriers imposed upon them at the community, institutional, and structural levels of society (e.g., racism, homophobia, poverty, traditional gender norms; Haberland & Rogow, 2015; Hall et al., 2019; Paradies et al., 2015).

There are a number of specific research directions that interventionists could explore to move towards making multi-level sexual health interventions common practice in the U.S. We need researchers to continue to identify factors at the community, institutional, and structural levels that influence youths’ sexual health and develop innovative ways to address them as part of sexual health interventions. For example, in clinic-based sexual health interventions, it may be important to include clinician education on reducing racist and heteronormative microaggressions in order to increase trust in the healthcare system among Black and sexual minority youth and improve the salience of the sexual health information that clinicians are providing. Then, these additional intervention components could be rigorously tested in experimental trials which employ hybrid designs aimed at evaluating the implementation and effectiveness of the interventions. Importantly, the employment of hybrid designs can speed the
time that it takes to move innovative ideas into sexual health intervention common practice (Curran et al., 2012).

Sex-positive approaches to sexual health interventions for youth

A second possible avenue for future research on improving sexual health interventions is to embrace more sex-positive (also referred to as “pleasure-based”) approaches to sexual health promotion for youth. In Chapter 1 of this dissertation, I described the multidimensional nature of sexual health and the importance of reducing sexual risk taking as well as promoting more sex-positive elements of sexuality (e.g., sexual self-efficacy, sexual esteem, sexual satisfaction). Here, I discuss the potential for implementing interventions to promote sex-positive aspects of youths’ sexuality. There is preliminary evidence to suggest that existing methods for sex education may be related to sex-positive components of young adults’ wellbeing (Evans, Widman, & Goldey, 2020; Wylie, 2010). In Chapter 3 of this Dissertation our team presents results from a study in which we found that the sex education youth receive from their schools and their parents when they are in middle and high school is linked to later sexual satisfaction as young adults.

In recognition of the multidimensional nature of sexual health and potential that sexual health interventions may have to promote sex-positive aspects of young people’s wellbeing, for decades there have been calls from sex educators and researchers around the world to take a sex-positive approach to sexual health interventions (e.g., school-based sex education; parent-child sexual communication) for youth. The terms “sex-positive” and “pleasure-based” have been used to capture a broad range of qualities that, ideally, sexual health interventions for youth would have. First, these programs should have components aimed at educating youth about healthy relationships and communication with sexual and romantic partners (Kantor & Lindberg, 2019;
Sexuality Information and Education Council of the United States, 2004; United Nations Educational, Scientific, and Cultural Organization, 2009). Second, these programs inform youth that sex should be pleasurable—and humans feel sexual pleasure in different psychological and physical ways (Kantor & Lindberg, 2019; United Nations Educational, Scientific, and Cultural Organization, 2009). With this, youth also have opportunities to learn and practice the skills they need to recognize, receive, and give sexual consent. Importantly, when sex education is only focused on risk (and not sex-positive) studies find that it often also leaves out information that is inclusive of youth with diverse sexual and gender identities (Bodnar & Tornello, 2019; Estes, 2017). Therefore, another important quality of sex-positive sexual health interventions and education is the presentation of information that is inclusive of LGBTQ+ youth (Kantor & Lindberg, 2019; Sexuality Information and Education Council of the United States, 2004; United Nations Educational, Scientific, and Cultural Organization, 2009). This may be especially important for improving sexual health equity as some studies, including the one presented in Chapter 3 of this Dissertation, find that LGBTQ+ youth do not receive equal benefits from their sex education (Bodnar & Tornello, 2019; Estes, 2017; Evans, Widman, & Goldey, 2020; Schalet, 2014).

The data on the number of youth in the U.S. who are receiving sex-positive sexual health education/interventions is limited. However, a 2016 report with data from middle and high schools in 48 states reveals that in some states as few as 18% of schools provide information to students about how to “create and sustain healthy and respectful relationships,” as few as 8% provide information about “sexual orientation,” and as few as 10% provide information about “gender roles, gender identity, or gender expression” (CDC, 2016b; 2019). Though this assessment did not evaluate the inclusion of all sex-positive topics which would ideally be in
sex-positive sexual health interventions, it does provide a window into how few youth may be receiving sex-positive sex education in the United States. In addition, in interviews, young people express their disappointment with how little information they receive about more sex-positive topics (Pingel et al., 2013; Pound et al., 2016; Steinke et al., 2017).

If researchers and sex educators have been advocating for decades to implement sex-positive approaches to sexual health intervention, then why is it that most communities in the U.S. do not provide comprehensive, sex-positive sex education (CDC, 2016b; Guttmacher Institute, 2019b; Kantor & Lindberg, 2019)? There is wide support from youth, researchers, and sex educators for providing more sex-positive, comprehensive sex education (Hirst, 2013; Kantor & Lindberg, 2019; Pound et al., 2016). However, a significant barrier to bridging the gap between research and practice and actually facilitating wide scale dissemination of this approach in communities across the U.S., may be a lack of parental, community, and state-level policy support in some areas which continue to experience “sex ed wars” (Strasburger & Brown, 2014).

A review by Hall et al. points towards “deeply rooted cultural and religious norms around adolescent sexuality” which perpetuate misinformation regarding the effects of sexual health interventions (2016). Some vocal groups of adults remain concerned that sex-positive approaches to sexual health interventions—especially for younger youth (i.e., adolescents)—may encourage youth to have sex before they are ready. It is important to note that there is no convincing body of evidence to suggest that talking comprehensively and sex-positively to young people about sex makes them more likely to have sex. In fact, some studies suggest the opposite—talking comprehensively with adolescents can delay sexual activity (Evans, Widman, et al., 2020a, 2020b). Also, many parents do support the inclusion of at least some sex-positive topics in sex education (Kantor & Levitz, 2017). However, to gain more necessary traction among
communities across the U.S., researchers may be wise to focus their attention on developing and testing implementation strategies that improve the acceptability of sex-positive approaches to sex education and thus, allow for their more seamless implementation in neighborhood schools, clinics, and community centers. For example, it may be important to develop information sessions for parents in which they can be introduced to the benefits of sex-positive sex education. Moving forward, it could be helpful to develop and evaluate strategies like this—with input from the families and communities that researchers hope to serve.

For researchers hoping to improve the evaluation of sex-positive approaches to sex education, another critical gap remains. Currently, there is no best-practice for evaluating the success of such approaches in the U.S. (Kantor & Lindberg, 2019). In their review, Kantor and Lindberg highlight that other countries who are on the forefront of implementing and evaluating sex-positive approaches to sex education (e.g., Canada, the United Kingdom), provide some examples of measures and methods for evaluation (2019). In the future, researchers could use these models to create and evaluate measures for use in U.S.-based samples of youth. It may be helpful to start by developing measures that evaluate: 1) whether sexual health programs are sex-positive (i.e., they have all of the necessary components) and 2) whether youth are experiencing improvements in more sex-positive outcomes (e.g., relationship health, sexual self-esteem).

Conclusion

Sexual health interventions can increase condom use and decrease the number of sex partners that youth have—changes in sexual behavior which have the potential to decrease STD/HIV contraction and unplanned pregnancy among this age group (Evans, Widman, et al., 2020a, 2020b; Haberland & Rogow, 2015; Johnson et al., 2011; Widman et al., 2019). Sexual health interventions may also be associated with sex positive outcomes (e.g., sexual satisfaction,
consent; Evans, Widman, & Goldey, 2020; Santelli, 2018). Furthermore, theoretical and empirical research in the field of psychology suggests that the way we teach adolescents about sexuality has the potential to impact their wellbeing throughout adulthood (Elder, 1998; Santelli, 2018; Walcott et al., 2011). However, while sexual health interventions, overall, are effective, there is certainly room for improvement (Evans, Widman, et al., 2020a; Widman et al., 2019). Thus, it is of utmost importance that we continue to better our methods for teaching about sexual health while also making available to youth the best, evidence-based programs that the field has to offer. Unfortunately, even the most effective programs do not always make it into the hands of the youth who need them (CDC, 2016c). Communities may not provide evidence-based sexual health interventions to youth for a number of reasons, including a lack of funding and resources as well as community-wide misinformation about the value of sex education (Hall, 2016; Strasburger & Brown, 2014). Disseminating evidence-based programs to all youth across the United States will likely require coordinated effort from researchers, policy makers, school and community center staff, clinicians, parents, and many more people and systems which youth depend on to thrive.
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