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## Two- and Three-Year Follow-Up from a Gender-Specific, Web-Based Drug Abuse Prevention Program for Adolescent Girls

Traci Marie Schwinn, PhD<sup>a</sup>, Steven Paul Schinke, PhD<sup>a</sup>, Bryan Keller, PhD<sup>b</sup>, and Jessica Hopkins, MPH<sup>a</sup>

<sup>a</sup>Columbia University School of Social Work, 1255 Amsterdam Ave, NY, NY 10027, USA

<sup>b</sup>Teachers College, Columbia University, 525 West 120th St., New York, NY 10027, USA

### Abstract

**Introduction:** Rates of drug use among early adolescent girls meet or exceed rates of their male counterparts. Girls are also vulnerable to differential risk factors for drug use. Yet, expressly designed prevention programs targeting this population are absent. The present study reports 2- and 3-year findings on a web-based drug abuse prevention program for adolescent girls.

**Methods:** A sample of adolescent girls ( $N = 788$ ) were recruited via Facebook. Online, all girls completed pretests; girls were randomly assigned to a 9-session intervention arm or to a measurement-only control arm and all girls completed posttests. All girls also completed 1-, 2-, and 3-year follow-up measurements.

**Results:** At 2-year follow-up and compared to girls in the control arm, intervention-arm girls reported less past-month cigarette, marijuana, and “other” drug use (club drugs, cocaine, ecstasy, hallucinogens, heroin, inhalants, methamphetamines, steroids, prescription drugs), lower rates of peer drug use, and increased scores on drug refusal skills, coping skills, self-esteem, media literacy, and self-efficacy. At 3-year follow-up, and compared to girls in the control arm, intervention-arm girls reported less past-month cigarette and e-cigarette use, lower rates of peer drug use, lower reported anxiety and stress, and increased scores on drug refusal skills, self-esteem, media literacy, self-efficacy, and body image.

**Conclusions:** Longitudinal outcome data lend support to the efficacy of a gender-specific, web-based drug abuse prevention program to reduce adolescent girls’ drug use rates and associated risk factors.

### Keywords

gender-specific; drug abuse; prevention; web-based; female

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Corresponding author: Traci Marie Schwinn, Columbia University School of Social Work, 1255 Amsterdam Avenue, New York, NY, 10027, USA. tms40@columbia.edu; Tel.: + 1 212-851-2280 (telephone).

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## 1. Introduction

Young girls' drug use rates rival and sometimes exceed their male counterparts' rates of use (Johnston et al., 2018a). As girls' transition from middle to high school, their drug consumption increases dramatically. Between 8th and 12<sup>th</sup> grades, the percentage of girls who vape any substance doubles from 6% to 12%; the percentage of girls who smoke cigarettes or marijuana quadruples from 2% to 8% and from 5.5% to 21.5%, respectively; and the percent of girls who drink alcohol increases by 255% (Johnston et al., 2018b).

Furthermore, as females mature, they are more vulnerable to drug addiction than males (Anker & Carroll, 2011). Females experience greater side effects during drug use, experience more negative affect during withdrawal, and are more likely to relapse than their male counterparts (Becker, McClellan, & Reed, 2017; National Institute on Drug Abuse, 2018). The sexual risks from impaired judgment that attend drug use also weigh heavier on females than on males (Chung et al., 2017). Without dispute, girls are using drugs at alarming rates and experience untoward consequences from their use. To mitigate girls' drug use and risks for drug use, effective prevention programs must be theory-based, tailored, engaging, and easy to disseminate.

### 1.1 Theoretical Framework

For boys and girls alike, deviant peers and other social influences are the leading risk factors for adolescent drug abuse (Catalano, Haggerty, Hawkins, & Elgin, 2011; Van Ryzin, Fosco, & Dishion, 2012). Affiliation with drug using peers has long been a robust predictor of drug use (Fergusson, Swain-Campbell, & Horwood, 2002; Lee, Padilla-Walker, & Memmott-Elison, 2017). Effective prevention programming, therefore, must provide instruction to youth on the skills required to navigate the risks associated with these peer influences. Similar to boys, girls' drug use is reduced when they possess the social and cognitive skills necessary to resist peer and social influences to use drugs (Scheier, 2015). Therefore, our intervention content was guided by social learning theory (Bandura, 1986) and aimed to enhance girls' social, emotional, and cognitive competencies around such skills as goal setting, self-efficacy, media literacy, peer use, and drug use refusal. Often referred to as comprehensive skills training, the aforementioned program elements are a hallmark of effective prevention programs (Faggiano, Minozzi, Versino, & Buscemi, 2014).

Risks for drug use do, however, differ by gender. Girls, more than boys, are susceptible to internalizing behaviors of low self-esteem, difficulty coping with stress, and negative body image, as well as disorders of anxiety and depression (Dir et al., 2017; Marmorstein et al., 2010). Evidence suggests that these internalizing behaviors and disorders are more strongly associated with later drug use for girls than for boys (Danzo et al., 2017; Edwards et al., 2014; Miettunen et al., 2014).

To address girls' gender-specific risk factors linked to mood management, self-esteem, and coping with stress, our intervention was further guided by a resiliency framework (Masten & Powell, 2003). Content on stress, puberty, body image, media images related to beauty, and coping strategies was included to bolster essential characteristics of resiliency that include positive self-regard, competency coping with stress, and managing mood (Hodder et al.,

2017). Our intervention, therefore, addressed girls' general and gender-specific risk factors for drug use.

## 1.2 Gender-Specific Interventions

Support for the use of gender-specific programming is evident in such fields as HIV prevention (Wechsberg et al., 2015), health education (LeCroy, Cosgrove, Cotter, & Fordney, 2018), behavioral and cognitive psychology (Belgrave, Chase-Vaughn, Gray, Addison, & Cherry, 2000; McCabe, M. P., Connaughton, C., Tatangelo, G., Mellor, D., & Busija, L., 2017), criminal justice (Wakai, Sampl, Hilton, & Ligon, 2014), and drug abuse treatment (Chen et al., 2004; Saxena, Messina, & Grella, 2014). Yet, despite decades of evidence noting gender differences in drug use rates, risk factors, and sequelae of use, prevention interventions tailored for adolescent girls remain in short supply (Kumpfer, Smith, & Summerhays, 2008). In addition to our prior work pilot testing gender-specific programming (Schinke & Schwinn, 2005, Schinke & Schwinn, 2005), only two additional drug prevention programs for adolescent girls appear in the literature.

One effort to stem adolescent girls' drug use is a comprehensive skills-based intervention delivered in high school to female athletes (ATHENA; Elliot et al., 2008). Females randomly assigned to ATHENA reported less alcohol, cigarette, and marijuana use compared to girls in the control arm, 1 to 3 years following the program. The lower rates of drug use observed in this longitudinal study speak to the promise of providing gender-specific, skills-based content to reduce girls' later vulnerabilities to drug use. A second promising effort to address adolescent girls' risk for drug use is a skills-based intervention developed by Girls Incorporated (Weiss & Nicholson, 1998). This facilitator-led program aimed to help girls who participated in an afterschool program to navigate the peer and societal pressures to use drugs. Study findings were modest and included delaying the onset of alcohol use and avoiding situations where alcohol was present.

## 1.3 Web-Based Interventions

The scarcity of gender-specific drug abuse prevention programming may be attributed to the implementation demands that attend delivery of any traditional prevention program, but which are heightened when tailored programming requires additional staff and space for delivery to distinct groups (e.g., boys and girls). Web-based interventions, however, hold promise to ease the implementation of delivering programming to a sub-population, with the added promise of high fidelity, improved participant engagement, and inexpensive distribution. With 92% of teens aged 13–17 years going online daily (Lenhart, 2015), novel, web-based, interactive drug abuse prevention program can reach youth where they socialize and spend much of their free time. Recent reviews and meta-analyses of web-based interventions suggest that researchers are capitalizing on the potential promise of online intervention delivery to mitigate adolescent drug use (Champion, Newton, Barrett, & Teesson, 2013; Rodriguez, Teesson, & Newton, 2013; Schinke & Schwinn, 2017; Tait, Spijkerman, & Riper, 2013).

## 1.4 Current Study

Toward advancing the field of prevention science, our team developed and tested a web-based intervention that addresses risk and protective factors salient to girls' drug use. We hypothesize lower rates of past 30-day drug use among girls randomly assigned to receive the intervention compared to girls randomly assigned to receive no intervention. We also hypothesize that girls who receive the intervention will have improved scores on risk and protective factors salient to drug use (anxiety, depression, body image, coping, stress, media literacy, goal setting, self-esteem, self-efficacy, refusal skills, and peer use) compared to girls who receive no intervention. The data presented here extend our previous reporting on posttest and 1-year followup data finding intervention effects on cigarette use, binge drinking, peer drug use, self-esteem, goal setting, self-efficacy, drug refusal skills, coping skills, and media literacy (Schwinn, Schinke, Hopkins, Keller & Liu, 2017).

## 2. Methods

Participants were 788 girls from 48 states. Girls were recruited using Facebook advertising. Appearing on the pages of users who registered as 13- and 14-year-old girls residing in the United States, the ads linked girls to our study webpage. There, girls were informed of the study and inclusion criteria—aged 13 or 14 years, United States resident, English speaker, and access to a private computer with broadband internet. Interested girls provided their name, birthdate, and home mailing address. To these girls' homes we mailed a packet that included: a) separate information booklets for the parent and girl, b) a parent permission form, c) a youth assent form, and d) a postage-paid, self-addressed envelope for returning the signed permission and assent forms.

Upon receipt of the forms, we mailed copies of the signed permission and assent forms to the signing parent with a letter instructing them to contact us if they had not enrolled their daughter. Also, when daughter and parent signatures displayed questionable similarities, the parent was called to verify permission. Only after completing these procedures was a girl enrolled and randomly assigned to the intervention or control arm of the study (see Schwinn, Hopkins, Schinke, & Liu, 2017 for more on Facebook recruitment). All study procedures were approved by the Columbia University Morningside Institutional Review Board.

Following completion of the online pretest, girls who were randomly assigned to the intervention arm received instructions to access the online intervention, *RealTeen*. The intervention comprised a homepage and nine intervention sessions. The homepage was accessible at any time and included feeds from entertainment sites, online polls, horoscopes, beauty tips, and quotes of the day. Links to the individual intervention sessions were embedded in a menu on the homepage. Sessions focused on goal setting, decision-making, puberty, body image, coping with stress, drug knowledge, and drug refusal skills. Content—guided by an animated young adult female—began with a skills-based lesson, was followed by interactive exercises to enhance skills acquisition, and concluded with a review and quiz (for more information on the intervention, see Schwinn, Hopkins, & Schinke, 2016). Each session required 15 to 20 minutes to complete; on average, the intervention required 3.5 weeks to complete. The nine intervention sessions were completed by 87% of girls.

## 2.1 Measures

The intervention addressed risk and protective factors salient for girls' drug use—mood management, body image, coping skills, stress, media influences, goal setting, self-esteem, self-efficacy, peer drug use, and drug use refusal skills. These factors were correspondingly measured across each measurement occasion in addition to girls' current drug use. At each measurement occasion, girls also responded to items about demographic characteristics. Two-year follow-up data were collected in late 2015 and early 2016, approximately 22 months after posttest; 3-year followup data were collected in late 2016 and early 2017. Reliability scores presented for the measures come from the study data. All measures were previously used with adolescent girls in our prior work (Schwinn et al., 2010) and are described in greater detail in Schwinn et al. (2017). Girls received \$40 for 2-year follow-up and \$50 for 3-year follow-up.

**2.1.1 Demographics.**—Girls reported their age, race/ethnicity, average letter grade in school, type of school, living arrangement, and parents' highest level of education.

**2.1.2 Anxious and depressive mood.**—Scales from the Brief Symptom Inventory (Derogatis, 1993) were used to assess girls' anxiety and depression. Each of the two scales included five, 5-point Likert-scaled items that asked girls to rate the extent to which they were bothered (Not at all = 0, All the time = 4) by various symptoms (e.g., lonely, tense, anxious) during the past month. The five-item scales were combined to form two indices ( $\alpha = .90$  for each).

**2.1.3 Body image.**—Items derived from the Multidimensional Body-Self Relations Questionnaire (Cash, 2000) were used to assess girls' body-image. Six, 5-point Likert-scaled items asked girls to report girls' satisfaction with aspects of their physical appearance. These were combined to form an index of girls' self-evaluation of their appearance (Very satisfied = 1, Very dissatisfied = 5). ( $\alpha = .89$ ).

**2.1.4 Coping skills.**—Ten, 4-point Likert-scaled items from the Brief COPE (Carver, 1997) were used to assess girls' coping skills. Girls reported the frequency with which they engaged in self-distraction, active coping, destructive coping, positive reframing, and obtaining help from instrumental supports (Never = 0, Very often = 3). The 10 items were combined to form an index ( $\alpha = .74$ ).

**2.1.5 Perceived stress.**—Four, 4-point Likert-scaled items adapted from the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983), were used to assess girls' stress. Girls rated the degree to which their life situations were unpredictable, uncontrollable, and stressful during the past month (Never = 0, All the time = 3). The four items were combined to form an index ( $\alpha = .71$ ).

**2.1.6 Media literacy.**—Eight, 4-point Likert-scaled items were adapted from a smoking media literacy scale (Primack et al., 2006) to assess general media literacy. Designed to measure youths' ability to critically assess advertising within mass media outlets, girls indicated their level of agreement with statements related to the use of product placement,

inherent values in the messaging, and motivation of the advertiser (Strongly agree = 1, Strongly disagree = 4). The eight items were combined to form an index ( $\alpha = .77$ ).

**2.1.7 Goal setting.**—This scale assessed goal-setting skills with five items (Fearnow-Kenney, Hansen, & McNeal Jr, 2002) measuring the degree to which girls set current and future goals, the extent to which they thought about how to achieve those goals, and how often they think about their goals in relation to solving problems (Never = 0, All the time = 3). The five items were combined to form an index ( $\alpha = .77$ ).

**2.1.8 Self-esteem.**—The Rosenberg Self-Esteem Scale (Rosenberg, 1989) was used to assess girls' self-esteem. Ten, 4-point Likert-scaled items combined to form a self-esteem index with lower scores indicating higher self-esteem ( $\alpha = .89$ ). For example, "I like myself for who I am." (Strongly agree = 1, Strongly disagree = 4).

**2.1.9 Self-efficacy.**—The Generalized Self-Efficacy Scale (Schwarzer & Jerusalem, 1995) was used to assess girls' self-efficacy. Six, 4-point Likert-scaled items asked girls to assess their ability to manage difficult life situations (Strongly agree = 1, Strongly disagree = 4). The six items were combined to form an index ( $\alpha = .85$ ).

**2.1.10 Refusal skills.**—Girls' ability to refuse alcohol, cigarettes, and marijuana was assessed on a 5-point Likert scale (Definitely would = 1, Definitely would not = 5; Epstein, Botvin, Diaz, Baker, & Botvin, 1997). Girls reported the likelihood of using various strategies (e.g., "tell them not now," "change the subject," "say 'no thanks'") to refuse the offer. The five items were combined to form indices for alcohol, cigarettes, and marijuana ( $\alpha = .77-.89$ ).

**2.1.11 Peer drug use.**—Girls were asked six items about how many of their closest friends had used various drugs in the past month (None = 0, All = 3; Schwinn & Schinke, 2014). Four-point Likert-scaled items were combined to form an index that had an internal consistency of  $\alpha = .87$ .

**2.1.12 Drug use.**—Adapted from the Centers for Disease Control's (CDC) Youth Risk Behavior Survey (YRBS; CDC, 2005), this scale asked girls to report how many times in the past month they used alcohol, cigarettes, e-cigarettes, marijuana, and other drugs (i.e., club drugs, cocaine, ecstasy, hallucinogens, heroin, inhalants, methamphetamines, steroids, and prescription drugs). Using a drop-down menu, girls selected a number from the available range of "0 times" to "71 or more times." Test-retest reliability for YRBS items is 0.82 to 0.95 (CDC, 2013).

## 2.2 Analytic Plan

Data were cleaned and analyzed using R (R Core Team, 2015). Twenty-nine cases were removed for extreme scores and unreliable patterns of reported drug use across measurement occasions. The primary outcomes were fit using negative binomial (NB) generalized linear regression models using the MASS package (Venables & Ripley, 2002), controlling for pretest. Exponentiating the coefficient on the treatment indicator from NB models provides the incidence rate ratio (IRR), a measure of effect size (e.g., an IRR of 0.60 indicates a 40%



reduction in the outcome in the treatment group relative to the control group, holding other variables in the model constant). The secondary outcomes—risk and protective factors for drug use—were analyzed using ordinary least squares regression models.

### 3. Results

At 2- and 3-year follow-up, the sample had a mean age of 15.91 years ( $SD = 0.76$ ) and 17.25 years ( $SD = 0.76$ ), respectively. With the exception of Wyoming and Alaska, participants resided across the United States; 63% identified as White, 17% as Black, 15% as Latina, 4% Asian, and 16% Other. Sample retention rates at 2- and 3-year follow-up were 95% and 96%, respectively. See Table 1 and Schwinn et al. (2017) for additional demographics.

#### 3.1 Primary Outcomes

At 2-year follow-up, negative binomial (NB) models controlling for pretest, revealed that girls assigned to the intervention arm reported less past-month use of cigarettes ( $B = -0.75$ ,  $p = .048$ ; IRR = 0.474), marijuana ( $B = -0.60$ ,  $p = .038$ ; IRR = 0.549), and other drugs (club drugs, cocaine, ecstasy, hallucinogens, heroin, inhalants, methamphetamines, steroids, and prescription drugs;  $B = -1.01$ ,  $p = .003$ ; IRR = 0.365) compared to girls assigned to the control arm (Table 2). The IRRs indicate a 53% reduction in expected past-month cigarette use, a 45% reduction in expected past-month marijuana use, and a 64% reduction in expected past-month “other” drug use among girls assigned to the intervention arm compared to girls assigned to the control arm.

At 3-year follow-up, NB models controlling for pretest, revealed that girls assigned to the intervention arm reported less past-month use of cigarettes ( $B = -1.04$ ,  $p = .007$ ; IRR = 0.353) and e-cigarettes ( $B = -1.92$ ,  $p < .001$ ; IRR = 0.146), compared to girls assigned to the control arm (Table 2). The IRRs indicate a 65% reduction in expected past-month cigarette use and an 85% reduction in expected past-month e-cigarette use among girls assigned to the intervention arm compared to girls assigned to the control arm.

#### 3.2 Secondary Outcomes

At 2-year follow-up, and compared to girls in the control arm, girls in the intervention arm reported lower rates of peer drug use ( $B = -0.55$ ,  $p = .018$ ), and increased drug refusal skills ( $B = -0.12$ ,  $p = .048$ ), coping skills ( $B = 0.12$ ,  $p = .010$ ), self-esteem ( $B = -0.11$ ,  $p = .020$ ), media literacy ( $B = -0.11$ ,  $p = .010$ ), and self-efficacy ( $B = -0.10$ ,  $p = .015$ ; Table 3).

At 3-year follow-up, and compared to girls in the control arm, girls in the intervention arm reported lower rates of peer drug use ( $B = -0.76$ ,  $p = .002$ ), anxiety ( $B = -0.18$ ,  $p = .033$ ), and perceived stress ( $B = -0.12$ ,  $p = .042$ ), and higher scores on drug refusal skills ( $B = -0.15$ ,  $p = .018$ ), self-esteem ( $B = -0.09$ ,  $p = .046$ ), media literacy ( $B = -0.09$ ,  $p = .014$ ), self-efficacy ( $B = -0.09$ ,  $p = .038$ ), and body image ( $B = -0.15$ ,  $p = .035$ ; Table 3).

### 4. Discussion

Longitudinal findings from this study support the use of a web-based, gender-specific intervention to reduce girls’ drug use and risk factors for drug use. Girls exposed to the

intervention reported less past-month use of cigarettes, e-cigarettes, marijuana, and other drugs (e.g., inhalants, methamphetamines, prescription drugs). Follow-up data also indicated that the tailored intervention was effective at reducing girls' associations with drug using peers, decreasing their perceived anxiety and stress, and improving their self-esteem, media literacy, self-efficacy, body image, coping skills, and ability to refuse drug use offers. These findings, 2 and 3 years following receipt of intervention, align with those seen at posttest and 1-year follow-up in which girls who received the intervention reported less cigarette smoking, binge drinking, and drug using peers, as well as higher self-esteem, goal setting, media literacy, self-efficacy, drug refusal skills, coping skills, and media literacy.

Our study's longitudinal findings lend credence to the value of intervening early with adolescent girls to reduce their later drug use and to improve their risk factors associated with drug use. The high sample retention over 3 years provides additional confidence to study findings. The rate of session completion among girls assigned to the intervention (87%) supports the feasibility of delivering tailored programming to girls via the internet. Such features as online accessibility, the absence of facilitators and facilitator trainings, and the flexibility to interact with intervention content on a schedule of girls' choosing increases the program's potential for largescale reach and impact.

The program was successful at modifying girls' general and gender-specific risk factors for drug use. The advantages afforded by delivering information to a female-only audience are obvious for such content as managing body image issues during puberty, coping with stressful peer group dynamics, and regulating shifting moods. The female-only gender audience, however, also confers advantage when discussing general risk factors like drug refusal skills, drug use offers, and media influences. For instance, our lesson content, practice scenarios, and examples of media influences reflected the adolescent female experience. Improved drug refusal skills, fewer drug using peers, and greater media literacy — general risk factors for drug use—were among the most consistent outcomes achieved by the intervention, suggesting that session content related to those risk factors resonated with girls in the study.

The value of tailoring content to address girls' general risk factors should not be underestimated. For instance, drug using peers are a chief risk factor for boys and girls alike (Danzo et al., 2017; Van Ryzin et al., 2012). Nevertheless, the motivation and skills necessary to refuse drug use offers from age-mate and older peers likely differ for girls and boys. Prior work suggests that although girls face the same exposure to drug use offers as boys, they are less likely to exercise drug use refusal skills (e.g., saying "no," avoidance, changing the subject), presumably because girls perceive such strategies as having the potential for relational discord (Okamoto et al., 2014). The longitudinal data presented here suggests that tailored content can not only mitigate the internalizing symptoms that accompany female adolescence, but also enhance girls' abilities to navigate the complexities of peer and social influences.

The consistent reductions in cigarette use and inconsistent reduction in alcohol, marijuana, and other drug use warrant discussion. Relative to control-arm girls, intervention-arm girls reduced their cigarette use at posttest, and at 1-, 2-, and 3-year follow-ups. Reductions in



binge drinking occurred at 1-year follow-up. Reductions in marijuana and other drug use occurred at 2-year followup. And, reductions in e-cigarette use or vaping occurred at 3-year follow up. The robust effects on cigarette use seen in our study may reflect decades of investigation on the risk and protective factors associated with tobacco use among youth (U.S. Department of Health and Human Services, 2012). Though comprehensive skills-based interventions have achieved favorable reductions in alcohol, marijuana, and other drug use (Botvin & Griffin, 2004; Schwinn & Schinke, 2010; Tobler, et al., 2000), these interventions were initially developed to reduce youths' tobacco use. Girls may not use alcohol, marijuana, and tobacco use for the same reasons. For example, whereas cigarette use can aid weight control, alcohol and marijuana can have the opposite effects. Continued efforts to identify the ways in which risk factors operate differentially by substance for adolescent girls, are warranted. Armed with these data, interventions can target salient risk factors to efficiently reduce alcohol, marijuana, and tobacco and other drug use simultaneously.

This study is not without limitations. Chief among them is the generalizability of the sample. Though prior work found the sample comparable to national data on rates of past-month drug use, race, ethnicity, parents' education, geographic region, and city type (Schwinn et al., 2017), findings are nevertheless limited to a sample of early adolescent girls who were registered users on Facebook, who clicked on ads, who had access to a private computer, who resided in the U.S., and who spoke English. Furthermore, the extent to which girls were motivated to enroll by the opportunity to earn money, complete surveys, potentially engage in material to help them avoid drug use, or some combination is unknown. Additionally, though attrition rates were low and girls from across the United States were represented, the sample size of  $N=788$  is modest. Reports of past-month drug use were self-reported. Finally, because our design employed a measurement-only control group, we cannot draw conclusions regarding the relative efficacy of a gender-specific intervention to a non-gender-specific intervention.

## 5. Conclusions

Prevention programming tailored to address adolescent girls' disquieting rates of drug use are in short supply. Longitudinal data from this study support the efficacy of a web-based intervention to reduce adolescent girls' drug use and to improve risk factors associated with drug use. The web-based intervention experienced low rates of attrition, had high rates of session completion, required no staff training, and can be easily disseminated with high fidelity. These program features suggest the viability of the intervention to positively impact the health of early adolescent girls. Perhaps the findings reported here will help stimulate increased attention to technology-facilitated tailored health interventions for sub-populations of adolescents.

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### Highlights

- Longitudinal data support the efficacy of a web-based intervention for girls.
- Intervention reduced cigarette, e-cigarette, marijuana, and other drug use.
- Improved general and gender-specific risk factors for drug use.
- Intervention implementation requires no staff training or facilitators.

**Table 1.**

Sample Characteristics and Comparability at Pretest (N = 788)

Variable	Intervention (n = 396)		Control (n = 392)		t or $\chi^2$	p-value
	%	M (SD)	%	M (SD)		
Age (R = 11 – 15 years)		13.66 (0.67)		13.72 (0.67)	1.365	.173
Ethnic/racial group					1.722	.788
White	64%		65%			
Black	24%		25%			
Hispanic	15%		15%			
Other	18%		19%			
Average school grades <sup>a</sup>		1.69 (0.82)		1.67 (0.83)	-0.423	.672
Geographic area <sup>b</sup>					2.538	.281
Urban	83%		80%			
Rural	10%		10%			
Large Town	7%		10%			
Parents' education					0.032	.859
< 2 years of college	49%		50%			
2 or > years of college	51%		50%			
Past-month drug use:						
Alcohol use		0.95 (4.45)		1.23 (4.86)	0.824	.410
Binge drinking <sup>c</sup>		0.25 (1.23)		0.36 (1.64)	0.999	.318
Cigarette use		0.89 (5.84)		0.85 (5.55)	-0.091	.928
Marijuana use		0.88 (5.50)		0.76 (4.76)	-0.320	.749
Other drug use <sup>d</sup>		0.97 (5.19)		1.02 (4.16)	0.161	.872

Note. Past-month use of alcohol, cigarettes, marijuana, and other drugs is a count variable and ranges between 0 = 0 times and 71 = 71 or more times.

<sup>a</sup>Range is 1 – 5, where 1 = “mostly A’s”, and 5 = “mostly F’s.”

<sup>b</sup>According girls' zip codes and Rural-Urban Commuting Area Codes, a Census tract-based classification system.

<sup>c</sup>Four or more drinks within a couple of hours.

<sup>d</sup>Use of the following: club drugs, cocaine, ecstasy, hallucinogens, heroin, inhalants, methamphetamines, steroids, and/or prescription drugs



**Table 2.** Average Marginal Counts and Negative Binomial Coefficients for Past-Month Drug Use at 2- and 3-Year Follow-Up

Variable	2-Year Follow-Up				3-Year Follow-Up			
	Intervention		Control		Intervention		Control	
	$M$ (SE)	$M$ (SE)	$B$ (SE)	$IRR^a$	$M$ (SE)	$M$ (SE)	$B$ (SE)	$IRR^b$
Alcohol	0.74 (0.09)	0.94 (0.10)	-0.24 (0.16)		1.29 (0.14)	1.37 (0.14)	-0.06 (0.15)	
Binge drinking <sup>b</sup>	0.21 (0.04)	0.24 (0.04)	-0.12 (0.23)		0.37 (0.06)	0.29 (0.05)	0.23 (0.23)	
Cigarettes	0.79 (0.22)	1.67 (0.44)	-0.75* (0.38)	.474	0.75 (0.21)	2.12 (0.57)	-1.04** (0.37)	.353
e-Cigarettes	0.59 (0.14)	0.67 (0.15)	-0.14 (0.32)		0.22 (0.06)	1.49 (0.38)	-1.92*** (.38)	.146
Marijuana	1.01 (0.21)	1.83 (0.37)	-0.60* (0.29)	.549	2.46 (0.48)	3.57 (0.68)	-0.37 (0.27)	
Other drugs <sup>c</sup>	0.23 (0.06)	0.62 (0.14)	-1.01** (0.34)	.365	0.21 (0.05)	0.31 (0.07)	-0.40 (0.35)	

Note. Average marginal counts of past-month drug use controlling for pretest score. Coefficients are adjusted for pretest score

<sup>a</sup>Incidence rate ratio—obtained by exponentiating the coefficient—represents the proportional change in expected drug use between the intervention and control (the reference group) conditions, controlling for pretest.

<sup>b</sup>Four or more drinks within a couple of hours.

<sup>c</sup>Use of the following: club drugs, cocaine, ecstasy, hallucinogens, heroin, inhalants, methamphetamines, steroids, and/or prescription drugs.

\*  $p < .05$

\*\*

$p < .01$

\*\*\*

$p < .001$

**Table 3.**

Adjusted Means and Estimates for Risk and Protective Factors at 2- and 3-Year Follow-up

Variable	2-Year Follow-Up (N = 731)				3-Year Follow-Up (N = 727)			
	Intervention		Control		Intervention		Control	
	M (SD)	M (SD)	t-test	p	M (SD)	M (SD)	t-test	p
Anxiety	1.62 (1.14)	1.67 (1.16)	0.62	.534	1.52 (1.04)	1.70 (1.14)	2.14	.033
Depression	1.79 (1.05)	1.90 (1.09)	1.10	.270	1.73 (1.01)	1.78 (1.07)	0.610	.542
Body image	2.62 (1.17)	2.79 (1.20)	1.97	.050	2.44 (0.91)	2.59 (0.95)	2.17	.031
Coping	1.47 (0.64)	1.32 (0.62)	-3.12	.002	1.63 (0.53)	1.59 (0.55)	-0.92	.360
Stress	1.45 (0.75)	1.53 (0.69)	1.46	.144	1.99 (0.89)	2.13 (0.87)	2.01	.044
Media literacy	1.52 (0.57)	1.63 (0.54)	2.67	.008	1.49 (0.49)	1.58 (0.52)	2.49	.013
Goal Setting	2.00 (0.76)	1.98 (0.80)	-0.42	.675	2.07 (0.76)	2.08 (0.78)	0.28	.782
Self-esteem	2.17 (0.60)	2.29 (0.68)	2.45	.015	2.22 (0.58)	2.31 (0.63)	1.99	.047
Self-efficacy	2.09 (0.57)	2.21 (0.58)	2.62	.009	1.97 (0.59)	2.06 (0.57)	2.10	.036
Drug refusal	1.54 (0.77)	1.68 (0.90)	2.29	.022	1.53 (0.74)	1.68 (0.91)	2.38	.017
Peer use	2.66 (3.19)	3.22 (3.41)	2.31	.021	2.86 (3.01)	3.63 (3.61)	3.16	.007

Note. For all variables, except coping and goal setting, lower scores are better.