Gender-Specific Intervention to Reduce Underage Drinking Among Early Adolescent Girls: A Test of a Computer-Mediated, Mother-Daughter Program*

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ABSTRACT. Objective: This study evaluated a gender-specific, computer-mediated intervention program to prevent underage drinking among early adolescent girls. **Method:** Study participants were adolescent girls and their mothers from New York, New Jersey, and Connecticut. Participants completed pretests online and were randomly divided between intervention and control arms. Intervention-arm girls and their mothers interacted with a computer program aimed to enhance mother-daughter relationships and to teach girls skills for managing conflict, resisting media influences, refusing alcohol and drugs, and correcting peer norms about underage drinking, smoking, and drug use. After intervention, all participants (control and intervention) completed posttest and follow-up measurements. **Results:** Two months following program delivery and relative to control-arm participants, intervention-arm girls and mothers had improved their mother-daughter communication skills and their perceptions and applications of parental monitoring and rule-setting relative to girls' alcohol use. Also at follow-up, intervention-arm girls had improved their conflict management and alcohol use-refusal skills; reported healthier normative beliefs about underage drinking; demonstrated greater self-efficacy about their ability to avoid underage drinking; reported less alcohol consumption in the past 7 days, 30 days, and year; and expressed lower intentions to drink as adults. **Conclusions:** Study findings modestly support the viability of a mother-daughter, computer-mediated program to prevent underage drinking among adolescent girls. The data have implications for the further development of gender-specific approaches to combat increases in alcohol and other substance use among American girls. (*J. Stud. Alcohol Drugs* **70:** 70-77, 2009)

ALCOHOL USE IS ON THE RISE among adolescent girls. Girls are starting to drink at younger ages than ever before (American Medical Association, 2004; Grunbaum et al., 2004; Hingson et al., 2006). Before entering high school, one third of all girls have drunk alcohol recreationally; once in high school, girls drink at the same rate as boys (Johnston et al., 2005; National Center on Addiction and Substance Abuse, 2003, 2006). Indeed, girls' rates of heavy drinking (i.e., consumption of five or more drinks in a row) are growing faster than boys' rates (Newes-Adeyi et al., 2007). If alcohol industry advertising is a gauge, girls are likely to continue these patterns (Center on Alcohol Marketing and Youth, 2006). Over a 1-year period, girls' exposure to low-alcohol refresher advertising increased 216%; boys' exposure increased 46% (Jernigan et al., 2004). That girls' underage drinking is associated with their unsafe sexual behavior, violence, school failure, riding in automobiles with impaired drivers, and later misuse of alcohol and other substances adds to the significance of girls' early use of alcohol (Cook et al., 2006; Miller et al., 2007; Shepherd et al., 2006; Zakrajsek and Shope, 2006).

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Efforts to prevent underage drinking among girls need to recognize gender-specific risk and protective factors. Because problems in female development often relate more to connection than to separation, girls may benefit from relationship-building interventions. Data indicating that poor attachment to parents is a stronger risk factor for alcohol use among girls than among boys illustrate this connectivity factor (Amaro et al., 2001). Similarly, low parental monitoring and an unstructured home environment correlate more with substance use among girls than among boys (Freshman and Leinwand, 2001). The protective nature of girls' families is suggested by evidence that girls who regularly eat dinner at home are less likely to drink alcohol than girls who seldom enjoy family dinners (Fisher et al., 2007). Parallel research documents that girls' positive parental relationships can moderate negative peer influences (Luthar and Goldstein, 2008). Not only are parental rules about substance use associated with girls' abstinence, but girls also may benefit disproportionately from parental control and supervision, strong family ties, and positive social supports (Alegria et al., 2004; Harakeh et al., 2005).

Efforts to inform prevention programs with gender-specific data have demonstrated positive effects. Elliot and her colleagues (2004) found that, relative to untreated controls, girls who received gender-specific intervention showed improved substance-use knowledge, decreased drug use, and increased intentions to avoid substance use. A prevention program for poor minority girls reduced the incidence and

onset of drinking (Weiss and Nicholson, 1998). Employing mass media, another gender-specific program reduced girls' weekly smoking by 40%, with effects maintained at 4-year follow-up (Worden et al., 1996).

Because girls tend to identify with and remain close to their mothers, even during the often turbulent adolescent years, family interventions hold special promise as a prevention approach (Kumpfer et al., 2003). Indeed, investigators have found that enhancing parent-child relationships can reduce underage drinking (Spoth et al., 2004). The most efficacious family approaches engage parents and children together (Dishion and Kavanagh, 2003; McDonald and Sayger, 1998). But family programs are costly, logistically complex, and ill-suited for poor parents who cannot easily attend intervention sessions because of job, child care, and single-parent-household demands.

Computer-mediated programs may overcome these and other obstacles to delivering family programs (Schinke et al., 2004). For adolescents, computer interventions may hold greater appeal than programs delivered face to face (Paperny, 2004). Computer programs are inexpensive to deliver, can reach participants at home at their convenience, and are associated with positive behavior changes among youth in such areas as underage drinking, drug use, depression, violence, and sexually transmitted diseases (Bellis et al., 2002; Bewick et al., 2008; Christensen et al., 2002; Cunningham et al., 2005; Portnoy et al., 2008).

The purpose of the present study was to test a computer-mediated, gender-specific prevention program for strengthening protective factors to help adolescent girls reduce their risks for underage drinking.

Method

Participants

Study participants were 202 pairs of adolescent girls (mean [SD] age = 12.2 [0.95] years; ethnicity: 67.8% white, 14.1% Latina, 9.5% black, 0.5% Asian, and 8% other) and their mothers (mean age = 41.07 [6.8] years) from New York, New Jersey, and Connecticut who responded to newspaper advertisements and postings on Craigslist.org. To be eligible, participant dyads needed to include a daughter between the ages of 10 and 13 years, have private access to a personal computer, and assure that daughter and mother would complete measurement and intervention procedures. Of the initial 380 pairs of girls and mothers who expressed interest in the study, 178 dyads either failed to meet inclusion criteria or to return signed consent/assent statements within the study's 2-week enrollment period.

Procedure

The study protocol was reviewed and approved by Columbia University's Morningside Campus Institutional Review Board. Girls assented and gained parental consent, and mothers consented before study enrollment. Stratified by age and ethnic-racial background, girls were randomly divided between intervention and control arms; mothers shared their daughters' arm assignments. Girls and mothers completed online pretest measures. Intervention-arm participants subsequently interacted with a 14-module underage drinking-prevention program. At the end of the program and 2 months later, all participants completed online posttest and follow-up measures, respectively.

Control-arm participants gained access to the intervention program after the 2-month follow-up data collection. During the study period, intervention- and control-arm girls and mothers received identical reminders to complete outcome measurement instruments.

Instrumentation

At pretest, posttest, and 2-month follow-up measurement occasions, girls completed a battery of instruments that assessed nine constructs.

Mother communication. The Family Problem Solving Communication Index (McCubbin et al., 1996) measures how family members communicate when faced with problems and conflicts. Adapted for our purposes, the instrument asked girls to indicate their agreement with such statements as "I can discuss my beliefs with my Mom without feeling restrained or embarrassed." The instrument has an α reliability of .78.

Perceived rules. The Intervention-Targeted Parenting Behaviors Scale (Spoth et al., 2002) measures perceptions of family rules regarding adolescent substance use. As adapted for our study, the scale asked girls to indicate their agreement with such statements as, "My mother has explained the consequences of not following her rules against my drinking alcohol." The scale's reliability is $\alpha = .82$.

Parental monitoring. The Parental Monitoring Scale (Li et al., 2000) assesses children's awareness of how closely their parents monitor their friendships and out-of-home activities. The scale asked girls to report their agreement with such statements as, "If I am going to be home late, I am expected to call my Mom to let her know." Alpha reliabilities range from .87 to .92.

Conflict management. The Individual Protective Factors Index (Phillips and Springer, 1992) measures contributors to children's resiliency. Adapted for our study, items from the Index asked girls about the way that their families manage conflict. Illustrative is, "My mother often seems angry with me." The instrument has an α reliability of .67.

Normative beliefs. Relevant items from the American Drug and Alcohol Survey (Beauvais et al., 2004) ask youths about whether and how much their peers drink and use other substances. Normative beliefs items from this measure are illustrated by, "How many of your friends get drunk?" The scale's reliability is $\alpha = .82$.

Self-efficacy. The Alcohol Abstinence Self-Efficacy Scale (DiClemente et al., 1994) asks respondents to assess their own confidence in abstaining from alcohol use in various situations. The scale includes such statements as, "I am confident that I won't drink when I see others drinking at a party." The scale's reliability is $\alpha = .95$.

Refusal skills. The Life Skills Training Questionnaire (Macaulay et al., 2002) asks youths about their capacity to refuse offers of alcohol. Illustrative is, "If my best friend offered me a drink, I would say, 'No' and would not take it." For the refusal skills subscale, the measure has an α reliability of .85.

Alcohol use. The American Drug and Alcohol Survey (Beauvais et al., 2004) quantifies patterns of past, recent, and current substance use among young people. Girls were asked to reflect on the past week, month, and year to report their consumption of beer, wine, and distilled spirits, responding to such questions as, "How often in the last week have you had alcohol to drink?" Reliabilities across items on the Survey range from .86 to .94.

Drinking intentions. The American Drug and Alcohol Survey (Beauvais et al., 2004) subscale items ask youths to quantify the likelihood that they intend to regularly consume alcohol when they are adults. Scaled items include such questions as, "Do you think you will drink alcohol when you are an adult?" The intentions scale has an α reliability of .78.

At each outcome measurement occasion, mothers completed instruments on three constructs that paralleled relevant scales completed by girls.

Daughter communication. The Family Problem Solving and Communication Index (McCubbin et al., 1996) that girls completed also provided items for mothers to describe the frequency and quality of communications with their daughters in response to such questions as, "During the past month when you and your daughter have spent time talking or doing things together, how often did you let your daughter know that you appreciated her ideas?" Inventory items completed by mothers had α reliabilities ranging from .74 to .76.

Parental rules. The Intervention-Targeted Parenting Behaviors Scale (Spoth et al., 2002) items for mothers are illustrated by, "I have explained the consequences of not following my rules concerning alcohol use to my child." Alpha reliability is .85.

Parental monitoring. The Parenting Practices Questionnaire (Gorman-Smith et al., 1996) items determine the extent to which parents monitor their children's whereabouts, activities, and friends. Illustrative is, "I set a time when my daughter is expected home." Reliability is $\alpha = .82$.

Intervention

Conceptually, the intervention program was informed by family interaction theory (Brook et al., 1990). Family interaction theory focuses on parent-child attachment, specifically the mother-child dyad. The theory suggests that if mothers have warm, nurturing relationships with their daughters, girls may be less likely to drink and take drugs. Conversely, if mothers fail to supervise and support their daughters, girls may attach to their peers, particularly to deviant peers. Theoretically, the risks of underage drinking can be reduced by fostering parent-child attachment, supervision, and support (Windle et al., 2008).

Grounded in this theory, our gender-specific prevention program had two aims: (1) enhance the quality of girls' relationships with their mothers and (2) teach girls cognitive-behavioral skills to avoid underage drinking. To accomplish these aims, girls and their mothers interactively completed 14 computer-mediated intervention modules. The first five modules focused on rapport building as a foundation of positive parent-child communication, interpersonal relationships, and respect between girls and their mothers. The next five modules addressed conflict management, ground rules for negotiating arguments, the value of being polite and respectful, and empathic listening. The last four modules helped participants analyze media portrayals of drinking, enabled girls to correctly understand peer norms around underage drinking, and taught girls alcohol use-refusal skills that they practiced in role-play scenarios.

Each intervention module, which was programmed onto a CD-ROM and available online, was introduced and demonstrated by animated characters portraying an adolescent girl and her mother. Mother-daughter pairs completed between four and five intervention modules at home each week. Twice-weekly emails reminded participants of the intervention delivery schedule.

Intervention program exercises taught mothers and daughters the value of listening to each other, spending time together, understanding one another's personality, negotiating mutually agreeable decisions to problems, and giving each other gifts of time, compliments, and personal favors. In a gift-giving exercise, for example, mothers and daughters identified compliments they could give to each other. One participant would turn her back to the computer screen while the other participant used the mouse to drag five "gifts"—in the form of praise statements—to a wrapped-box icon. Turning around, the first participant clicked the wrapped box to reveal and hear, one by one, each chosen compliment. Following the activity, mothers and daughters shared how the gift exchanges made them feel, altered their perceptions of one another, and could be integrated into their everyday lives.

At the completion of each module, embedded program commands transmitted the data from the mothers and daughters to our server. CD-ROM versions of the program instructed participants' computers to transmit comparable data the next time the users were online. Monitoring data captured the duration, progress, and accessed sequences of

TABLE 1. Girls' and mothers' ratings of the intervention program

Rated parameter	Girls Mean (SD)	Mothers Mean (SD)
Improved mother-daughter relationship	4.14 (0.35)	4.25 (0.29)
Learned information useful for mother-daughter relationship	4.16 (0.38)	4.13 (0.34)
Enjoyed intervention program	4.07 (0.39)	4.20 (0.34)
Found time to complete program online	3.04 (0.37)	3.24 (0.33)

Note: Scores are responses to 5-point scales where 5 = "strongly agree" and 1 = "strongly disagree."

the intervention program; scores on postsession quizzes; and whether and how frequently research staff contacted girls and mothers. To help ensure that mothers and daughters jointly interacted with the material, the program required participants to independently log on to the study's Web site and to complete questions about each module's content. Participants could not advance the program until both mother and daughter answered the questions correctly.

Process data

When asked to anonymously rate the program, intervention-arm girls and mothers were uniformly favorable in their opinions of (1) whether the program improved their relationship with each other, (2) whether they learned information from the program that was useful for their relationship, (3) the extent to which they enjoyed the intervention program, and (4) their ability to find time to complete interactive modules together (Table 1). Most (92%) intervention-arm participants accessed the program online. No differences in demographic data, process findings, and outcome results were discernible between participants who accessed the program online and those who employed the CD-ROM version.

All girls and mothers who completed pretest measures also completed posttest measures. Between the posttest and follow-up measurements, two pairs (2%) of girls and mothers in the intervention arm and one pair (1%) of girls and mothers in the control arm were lost to attrition.

Statistical analysis

We compared the demographic background characteristics of intervention- and control-arm participants with *t* tests and chi-square statistics. Outcome variables were examined with general linear model repeated-measures analyses. At

TABLE 2. Pretest, posttest, and 2-month follow-up scores for girls

Outcome variable	Pretest		Posttest		2-month follow-up		Time[d] (T)		Intervention[e] (I)		Interaction[d] (T × I)	
	Intervention Mean (SD)	Control Mean (SD)	Intevention Mean (SD)	Control Mean (SD)	Intervention Mean (SD)	Control Mean (SD)	*F*	η^2	*F*	η^2	*F*	η^2
Mother communication[a]	2.29 (1.22)	2.25 (1.37)	2.89 (1.30)	2.29 (1.25)	2.70 (1.16)	2.41 (1.32)	0.23	.00	4.13*	.02	3.33*	.02
Parental rules[a]	1.51 (0.50)	1.50 (0.50)	1.77 (0.42)	1.53 (0.50)	1.73 (0.45)	1.59 (0.49)	0.46	.00	4.59*	.02	6.29†	.03
Parental monitoring[a]	3.89 (0.38)	3.83 (0.36)	3.92 (0.31)	3.75 (0.66)	3.92 (031)	3.74 (054)	2.07	.01	8.97†	.04	4.34*	.02
Conflict management[a]	2.42 (0.67)	2.48 (0.65)	2.63 (0.67)	2.38 (0.64)	2.67 (0.61)	2.36 (0.67)	0.46	.00	5.15*	.03	8.89‡	.04
Normative beliefs[b]	1.58 (1.05)	1.55 (1.14)	1.34 (0.68)	1.71 (1.32)	1.24 (0.58)	1.76 (1.37)	0.38	.00	5.66*	.03	9.01‡	.05
Self-efficacy[a]	3.63 (0.59)	3.59 (0.69)	3.74 (0.57)	3.52 (0.73)	3.77 (0.47)	3.51 (0.69)	0.57	.00	6.60*	.03	3.18*	.02
Refusal skills[a]	3.46 (0.55)	3.44 (0.54)	3.67 (046)	3.47 (0.60)	3.72 (0.45)	3.52 (0.67)	0.25	.00	4.86*	.03	4.15*	.02
30-day alcohol use[c]	0.33 (0.47)	0.30 (0.46)	0.18 (0.39)	0.31 (0.47)	0.26 (0.44)	0.30 (0.46)	0.37	.00	0.79	.00	3.96*	.02
7-day alcohol use[c]	0.17 (0.38)	0.10 (0.30)	0.08 (0.27)	0.12 (0.32)	0.08 (0.27)	0.16 (.37)	1.40	.01	0.56	.00	4.74†	.02
1-year alcohol use[c]	0.47 (0.50)	0.35 (0.48)	0.31 (0.47)	0.35 (0.48)	0.35 (0.48)	0.39 (0.49)	1.00	.01	0.01	.00	6.18†	.03
Drinking intentions[b]	4.22 (2.73)	4.90 (2.95)	3.71 (2.46)	4.35 (2.71)	3.35 (2.34)	3.98 (2.72)	0.14	.00	4.98*	.02	0.02	.00

[a]Responses to 5-item scales; higher scores are better; [b]responses to 5-item scales; lower scores are better. [c]number of alcohol drinks consumed (e.g., glasses of wine or mixed drinks; cans or bottles of beer; shots of distilled spirits); [d]2/386 df; [e]1/193 df.
*$p < .05$; †$p < .01$; ‡$p < .001$.

TABLE 3. Pretest, posttest, and 2-month follow-up scores for mothers

Outcome variable	Pretest		Posttest		2-month follow-up		Time[a] (T)		Intervention[b] (I)		Interaction[a] (T × I)	
	Intervention Mean (SD)	Control Mean (SD)	Intevention Mean (SD)	Control Mean (SD)	Intervention Mean (SD)	Control Mean (SD)	*F*	η^2	*F*	η^2	*F*	η^2
Daughter communication	1.94 (1.31)	2.11 (1.29)	2.00 (1.24)	2.01 (1.18)	2.09 (1.29)	1.84 (1.16)	3.63*	.02	2.41	.01	3.95*	.02
Parental rules	2.11 (1.24)	1.90 (1.28)	2.42 (0.99)	2.06 (1.29)	2.60 (0.90)	2.06 (1.33)	7.85‡	.04	5.57*	.03	3.10*	.02
Parental monitoring	3.39 (0.63)	3.45 (0.61)	3.51 (0.52)	3.45 (0.65)	3.55 (0.47)	3.46 (0.69)	1.11	.01	0.41	.00	3.23*	.02

Notes: Scores are responses to 5-item scales where higher scores are better. [a]2/386 df; [b]1/193 df.
*$p < .05$; ‡$p < .001$.

each measurement occasion, outcome variables comprised the within-subject factor; study arm assignment was the between-subject factor; and girls' ages and ethnic-racial backgrounds and mothers' ages and education were covariates. We used Mauchly's method to determine whether sphericity was violated (Mauchly, 1940). If so, we adjusted the repeated-measures analysis of variance using the Greenhouse-Geisser correction and used the epsilon-corrected value for hypothesis testing (Keselman et al., 2001). Effect size was calculated by eta squared (η^2). All analyses were conducted at $p < .05$.

Results

Means and standard deviations for girls' and mothers' outcome measurement variables at pretest, posttest, and follow-up appear in Tables 2 and 3. Pretests failed to differ between arms for girls or mothers on any demographic variable. The only outcome variable to show pretest differences was girls' intentions to drink as adults, which favored intervention-arm girls.

Girls' outcomes

Relative to control-arm girls, intervention-arm girls reported improved communication with their mothers at posttest and follow-up ($p < .05$) and also reported greater improvement than control-arm girls over time ($p < .05$). At posttest and follow-up, intervention-arm girls reported more parental rules against drinking than control-arm girls ($p < .05$); over time, parental rules scores increased from pretest to follow-up more for intervention-arm girls than for control-arm girls ($p < .01$). Compared with intervention-arm girls, control-arm girls reported less parental monitoring of their out-of-home activities at posttest and follow-up ($p < .01$) and over time ($p < .05$). Reports of girls' family conflict management skills improved more for girls who received intervention than for girls in the control arm ($p < .05$); girls in the intervention arm also showed greater improvements than girls in the control arm in these skills over time ($p < .001$).

Compared with control-arm girls, intervention-arm girls reported better normative beliefs about underage drinking at posttest and follow up ($p < .05$) and over time ($p < .001$). Scores on girls' self-efficacy about avoiding alcohol also revealed positive intervention effects ($p < .05$) and greater improvements over time ($p < .05$) relative to control-arm girls. Girls' alcohol use-refusal skills favored the intervention arm relative to the control arm ($p < .05$) and over time ($p < .05$). Intervention by time interactions found intervention-arm girls reporting less alcohol consumption than control-arm girls in the past week ($p < .01$), month ($p < .05$), and year ($p < .01$). At pretest, posttest, and 2-month follow-up, fewer intervention-arm girls than control-arm girls said that they intended to drink alcohol when they became adults ($p < .05$).

Mothers' outcomes

Across measurement occasions, intervention-arm mothers reported increased mother-daughter communication ($p < .05$), whereas control-arm mothers reported decreased communication with their daughters over time ($p < .05$). Parental rules against underage drinking as reported by mothers revealed main effects for time ($p < .01$), for intervention ($p < .05$), and for an Intervention × Time interaction ($p < .05$), in favor of the intervention arm relative to the control arm. Finally, an intervention by time interaction showed closer monitoring of daughters' out-of-home behavior for intervention-arm mothers than for control-arm mothers ($p < .05$).

Discussion

Study findings modestly support the viability of a mother-daughter, computer-mediated program to prevent underage drinking among adolescent girls. Two months following intervention delivery, girls and their mothers reported improved patterns of communication, parental rules, and monitoring. Girls additionally improved their conflict management and alcohol use-refusal skills, self-efficacy, and normative beliefs, and they reported less alcohol use and

lower intentions to drink as adults. These outcomes suggest that the gender-specific program provided an efficacious means to help adolescent girls avoid problems with alcohol and, hence, to potentially reverse disquieting trends toward high rates of drinking among young women.

Lending credence to the tested program's potential were the absence of time effects on any variable for girls and the presence of intervention by time interactions on 10 variables for girls. Moreover, intervention effects were seen on eight variables including girls' drinking intentions, the only outcome that did not show an intervention by time interaction. Data for mothers showed intervention by time interactions on each of three measured variables: time effects on the daughter communication and parental rules variables and intervention effects on the parental rules variable.

Various programmatic components directly addressed some of the measured outcome variables that in turn indicated change favoring the intervention arm. Girls and their mothers learned how to communicate more effectively with one another and acquired strategies for resolving mother-daughter conflicts in a nonconfrontational manner. Changes in variables measuring these qualities are unsurprising. Also expected were changes in girls' normative beliefs and refusal skills, variables mirrored in two additional intervention components. Additional positive outcomes from the program in girls' alcohol use may have come about through the aforementioned mediating variables that gave focus to the intervention. Other outcomes occurred for variables that were implicit in the intervention program. These include parental rules and monitoring, both of which changed for girls and mothers, as well as girls' self-efficacy. The total constellation of positive outcomes for intervention-arm participants may thus reveal the direct and indirect effects of components included in the intervention program.

Study outcomes compare favorably to other investigations of computer-delivered interventions for promoting health and for reducing health behavior risks in general and to Web-based interventions for decreasing alcohol consumption in particular. Regarding the general universe of health-promoting and risk-reducing interventions, our findings strengthen conclusions that computer-based approaches can lead to short-term changes in theoretically indicated mediator variables that can precede behavior change (Portnoy et al., 2008). Our data substantiate behavior change at 2-month follow-up, which adds evidence to this conclusion. As for Web-based approaches to reducing alcohol use, our study findings are somewhat unusual. To date, for example, most such alcohol-focused approaches have engaged adults, and are often evaluated for their processes rather than for their outcomes; concomitantly, these approaches have lacked adequate controls, including randomized designs (Bewick et al., 2008).

The current study advances knowledge in three areas. First, our data have implications for gender-specific approaches to prevention programming. These approaches, which are in relatively short supply, are increasingly warranted given trends in girls' drinking and other substance use. By addressing risk and protective factors that are particular to girls, gender-specific programs may attract populations that would not otherwise be engaged by alcohol-prevention programming (Lewis et al., 2007; Rohrbach and Milam, 2003). Second, the study confirmed the salubrious effects of family programs, as documented by others (Dishion and Kavanagh, 2003; Spoth et al., 2007). Because girls often turn to their mothers for support and guidance, approaches that enhance mother-daughter bonds can draw from readily accessed resources (Boone and Lefkowitz, 2007). Third, the study argues for the viability of computer-mediated prevention programming. Because intervention was delivered by computer, mothers and daughters could access the program in their own homes and at times of their choosing. Concurrently, the program yielded objective and confidential reports on its fidelity, while unearthing any problems encountered by participants to allow research staff to address the issues nearly in real time. Process data underscore the program's perceived value to intervention-arm participants.

Despite and in part owing to its innovations, the study has weaknesses. Although it represented a cross-section of early adolescent girls in New York, New Jersey, and Connecticut, the sample was nonetheless small. Despite the size of the sample, the randomized design controlled all major threats to internal validity except testing—because both arms were pretested before program delivery—but the external validity of study findings are limited. We engaged only girls and mothers who had computer access and who likely were comfortable with this mode of information acquisition. Further, most participants enjoyed high-speed online access, another characteristic that is not typical of all American homes. Because we engaged only girls and mothers and a single-intervention approach, we cannot examine interactions of gender and prevention program components. Moreover, the program was brief, as was follow-up measurement. Also, measured outcomes relied on self-report.

Conclusions

A gender-specific intervention program aimed at protective factors between adolescent girls and their mothers and designed for home delivery via personal computer helped girls reduce their risks for underage drinking. Prevention programming expressly for girls has the capacity to address gender-specific influences that may explain troubling rates of alcohol use among female adolescents. Efforts to involve mothers in prevention programs aimed at their adolescent daughters can nurture and sustain powerful bonds between parents and children while encouraging parents to impose and monitor appropriate limits and controls. The potential of computer approaches has only begun to be tapped and will

doubtless be subject to further study. The possibilities for intervening through new and creative ways, especially with youth, are myriad.

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