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HIV Risk-Reduction Prevention Interventions Targeting African American Adolescent Women

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Abstract

African American young women are overwhelmingly disproportionately burdened by HIV/AIDS in the United States today. The purpose of the current systematic review was to identify the characteristics of efficacious HIV risk-reduction prevention interventions targeting African American adolescent women in order to inform future intervention development and expansion. We searched PubMed, PsychInfo, and ProQuest databases for journal articles and dissertations published between 2000 and 2015 reporting the impacts of HIV risk-reduction prevention interventions in the U.S. targeting African American adolescent women under age 25. Twenty articles assessing the efficacy of 12 interventions were eligible for inclusion. Selected interventions represented a total of 5,556 African American adolescent women and primarily drew from self-efficacy and self-empowerment-based theoretical frameworks. One intervention targeted girls under age 13; eight included participants ages 13–17; ten targeted adolescents aged 18–24 years; and five interventions included women over age 24 among their participants. Most interventions consisted of in-person knowledge and skills-based group or individual sessions led by trained African American female health professionals. Three were delivered via personal electronic devices. All programs intervened directly at the individual-level; some additionally targeted mothers, friends, or sexual partners. Overall, efficacious interventions among this population promote gender and ethnic pride, HIV risk-reduction self-efficacy, and skills building. They target multiple socio-ecological levels and tailor content to the specific age range, developmental period, and baseline behavioral characteristics of participants. However, demonstrated sustainability of program impacts to date are limited and should be addressed for program enhancements and expansions.

Keywords

HIV; HIV Prevention Intervention; Sexually Transmitted Infections; African American; Women; Adolescents; Systematic Review

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Authors' contributions

CEH conceived of the study, participated in its design and coordination, participated in the extraction and interpretation of the data, and drafted the manuscript; CC participated in the design of the study, participated in the extraction and interpretation of the data, and helped to draft the manuscript. All authors read and approved the final manuscript.

Conflicts of Interest

The authors declare that they have no conflict of interest.

Introduction

African American young women are overwhelmingly disproportionately burdened by HIV/AIDS throughout the United States (U.S.) today. At current rates, 1 in 32 African American women will be diagnosed with HIV in her lifetime (Centers for Disease Control and Prevention, 2015a). This represents an infection rate 5 times higher than that of Hispanic/Latina women and 20 times higher than that of white women (Centers for Disease Control and Prevention, 2015a). Accordingly, HIV-related diseases are in the top 7 leading causes of death for African American women ages 20 through 44, a statement that is not true for women of any other racial/ethnic group in the U.S (Centers for Disease Control and Prevention, 2013). African American adolescent females make up only 15% of the U.S. adolescent female population; yet, by the end of 2012, they comprised 64% of the female adolescents in the U.S. living with HIV (Centers for Disease Control and Prevention, 2015c).

As African American women are often diagnosed late in the disease process, it is believed that many African American women receiving their diagnoses in early adulthood acquired HIV during adolescence (Sionean et al., 2014). Additionally, over 60% of perinatal HIV transmissions in the U.S. occur among African Americans (Centers for Disease Control and Prevention, 2012). As over half of first births among African American women occur before age 24 (Martin, Hamilton, Osterman, Curtin, & Mathews, 2015), perinatal HIV transmission is of particular concern for African American adolescent women. Thus, it is crucial to reduce the burden of HIV for all African American women, starting with adolescents, before many of the risk factors associated with HIV infection are already well-embedded in women's lives. Prevention efforts appropriately developed for African American adolescent women's age and developmental stages have the potential to reduce HIV incidence among adolescent African American women of today and the African American adult women and infants of tomorrow.

The immense and sustained disproportionate burden of HIV infection among young African American women is attributed to a complex combination of individual and environmental factors. As over 90% of HIV cases among African American women are acquired through heterosexual contact (Centers for Disease Control and Prevention, 2015b), the underlying etiology of the disproportionate burden of HIV among African American women differs from other populations with high rates of HIV — such as men who have sex with men and individuals who use intravenous drugs. Namely, the high prevalence and viral load of HIV, as well as elevated rates of gender inequity, poverty, and lack of educational resources in African American young women's communities, are all believed to contribute to African American women's elevated risk for HIV infection in adolescence and young adulthood. Further, the sexual risk behaviors of African American young men and women, and the prevalence of other STIs among African American women, contribute to African American women's elevated risk, as well (Adimora, Schoenbach, & Floris-Moore, 2009; Paxton, Williams, Bolden, Guzman, & Harawa, 2013; Perkins, Voisin, & Stennis, 2013; Pflieger, Cook, Niccolai, & Connell, 2013; Raiford, Seth, & DiClemente, 2013; Stockman et al., 2013; Wingood & DiClemente, 2000). As Brawner states in an article exploring the multiple levels of HIV/AIDS disease burden among African American women, "...some African

American women have minimal room for error because of the sheer concentration of HIV in their geographical and social environments” (Brawner, 2014, p. 634). Thus, African American adolescent women may be at elevated risk for acquiring HIV even when they do not personally exhibit high risk sexual behaviors (Adimora et al., 2006). Further, as adolescent women move along the developmental trajectory from early (<13 years old) to late adolescence (18–24), they are exposed to and engage in different risk behaviors and environments. Important variations in HIV risk behaviors and environments (e.g., sexual behavior, substance use) exist between early, middle, and late adolescence and may have important consequences for women’s risk of acquiring HIV during adolescence (Fergus, Zimmerman, & Caldwell, 2007). Consequently, in determining the most effective mechanisms for reducing HIV risk among African American adolescent women, the complex combination of individual and environmental factors that put African American women at elevated risk for acquiring HIV, as well as their age and developmental stage, must be considered.

The Current Study

As the HIV risk profile of African American adolescent women is unlike that of other populations in the U.S., we cannot predict which intervention characteristics will be most salient for program efficacy based on findings from other populations or studies that combine multiple populations (Lyles et al., 2007). Thus, the current systematic review is exploratory in nature, with the aim of identifying the characteristics of efficacious HIV risk-reduction prevention interventions specifically targeting African American adolescent women (under age 25). The current study aims to contribute to the literature in two important ways. First, we identify characteristics of recent efficacious HIV prevention efforts among this population (through 2015), thereby building upon earlier reviews. Secondly, we isolate the effects of studies specifically for African American heterosexual adolescent women, acknowledging that the risk profiles of African American adolescent women differ from that of older African American women, adolescent women of different races/ethnicities, and African American adolescent males. The findings from this study can be used in the creation and expansion of high-impact prevention approaches that address the needs, environments, and risks specific to African American adolescent women in the United States.

Methods

Search Strategy

In January of 2016, both authors searched PubMed/MEDLINE, PsychInfo, and ProQuest databases for English-language journal articles and dissertations published between 2000 and 2015. The literature search strategy is outlined in Figure 1. Our search terms included a combination of words related to HIV, African American adolescent women, and efficacy studies of risk-reduction and/or prevention interventions (see search terms in Table 1). Our initial search yielded a total of 1,049 articles across the three databases.

After removing duplicate citations retrieved from the databases (n=384), both authors screened the remaining 665 article titles and abstracts according to the inclusion and

exclusion criteria (see Table 1) and excluded irrelevant articles. During an in-person meeting, we discussed any discrepancies in excluded articles until consensus was reached on the final list of articles for full text screening. Ultimately, 592 articles were excluded at this stage. We repeated this process with both authors screening the full text of the remaining 73 articles and excluded an additional 54 articles that did not meet inclusion/exclusion criteria. The most common reasons articles were excluded during the full text screening were that they 1) did not test intervention effects (such as feasibility or acceptability studies), 2) only tested effects for a short duration (<3 months), or 3) did not include a comparison group in the study design. After an in-person meeting to resolve discrepancies, 19 articles remained for inclusion in the current review derived from the database searches. We next conducted an ancestry search, searching the reference lists of the included articles, for additional appropriate articles (n=1) resulting in a total of 20 articles for inclusion in the current systematic review.

Articles meeting our inclusion criteria assessed HIV risk-reduction intervention outcomes at least 3 months post intervention targeting African American adolescent women in the U.S. with a mean age of less than 25 years. Per quality criteria of HIV risk-reduction intervention studies established by the CDC (Lyles et al., 2007), we included only studies employing a comparison group to determine intervention effects that conducted statistical analyses to determine program efficacy or effectiveness. Articles that included adolescent women of other races/ethnicities were included if the study sample was comprised of over 80% African American adolescent women. Further, studies including adolescent males were only included if data was analyzed separately by gender. Due to the unique HIV risk profile of transgender women (Garofalo, Deleon, Osmer, Doll, & Harper, 2006) and individuals using intravenous drugs (Strathdee et al., 2010), interventions specifically targeting these populations were excluded. We also excluded interventions targeting HIV-positive individuals.

In a second review of the full text of the remaining articles, both authors extracted information describing the characteristics of the interventions (Tables 2 and 3). In describing the characteristics of the interventions, we extracted information regarding the theoretical or conceptual framework reported to drive the intervention approach, the subpopulation of African American adolescent women targeted by the intervention, the mode of delivery of intervention content, and how the comparison group treatment differed from the intervention group. To describe the studies (Table 4), we extracted the characteristics of the study sample, the participant recruitment strategy and/or location, the geographic and/or temporal setting, characteristics of the randomization strategy, the intervention outcomes assessed, and a summary of the main findings. We held an in-person meeting to discuss any discrepancies in extracted information and reach consensus on final information to be included in each of the tables.

Methodological Quality Assessment

To evaluate the risk of bias for each of the HIV risk-reduction intervention studies (Lyles et al., 2007), we extracted information regarding the study design, the timeline of follow up

outcome assessments, attrition rates, and methods of data collection. Methodological quality information for each study is presented in Table 4.

Results

Description of Intervention Features

Twelve interventions were assessed in the reviewed articles. Three of the interventions, SiHLE, HORIZONS, and Centering Pregnancy Plus (CPP), received a “Best” rating from the CDC in their assessments of Risk Reduction Evidence-based Behavioral Interventions (Centers for Disease Control and Prevention, 2015d). Best-evidence Risk Reduction Behavioral Interventions are those with a clearly detailed intervention design, a prospective study design with either a randomly-assigned or minimally-biased comparable control group, at least 50 participants per study arm, at least a 70% retention rate for each arm, a follow-up assessment at least 3 months post-intervention, and demonstrated positive, relevant intervention effects at $p < .05$ (Lyles et al., 2007). The CDC defines a relevant outcome as a behavior “that directly impacts HIV risk or a biologic measure indicating HIV or STD infection” (Centers for Disease Control and Prevention, 2014, p. 1). Five interventions (Multimedia SiHLE, SAHARA, SISTA/HORIZONS adaptation, Imara, and HORIZONS + PMI) are adaptations of one or more of the three CDC “Best” rated interventions listed above. The theoretical and conceptual frameworks informing intervention content and structure as well as the target populations and modes of intervention delivery are presented in Table 2 and described below.

Theoretical frameworks—Each intervention describes one or more theoretical frameworks informing its content, approach, and design (see Table 2 and Figure 2). Common theoretical frameworks employed included those based on increasing participants’ self-efficacy around communicating with partners about sexual and reproductive health topics, refusing sex, and/or using condoms. Self-efficacy-based theoretical frameworks included the Social Cognitive Theory (SCT), the AIDS Risk-Reduction Model (ARRM), the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB). Other theoretical frameworks focus on increasing participants’ self-empowerment to increase the level of power or control a woman has in her romantic relationships and sexual experiences—including deciding when, with whom, and the steps that will be taken to lower HIV risk during sex, such as using condoms. Self-empowerment-based frameworks included the Theory of Gender and Power (TGP), Sex Script Theory (SST), and the Theory of Power as Knowing Participation in Change (TPKPC). Whether explicitly stated or not, several interventions draw upon socio-ecological models by additionally targeting the friends, mothers, and sex partners of African American adolescent women to reduce their risk of acquiring HIV.

Target populations—Interventions targeted African American adolescent women from age 11 to 39 (see Table 3). One intervention targeted younger adolescents (ages 11–14); four specifically targeted older adolescents (over age 18). Most ($n=7$) interventions targeted adolescents of high school age; however, of these, five also targeted women over age 18. The intervention targeting younger adolescents also targeted the girls’ mothers (MDRR) and

focused on the mother-daughter relationship and communication as protective against HIV risk. Project ORE targeted African American adolescent women ages 14–18 and their friends ages 14–21 with the objective that participating friends would reinforce the risk-reduction goals set by participants after completion of the single-session intervention. Interventions based on the HORIZONS model provided STI treatment vouchers or expedited therapy for male partners of participants testing positive for an STI in order to reduce participant risk of re-infection and extended biological vulnerability to HIV due to STI infection. Imara targeted African American adolescent women during detainment in a short-term juvenile detention facility as well as following their release to home. Eight interventions targeted adolescents reporting some level of sexual behavior risk (e.g., sexually initiated, recently sexually active, reporting recent unprotected sex with male). One intervention (MDRR) specifically targeted participants from households with low incomes or living in an area of high poverty.

Mode of delivery—Ten interventions were delivered in-person. Of these, all were conducted in group sessions save for one —Imara— which was delivered in-person individually in a juvenile detention center and in the participants’ homes. All in-person sessions were conducted by African American female nurses or health educators aside from MDRR which was delivered by the mothers of participants after they received 12 weeks of intervention facilitator training from research staff. Group sessions were delivered in healthcare settings, schools, community organizations or otherwise not specified. The number of in-person sessions ranged from one (Project ORE) to ten (Centering Pregnancy Plus). Two HORIZONS-based interventions with group sessions and Imara additionally provided individually tailored booster telephone contacts ranging from 4 (HORIZONS and Imara) to 18 (HORIZONS + PMI) to reinforce material from in-person sessions.

Some interventions with demonstrated efficacy via an in-person group design facilitated by African American female health educators or nurses have been adapted to test the efficacy of computer-delivered versions of the interventions in order to decrease per participant intervention cost and increase dissemination feasibility. One intervention (Multi-media SiHLE) delivered all intervention content via 2 60-minute computer-delivered sessions while SAHARA delivered content via a hybrid of 2 60-minute laptop sessions and one 15-minute in-person group session. One intervention did not originate from an in-person-delivery designs: Love, Sex, and Choices consisted of 12 weekly 15–20 minute soap opera video episodes delivered directly to smartphones provided to the participants. All in-person and telephone interventions were delivered by African American women; those delivered electronically featured African American women in video or audio form.

Description of Studies

Study characteristics are summarized in Table 4. Twenty articles assessing participant outcomes from 12 studies are included in the review. This represents 5,556 participants, 2,787 of whom received the intervention tested in the study. The 2,769 control participants received a variety of alternative treatments ranging from no intervention, to an intervention for a dissimilar topic such as nutrition and exercise, to a different version of the intervention than received by the treatment group (see Table 2). Studies range from 135 to 1,047

participants per study. The weighted mean average of the participants' ages is 18.0 years across all 12 studies. Participant inclusion/exclusion criteria varied across studies. Nine studies included only non-married participants. Studies of 6 interventions included women seeking health services at specific locations. One study included only pregnant women (Centering Pregnancy Plus). Five studies specified that participants must not currently be pregnant and not trying to become pregnant. Other study inclusion criteria required that participants were recently sexually active, had ever had sex with a male, or reported high sexual risk behaviors such as recent unprotected sex with a male. One study included only women that had low incomes; one required that the women live in the same household as their mothers and another required that participants be willing to nominate a friend to participate. Studies conducting secondary analyses included sub-populations of the original study samples, such as only participants who had experienced intimate partner violence, and women reporting baseline depressive symptoms above a designated threshold. Participants were recruited through middle schools, reproductive and sexual health clinics, Kaiser Permanente, juvenile detention centers, community organizations, street outreach, flyers, market research emails and social networking, and/or participant referrals.

Studies assessed participant outcomes related to HIV risk-reduction mediators including HIV prevention knowledge, perceived risk, attitudes, intentions, assertiveness, depression, self-efficacy, parent or partner communication, sexual risk-reduction behaviors, condom application skills, and STI infection or re-infection. Assessed study outcomes reflect both documented direct HIV-risk reduction mediators (e.g., other STI infection, number of sexual partners —both concurrent and sequential, consistent condom use, sex while intoxicated) as well as mediators based on the theoretical frameworks informing intervention content and design (e.g., mother-child communication, assertiveness, condom and/or sex refusal self-efficacy).

Commonly reported indicators of study quality include the study design, time to the furthest assessment point, attrition rate, and the method of data collection. Study quality indicators are presented in Table 4. Eighteen studies used randomized control trial designs with one or two control arms. Two studies report multi-group quasi-experimental designs. Seven studies report conducting secondary or sub-analyses drawing from participant data from 4 randomized control trials. These studies assessed intervention mediators, or evaluated a sub-sample of the participants based on baseline (e.g., depression symptomology, experienced intimate partner violence) characteristics.

The furthest follow-up assessment is a key aspect of behavioral intervention study methodological quality due to the challenge of short-term behavioral interventions in producing sustainable behavior change among individuals within high-risk environments (Lyles et al., 2007). The presently reviewed studies range from 3 months post intervention to 36 months post primary treatment (HORIZONS + PMI) in their furthest point of follow up assessment, with the majority of studies assessing follow-up intervention outcomes between 3 and 12 months post baseline or post intervention. Attrition rates reflect the time to assessment which averages about 10% for assessments up to 3 months post intervention, 20% for assessments at 6 and 12 months post intervention and 39% for the intervention assessing outcomes at 36 months post primary treatment.

Due to the potentially sensitive nature of outcome assessment measures related to HIV risk reduction, twelve studies reported using Audio Computer-Assisted Self-Interview (ACASI) systems for participant self-reported data collection. Eight studies reported the use of pen and paper questionnaires. In studies assessing outcomes of the SiHLE and Imara interventions, participant condom application skills were assessed via an in-person assessment. Additionally, studies assessing incident STIs as an outcome of interest collected specimens to conduct STI testing.

Discussion

The aim of the current systematic review was to identify the characteristics of risk-reduction interventions with demonstrated efficacy in reducing HIV risk among African American adolescent females under age 25. As the ages of participants in the reviewed studies extended from early to late adolescence, the impacted outcomes reflect the developmental trajectories of adolescents as they progress from early to late adolescence and begin to engage in HIV risk behaviors such as sexual activity and drug and alcohol use. Outcomes ranged from more distal protective factors such as improving mother-child communication among early adolescents (the MDRR study targeted adolescents ages 11–14 regardless of sexual experience) to more proximal and direct protective factors such as increasing the proportion of condom-protected sex acts and reducing STI incidence among older adolescent women with a history of high-risk sexual behavior.

Overall, interventions with positive impacts among African American adolescent women promote self-empowerment and HIV risk-reduction self-efficacy and skills building. They tailor content to the developmental stage, age range, and baseline characteristics of participants, such as previous sexual behavior and incarceration status. Further, secondary analyses of intervention data revealed differential efficacy of interventions by women's baseline depression symptomology, alcohol use, and experience with interpersonal violence.

Two main challenges for HIV risk-reduction interventions targeting African American adolescent women are demonstrating sustained intervention effects over time and the feasibility of expanding the intervention to reach more participants due to the per-participant resources required for in-person interventions. Notably, interventions in this review report success in extending intervention effects through the use of telephone booster sessions to reinforce in-person group interventions. Also, while not explicitly tested in the reviewed studies, interventions additionally targeting mothers, friends, and partners of African American adolescent women aim to extend sustainability of intervention effects by intervening at the interpersonal relationship level —anticipating that the intervention effects will continue to be reinforced through these relationships after completion of the structured intervention period. The reviewed interventions offer two promising strategies for testing the feasibility of scaling up efficacious in-person interventions: delivering intervention content through electronic devices, and training mothers to deliver intervention content in-person in lieu of health professionals. However, when moving from efficacy to effectiveness trials in delivering HIV risk-reduction interventions via electronic devices, researchers note challenges in feasibility of implementation (DiClemente et al., 2013).

While the reviewed studies contain variation in methodological quality, the majority of studies had clear descriptions of the tested interventions, comparable comparison groups, used ACASI systems and appropriate measures for collecting self-reported data, and maintained retention rates of over 70% by 3 months post-intervention. Considering the challenges associated with conducting sexual health intervention research with adolescents, it is expected that the validity of findings are relatively high for the reviewed studies.

Based on the synthesis of the reviewed studies, we present three main recommendations for practice and future research. Specifically, our findings suggest future studies and intervention efforts in this field should aim to: 1) address factors that have been demonstrated to modify intervention efficacy; 2) include and test strategies to promote long-term sustainability of intervention effects; and 3) continue efforts to promote scalability of efficacious interventions.

To increase intervention efficacy, intervention designers should consider addressing participants' baseline characteristics that are demonstrated to modify intervention efficacy such as participants' depression symptomology, substance use, experiences with interpersonal violence, previous sexual experience, and age. This could come in the form of screening participants for the type and content of intervention that would be most appropriate for them considering their baseline characteristics and/or incorporating content into the intervention that addresses these factors. Lessons can be learned from interventions that target both substance use and sexual risk prevention in their content and design (Belgrave, Corneille, Nasim, Fitzgerald, & Lucas, 2008; Coatsworth, Pantin, & Szapocznik, 2002).

Also, accounting for variation in risk profile between age groups and developmental stages has the potential to increase the impact of HIV prevention programs among adolescent women. Adolescence is a long developmental period with extensive variation from beginning to end. In addition to the variation in experiences of HIV risk behaviors and environments across adolescence, there is wide variety in decision-making capabilities, autonomy, and access to resources from early to late adolescence that may be associated with adolescents' risk, and their ability to lower their risk, for acquiring HIV. For example, while minors may consent to their own STI services in all states, they currently need parental consent for HIV testing in 19 states (Guttmacher, 2016). Researchers should consider adolescents' age and developmental stage both when designing interventions and when analyzing intervention effects. Two studies included in this review found significant differential impacts between younger and older adolescents (Centering Pregnancy Plus and Project ORE) indicating important variation in program effects across adolescent age group and developmental stage. For example, Dolcini et al (2010) found no overall intervention effects across their Project ORE participants, but significant and distinct intervention impacts when assessing impact by age group within the study population. Similarly, in a test of Multimedia SiHLE, Klein and Card (2011) found differential intervention effects for condom use self-efficacy for their non-sexually initiated participants and sexually initiated participants.

While most of the reviewed interventions specifically targeted sexually initiated women and/or women already demonstrating sexual risk behaviors, much of the content addressed in the reviewed interventions is also developmentally appropriate for younger adolescents (Future of Sex Education Initiative, 2012). Thus, another potential strategy for enhancing intervention impact is to begin intervening earlier in adolescence, before sexual risk behavior patterns are already established. According to 2013 Youth Risk Behavior Survey (YRBS) results, one third of African American female 9th graders already report having had sex (Kann et al., 2014). Thus, African American adolescent women in high risk environments may be in need of effective risk reduction prevention intervention before entering high school. In order to test sustainability of effects of prevention efforts beginning earlier in adolescence, long-term follow up is necessary. If not feasible to follow a comparable control group longitudinally, researchers could draw from measures from national surveys (e.g., YRBS) and compare intervention participants' behaviors in high school to similar population survey results. A study not included in the review targeted African American adolescent women under age 13 with promising initial efficacy results, but did not meet our inclusion criteria requirements for methodological quality (Bartlett & Shelton, 2010). An additional qualitative study of a prevention intervention for African American girls ages 9–12 was not included in the current review, but begins to address the need for earlier intervention for this population (Shambley-Ebron, 2009). Consequently, interventions targeting African American girls prior to entering high school are also in need of funding for developing trials with high methodological quality to test the longitudinal effects of their interventions.

Additionally, strategies to promote sustainability of intervention effects should be included in intervention design and tested against traditional short-term, individual-level interventions. One of the most promising strategies to date is the inclusion of follow-up telephone booster sessions (DiClemente et al., 2014). Also, interventions targeting mothers, friends, partners, and the community-at-large of African American adolescent women could be coupled with individual-level interventions and tested against individual-level-only interventions to determine if additional intervention in the environmental levels of the individuals prolongs intervention effects.

Finally, efforts to promote scalability of efficacious interventions, such as the use of computer-based multimedia prevention interventions and/or smart phone-delivered educational materials targeted to African American adolescent women, should continue. While researchers have identified successful strategies for adapting in-person content to be delivered electronically and in-person by mothers in lieu of health professionals, further implementation studies and effectiveness trials are needed for interventions targeting African American adolescent women. Lessons can be learned from the facilitators and barriers identified while scaling up other evidence-based HIV prevention interventions (Kegeles, Rebchook, Tebbetts, & Arnold, 2015).

Conclusion

This review provides further evidence that efficacious HIV prevention interventions targeting African American adolescent women promote gender and ethnic pride, self-

empowerment, and HIV risk-reduction self-efficacy and skill building. They target multiple socio-ecological levels and tailor content to the specific age range, developmental period, and baseline behavioral characteristics of participants. However, demonstrated sustainability of program impacts to date are limited and should be addressed for program enhancements and expansions. In order to increase program efficacy and effectiveness in a cost-effective manner, our findings suggest that intervention designers should consider factors that are demonstrated to diminish intervention efficacy, include and test strategies to promote sustainability of intervention effects, and continue efforts to promote scalability of efficacious interventions.

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Biographies

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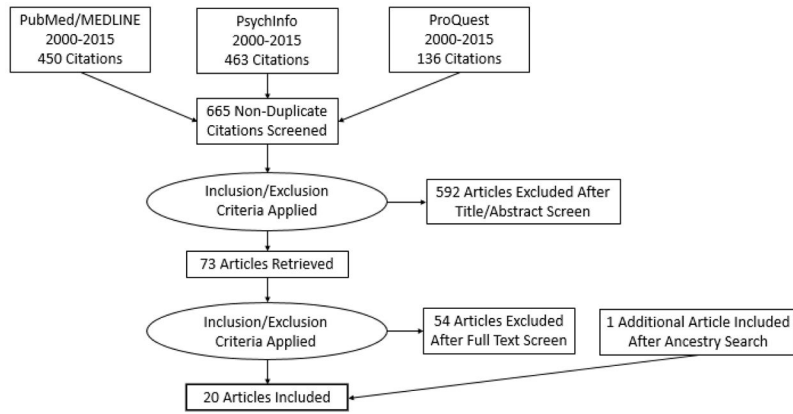


Figure 1.
Flow diagram of literature search

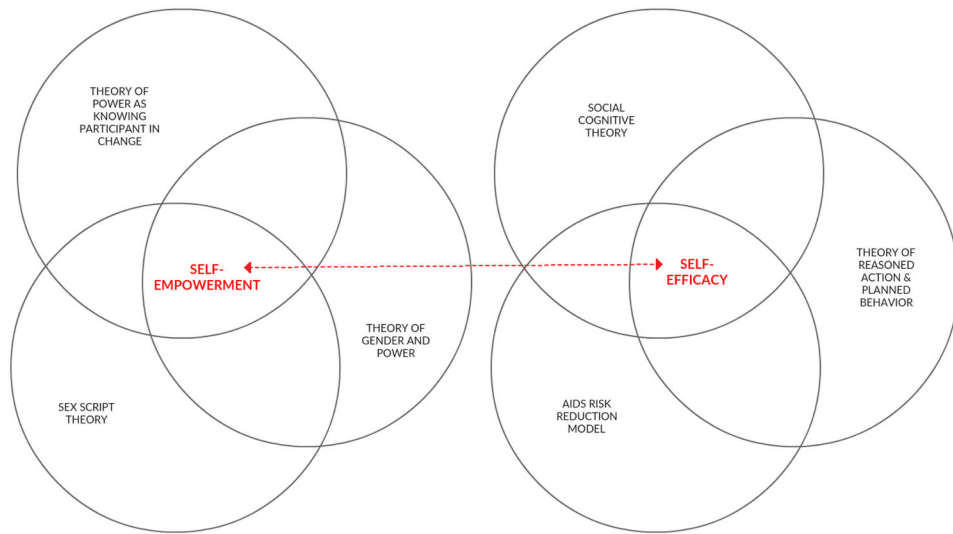


Figure 2. Dominant theoretical frameworks guiding HIV prevention interventions targeting African American adolescent women, 2000–2015

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Table 1

Search terms, inclusion, and exclusion criteria

<p>Search Terms: HIV OR "human immunodeficiency virus" AND "African American" OR black AND adolescen* OR teen* OR young OR youth* AND female* OR women OR girl* OR gender AND prevent* OR risk OR reduc* OR intervention* OR program* OR trial* OR experiment* OR efficac* OR impact*</p>
<p>Inclusion Criteria:</p>
<p>01/01/2000 – 12/31/2015</p>
<p>Interventions</p>
<p>Within the United States</p>
<p>Assessing outcomes of intervention 3 months post intervention</p>
<p>Includes control group</p>
<p>Quantitative-conducts statistical analysis to determine efficacy</p>
<p>Including African American adolescent women as a target population of the intervention</p>
<p>Sample >80% African American</p>
<p>If males included, data analyzed by gender</p>
<p>Mean age of participants is under 25</p>
<p>Exclusion Criteria:</p>
<p>Interventions targeting transgender women</p>
<p>Interventions targeting IV drug users</p>
<p>Interventions targeting individuals living with HIV</p>

Table 2

Intervention characteristics of HIV risk-reduction programs targeting African American adolescent women

Program	Reference(s)	Theoretical/ conceptual framework	Target population	Mode of delivery	Control group
SiHLE	DiClemente et al, 2004 Wingood et al, 2006 Milhausen et al, 2008 Sales et al, 2010	SCT, TGP	<ul style="list-style-type: none"> AA sexually active women ages 14–18 	<ul style="list-style-type: none"> 4 4-hour in-person group sessions led by trained AA female health educator & 2 AA female peer educators focus on gender & ethnic pride 	<ul style="list-style-type: none"> 4 4-hour in-person group sessions on exercise & nutrition
Enhanced SISTA	Belgrave et al, 2008	SCT, TGP	<ul style="list-style-type: none"> AA women ages 18 and 34 	<ul style="list-style-type: none"> 2 hours per week for 5 weeks in-person group sessions, optional booster session after 2–3 months enhanced additional topic: relationship between drug use and HIV risk 	<ul style="list-style-type: none"> standard SISTA curriculum
HORIZONS	DiClemente et al, 2009 Sales et al, 2012	SCT, TGP	<ul style="list-style-type: none"> AA sexually active, not married, not currently or trying to become pregnant, women seeking sexual health clinic services, ages 15–21 	<ul style="list-style-type: none"> 2 4-hour group sessions led by trained AA female health educators 4 telephone contacts to reinforce group sessions vouchers for male partner STD testing/treatment focus on gender & ethnic pride 	<ul style="list-style-type: none"> enhanced usual care: 1-hour group session; 4 telephone contacts to update contact information
HORIZONS + PMI	DiClemente et al, 2014 Brown et al, 2014	SCT, TGP, Directive, cognitive-behavioral problem-solving and goal-setting approach	<ul style="list-style-type: none"> AA sexually active, not married, not currently or trying to become pregnant, women seeking sexual health clinic services, ages 14–20 	<ul style="list-style-type: none"> primary treatment: HORIZONS: in-person group session delivered by trained AA female health educators supplemental treatment: PMI: individually-tailored phone-delivered HIV prevention maintenance counseling sessions every 8 weeks for 36 months delivered by health educator 	<ul style="list-style-type: none"> primary treatment + general health promotion phone-delivered counseling
Multimedia SiHLE	Klein and Card, 2011	SCT, TGP	<ul style="list-style-type: none"> AA women ages 14–18 	<ul style="list-style-type: none"> SiHLE adaptation 2 1-hour computer-delivered individual-level intervention 	<ul style="list-style-type: none"> 65-minute computer-delivered videos on diet & nutrition
SAHARA	Wingood et al, 2011	SCT, TGP	<ul style="list-style-type: none"> AA women with high sexual risk behavior, ages 21–29 	<ul style="list-style-type: none"> 2 60-minute laptop-delivered sessions including 15-minute small group session led by AA female health educator 	<ul style="list-style-type: none"> 60-minute group session of general health information (including HIV prevention video)
SiHLE/HORIZONS adaptation	Wingood et al, 2013 Seth et al, 2014 Seth et al, 2015	SCT, TGP	<ul style="list-style-type: none"> AA not married, sexually active women, ages 18–29 	<ul style="list-style-type: none"> SiHLE/HORIZONS adaptation 2 4-hour in-person group sessions led by AA female health educators 	<ul style="list-style-type: none"> 1 4-hour in-person group session on nutrition & exercise

Program	Reference(s)	Theoretical/ conceptual framework	Target population	Mode of delivery	Control group
Imara	DiClemente et al, 2014	SCT, TGP	<ul style="list-style-type: none"> AA women in juvenile detention, ages 13–17 	<ul style="list-style-type: none"> HORIZONS adaptation 1 individual in-person session at detention facility & 2 home sessions led by trained AA female health educator-1.5 hours each 4 telephone contacts to reinforce individual sessions expedited partner therapy for STI-positive participants 	<ul style="list-style-type: none"> usual care: STI testing, treatment, and counseling
MDRR: Mother/Daughter Risk Reduction	Dancy et al, 2009	SCT, TRA/TPB	<ul style="list-style-type: none"> AA girls ages 11–14 living below poverty line & their mothers 	<ul style="list-style-type: none"> mothers receive 12 weeks of curriculum & facilitator training from research staff 6 weekly group sessions led by trained mothers mother/daughter homework assignments 	<ul style="list-style-type: none"> group #1: Mother Daughter Health Promotion (MDHP) group #2: Health Expert HIV Risk Reduction (HERR)
Centering-Pregnancy Plus	Kershaw et al, 2009	SCT, ecological model	<ul style="list-style-type: none"> pregnant AA women under 25 years old 	<ul style="list-style-type: none"> 10 CenteringPregnancy (CP) in-person group prenatal care sessions additional HIV content and focus on sex partner communication skills 	<ul style="list-style-type: none"> group #1: standard individual prenatal care (IC) group #2: standard CenterPregnancy group (CP)
Project ORE	Dolcini et al, 2010 Bangi et al, 2013	ARRM	<ul style="list-style-type: none"> sexually experienced AA women ages 14–18, 2–5 friends ages 14–21 	<ul style="list-style-type: none"> 5-hour, single-session, in-person friendship group led by trained AA female health educators 	<ul style="list-style-type: none"> nutrition/exercise intervention
LSC: Love, Sex, and Choices	Jones et al, 2013	Sex script theory, Theory of Power as Knowing Participation in Change	<ul style="list-style-type: none"> AA women with high sexual risk behaviors ages 18–29 	<ul style="list-style-type: none"> 12 weekly 15–20 minute soap opera video episodes streamed to study-provided smartphones 	<ul style="list-style-type: none"> 12 weekly HIV risk reduction text messages sent to smartphones

Abbreviations: ARRM: AIDS Risk Reduction Model; SCT: Social Cognitive Theory; TRA/TPB: Theory of Reasoned Action/Theory of Planned Behavior; TGP: Theory of Gender and Power; AA: African American

Table 3

Age ranges of participants included in reviewed interventions (N=12)

AGE RANGE	SIHLE (ages 14-18)	Enhanced SISTA (ages 18-39)	HORIZONS (ages 15-21)	HORIZONS + PMI (ages 14-20)	Multimedia SIHLE (ages 14-19)	SAHARA (ages 21-29)	SIHLE/HORIZONS adaptation (ages 18-29)	Imara (ages 13-17)	MDRR (ages 11-14)	Centering Pregnancy Plus (ages 14-25)	Project ORE (ages 14-21)	Love, Sex, & Choices (ages 18-29)	TOTALS
>24		X				X	X			X		X	5
18-24	X	X	X	X	X	X	X			X	X	X	10
13-17	X		X	X	X			X	X	X	X		8
<13									X				1

Table 4
Study characteristics of HIV risk-reduction interventions targeting African American adolescent women

Program	Reference	Sample	Recruitment	Setting	Study quality	Randomization level	Outcome(s)	Summary of findings
SHLE	DiClemente et al. 2004	522 sexually experienced girls; 251 intervention/271 control	Community health agencies	Birmingham, AL, 1995–2002	design: 2-arm RCT	individual	condom use	6 mo fr. intervention pts had more consistent condom use than control
		14–18 years old (M=16)		fr. 6 & 12 mos	sexual behaviors		12 mo fr. intervention pts had higher HIV prevention knowledge; partner efficacy, & proficiency than control; intervention pts had less chlamydia infection than control.	
		100% AA		attribution: 6 mos: 10%, 12 mos: 12%	condom application skills			
		100% female		data collection: pen & paper questionnaire, interview, self-collected vaginal specimens for STI testing	incident STI		no difference in trichomonas or gonorrhea infection	
SHLE	Wingood et al. 2006	sub analysis of 146 participants reporting gender-based violence experience at baseline	Community health agencies	Birmingham, AL, 1995–2002	design: 2-arm RCT	individual	condom use	among pts who had experienced gender-based violence, intervention pts had more consistent condom use, were less likely to have a new sexual partner or an STI, and had higher condom application skills than control
				fr. 6 & 12 mos	new sex partner			
				attribution: 6 mos: 10%, 12 mos: 12%	incident STI			
				data collection: pen & paper questionnaire, interview, self-collected vaginal specimens for STI testing	unprotected vaginal sex			
SHLE	Mihause et al. 2008	522 sexually experienced girls; 251 intervention/271 control	Community health agencies	Birmingham, AL, 1995–2002	design: 2-arm RCT	individual	frequency of vaginal sex	no difference in frequency of sex at any time post intervention; does not increase frequency of sex.
		14–18 years old (M=16)		fr. 6 & 12 mos				
		100% AA		attribution: 6 mos: 10%, 12 mos: 12%	HIV prevention knowledge			
		100% female		data collection: pen & paper questionnaire, interview, self-collected vaginal specimens for STI testing	condom attitudes			
SHLE	Sales et al. 2010	sub analysis of 245 participants reporting at or above threshold depressive symptoms	Community health agencies	Birmingham, AL, 1995–2002	design: 2-arm RCT	individual	HIV prevention knowledge	among pts with above threshold depressive symptoms, intervention pts had greater HIV prevention knowledge; favorable attitudes, & skills; & HIV prevention knowledge than control
				fr. 6 & 12 mos	condom use			
				attribution: 6 mos: 10%, 12 mos: 12%	condom attitudes			
				data collection: pen & paper questionnaire, interview, self-collected vaginal specimens for STI testing	condom application skills		no difference in partner communication	
Enhanced SISTA	Belgrave et al. 2008	260 women identifying as heterosexual	Churches, universities, clinics, community centers	Southeastern metropolitan area	design: 2 group between-group quasi-experiment	N/A	HIV prevention knowledge	immediately post intervention: enhanced pts had greater HIV prevention knowledge
		over 50% college students		fr. 3 mos post intervention	condom use		3 mo fr. enhanced pts had greater frequency of condom use	
		114 intervention/146 control		attribution: 13%				
		18–39 years old (M=22)		data collection: pen & paper questionnaire				

Program	Reference	Sample	Recruitment	Setting	Study quality	Randomization level	Outcome(s)	Summary of findings
HORIZONS	D'Clarence et al, 2009	<ul style="list-style-type: none"> 715 women seeking sexual health services 348 intervention/367 control not married, not currently nor trying to become pregnant sexually active in past 60 d 15-21 years old (M=17.8) 100% AA 100% female 	Clinics providing sexual health services	Atlanta, GA, 2002-2004	<ul style="list-style-type: none"> design: 2-arm RCT fu: 6 & 12 mos post group sessions attrition: 6 mos: 14%; 12 mos: 15% data collection: ACASI, self-collected vaginal specimens for STI testing 	individual	<ul style="list-style-type: none"> chlamydial infection condom use douching frequency # lifetime sex partners HIV prevention knowledge condom use self-efficacy partner safer sex communication 	<ul style="list-style-type: none"> 12 mo fu: intervention pts had fewer chlamydial infections, higher proportion of & more consistent condom use, less frequent douching, higher HIV prevention knowledge, condom use self-efficacy, & partner communication
HORIZONS	Sales et al, 2012	secondary analysis of full sample	Clinics providing sexual health services	Atlanta, GA, 2002-2004	<ul style="list-style-type: none"> secondary mediation analyses 	individual	<ul style="list-style-type: none"> proportion of condom-protected sex acts consistent condom use 	<ul style="list-style-type: none"> partner communication partially mediated intervention influence on proportion of condom-protected sex acts & consistent condom use
HORIZONS + PMI	D'Clarence et al, 2014	<ul style="list-style-type: none"> 701 clinic patients 342 intervention (PMI)/359 control not married, not currently nor trying to become pregnant reported unprotected vaginal sex in past 6 mos 14-20 years old (M=17.6) 100% AA 100% female 	Clinics providing sexual health services	Atlanta, GA, 2005-2007	<ul style="list-style-type: none"> design: 2-arm randomized supplemental treatment trial fu: 6, 12, 18, 24, & 36 mos post primary treatment attrition: overall: 10%, 6 mos-22%, 12 mos-28%, 18 mos-31%, 24 mos-39%, 36 months-39% data collection: ACASI with blinded monitors, self-collected vaginal specimens for STI testing 	individual	<ul style="list-style-type: none"> proportion of condom-protected sex acts sex while intoxicated # of sex partners incident STI 	<ul style="list-style-type: none"> 36 mo fu: intervention pts had higher proportion of condom-protected sex acts, fewer chlamydia & gonorrhea infections, & fewer sex partners than control
HORIZONS + PMI	Brown et al, 2014	<ul style="list-style-type: none"> 701 clinic patients 342 intervention (PMI)/359 control not married, not currently nor trying to become pregnant reported unprotected vaginal sex in past 6 mos 14-20 years old (M=17.6) 100% AA 100% female 	Clinics providing sexual health services	Atlanta, GA, 2005-2007	<ul style="list-style-type: none"> design: 2-arm randomized supplemental treatment trial fu: 6, 12, 18, 24, & 36 mos post primary treatment attrition: overall: 10%, 6 mos-22%, 12 mos-28%, 18 mos-31%, 24 mos-39% data collection: ACASI with blinded monitors, self-collected vaginal specimens for STI testing 	individual	<ul style="list-style-type: none"> depressive symptoms: CES-D 	<ul style="list-style-type: none"> 24 mo fu: both groups decreased depressive symptoms; PMI pts decreased depressive symptoms additionally 3.6% over control
Multimedia SHLE	Klein and Caid, 2011	<ul style="list-style-type: none"> 178 women living in San Francisco Bay Area 91 intervention/87 control 14-18 years old (M=15.8) 100% AA 100% female 	Market research firm e-mails, flyers, direct mail, & Twitter. Flyers at schools, & referrals from contacted individuals	Fremont, Concord, & Sunnyvale, CA	<ul style="list-style-type: none"> design: 2-arm RCT fu: 3 mos attrition: 9% data collection: pen & paper questionnaire 	individual	<ul style="list-style-type: none"> HIV prevention knowledge condom use & self-efficacy partner communication 	<ul style="list-style-type: none"> 3 mo fu: all pts: intervention pts had higher HIV prevention knowledge, condom-protected sex acts, & HIV prevention knowledge than controls no differences in sexual communication self-efficacy nor frequency, # of women becoming sexually active 3 mo fu non-sexually active pts: intervention pts increased condom self-efficacy, controls did not.
SAHARA	Wingood et al, 2011	<ul style="list-style-type: none"> 135 women seeking services at Planned Parenthood 67 intervention/68 control ages 21-29 (M=24) report unsafe sex with male in past 3 mos 	Planned Parenthood clinic	Atlanta, GA	<ul style="list-style-type: none"> design: 2-arm RCT fu: 3 mo attrition: 14% data collection: ACASI with blinded monitors 	individual	<ul style="list-style-type: none"> HIV prevention knowledge condom use, self-efficacy, barriers, & attitudes partner communication frequency 	<ul style="list-style-type: none"> 3 mo fu: intervention pts had higher HIV prevention knowledge, higher condom self-efficacy, higher % & consistency of condom use

Program	Reference	Sample	Recruitment	Setting	Study quality	Randomization level	Outcome(s)	Summary of findings
SHLE/HORIZONS adaptation	Wingood et al., 2013	100% AA	Kaiser Permanente Centers	Atlanta, GA 2002–2006	•	individual	<ul style="list-style-type: none"> HIV prevention knowledge condom self-efficacy, barriers, & attitudes safer sex strategies partner characteristics STI incidence: chlamydia, gonorrhea, trichomonas, HPV 	<ul style="list-style-type: none"> 12 mo fu: intervention pts had higher HIV prevention knowledge & condom use self-efficacy, used more safer sex behaviors, less STIs, less high-risk HPV than control pts
		• 100% female						
		• 848 female Kaiser Permanente members						
		• 605 intervention/243 control not married, sexually active						
		• 18–29 years old (M=22)						
		• 100% AA						
SHLE/HORIZONS adaptation	Seth et al., 2014	100% female	Kaiser Permanente Centers	Atlanta, GA 2002–2006	•	individual	<ul style="list-style-type: none"> Incident STI 	<ul style="list-style-type: none"> 12 mo fu: alcohol use moderated intervention effects; only intervention pts that used alcohol had less STI incidence than control pts
		• 848 female Kaiser Permanente members						
		• 605 intervention/243 control not married, sexually active						
		• 18–29 years old (M=22)						
		• 100% AA						
		• 100% female						
SHLE/HORIZONS adaptation	Seth et al., 2015	100% AA	Kaiser Permanente Centers	Atlanta, GA 2002–2006	•	individual	<ul style="list-style-type: none"> Condom use # of sexual partners sex with risky partner incident STI 	<ul style="list-style-type: none"> 12 mo fu: experiencing intimate partner violence (IPV) moderated some effects; condom use moderated trichomonas infection for intervention pts that did not experience IPV no IPV moderation effects on condom use, risky sex partners, chlamydia
		• 848 female Kaiser Permanente members						
		• 605 intervention/243 control not married, sexually active						
		• 18–29 years old (M=22)						
		• 100% AA						
		• 100% female						
Imara	DiClemente et al., 2014	100% female	Short-term juvenile detention facility	Atlanta, GA 2011–2012	•	individual	<ul style="list-style-type: none"> incident STI condom use & self-efficacy condom application skills HIV prevention knowledge partner communication self-efficacy # of sex partners 	<ul style="list-style-type: none"> 6 mo fu: intervention pts had higher condom use self-efficacy, HIV prevention self-efficacy, and condom application skills than controls no differences in STI incidence, consistency of condom use, proportion of condom protected sex acts, # of sex partners
		• 188 women in juvenile detention						
		• 95 intervention/93 control ever had consensual sex						
		• not married, not pregnant						
		• not wards of this state nor to be placed in group home upon release						
		• 13–17 years old (M=15.3)						
• 100% AA								
MDRE: Mother/Daughter Risk Reduction	Dancy et al., 2009	100% female	N/A	Chicago, IL	•	geographic area	<ul style="list-style-type: none"> sexual activity HIV transmission knowledge intention to refuse sex self-efficacy to refuse sex self-efficacy to use condoms condom attitudes 	<ul style="list-style-type: none"> 6 mos fu: HERR pts had more favorable condom attitudes than MDRR; no differences in other outcomes 6 mo fu: MDRR & HERR had greater HIV transmission knowledge, condom attitudes, self-efficacy to refuse sex than MDHP; no differences in intention to use condoms, self-efficacy to refuse sex, intention to refuse sex, sexual activity.
		• 553 low-income girls & mothers residing in same household from three areas						
		• 135 MDRR/141 MDHP/127 HERR						
		• 11–14 years old (M=12.3)						
		• 100% AA						
		• 100% female						

Program	Reference	Sample	Recruitment	Setting	Study quality	Randomization level	Outcome(s)	Summary of findings
Centering-Pregnancy Plus	Keshaw et al. 2019	<ul style="list-style-type: none"> 1047 pregnant women <24 wks gestation no severe medical problems 14–25 years old (M=20.4) 80% AA 100% female 	Perinatal clinics	Atlanta, GA & New Haven, CT	<ul style="list-style-type: none"> design: 3-arm RCT fu: 6 & 12 mos postpartum intervention: 6 mos: 25% 12 mos: 20% data collection: ACASI 	<ul style="list-style-type: none"> blocks by site & delivery 	<ul style="list-style-type: none"> STI incidence unprotected sex safe sex communication perceived STI/HIV risk condom use self-efficacy HIV risk knowledge 	<ul style="list-style-type: none"> 12 mos fu: 6-mo, CPP pts had less unprotected sex & more communication with partners than controls overall, no differences in STI incidence, perceived STI/HIV risk, or condom use self-efficacy 12 mo fu for ages 14–19 only; CPP had fewer STIs than controls
		<ul style="list-style-type: none"> 264 girls in 4 neighborhoods 131 intervention/133 control 70 friendship groups of mean 3–4 friends 14–21 years old (M=16.7) 100% AA 100% female 	Street outreach & community agency referral	San Francisco, CA	<ul style="list-style-type: none"> design: 2-arm RCT fu: 3–4 mos post-intervention intervention: 5% data collection: pen & paper questionnaire 	neighborhood	<ul style="list-style-type: none"> sexual risk behavior multiple sex partners HIV/STI testing 	<ul style="list-style-type: none"> 3 mos fu: behavioral differences vary by neighborhood 2 mos fu: intervention pts had more HIV testing, 16–17; intervention pts had lower odds of multiple partners, 18–21; intervention pts had lower odds of engaging in risky sex overall, no differences in outcomes; findings differ by age group
Project ORE	Braght et al. 2013	<ul style="list-style-type: none"> 264 girls in 4 neighborhoods 131 intervention/133 control 70 friendship groups of mean 3–4 friends 14–21 years old (M=16.7) 100% AA 100% female 	Street outreach & community agency referral	San Francisco, CA	<ul style="list-style-type: none"> design: 2-arm RCT fu: 3–4 mos post-intervention intervention: 5% data collection: pen & paper questionnaire 	neighborhood	<ul style="list-style-type: none"> HIV/STI knowledge & perceived HIV/STI risk condom attitudes, peer norms, & HIV/STI testing intentions sexual communication 	<ul style="list-style-type: none"> immediately post-intervention, intervention pts had more HIV/STI prevention knowledge, perceived HIV/STI risk, & intentions to use condoms for vaginal sex 3 mo fu: no difference in ARRM outcomes
		<ul style="list-style-type: none"> 295 women reporting high sexual risk behaviors 149 intervention/146 control 18–29 years old (M=22.0) 88.2% AA 100% female 	Public housing, STI clinics, community center, restaurant, food pantry	Newark, Jersey City, East Orange, & Irvington, NJ	<ul style="list-style-type: none"> design: 2-arm RCT fu: 3 & 6 mos intervention: 3&6 mos: 19% data collection: ACASI 	<ul style="list-style-type: none"> 1:1 to each treatment arm in blocks of 4–6, stratified by 4 sites 	<ul style="list-style-type: none"> unprotected vaginal & anal sex sex with high risk male partner 	<ul style="list-style-type: none"> 6 mos fu: both arms reduced unprotected sex with high risk partner; intervention pts had nonsignificant additional 1.8% reduction over comparison

Abbreviations: AA: African American; ACASI: Audio Computer-Assisted Self-Interview; NIA: No information available; d: days; mo: month; wk: week; fu: follow up; %: percentage; STI: sexually transmitted infection; pts: participants; M: mean; MDRR: Mother/Daughter Risk Reduction; HERR: Health Expert Risk Reduction; MDHP: Mother/Daughter Health Promotion