



Published in final edited form as:

Res Nurs Health. 2009 December ; 32(6): 569–581. doi:10.1002/nur.20357.

Preliminary Efficacy of a Comprehensive HIV Prevention Intervention for Abstinent Adolescent Girls: Pilot Study Findings

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Abstract

We developed and pilot-tested a comprehensive HIV prevention/sexual risk reduction intervention with 54 sexually abstinent girls and estimated the effect of the intervention on three antecedents of sexual risk behavior: information, motivation, and behavioral skills. Girls ages 14–18 were randomized into either (a) an *AbsPlus* intervention or (b) a structurally equivalent control group. Assessments were obtained at baseline and 3 months follow-up using audio computer assisted self-interview. The intervention resulted in a large effect for information ($d = 1.11$); small to large effects for the motivational measures ($d = .34-.88$), and a moderate effect for a measure of behavioral skills ($d = .67$). The results indicate that antecedents of sexual risk behavior change were improved by a gender-specific theoretically guided intervention.

Keywords

adolescent; female; HIV prevention; abstinence

HIV is a threat to the health and well-being of adolescent and young women in the U.S. and globally. Nearly 90% of the adolescents infected via heterosexual contact are female (Centers for Disease Control and Prevention (CDC) 2008c; 2009). African-American girls and women are particularly vulnerable, as they are infected with HIV at rates that are more than 19 times that of white females (CDC, 2008c). Other sexually transmitted infections (STIs) also affect girls aged 15–24 disproportionately—compared to other demographic groups, 15–19 year old girls have the highest rates of Chlamydia and gonorrhea (CDC, 2008a,b).

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Many adolescent girls do not perceive themselves at risk for HIV or other STIs, and often have a poor understanding about the situations that put them at risk. In addition, many lack the interpersonal skills needed for risk reduction, and all live in a culture that commonly expects females to be sexual gate-keepers even though they have no direct control over male condom use (Morrison-Beedy, Carey, Kowalski, & Tu, 2005; Morrison-Beedy, Nelson, & Volpe, 2005). Thus, adolescent girls are particularly vulnerable to the consequences of unprotected sexual behavior, and they experience many challenges to sexual risk reduction. Despite the challenges, more than one-half of adolescent females report that they have not had sexual intercourse (Abma, Martinez, Mosher, & Dawson, 2004; CDC, 2008d). Although rates of ever having had sexual intercourse differ by race, with 39% of black girls aged 15–19 reporting they had not had sexual intercourse versus 56% of white girls of the same age group, overall girls ages 15–17 report much lower rates of never having had sexual intercourse (70%) than older girls ages 18–19 (29%; Gavin et al., 2009). From a public health perspective, intervening with these abstinent girls represents a true primary prevention opportunity; that is, HIV prevention can take place preemptively, prior to the girls' sexual debut. Nonetheless, few gender-specific HIV prevention interventions for mid-to-late adolescent abstinent girls have been developed and evaluated (Jemmott & Jemmott, 2000; Pedlow & Carey, 2004). Therefore, the purpose of this pilot study was twofold. First, to assess feasibility of a gender-specific intervention designed to prolong abstinence and decrease future risk for HIV in a sample of adolescent girls ages 14–19. Second, this pilot study was designed to assess intervention effect sizes to establish evidence of preliminary efficacy and to ascertain sample size needed for a full-scale RCT.

This pilot study is particularly relevant given that a recent synthesis of 20 meta-analyses in the HIV prevention literature found that the *smallest* effects are observed with adolescents (Noar, 2008). Other research indicates that girls respond differently than boys to risk reduction interventions (Caron, Godin, Otis, & Lambert, 2004; Nahom et al., 2001), and several mixed-gender interventions have shown beneficial effects for boys but not for girls (Coyle, Kirby, Marin, Gomez, & Gregorich, 2004; Marin, Coyle, Gomez, & Kirby, 2003). Because girls are more vulnerable to HIV (DiClemente, Wingood, et al., 2002; Marin, Coyle, Gomez, Carvajal, & Kirby, 2000; Shrier, Bowman, Lin, & Crowley-Nowick, 2003), and because they respond differently to risk reduction interventions, there is a need to develop interventions that meet their needs more effectively than current interventions that include both genders (Morrison-Beedy & Nelson, 2004).

Building Effective Sexual Risk Reduction INTERVENTIONS for Adolescent Girls

Risk reduction interventions are more likely to be effective when guided by a theoretical model that has been tested empirically (Pedlow & Carey, 2004). In the context of HIV prevention, one framework that has been tested is Fisher and Fisher's (1992) Information-Motivation-Behavioral Skills (IMB) Model. The IMB Model combines elements from several health behavior models including the theory of reasoned action (Fishbein & Middlestadt, 1989) and proposes that initiating and maintaining HIV prevention behaviors are a result of information about HIV prevention, motivation to reduce risk, and HIV

prevention behavioral skills. The theoretical links in the IMB framework, in which information and motivation are partially mediated by behavioral skills to influence HIV preventive behavior, have been supported in other adolescent groups (Fisher, Fisher, Williams, & Malloy, 1994; Fisher, Misovich, Kimble, Fisher, & Malloy, 1996; St. Lawrence, Jefferson, Alleyne, & Brasfield, 1995).

We have used the IMB model to guide intervention development for sexually active female adolescents with promising results (Morrison-Beedy, Carey, & Tu, 2006), as well as in efficacious trials with adult women (Carey, Maisto, et al., 1997, 2000). The IMB model provides a heuristic framework for intervention design, and meta-analyses that include adolescents indicate that addressing the IMB constructs (information, motivation, and behavioral skills) is crucial to intervention efficacy (Johnson, Scott-Sheldon, & Carey, in press; Smoak, Scott-Sheldon, Johnson, Carey, & SHARP Research Team, 2006).

Intervention design also hinges on identification of realistic and feasible outcomes. Recently, debate has centered on the efficacy of abstinence-only relative to more comprehensive sexual education and risk reduction programs. Important distinctions between these two approaches include the outcomes that are emphasized (i.e., abstinence until marriage vs. short- and long-term risk reduction) as well as the use of virginity pledges (abstinence only; Bearman & Bruckner, 2001) and whether and how condoms are discussed (Card, Lessard, & Benner, 2007). Abstinence-only approaches sometimes encourage girls to make virginity pledges, and the approach tends to highlight the limitations of condoms (e.g., breakage or mis-use; United States Government Accountability Office, 2006). In contrast, comprehensive programs discuss the range of risk reduction strategies (including abstinence) and emphasize the correct and consistent use of condoms (Card et al.). The available evidence suggests that abstinence-only programs may increase the likelihood that a girl's first sexual contact will be unprotected (Bearman & Bruckner, 2001, 2004; Bruckner & Bearman, 2005); moreover, such programs have not demonstrated efficacy in delaying onset of sexual intercourse (Santelli, Ott, Lyon, Rogers, & Summers, 2006). Findings from a systematic review of 10 studies involving 15,940 ethnically diverse youth in the U.S. showed no indication that abstinence only programs can reduce sexual risk as indicated by self-report and behavioral outcomes (Underhill, Montgomery, & Operario, 2007). Even if girls abstain from vaginal intercourse to prevent pregnancy or to maintain virginity, they may engage in oral or anal sex that still puts them at risk for HIV/STIs (Stone, Hatherall, Ingham, & McEachran, 2006). Although it is important that girls learn the benefits of, and be assisted with, delaying onset of sexual activity, evidence suggests they must also be prepared to protect themselves from HIV and other STIs when they eventually become sexually active (Haffner, 1998). Thus, there is a need to develop an abstinence plus approach, one that incorporates components that encourage the delay of sexual activity as well as prepares girls for other risk reduction strategies once they become sexually active.

HIV prevention interventions for youth may be further strengthened by including parents and building upon the parent-child relationship (DiClemente, Crosby, & Wingood, 2002; DiIorio, McCarty, Denzmore, & Landis, 2007). The optimal time for parents' involvement in prevention interventions may likely be the period before sexual behaviors are initiated (Wyckoff et al., 2008). Mother-daughter communication, in particular, has been linked with

a reduction in the number of sexual partners and fewer sexual episodes among adolescent girls (Hutchinson, Jemmott, Jemmott, Braverman, & Fong, 2003), but these communication skills may need to be reinforced to positively affect their health choices. Parental responsiveness to their daughters and girls' feeling connected with their parents may increase a sense that the daughters matter to their parents; this mattering to others has been linked to wellness in adolescents (Rayle & Myers, 2004). Feeling like they count or make a difference to their parents may motivate girls to make healthy life decisions and remain sexually abstinent.

Focus groups with sexually abstinent girls aged 14–19 revealed that girls who remain abstinent, despite being in sexual pervasive climates, often cite the positive influence of their mothers and the importance of envisioning a future for themselves as factors that help them to remain abstinent longer than their peers (Morrison-Beedy, Carey, Cote-Arsenault, Seibold-Simpson, & Robinson, 2008). Other investigators have corroborated the importance of future plans for adolescent girls and the important role that mothers play in enhancing future time perspective (Aronowitz & Morrison-Beedy, 2004; Vesely et al., 2004). Ultimately, imagining a positive future has been linked with positive motivation (Nurmi, 1991) and may reduce sexual risk behavior (Lee, Ross, Mizwa, & Scott, 2000). Thus, promoting hope for a bright future for adolescent girls may be an important component for HIV preventive interventions.

Given the importance of sexual risk reduction for adolescent girls and the lack of interventions for abstinent girls, this intervention built upon previous work with at risk, sexually active girls (Morrison-Beedy, Carey, et al., 2005; Morrison-Beedy et al., 2006; Morrison-Beedy, Carey, Feng, & Tu, 2008), as well as the formative work with abstinent girls (Morrison-Beedy, Carey, Cote-Arsenault, et al., 2008), to develop a theoretically and empirically based sexual risk reduction intervention (abstinence-plus [*AbsPlus*]). This intervention included targeted knowledge, motivation, and skills needed by abstinent girls to delay sexual debut while also preparing them for protected first and subsequent sex. It was pilot tested with middle-adolescent girls who were not yet sexually active. In this paper, data on the feasibility of this multi session, group-based intervention and its impact on the theoretically driven antecedents of HIV prevention behaviors are presented.

Hypotheses

The effects of the intervention on three key theoretical antecedents of sexual risk reduction (i.e., information, motivation, behavioral skills) were assessed. It was hypothesized that, compared to girls assigned to the control condition, girls assigned to the *AbsPlus* intervention would increase their: (a) knowledge regarding HIV; (b) motivation for engaging in preventive behaviors, and (c) behavioral skills for abstinence and risk reduction.

Methods

Design

A randomized two-group design was used to obtain evidence of feasibility and preliminary efficacy. Fifty-four girls were randomized into either (a) an *AbsPlus* HIV preventive

intervention or (b) a structurally equivalent health promotion control group. Assessments were obtained at baseline and at 3 months follow-up. The study was approved by two university Institutional Review Boards. A Certificate of Confidentiality from the National Institutes of Health was also obtained to protect the girls' privacy.

Sample and Setting

The study was conducted in an Eastern urban center where adolescent girls demonstrate the highest rates in the US of Chlamydia and gonorrhea of either sex or age group (CDC, 2008a; Monroe County Department of Health, 2009a,b). Participants were recruited through adolescent health clinics, youth development centers, and school-based health centers. Eligibility criteria included: age 14–19, unmarried, with no experience of vaginal, anal, or oral intercourse, able to attend groups with 3-month follow-up, and able to participate in an intervention delivered in English. Recruiting 50–60 girls for the pilot was planned to ensure sufficient diversity of participants' experiences and behaviors to allow feasibility as well as preliminary efficacy to be assessed. Fifty-eight girls who met these criteria were invited to participate, with 54 girls enrolling. All participants were female (M age = 15.5 years, SD = 1.01, range = 14–17). The girls were predominantly impoverished (83% received free school-lunch program), African American (70%), and non-Hispanic (87%). The majority lived in their family's apartment or home (n = 47, 87%) with almost half (n = 26, 48%) residing with a single parent.

Measures

Demographics and descriptive measures—Participant's age, date of birth, race, ethnicity, housing environment (family home, foster care, living on own), with whom the participant lived, and socioeconomic status were assessed by questionnaire.

Information—*HIV-related knowledge* was assessed using the HIV Knowledge Questionnaire for Adolescent Girls (HIV-KQ AG; Volpe, Nelson, Kraus, & Morrison-Beedy, 2007), a 21-question modification of the HIV Knowledge Questionnaire (HIVKQ; Carey, Morrison-Beedy, & Johnson, 1997) and the HIVKQ-Brief (Carey & Schroder, 2002) tailored to be specific to adolescent girls. Items elicit *true*, *false*, *I don't know* responses. The *don't know* responses were collapsed into the false category. The HIVKQ-Brief is internally consistent across samples (α = .75–.89), stable over various intervals (rs = .77–.94), associated with longer, validated measures (rs = .93–.97; and sensitive to change and appropriate for populations with low literacy levels (Carey & Schroder). Initial testing with the HIV-KQ AG (Volpe et al.) indicated adequate internal consistency reliability (α = .75), which also was present in this sample (α = .88). For ease of interpretation, we converted number correct to percent correct for analysis.

Motivation—The motivation construct in the IMB model was assessed using five measures.

Future time perspective was assessed using a modified subscale of the Future Time Perspective Inventory (Kalichman, Kelly, Morgan, & Rompa, 1997). The 5 item Likert-type scale uses answer choices ranging from *strongly agree to strongly disagree*, with higher scores indicating more positive future expectations. This scale has been shown to be

internally consistent and to have convergent and discriminant validity (Kalichman et al.; Zimbardo & Boyd, 1999). A sample statement is “My future seems dark to me.” Internal consistency in this sample was .71.

Parental caring was measured with 20 Likert-type items that assess girls' satisfaction with their relationships with their mothers (10 items) and fathers (10 items); items focus on the amount of affection, discipline, time spent together, and respect shown, with an initial Cronbach's alpha of .90 (Jaccard, Dittus, & Gordon, 1998). Higher scores indicate perceptions of greater caring. Examples of items include, “I am satisfied with the love and affection my mother (or father) shows me,” and “I am satisfied with how many things my mother and I have in common.” Internal consistency in this sample was .94 for the mother scale and .91 for the father scale.

Parental responsiveness was measured with 9 Likert-type items that assess how girls perceive the way their mother/father responds when they ask sexual questions, including openness, understanding, skill, and comfort (Fasula & Miller, 2006). For example, “My mother (or father/guardian) and I talk openly and freely about these topics.” Higher scores indicate perceptions of greater responsiveness. Internal consistency in the past was .81; in this sample it was .77 for mothers and .68 for fathers.

Reasons to become sexually active were measured by 17 items, including motive subscales for: (a) partner approval, (b) peer approval, (c) coping, (d) intimacy, (e) self-affirmation, and (f) enhancement (Cooper, Shapiro, & Powers, 1998). Examples of items, respectively, include “How often would you choose to have sex” (a) because you worry your partner won't want to be with you if you don't, (b) because you worry that people will talk about you if you don't have sex, (c) to help you deal with disappointment in your life, (d) to express love for your partner, (e) to prove to yourself that your partner thinks you're attractive, and (f) for the thrill of it. Items are answered on a 5-point scale. Higher scores indicate greater motivation to have sex for this reason. This measure has established validity and reliability (all subscales $\alpha > .83$; Cooper et al.). Internal consistency for self-affirmation, with the item “How often would you choose to have sex to help you feel better about yourself” removed, yielded a Cronbach's $\alpha = .60$. Internal consistency for the remaining subscales ranged from .81 to .97.

Behavioral intentions to limit various forms of risky and less risky sexual behaviors were measured by five items (Blake, Simkin, Ledsky, Perkins, & Calabrese, 2001). Girls were presented with a scenario and asked to rate on a 4-point scale with answer options from definitely no to definitely yes, the chance that they would engage in different types of sexual activity, including: (a) only have oral sex, (b) have intercourse, (c) refuse vaginal, oral, and anal sex, (d) limit contact to touching breasts or genitals, and (e) only touch the boy's penis with her hands. Validity and reliability ($\alpha = .87$) with middle school students has been established, and reliability was found to be reasonable in this sample ($\alpha = .68$).

Behavioral skills—Parent communication was measured with eight items that assess how girls and their mothers (and fathers) communicate regarding specific sexual topics (birth control, condoms, starting sex, HIV, STDs abstinence, sexual peer pressure, choosing partner

(Miller, Kotchick, Dorsey, Forehand, & Ham, 1998). Examples of items include, “Have you and your mother (or father/guardian) ever talked about HIV/AIDS?” and “Have you and your father (or mother/guardian) ever talked about when to start having sex with boys?” Each item is measured on a 5-point scale, with higher scores indicating more frequent communication. The internal consistency of this scale was strong for both parents ($\alpha = .92$ for mothers, .90 for fathers), and was .78 in a past sample (Miller et al.).

Procedures

Recruitment—Girls were approached while attending adolescent health clinics or clinic-sponsored youth development programs. Those who expressed interest in the study were screened privately to determine eligibility. Following review of the consent by trained research team members, potential participants were invited to ask questions, and then to read and sign an assent. Underage participants received a copy of the consent and a stamped, addressed envelope to give to their parents. Parents were contacted by phone within 1 week of assent to review the consent and study procedures, answer their questions, and request that the signed consent be returned prior to the start of groups.

Random assignment—Participants were randomly assigned to either the *AbsPlus* intervention or a structurally equivalent health promotion control group using a permuted block randomization procedure. Girls did not know their group assignment until they attended their first session where they were introduced to group topics to be discussed during the 4 weeks.

Baseline assessments—Data were collected using audio-computer assisted self-interview (ACASI), which has been used successfully with adolescents. ACASI was chosen to increase validity of the sensitive self-report data as well as address concerns related to low literacy (Morrison-Beedy, Carey, et al., 2005; Morrison-Beedy et al., 2006; Turner et al., 1998). Data collection using lap-top computers took place in private areas at each recruitment site a week prior to the group meetings, and girls were paid \$20 for completing the baseline assessment.

Overview of Interventions

Both *AbsPlus* and control interventions were administered in small groups that occurred over four weekly 120-minute sessions and engaged girls with a variety of learning modalities (e.g., verbal, visual, experiential). Both interventions were manualized and provided in single gender groups by two trained female facilitators. Each manual had detailed instructions for delivering the intervention components, including guidelines for time allotted and sequencing, probes and prompts to use to facilitate interaction, and equipment needed. Sessions always included time for participants to role play, practice skills, and receive feedback, and included take-home journal activities to complete for the next session. The experimental and control sessions were similar in process but differed on specific knowledge, content-appropriate role-play scenarios, and targeted behaviors.

All sessions were audiotaped to assess intervention fidelity. Following training and establishment of cross-rater reliability, fidelity assessors independently reviewed and scored

each tape for interventionist's adherence to both the intervention and control manuals and use of motivationally driven interactions. Inter-rater reliability on structured fidelity assessments was 98%. Girls were paid \$20 for each intervention session attended.

Abstinence-plus HIV prevention intervention (AbsPlus)—The intervention design was informed by previous formative and intervention work with sexually active adolescent girls (Morrison-Beedy, Carey, Aronowitz, Mkandawire, & Dyne, 2002; Morrison-Beedy, Carey, et al., 2005; Morrison-Beedy et al., 2006; Morrison-Beedy, Carey, Cote-Arsenault, et al., 2008; Morrison-Beedy, Carey, Feng, et al., 2008). Subsequently focus groups were conducted with abstinent urban minority girls ages 14–18 to gain insight into the context and potential determinants of sexual abstinence (Morrison-Beedy, Carey, Cote-Arsenault, et al., 2008). The experiences of these participants were used to develop the intervention to address cultural, developmental, and sexual experience concerns relevant to females. The gender-specific format addressed information (e.g., Pap tests do not assess for HIV), motivation (e.g., childbearing potential is affected by HIV), and skills (e.g., negotiating with male partners who pressure for sex). Intervention strategies were shaped using common vernacular, mannerisms, and relevant media familiar to adolescent girls. Developmentally appropriate strategies such as games and interactive group activities were integrated throughout the sessions.

Guided by the IMB Model (Fisher & Fisher, 1992) the *Abs-Plus* intervention was designed to (a) provide correct, current HIV information necessary to appraise risk, (b) promote abstinence and readiness to avoid or change risk behaviors (motivation), and (c) offer behavioral skills that are ultimately necessary to maintain abstinence and reduce risk. The informational component provided current information on HIV transmission, prevention, and consequences of infection. The motivational component helped participants understand why maintaining abstinence or safer sex behaviors is desirable and build upon their commitment. Concerns that influence both immediate (behavior focused) and broader-based motivation related to gender-specific life goals, and personal, parental, and community values were presented. The behavioral skills component focused on assertiveness skills, improving self-efficacy, negotiating abstinence, condom use or other risk reduction practices with partners, and identifying high-risk situations. It also prepared girls to buy and use condoms and counter negative attitudes about abstinence and condoms. Important and consistent themes identified included the girls' belief in their own self-worth and plans for the future, as well as the positive impact of their mothers, both as guides and advisors. Intervention strategies to help girls maintain abstinence/delayed onset of sexual activity built upon these themes.

Each session included a mother/parent–daughter journaling activity that encouraged critical reflection on personal values and future plans. The journaling activities encouraged the girls to reflect on positive qualities about themselves, their future goals, and choosing romantic partners. They were designed to develop or strengthen parental communication, closeness, and connectedness to, a parent or other significant adult. Girls were asked to consider the following questions and then discuss them with their mothers (or fathers/parents): After Session 1: What do I see myself accomplishing in the next year? The next 5 years? What do my parents say I can accomplish?; after Session 2: What qualities should my future partner

have? How should he treat me? Who do my parents see as a good partner?; and after Session 3: Why is abstinence important to me?. Developed as between-session activities, journaling also provided a feasible way in which mothers (parents) could participate in the intervention that did not require their attendance at the after-school sessions.

Health promotion intervention control group (CTL)—The structurally equivalent CTL intervention controlled for effects of time, professional attention, and group support. To contrast with the intervention, the alternative program addressed three health promotion topics (friendship skills and anger management, breast health, and nutrition); these have direct health benefits and were identified by adolescent girls in previous studies as important and interesting (Morrison-Beedy, Carey, et al., 2005). This intervention also was pilot tested, manualized, and involved four weekly 120-minute sessions. To mirror intervention strategies, journal questions for the control sessions were: After Session 1: What qualities do I look for in a friend? How do I treat my friends? How do I want my friends to treat me?; after Session 2: What makes me angry? How do I handle being angry?; after Session 3: How did I eat this week? Was this how I planned to eat? What can I do to eat more like I planned?.

Follow-Up Assessments

Procedures for the follow-up 3 months after the last intervention session were identical to the baseline assessment (i.e., collected using ACASI, took place in private areas on laptop computers at recruitment sites, \$20 to compensate for the time involved).

Data Analyses

Descriptive statistics were used to characterize the sample and levels of HIV- and abstinence-related knowledge, motivation, and skills. Methods for longitudinal data analysis modeled intervention differences and estimated effect sizes. Because there was only one post-intervention assessment, we did not employ the popular methods for more than one follow-up assessment such as the weighted generalized estimating equations (WGEE) and mixed-effects model (MM; Kowalki & Tu, 2007), but instead opted for an equivalent and simpler approach based on the analysis of covariance model (ANCOVA). Unlike WGEE and MM, which involve a treatment by time interaction to test the intervention effect, the ANCOVA-based approach only tests the main treatment effect, leading to more efficient inference given the small study sample. To provide robust inference in the analyses, we based inference on a set of estimating equations, a procedure which does not require any distribution assumption (Kowalski & Tu, 2008).

The impact of missing data was characterized by model estimates through two well-established missing data mechanisms: the missing completely at random assumption (MCAR) and missing at random assumption (MAR). The MCAR assumption for each outcome was tested by modeling the missingness of the participant's response at 3 months as a function of observed response at baseline using logistic regression. If the results of the logistic model showed that missingness depended on the observed responses, MCAR was deemed inappropriate, and the baseline value of the outcome was included in the ANCOVA

model. Otherwise, MCAR was assumed, and the baseline value of the outcome was not included.

The treatment effects between baseline and 3-month follow-up were modeled using the main effects of treatment conditions in the aforementioned ANCOVA-based approach. All analyses followed the intent-to-treat (ITT) principle; we compared the two groups based on the assigned treatment condition regardless of whether they attended any session or dropped out from the study. The ITT approach tends to underestimate intervention effects but it reflects how the intervention works in real practice.

In estimating effect sizes, we also controlled for covariates that differed significantly between the two treatment groups at baseline using an adjusted version of Cohen's *d* effect sizes (Rosenthal, 1994). For interpretation, small, medium, and large effect sizes were defined as .2, .5, and .8 (Cohen, 1992). Effect sizes are presented because they convey whether an observed difference between groups is substantively important independent of sample size, whereas a statistical significance test only assesses whether a relationship could be due to chance, regardless of the strength of the apparent relationship in the data (Wilkinson, 1999). At this stage of development, the issue of importance for this pilot study was determining the possible effect of the intervention, understanding that the small sample size was not intended to provide formal assessment of statistical significance of the results, but rather to inform power analyses for future work.

Results

Feasibility

Sexually abstinent girls ages 14–18 were both recruited and retained. Of the 54 participants who provided consent and completed the baseline survey, 16/20 (80%) of control and 26/34 (76%) of AbsPlus participants attended 3 or 4 sessions, and one from each group attended only a single session. Forty-five participants (82%) completed the 3-month follow up. Seven participants were lost to follow-up (e.g., moved out of area, disconnected telephone numbers). Two subjects had disciplinary issues that prevented them from attending groups or follow up data collection.

Baseline Data

Girls who attended the intervention group ($n = 34$) were compared to those who attended the control group ($n = 20$) for any preintervention differences between groups. There were no differences between these two groups (based on a Type I error of .05) with respect to demographics, knowledge, skills, and most measures of motivation. However, girls in the control group had higher levels of behavioral intentions ($M = 9.50$, $SD = 3.67$) than girls in the intervention ($M = 6.69$, $SD = 3.05$) at pre-intervention ($F[1, 40] = 8.45$, $p < .01$); we controlled for this in the analysis.

Intervention Effect Sizes

As hypothesized, girls in the intervention group improved in the theoretical antecedents to HIV preventive behavior as compared to those in the control condition (see Table 1 for a

summary of the pre- and post-intervention scores and effect sizes on these outcomes). The intervention resulted in a large positive effect for information, with small to large effects for several of the motivational measures. Because individual behavioral intention items differed from one another and presented more of a menu of intentions, each was examined for effect size. Medium effect sizes were noted for four of the five behavioral intention items: (a) limit behavior to only oral sex, (b) refuse vaginal, oral, and anal sex, (c) limit contact to touching breasts or genitals, and (d) only touch the boy's penis with her hands. There was no effect for the item asking if the girls “would have intercourse that night.” The effect for behavioral skills was medium in magnitude.

Discussion

Results of this pilot study demonstrate that recruiting sexually abstinent adolescent girls ages 14–18 to an HIV prevention intervention is feasible and potentially efficacious. Of eligible participants, the majority were recruited, completed weekly intervention sessions for 4 weeks, and then returned for a follow up data collection session 3 months later. Thus, sexually abstinent middle-adolescent girls were accessed, recruited, and retained for this intervention. Data also suggest that providing a multi-session manualized intervention for sexually abstinent girls with demonstrated fidelity was also feasible. In addition, the results indicated that several theoretically suggested antecedents of risk behavior change were improved by an IMB-guided intervention developed specifically for abstinent girls, as indicated by small to large effects on a majority of the information, motivation, and behavioral skills measures.

Greater improvement in HIV-related information, motivation to reduce risk, and behavioral skills was predicted for the girls in the HIV risk reduction intervention compared to girls in the general health promotion intervention. Indeed, the HIV intervention did significantly increase knowledge. The low baseline scores on the HIVKQ-AG are important to note. These scores suggest that these urban adolescent girls continue to lack accurate HIV knowledge, and this remains a valuable avenue for intervention.

Although several of the motivational measures improved in girls in the intervention group, other measures remained stable over the follow-up period, while scores on these measures for girls in the control group decreased. For example, perceptions of maternal caring and responsiveness decreased in the control group while scores on these measures either improved or remained relatively stable in the intervention group, despite both groups being involved in a journaling activity. These findings may be related to differences in the questions asked; only mothers and daughters in the intervention group focused on the girls' future plans and relational/romantic concerns. Earlier work (Aronowitz & Morrison-Beedy, 2004) suggested that an important component of our intervention would be to foster resilience or resistance against risk behaviors in young girls by assisting mothers and daughters to develop a more connected relationship, which we endeavored to do with the journaling activity as well as communication skills training. The intervention had no effect on maternal communication targeting specific sexually related topics (e.g., contraception, STIs), perhaps because the intervention included strategies targeting broad motivations for

risk reduction rather than methods of contraception other than condoms and STIs other than HIV.

Promoting a future time perspective has been shown to serve as a mediator between mother–daughter connectedness and resilience to risk-taking behaviors (Aronowitz & Morrison-Beedy, 2004), thus, one of our effective intervention strategies was to focus on enhancing FTP. Control group strategies did not include reinforcement of FTP, whereas girls in the intervention group discussed their futures and had their beliefs in their future perspectives reinforced both within groups as well as between groups. Answering repeated questions during data collection about their futures without receiving positive reinforcement strategies during the group sessions may have served as a “consciousness raiser” for those girls in the control group who responded less positively about the future. Harris, Duncan, and Boisjoly (2002) found that a “nothing to lose” attitude about the future predicts greater involvement in risky behaviors involving early sexual intercourse. The findings suggest that maintaining optimism about the future played an important role in our intervention.

Another motivational measure, behavioral intentions for the time when they do become sexually active, also improved in the intervention group. The data indicate that girls in the intervention group intended to limit their sexual behaviors to choices less risky than intercourse, whereas girls in the control group indicated they were less likely to limit such behaviors. These responses reflect a benefit of the abstinence plus approach, that is, teaching harm reduction strategies to use when faced with potential sexual behavior.

A limitation of this pilot study is the small sample and the limited power to test for statistically significant differences between groups. However, the effect sizes observed for the antecedent measures are encouraging. A second limitation is the relatively brief follow-up interval, which limited assessment of behavioral change over time. Nonetheless, short-term changes in the hypothesized IMB antecedents have been repeatedly linked with positive behavioral outcomes in longitudinal studies of adults (Carey et al., 2000; Carey, Venable, Senn, Coury-Doniger, & Urban, 2008). A third possible limitation is the risk of contamination between groups. Based on prior experience (Morrison-Beedy, Carey, et al., 2005) we expected this to be minor and sought to reduce it by encouraging participants to “keep what is said within the group.” We did not expect any discussions that took place outside of groups to affect girls' behavior because both interventions relied on trained facilitators using a motivational approach, one not easily replicated in everyday conversations. However, contamination may have had an impact on effect sizes. Lastly, some of the measures had low alpha coefficients, but this may be related to some items not being germane to abstinent participants, thus increasing inconsistency within item measures. Further refinement of measures for future work with abstinent girls is needed.

The intervention piloted in this study was developed to address a critical gap in the literature focusing on sexually abstinent adolescent girls recruited from a variety of settings in impoverished environments. Our findings are encouraging because they suggest that a theoretically driven intervention, designed to both delay sexual debut and promote protected sex, can help girls to make improvements on antecedent factors linked with subsequent risk behavior. Although the current study intentionally had a small sample, confidence in these

preliminary findings is enhanced by the use of a randomized design, careful evaluation of key outcomes with reliable and valid measures, and intervention fidelity, including use of a manualized program for both the intervention and control conditions. In light of these encouraging findings, testing the efficacy of these results using a large scale randomized trial with a longer follow up interval, and behavioral and biological outcomes is recommended. This intervention holds promise for urban girls who are sexually abstinent but face both the challenges of remaining abstinent and, eventually, engaging in sexual behaviors in a way which affords them protection from HIV and other STIs.

Acknowledgments

We acknowledge funding received by the PI from the National Institute of Nursing Research (NR010193) and the University of Rochester's Developmental Center for AIDS Research funded by the National Institutes of Health (P30 AI078498). We thank the study participants for their important contribution to the scientific fight against HIV/AIDS.

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Table 1
Pre- and Post-Intervention Group Differences and Effect Sizes for Information, Motivation, and Behavioral Skills Variables*

	Pre-Intervention Mean (<i>SD</i>)	3 Months Post-Intervention Mean (<i>SD</i>)	LSmean	Effect Size (<i>d</i>)
Information				
HIV knowledge				
AbsPlus	53.52 (22.00)	74.06 (23.12)	75.66	
Control	49.70 (30.22)	51.19 (30.04)	48.69	1.11
Motivation				
Reasons for sex—enhanced motives				
AbsPlus	4.92 (2.63)	5.64 (3.32)	5.97	
Control	4.88 (2.36)	5.56 (3.14)	5.04	.32
Reasons for sex—self-affirmation motives				
AbsPlus	3.18 (.90)	3.24 (.71)	3.25	
Control	3.00 (.00)	3.00 (.00)	2.99	.44
Reasons for sex—intimacy				
AbsPlus	10.32 (2.15)	10.92 (1.50)	10.96	
Control	10.19 (3.37)	10.94 (2.21)	10.87	.06
Reasons for sex—coping				
AbsPlus	3.24 (.66)	3.32 (.75)	3.28	
Control	3.18 (.75)	3.13 (.50)	3.19	.13
Reasons for sex—partner approval				
AbsPlus	3.00 (.00)	3.40 (1.63)	3.30	
Control	3.06 (.25)	3.00 (.00)	3.15	.11
Reasons for sex—peer pressure				
AbsPlus	2.00 (.00)	2.16 (.80)	2.19	
Control	2.00 (.00)	2.00 (.00)	2.05	.12
Motivation				
Future time perspective				
AbsPlus	20.40 (3.03)	20.64 (3.77)	21.20	
Control	20.44 (3.78)	18.94 (4.57)	18.07	.88
Maternal caring				
AbsPlus	38.80 (8.75)	38.64 (10.11)	38.13	
Control	38.56 (11.66)	33.19 (14.34)	33.99	.43
Maternal responsiveness				
AbsPlus	26.32 (8.19)	27.04 (7.68)	27.75	
Control	29.19 (6.70)	26.75 (7.25)	25.64	.34
Paternal caring				
AbsPlus	32.93 (11.36)	37.71 (11.10)	36.09	
Control	35.29 (6.80)	31.43 (14.20)	34.67	.47
Paternal responsiveness				
AbsPlus	23.36 (8.11)	22.21 (6.59)	22.52	

	Pre-Intervention Mean (SD)	3 Months Post-Intervention Mean (SD)	LSmean	Effect Size (d)
Control	23.14 (5.21)	22.29 (4.79)	21.67	.16
Behavioral intentions				
AbsPlus	6.44 (2.89)	6.60 (2.74)	7.02	
Control	9.44 (3.61)	9.19 (4.17)	8.52	.49
Behavioral skills				
Maternal communication				
AbsPlus	15.00 (9.90)	15.88 (9.75)	16.16	
Control	15.81 (9.12)	16.00 (9.98)	15.56	.08
Paternal communication				
AbsPlus	7.36 (8.19)	5.79 (7.94)	5.36	
Control	12.00 (10.47)	8.43 (10.83)	9.28	.67

* AbsPlus ($n = 34$) and Control ($n = 20$) Groups; Analyses control for Age, Impoverishment, Behavioral Intentions, and Time 1 (baseline).

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