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Gender-Specific Computer-Based Intervention for Preventing Drug Abuse Among Girls

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Abstract

This study developed and tested a gender-specific intervention for preventing substance abuse among adolescent girls. Delivered on CD-ROM by computer, the program was compared with a conventional substance abuse prevention program delivered live in a group setting. Seventh-grade girls in New York City middle schools completed pretests, and, by school, were randomly assigned to receive either gender-specific computer intervention (GSI) or conventional intervention, and were posttested. Analyses of pretest to posttest gain scores showed GSI girls compared to girls receiving conventional intervention to possess a larger repertoire of stress-reduction methods, to report lower approval of cigarettes, alcohol, and drugs, to identify more unhealthy ways to deal with stress, to report lower likelihood of cigarette use or alcohol consumption if asked to do so by best friends, and to hold stronger plans to avoid cigarettes, alcohol, and drugs in the next year. These modest findings lend credence to the promise of gender-specific, computerized interventions for substance abuse prevention among adolescent girls.

Keywords

Gender-specific intervention; computer-based intervention; substance abuse prevention

INTRODUCTION

Adolescent girls are closing the gender gap in their substance use behavior (1). Over one-fifth of all eighth-grade girls report drinking alcohol in the past month (2), and their rates of marijuana use are rising faster than among eighth-grade boys (3). Girls use inhalants and stimulants more than boys and are more likely to smoke cigarettes regularly (4). Once girls use drugs, they are more apt than boys to become physically and psychologically dependent (5). Girls who use substances also are at risk sexually. Compared to abstemious girls, those who drink more than 5 times a month are less likely to use condoms during intercourse (6). Marijuana use similarly increases the likelihood of unprotected sex (7). Evidence of girls' substance use rates notwithstanding, gender-specific prevention programs for girls are in short supply.

Added support for gender-specific programming comes from data on how girls respond to extant substance abuse prevention programs. Of the studies examining differential gender effects, some report better results for girls than for boys (8,9); others find gender-nonspecific prevention programs less effective for girls than for boys (10,11). A few investigators have begun to test girl-specific prevention programs. Palinkas et al. (12) tested social skills training

and social network restructuring among multiethnic female adolescents aged 14–19 years, and found the program largely ineffective and possibly counterproductive relative to substance abuse outcomes. A program by Weiss et al. (13) taught leadership development and empowerment to minority girls aged 11–14 years to prevent substance abuse. Outcome data revealed lower rates of drinking onset and incidence for intervention girls, who also were less likely to associate with substance-using peers, compared to girls in the comparison group. Most recently, Elliot et al. (14) tested a program for high school girls involved with team sports aimed to prevent drug abuse and eating disorders and to promote healthy nutrition and exercise training. Relative to untreated controls, girls who took part in the program increased their knowledge about the effects of substance abuse, decreased their abuse of harmful drugs, and increased their intentions to not use drugs and cigarettes. Against this backdrop, the present study investigated the efficacy of gender-specific intervention to prevent substance abuse among adolescent girls.

To further advance the science of substance abuse prevention, the study delivered intervention by computer. Strategies for delivering prevention programs have not kept pace with technological advances. Most science-based adolescent drug abuse and other prevention programs are delivered live in groups (15). Computer technology offers advantages over traditional formats: cost, fidelity, replicability, ease of use, engaging interactivity, data storage, and dissemination capacity. Youths who receive prevention programs via computer can navigate through topic modules at their own pace, receive stimulating and varied content through interactive games, skill demonstrations, and guided rehearsals, and, in the process, enjoy high-quality graphics, judiciously placed text, and developmentally and culturally tailored audio tracks and computer animations. Computers are ideal for intervening with youth on such sensitive topics as drug and alcohol use because they allow for more private disclosure than interventions in live group settings (16,17). Further, variations in administration—always possible when interventions are delivered in person—are eliminated in computer-based approaches; all respondents receive the same information, rendering this method of delivery highly consistent over repeated administrations. Albeit computer-mediated prevention approaches show promise with youths (18–21), no controlled studies to date have tested these approaches in the delivery of gender-specific intervention for girls and substance abuse. The present study provides empirical data from such a test.

METHOD

Participants and Design

Study participants were 91 seventh-grade girls in two New York City middle schools. The schools had comparable profiles in the number and demographic background of enrolled seventh-grade students. In each school, girls and their parents or legal guardians received informed consent statements advising them of study procedures and risks and asking for their permission to participate. Across schools, consent rates were 95% (94% and 96%). Informed and consenting girls were pretested, and, randomly by school, assigned to receive either gender-specific computer intervention (GSI) or conventional intervention. Both drug abuse prevention programs were delivered, and 2 weeks later all girls were posttested.

Measures

Outcome measures were completed in school classrooms under the direction of research staff. At pretest and posttest measurement, girls completed three scales:

- Psychosocial questions asked girls about their likely responses to stress, their capacity to handle stress, their awareness of unhealthy ways to reduce stress, and whether cigarettes, alcohol, or drugs were adaptive responses to stress (Cronbach $\alpha=0.84$).

- Attitudinal items asked girls whether they were satisfied with their current physical appearance and weight and whether they were concerned about what their friends thought of them (alpha reliability=0.82).
- Substance use items, adapted from the CDC's Youth Risk Behavior Survey (22) and the American Drug and Alcohol Survey (23), asked girls whether they would smoke cigarettes, drink beer or other alcohol, or use crack, heroin, or other drugs if the substances were offered to them by their best friend, and whether they planned to begin smoking, drinking, or using drugs in the next year (Cronbach α =0.85 to 0.89).

For ease of administration, responses for each scale were revised to fit a 5-point scale.

Intervention

Once schools were randomly assigned to study arms, girls in the GSI school independently completed a CD-ROM program entitled, "Girls and Stress" in their school's computer laboratory. Emphasizing the role of stress in the lives of adolescent girls, the program employed a digital process called rotoscoping to adapt audio and video material captured expressly for the intervention. Video images of adolescent female volunteers were manipulated through rotoscoping to hide their identity while exposing study participants to dialogue from peer role models.

The CD-ROM program covered four content areas: "What Is Stress?," "Drugs and Stress," "Dealing with Stress," and "Stress-Reducing Techniques." Each of the first three content areas was introduced by rotoscoped video footage of girls sharing their perceptions and experiences with stress and with positive and negative methods for coping with stress. An authoritative female narrator supplemented each session by identifying the physical and emotional aspects of stress, describing how drugs negatively affect stressful situations and providing ways to deal positively with stress. The program reviewed sources of stress and showed girls that they already possessed positive coping skills. "Stress-Reducing Techniques" provided a visual and auditory explanation of deep breathing, progressive relaxation, and guided imagery. The stress-reduction techniques were explored for their effectiveness and their application.

The CD-ROM program was mouse activated. Girls selected content in which they were interested. Once chosen, a content area was presented via an audio track enhanced with video images and appropriate graphics. Between 20 and 30 minutes were needed to complete the program. Research staff supervised girls, and loaded and advanced the program as needed; material guidance was neither offered nor solicited.

Girls in the comparison school received a conventional drug abuse prevention program called "Keep a Clear Mind" (24). Identified as an exemplary drug abuse prevention program (25), "Keep a Clear Mind" was delivered by teachers and involved one 40-minute session of didactic information, class discussion, and student-volunteered examples of the material's applications to everyday situations.

RESULTS

Analyses of pretest data showed GSI and comparison arms equivalent on all outcome variables. Fidelity checks on the consistency of intervention delivery in each arm were done by research assistants who monitored girls' receipt of the respective programs. No differences were observed in the degree and magnitude of intervention involvement between arms. To analyze intervention outcomes, 2-sample independent *t*-tests were performed on gain scores (posttest scores net of pretest scores) on each outcome. Means and standard deviations on gain scores for GSI and comparison arms are presented in Table 1.

Girls in the GSI arm scored more positively than girls in the comparison arm on several outcome measures. GSI girls reported that they were more likely to employ a larger repertoire of stress-reduction methods after intervention than before when compared to girls receiving conventional intervention, $t(89)=2.22, p<0.028$. Responding to the appropriateness of using harmful substances to handle stress, GSI girls were more likely than comparison arm girls to lower their approval of cigarettes, $t(89)=-2.09, p<0.04$, alcohol, $t(89)=-2.35, p<0.021$, and drugs, $t(89)=-1.97, p<0.052$, following intervention.

On another multicomponent item, GSI girls improved more from pretest to posttest than comparison arm girls on their identification of unhealthy ways to deal with stress, $t(89)=3.06, p<0.003$. Asked whether they would use various substances if offered them by their best friends, GSI girls relative to comparison girls decreased their scores regarding cigarette use, $t(89)=-2.10, p<0.038$, and beer drinking, $t(89)=-2.34, p<0.022$. At posttest, GSI girls scored lower than comparison girls on their plans to use cigarettes, $t(89)=-2.02, p<0.046$, alcohol, $t(89)=-2.31, p<0.023$, and marijuana, $t(89)=-2.06, p<0.042$.

DISCUSSION

These modest findings lend support to the promise of gender-specific computer-delivered intervention for reducing risks of substance abuse among early adolescent girls. Study data imply that GSI was superior to conventional intervention in affecting potentially important parameters of substance abuse. Measures of stress reduction, vulnerability to peer pressure, and substance use intentions revealed post-intervention changes in favor of girls who received GSI. The consistent directionality of outcomes, together with the range of assessed parameters, strengthen the quality of study findings.

Admittedly, the study suffers from weaknesses, including self-reported outcomes, short-term assessment, and a small sample. Notwithstanding these limitations, study data augur well for future work.

Despite its brevity, the gender-specific, CD-ROM intervention exerted a salubrious influence on involved girls. That computer intervention impacted girls' behavioral intentions regarding substance use is an added strength since this proxy reliably has predicted subsequent behavior change (26). Reflecting the everyday realities of early adolescent girls, computer intervention may have profited in credibility, timeliness, and sensitivity. The study underscores the viability of gender-specific computer-delivered intervention for the target population and problem, and it lays a scientific foundation for future larger-scale, more sophisticated research.

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REFERENCES

1. Wallace JM, Bachman JG, O'Malley PM, Schutenberg JE, Cooper SM, Johnston LD. Gender and ethnic differences in smoking, drinking and illicit drug abuse among American 8th, 10th, and 12th grade students, 1976–2000. *Addiction* 2003;98:225–234. [PubMed: 12534428]
2. Johnston, LD.; O'Malley, PM.; Bachman, JG. Monitoring the Future Occasional Paper No. 57. Institute for Social Research; Ann Arbor, MI: 2002 [August 4, 2004]. Demographic subgroup trends for various licit and illicit drugs, 1975-2001.. Available online at <http://monitoringthefuture.org>,
3. Johnston, LD.; O'Malley, PM.; Bachman, JG. NIH Publication No. 00-4802. National Institute on Drug Abuse; Bethesda, MD: 2000. Monitoring the future national survey results on drug abuse, 1975–1999. Volume I: secondary school students..

4. Centers for Disease Control and Prevention. Trends in cigarette smoking among high school students—United States, 1999–2001. *Morb Mort Wkly Rep* 2002;51:409–412.
5. Kandel, DB.; Warner, LA.; Kessler, RC. The epidemiology of substance abuse and dependence among women.. In: Gilligan, C.; Lyons, NP.; Hammer, T., editors. *Making Connections: The Relational Worlds of Adolescent Girls at Emma Willard School*. Harvard University Press; Cambridge, MA: 1998.
6. Phillips, L. *The Girls Report*. The National Council for Research on Women; New York: 1998.
7. Centers for Disease Control and Prevention. *Youth Risk Behavior Surveillance System Summary*. US Department of Health and Human Services, Public Health Service; Washington, DC: 1997.
8. Botvin GJ, Baker E, Filazzola AD, Botvin EM. Cognitive-behavioral approach to substance abuse prevention: one year follow-up. *Addict Behav* 1990;15:47–63. [PubMed: 2316411]
9. Graham JW, Johnson CA, Hansen WB, Flay BR, Gee M. Drug abuse prevention programs, gender, and ethnicity: evaluation of three seventh-grade project SMART cohorts. *Prev Med* 1990;18:235–248.
10. Gilchrist LD, Gillmore M, Lohr M. Drug abuse among pregnant adolescents. *J Sch Health* 1990;59:181–188.
11. Gilchrist LD, Schinke SP, Nurius P. Reducing onset of habitual smoking among women. *Prev Med* 1989;18:235–248. [PubMed: 2740294]
12. Palinkas LA, Atkins CJ, Miller C, Ferreira D. Social skills training for drug prevention in high-risk female adolescents. *Prev Med* 1996;25:692–701. [PubMed: 8936571]
13. Weiss F, Nicholson H. Friendly PEERSuasion against substance abuse: the girls incorporated model and evaluation. *Drugs Soc* 1998;12:7–22.
14. Elliot DL, Goldberg L, Moe E, Duncan T, DeFrancesco C, Durham M. ATHENA: deterring drug abuse and disordered eating. *J Investig Med* 2002;50:66A.
15. Rotheram-Borus MJ. Expanding the range of interventions to reduce HIV among adolescents. *AIDS* 2000;14(suppl 1):S33–S40. [PubMed: 10981472]
16. Paperny DMN. Computerized health assessment and education for adolescent HIV and STD prevention in health care settings and schools. *Health Educ Behav* 1997;24:54–70. [PubMed: 9112098]
17. Paperny DM, Aono JY, Lehman RM, Hammar SL, Risser J. Computer-assisted detection and intervention in adolescent high-risk health behaviors. *J Pediatr* 1990;116:456–462. [PubMed: 2308041]
18. Bosworth K, Gustafson DH, Hawkins RP. The BARN system: abuse and impact of adolescent health promotion via computer. *Comput Hum Behav* 1994;10:467–482.
19. Schinke SP, Moncher MS, Singer BR. Native American youths and cancer risk reduction: effects of software intervention. *J Adolesc Health* 1994;15:105–110. [PubMed: 8018682]
20. Schinke SP, DiNoia J, Glassman JR. Computer-mediated intervention to prevent drug abuse and violence among high-risk youth. *Addict Behav* 2004;29:225–229. [PubMed: 14667434]
21. Schinke SP, Schwinn TM, Ozanian AJ. Alcohol abuse prevention among high-risk youth via computer-based intervention. *J Prev Interv Community* 2005;29:117–130. [PubMed: 16804562]
22. Centers for Disease Control and Prevention. *Youth Risk Behavior Surveillance System*. [August 1, 2004]. Available online at <http://www.cdc.gov/nccdphp/dash/yrbs/index.htm>,
23. Oetting ER, Edwards RW, Beauvais F. Reliability and discriminant validity of the children's drug-abuse survey. *Psychol Rep* 1985;56:751–756. [PubMed: 4034827]
24. Werch CE, Young M, Clark M, Garrett C, Hooks S, Kersten C. Effects of a take-home drug prevention program on drug-related communication and beliefs of parents and children. *J Sch Health* 1991;61:346–350. [PubMed: 1787697]
25. Substance Abuse and Mental Health Services Administration. *Keep a Clear Mind Model Program*. [August 1, 2004]. http://www.modelprograms.samhsa.gov/programs_all.cfm?tbviewed=12,
26. Botvin, GJ.; Schinke, SP. *The Etiology and Prevention of Drug Abuse Among Minority Youth*. Haworth Press; Binghamton, NY: 1997.

Table 1

Pretest to posttest gain scores on outcome measures

	GSI (n=47)	Conventional (n=44)
Outcome variable	<i>M (SD)</i>	<i>M (SD)</i>
Likely response to stress ^{a,b}	1.08 (0.36)	0.79 (0.41)
Stress management capacity ^{a,b}	0.78 (0.36)	0.55 (1.34)
"—" use is a good way to handle stress		
Cigarette	-0.41 (0.80)	-0.07 (0.37)
Alcohol	-0.59 (0.57)	-0.25 (0.38)
Drug	-0.49 (0.59)	-0.21 (0.39)
Unhealthy ways of dealing with stress ^{a,b}	0.99 (0.40)	0.51 (0.73)
Satisfied with physical appearance ^b	0.65 (0.84)	0.70 (0.50)
Worried about what peers think	-0.20 (0.74)	0.11 (0.38)
Satisfied with current weight ^b	0.80 (0.42)	0.74 (0.38)
Would use "—" if best friend offered		
Cigarette	-0.29 (0.53)	0.02 (0.45)
Beer	-0.23 (0.63)	0.15 (0.55)
Crack, heroin, or other drugs	-0.32 (0.64)	-0.15 (0.31)
"—" use planned in the next year		
Cigarette	-0.33 (0.55)	-0.03 (0.45)
Alcohol	-0.48 (0.56)	-0.16 (0.32)
Marijuana	-0.50 (0.57)	-0.20 (0.39)
Crack, heroin, or other drugs	-0.31 (0.97)	-0.06 (0.51)

Note. Unless otherwise indicated, lower scores are better.

^a Multicomponent responses.

^b Higher scores are better.