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Evaluation of a Brief Computer-mediated Intervention to Reduce HIV Risk Among Early Adolescent Females

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Abstract

Purpose—To evaluate the efficacy of a brief computer-mediated intervention, relative to no intervention, in altering HIV/AIDS-related knowledge, protective attitudes, and self-efficacy for risk reduction among early adolescent females aged 11 through 14 years.

Method—Recruited through the auspices of a large social services agency with multiple sites across New York City, a volunteer sample of 205 Black, White, and Hispanic young women participated in this research. The efficacy of the software intervention was examined in a randomized blocks design with site as the unit of randomization. Young women at experimental arm sites interacted with the software in a single 30-minute session. Youths at control arm sites participated in regular programs offered at these sites, but did not receive the intervention until all planned assessments were concluded. Before and after intervention, participants completed measures of HIV/AIDS-related knowledge, protective attitudes, and self-efficacy for HIV risk reduction. Analyses of covariance were used to test for significant between-arm effects.

Results—Between-arm effects were observed for HIV/ AIDS-related knowledge and risk reduction self-efficacy. Experimental arm youths evidenced greater improvements from pretest to posttest than control-arm youths on these outcomes.

Conclusion—Computer-mediated interventions may improve HIV/AIDS-related knowledge and risk reduction self-efficacy among early adolescent females. However, additional research is needed to find effective computer-mediated approaches for enhancing protective attitudes among this population.

Keywords

Adolescent girls; HIV prevention; Computer intervention

Women comprise an increasing proportion of persons infected with human immunodeficiency virus (HIV). Three-fourths of the estimated 12,000 U.S. women infected with HIV each year are exposed to the virus through heterosexual contact [1]. HIV-risk-related sexual behaviors include unprotected vaginal and anal intercourse, multiple sex partners, and sex with partners who engage in high-risk behaviors such as injection-drug use [2]. Because women are becoming sexually active at younger ages, interventions to forestall the initiation of HIV-risk-related behaviors among adolescent girls are needed. Promising vehicles for delivering such programs include CD-ROM and the Internet, which can segment audiences, tailor content, and

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engage youths interactively [3]. This article reports an evaluation of the *Keeping It Safe* CD-ROM intervention designed to prevent HIV among adolescent females.

Methods

Selection criteria for study participation were that adolescents were female and between ages 11 and 14 years. Recruited through social services agencies in New York City, a volunteer sample of 205 early adolescent females participated in the study. For a two-arm design (computer intervention vs. waiting-list control), this sample size provided 80% power to detect a .20 effect size ($1 - \beta = .80$; two-tailed $\alpha = .05$) [4]. The efficacy of the program was evaluated in a randomized blocks design with site as the unit of randomization. After randomization, girls at experimental arm sites interacted with the software intervention. Girls at control arm sites participated in regular programs offered at these sites, but did not receive the intervention until all planned assessments concluded. Two weeks before and after intervention, girls completed an outcome battery of demographic items and measures of HIV risk and prevention behaviors [5].

Designed to increase HIV/AIDS knowledge, protective attitudes (peer norms, partner norms, and attitudes toward sexually active youths), and risk-reduction self-efficacy among early adolescent girls, *Keeping It Safe* incorporates strategies proven effective for altering these outcomes [2,6–10]. Didactic instruction teaches girls basic medical information about HIV, how it is transmitted, and behaviors that reduce HIV risk. Learning is reinforced through an interactive game in which girls identify facts and myths about HIV/AIDS and receive feedback for their responses. Using a similar approach, girls view videotaped footage of a young woman who contracted HIV as a teenager through unprotected intercourse. The speaker shares her story and discusses common misperceptions about AIDS, beliefs and attitudes that may place girls at risk for HIV, and preventive behaviors to reduce this risk. Local epi-demiological data regarding the incidence and prevalence of HIV/AIDS among young women and other information relevant to her story are shown on a split screen as she talks. Using scenarios and simulations, girls learn a four-step model of assertive responding [10] to help them manage interpersonal situations and their own behaviors in ways that reduce HIV risk.

Descriptive and inferential statistics generated a profile of respondent risk and prevention behaviors and confirmed between-arm equivalence at baseline on demographic and outcome variables studied. The effects of software intervention were examined with analysis of covariance (ANCOVA) models. Demographic variables (ethnicity, age) and pretest composite scores for each outcome were covariates; study arm was the fixed factor. Paired samples Student's *t*-tests examined within-group changes from pretest to posttest.

Results

Participants were black (43%), Hispanic (46%), and white (11%), with a mean age of 13.01 years; most (78%) were in middle school grades five through eight. English was the primary language spoken in a majority of youths' households (78%), with almost all youths (94%) reporting that they were comfortable speaking and reading English. Although one-third of respondents' parents were born outside of the United States, 92% of respondents were American born. Of girls, 9% reported having had sexual intercourse, with roughly 5% having done so by age 13 years. Although most (67%) reported having had a single lifetime sexual partner, 28% reported having two to three partners; 5% reported having four or more. Of sexually active girls, 6% reported that at last intercourse, a condom was not used.

Analyses to ensure between-arm equivalence at baseline revealed that experimental-arm youths were slightly older and in later school grades than their control-arm counterparts ($p < .$

05). No significant differences were seen for outcome variables. Examination of baseline responses to items in the HIV/AIDS knowledge scale revealed that 54% of girls believed that a person could get AIDS by being bitten by a mosquito that had bitten someone with AIDS. Forty percent believed that HIV could be contracted by kissing someone with AIDS. Fifteen percent were unaware that condoms can prevent the spread of HIV. Similar proportions believed that birth control pills protect a woman from getting AIDS (11.2%) and that most people who have AIDS look sick right away (15%).

After adjustment by covariates, knowledge and self-efficacy varied significantly with study arm, as summarized in Table 1, with $F(1,200) = 27.86, p < .001$ and $F(1,200) = 3.65, p < .05$, respectively. The effects of study arm on knowledge ($\eta^2 = .12$) and self-efficacy ($\eta^2 = .02$) were small, using Cohen's conventions for the social and behavioral sciences [4]. Adjusted marginal means revealed that experimental arm youths had higher posttest knowledge and self-efficacy than controls ($M = 8.18$ vs. $M = 6.87$ and $M = 13.29$ vs. $M = 12.72$, respectively). Within-group analyses revealed improvements among experimental-arm youths for HIV/AIDS knowledge $t(104) = -6.39, p < .001$ and peer norms $t(104) = -2.11, p < .05$. Trends toward improvement were observed for partner norms, attitudes, and self-efficacy. Control arm youths' self-efficacy significantly deteriorated from pretest to posttest $t(99) = 2.45, p < .01$.

Discussion

Data from this modest study support the efficacy of the *Keeping It Safe* computer-mediated intervention. For two of five variables studied (HIV/AIDS knowledge and risk reduction self-efficacy), significant between-group effects were observed. Further, experimental-arm youths evidenced within-group improvements for two of five outcomes and trends toward improvement for the remaining three. Experimental-arm youths' gains were accompanied by deterioration in control-arm youths' HIV/AIDS knowledge, attitudes, and risk reduction self-efficacy.

The absence of between-arm effects for protective attitudes was an unanticipated outcome of this research. Ceiling effects may account for this finding, given the relatively high baseline attitudinal scores found among study participants relative to similarly aged youths [5]. Possibly, the duration of girls' exposure to prevention content designed to enhance protective attitudes was insufficient to produce significant between-arm differences. Interventions that have effectively modified adolescent risk-related attitudes have been of greater duration than *Keeping It Safe* and have included multiple sessions of intervention [11,12]. Additional research is needed to systematically vary these factors and examine the effects, on protective attitudes, of differing attitudinal endorsements and exposure to prevention content.

Study findings should be interpreted with caution. The use of a volunteer sample restricts the external validity of findings. All outcomes were self-reported. Although measures with stronger psychometric properties were available for assessing most study outcomes, norms for these measures were established with samples of adolescents older than our target youth. Although site was the unit of randomization, individual was the unit of analysis. Replication studies that include sufficient numbers of sites to analyze outcomes at this level are needed. Finally, the study design allowed measurement of only short-term changes. Longitudinal research is needed to examine both immediate and long-term effects of software intervention.

Despite these limitations, study findings augur well for the increased use of computers to deliver adolescent health interventions. This study shed empirical light on the merits of computer intervention for altering HIV/AIDS knowledge and risk reduction self-efficacy among early adolescent females, and established a scientific foundation on which to build more extensive interventions to target and address these outcomes.

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Table 1
Analysis of Covariance of HIV/AIDS Knowledge and Risk Reduction Self-efficacy

Source of Variance	Adjusted SS	df	MS	F	p
HIV/AIDS knowledge					
Arm	84.03	1	84.03	27.86	.001
Pretest knowledge	287.50	1	287.50	95.34	.001
Age	27.60	1	27.60	9.15	.01
Ethnicity	15.35	1	15.35	5.09	.05
Error	603.11	200			
Risk-reduction self-efficacy					
Arm	15.98	1	15.98	3.65	.05
Pretest self-efficacy	780.97	1	780.97	178.66	.001
Age	.32	1	.32	.07	ns
Ethnicity	9.70	1	9.70	2.22	ns
Error	874.23	200			