Risk and Protective Factors Associated with Adolescent Girls' Substance Use: Data from a Nationwide Facebook Sample

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Abstract

Background—Despite overall reductions in teenage substance use, adolescent girls' rates of substance use remain unacceptably high. This paper examines whether girls' substance use is associated with general risk and protective factors (goal setting, problem solving, refusal skills, peer use, and self-efficacy), and gender-specific risk and protective factors (communication style, coping skills, self-esteem, body image, perceived stress, anxiety, and depression).

Methods—Cross-sectional data were collected in 2013 via online surveys from a nationwide sample of adolescent girls ($N = 788$), aged 13 & 14 years, who were recruited through Facebook.

Results—In multivariate analyses, controlling for correlates of adolescent substance use, 11 of the 13 general and gender-specific risk and protective factors were consistently associated with past-month alcohol, cigarette, and other drug use in the expected direction; past-month marijuana use was associated with 8 of the 13 factors. Refusal skills, peer use, coping, and depressive mood were most consistently and strongly associated with substance use.

Conclusions—Substance abuse prevention programs targeting adolescent girls should focus on such general risk and protective factors as problem solving, refusal skills, peer influences, and self-efficacy, as well as such gender-specific risk and protective factors as communication style, coping, self-esteem, body image, perceived stress, and mood management.

Keywords

Female; adolescent; drug abuse prevention; risk factors; Facebook

INTRODUCTION

Gender differences in substance use are characterized by higher rates of use among girls in early adolescence followed by higher and heavier rates of use among boys in late

adolescence.[1,2,3] In 2014, eighth-grade girls' rates of use exceeded boys' rates of use for alcohol (including binge drinking), cigarettes, inhalants, and amphetamines.[3] These differences suggest that gender-specific interventions for girls are warranted in early adolescence. However, determining the necessary intervention components for such an approach requires evidence of association between potential risk and protective factors and girls' substance use during this developmental period.

Though boys and girls share common paths to drug use, gender differences moderate adolescent drug use.[4,5,6] Chief among the common pathways are deviant peers and other social influences.[7,8,9] Past prevention efforts have focused largely on improving youths' skills to resist social influences.[10,11] However, boys and girls alike may also use substances to offset mood, low self-esteem, or discomfort with social settings rather than to conform to their peers' offers and use. As such, current prevention efforts targeted at the individual level focus on enhancing overall social-emotional competency skills.[12,13] Common competence skills thought to be protective against youths' drug use include problem solving, decision making, goal setting, peer refusal, communication, coping and self-efficacy.[14,15]

Despite the aforementioned commonalities in risks for drug use, the psychosocial adolescent development of girls and boys results in gender differences in pathways to use.[16] For instance, whereas boys tend to abuse drugs for sensation seeking, girls turn to drugs to increase their confidence, reduce tension, cope with stress, decrease inhibitions, and manage their weight.[17,18,19] Girls, in particular, use amphetamines to achieve or maintain an idealized body image.[14] More than their male peers, young girls' risk for drug use is associated with lower self-esteem, higher levels of perceived stress, and higher rates of depression.[20] Low self-worth and perceived unattractiveness are more common risk factors for drug use among girls than among boys.[21,22]

Adolescent girls report higher levels of stress than their male counterparts.[23,24,25] Increases in the number of stressful life events predict drug use.[26,27,28] During puberty, girls are inordinately vulnerable to depression and anxiety which serve as additional risk factors for drug use.[29,30,31] Indeed, girls who engage even in light to moderate drug use are likely to report depressive symptoms, whereas boys are not.[32] Though boys and girls both engage in coping strategies to deal with stress, girls tend to internalize, ruminate, and use other passive coping strategies, whereas boys more often externalize and engage in active coping strategies.[33,34]

The general risk and protective factors examined in this study are guided by social learning theory.[35,36] Following social learning theory, youths' risk for drug use is mitigated by having the skills (goal setting, problem solving, refusal, normative beliefs, self-efficacy) to resist peer and social influences.[37] The gender-specific risk and protective factors examined in this study are guided by resiliency framework.[38,39,40] Essential characteristics of resiliency include self-esteem, a positive self-image, and competency at communicating, coping with stress, and managing mood.[41,42]

Employing a nationwide sample, this study aims to provide an empirical foundation for developing tailored, science-based, drug abuse prevention programming for adolescent girls.

As part of a larger study to test a gender-specific, drug abuse prevention program,[43] baseline data from adolescent U.S. girls recruited from Facebook were collected. Issuing from those data, this paper examines prevalence rates for girls' past-month use of alcohol, cigarettes, marijuana, and other drugs (a composite variable of club drugs, cocaine, ecstasy, hallucinogens, heroin, inhalants, methamphetamines, steroids, and prescription drugs). We also examine whether girls' substance use is associated with general risk factors (goal setting, problem solving, refusal skills, peer use, and self-efficacy), and gender-specific risk factors (aggressive communication style, assertive communication style, coping skills, self-esteem, body image, perceived stress, depression, and anxiety).

METHODS

Participants

Study participants were 788 girls from 48 states. Girls were recruited through Facebook ads that appeared on the pages of users who registered as 13- and 14-year-old girls who reside in the United States. Facebook ads linked to our study webpage, which briefly described the project. Interested girls who met the inclusion criteria—aged 13 or 14 years, United States resident, English speaker, and access to a private computer with broadband Internet—were asked to provide their name, mailing address and birthdate. Upon receipt of this information, an enrollment packet was mailed home, which included: a) separate information booklets for the parents 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 signed forms, we mailed a letter and copies of the signed permission and assent forms to the signing parent instructing them to contact us if they had not enrolled their daughter in the study. When daughter and parent signatures displayed questionable similarities, we called the parent to verify permission. Only after these procedures was a girl enrolled in the study. As such, youth assent and parental permission were obtained from every girl who participated in the study. All study procedures were approved by the Columbia University Institutional Review Board.

Design and Procedures

After study enrollment, girls were notified by email and regular mail to complete the initial online survey measures via the study's secure, password-protected website. Each girl logged onto our website with a unique ID number. Girls received $25 for completing the survey. Data were collected between June 2013 and December 2013.

Measures

(the order of variables measured was changed to map onto Table 2)

Unless otherwise noted, internal consistency scores provided are from study data.

Demographic questions asked girls to report their: age, race/ethnicity, average letter grade in school, living arrangement, and parents' highest level of education. Zip code data used to determine geographic area (urban, rural, large town) was obtained from contact information forms obtained at enrollment.

Goal-setting skills were assessed with four items[44,45] measuring the degree to which girls set current and future goals and the extent to which they thought about how to achieve those goals (*Never* = 1, *All the time* = 4). The four items were combined to form an index (α = .83).

Problem-solving skills were assessed with six items from the Social Problem-Solving Inventory-Revised[46] that asked girls to rate their level of agreement on statements that probed evaluating options to solving problems and assessing consequences of action (*Strongly agree* = 1, *Strongly disagree* = 4). The six items were combined to form an index (α = .74).

Refusal skills related to offers to use alcohol, cigarettes, and marijuana were each assessed with five items[47] using a 5-point Likert scale (*Definitely would* = 1, *Definitely would not* = 5) in which girls reported the likelihood of using various strategies (e.g., "tell them not now," "change the subject," "say 'no thanks'") to refuse a drug use offer. The five items were combined to form indices for alcohol, cigarettes, and marijuana (α = .77–.89). Skills to refuse offers of "Other drugs" were not assessed.

Peer substance use was assessed with six items that asked girls to report how many of their closest friends had used various substances in the past month (*None* = 0, *All* = 3). Four-point Likert-scaled items were combined to form an index that had an internal consistency of α = .87.

Self-efficacy was assessed with items from the Generalized Self-Efficacy Scale.[48] Six, 4-point Likert-scaled items asked girls to assess their ability to take the action necessary for a successful outcome and to manage difficult life situations (*Strongly agree* = 1, *Strongly disagree* = 4). The six items were combined to form an index (α = .85).

Aggressive and assertive communication style was measured by posing two school-related scenarios in which girls were rated the likelihood that they would respond passively, aggressively, or assertively.[49] Each scenario used a 4-point Likert scale (*Very likely* = 1, *Very unlikely* = 4) to assess the three response options (α = .72–.75).

Coping skills were assessed with ten, 4-point Likert-scaled items from the Brief COPE.[50] Girls reported the frequency with which they engaged in self-distraction, active coping, destructive coping, positive reframing, and obtaining help from instrumental supports (*Never* = 1, *All the time* = 4). The ten items were combined to form an index (α = .74).

Self-esteem was assessed with the Rosenberg Self-Esteem Scale.[51] Ten, 4-point Likert-scaled items combined to form a self-esteem index with lower scores indicating higher self-esteem (α = .89). For example, "*I like myself for who I am*," (*Strongly agree* = 1, *Strongly disagree* = 4).

Body-image was assessed with items derived from the Body-Self Relations Questionnaire.[52] Six items, using a 5-point Likert scale asked girls to report their satisfaction with aspects of their physical appearance combined to form an index of girls' self-evaluation of their appearance (*Very satisfied* = 1, *Very dissatisfied* = 5). (α = .89).

Perceived stress was measured with four, 4-point Likert-scaled items. Adapted from the Perceived Stress Scale,[53] girls rated the degree to which their life situations were unpredictable, uncontrollable, and stressful during the past month (*Never* = 1, *All the time* = 4). The four items were combined to form an index (α = .71).

Anxious and depressive mood was assessed using the anxiety and depression scales from the Brief Symptom Inventory.[54] Each scale 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 (α = .90 for each).

Substance use items, adapted from the CDC's Youth Risk Behavior Survey (YRBS),[55] asked girls to report how many times in the past month they used alcohol, cigarettes, marijuana, and other drugs (i.e., club drugs, cocaine, ecstasy, hallucinogens, heroin, inhalants, methamphetamines, steroids, and prescription drugs). Response options ranged from "0 times" to "70 or more times." Test-retest reliability for YRBS items is 0.82 to 0.95.[56]

Data Analysis

Data were analyzed using SPSS 21.0. Means, standard deviations, and sample sizes were calculated for dependent and independent variables; each variable was examined for distributional qualities. To improve the distributional quality of the substance use variables, count values for past-month alcohol, marijuana, and "other drug" use (originally ranging from 0 times to 70 or more times) were recoded with categories used in Monitoring the Future data collection:[57] *0 times* = 0, *1–2 times* = 1, *3–5 times* = 2; *6–9 times* = 3; *10–19 times* = 4; *20–39 times* = 5; *40 or more times* = 6. Past-month cigarette use was recoded with categories used by the YRBS:[55] *0 times* = 0; *1–2 times* = 1; *3–5 times* = 2; *6–9 times* = 3; *10–19 times* = 4; *20–29 times* = 5; *30 times or more* = 6.

The Pearson product-moment correlation coefficient (*r*) was used to assess the bivariate relationship between past-month substance use and girls' general and gender-specific risk and protective factors. All 13 risk and protective factors were coded so that lower scores were better (e.g., a positive *r* on coping skills and past-month drinking means that better coping skills were associated with less drinking).

To test the robustness of the associations, we used multivariate linear regression models controlling for age, race/ethnicity, living arrangement, geographic area, grades in school, and parent education (a proxy for socioeconomic status). Control variables were included owing to their associations with our sample's substance use rates as well as their associations documented in the literature. Adolescent substance use increases during adolescence and is associated with lower academic achievement.[14] Adolescent substance use varies by race/ethnicity, socioeconomic status, geographic area, and living arrangement.[3,14,58] Statistical significance was set at α = .05.

RESULTS

Sample

The descriptive characteristics of our study sample ($N = 788$) appear in Table 1. Girls were, on average, aged 13.69 years ($SD = 0.67$). The ethnic-racial composition of our sample was 54% White, 22% Black, 13% Latina, and 11% Other. On average, girls' received mostly A's and B's in school. Less than one-half (46%) of girls lived with their mother and father; 40% lived with either their mother alone, father alone, mother and step-father, or father and step-mother; 10% lived with foster parent(s), an aunt or uncle, or other; and 4% lived with their grandparent(s). By zip code, 82% of girls lived in urban areas, 10% lived in rural areas, and 8% lived in large towns. Parents' highest level of education was evenly split – 47% has less than a 2-year degree and 47% had more than a 2-year degree; 6% of girls did not know their parents' highest level of education.

Just over one-quarter (26%) of girls reported past-month alcohol use; 14% reported past-month cigarette use; 14% reported past-month marijuana use; and 16% reported using other drugs (i.e., a composite of club drugs, cocaine, ecstasy, hallucinogens, heroin, inhalants, methamphetamines, steroids, and prescription drugs) in the past month.

Bivariate Associations

As seen in Table 2, 12 of the 13 risk and protective factors were consistently associated with girls' past-month use of alcohol, cigarettes, marijuana, and other drugs in the expected direction (e.g., poorer problem solving skills were associated with greater past-month use of alcohol ($r = 0.138$, $p < .001$), cigarettes ($r = 0.173$, $p < .001$), marijuana ($r = 0.087$, $p < .05$), and other drugs ($r = 0.187$, $p < .001$). Poorer use of goal setting was associated with greater past-month use of cigarettes ($r = 0.095$, $p < .01$) and marijuana ($r = 0.071$, $p < .05$); goal setting was not associated with past-month use of alcohol or other drugs. Among the risk and protective factors associated with past-month substance use, peer use was the strongest, with correlations ranging from $r = 0.425$, $p < .001$ (other drug use) to $r = 0.554$, $p < .001$ (alcohol use).

Multivariate Associations

Controlling for girls' ages, races/ethnicities, average letter grades in school, living arrangements, geographic areas, and parents' education, we again tested the association between general risk and protective factors and gender-specific risk and protective factors. Among the general risk and protective factors (Table 2.), poorer drug refusal skills and higher rates of peer substance use were associated with more past-month use of alcohol ($B = 0.417$, $p < .001$; $B = 0.177$, $p < .001$, respectively), cigarettes ($B = 0.360$, $p < .001$; $B = 0.135$, $p < .001$, respectively), marijuana ($B = 0.273$, $p < .001$; $B = 0.117$, $p < .001$, respectively), and other drugs ($B = 0.164$, $p < .001$ for peer use; refusal skills for "other drugs" was not measured). Poorer self-efficacy and problem solving were associated with more past-month use of alcohol, cigarettes, and other drugs; self-efficacy and problem solving were associated with past-month marijuana use. Goal setting was not associated with past-month use of any substance.

Among the gender-specific risk and protective factors, more aggression, less assertiveness, poorer coping, and higher levels of stress, anxiety, and depression were consistently associated with more past-month use of alcohol, cigarettes, marijuana, and other drugs. For example, higher levels of past-month depressive symptoms were associated with higher levels of past-month alcohol use ($B = 0.191$, $p < .001$), cigarette use ($B = 0.104$, $p < .001$), marijuana use ($B = 0.087$, $p < .01$), and other drug use ($B = 0.198$, $p < .001$). Lower self-esteem was associated with more past-month use of alcohol ($B = 0.218$, $p < .001$), cigarettes ($B = 0.127$, $p < .05$), and other drugs ($B = 0.262$, $p < .001$); self-esteem was not associated with past-month marijuana use. Less favorable body image scores were associated with more past-month alcohol use ($B = 0.099$, $p < .05$) and other drug use ($B = 0.121$, $p < .01$); body image was not associated with past-month cigarette or marijuana use.

DISCUSSION

This paper examined the role of certain risk and protective factors at play in adolescent girls' substance use behaviors. Cross-sectional data from this nationwide sample of 788 adolescent girls revealed consistent associations between general and gender-specific risk and protective factors and girls' past-month substance use. Guided by social learning theory,[35,36] we examined five general risk and protective factors (goal setting, problem solving, drug refusal skills, peer use, and self-efficacy); following a resilience framework,[38,39,40] we examined eight gender-specific risk factors (aggressive communication, assertive communication, coping, self-esteem, body image, stress, anxiety, and depression).

Controlling for demographic variables associated with substance use (e.g., age, race, parent education), past-month alcohol and other drug use (i.e., club drugs, cocaine, ecstasy, hallucinogens, heroin, inhalants, methamphetamines, steroids, and/or prescription drugs) were associated with 12 of the 13 risk and protective factors. Goal setting was not associated with alcohol or other drug use. Past-month cigarette use was associated with 11 of the 13 risk and protective factors. Goal setting and body image were not associated with cigarette use. Past-month marijuana use was associated with 8 of the 13 risk and protective factors. Not associated with girls' use of marijuana were goal setting, problem solving, self-efficacy, self-esteem, and body image.

That 5 of the 13 risk and protective factors examined in this study were not associated with girls' rates of past-month marijuana use suggests that girls' risk profile for marijuana use differed from their risk profile for alcohol, cigarette, and other drug use. Girls who had better problem-solving skills, higher self-esteem, and greater self-efficacy drank less alcohol, smoked fewer cigarettes, and engaged in less other illicit drug use. Yet these protective factors were not associated with lower rates of marijuana use. In light of the shifting legal landscape around marijuana use, new work needs to identify the additional factors that can mitigate girls' risks for marijuana use.

Not surprisingly, girls' substance use (alcohol, cigarettes, marijuana, and other drugs) was strongly and positively associated with their peers' substance use, a finding consistent with others' work.[59] Girls' better drug refusal skills were also consistently and strongly ($p < .001$) associated with less past-month substance use. The associations between peer substance use

and refusal skills (two general risk and protective factors) support the value of extant interventions based on social learning theory[60,61,62] and suggest the importance of retaining components that address peer use and refusal skills when developing interventions tailored for girls.

However, girls' effective communication, better coping skills, lower anxiety, and lower depressive mood (gender-specific risk and protective factors) were also strongly associated with less substance use. Associations with these internal, psychological factors point toward the value of incorporating a resiliency framework[63] when tailoring prevention content for girls. That girls who reported higher rates of alcohol, cigarette, marijuana, and other drug use had higher levels of depressed mood and anxiety further demonstrates the co-occurrence of substance use and mental health problems[64,65] and highlights the necessity of incorporating salient mood management content into intervention programming.

Study findings are generated from a large, nationwide (48 of the 50 U.S. states) sample of adolescent girls that mirror the nation's racial/ethnic composition. Data were collected online, which has been shown to improve respondent accuracy.[66] This study is limited, however, to cross-sectional associations. Our data cannot discern, for example, whether girls who are depressed turn toward drug use or whether girls who use drugs are more likely to become depressed. Furthermore, though we accounted for several confounders of drug use (age, race/ethnicity, living arrangement, geographic area, school performance, and socioeconomic status – measured as parents' education), [3,14,58] additional confounders remain. The sample is restricted to girls who responded to Facebook ads and excludes girls who did not use Facebook or who used Facebook but chose not to enroll in our study. Data collection methods were systematic but relied on self-report and were not triangulated.

As national data continue to show adolescent girls initiating and using substances at alarming rates,[1,2,3] the field must respond with effective prevention, early intervention, and treatment approaches. Because relatively few interventions have focused specifically on adolescent girls,[67,68,69,70] the theory-based risk and protective factors identified in this study may guide policymakers, clinicians, and researchers in the development of best practices and interventions to stem female adolescent substance use. Specifically, study findings support the need for substance abuse prevention programs and practices that focus on reducing risk factors and enhancing protective factors. When developing interventions tailored to girls, program components should not only address general risk and protective factors such as peer influences, problem solving, refusal skills, and self-efficacy, but also gender-specific risk factors of communication style, coping, self-esteem, stress, and mood management.

Acknowledgments

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Table 1

Descriptive Sample Statistics (N = 788)

Variable	%	M	(SD)
Age (R = 11 – 15 years)		13.69	0.67
Ethnic/racial group			
White	54		
Black	22		
Hispanic	13		
Other	11		
Average letter grade in school[b]		1.68	0.82
Living Arrangement			
Mother and father	46		
Single parent or two-parent with a step-parent	40		
Foster parent(s), aunt and/or uncle, other	10		
Grandparent(s)	4		
Geographic Area[a]			
Urban	82		
Rural	10		
Large Town	8		
Parents' highest level of education			
Less than 2 years of college	47		
More than 2 years of college	47		
Unknown	6		
Past-month use			
Alcohol	26	0.75	1.92
Cigarettes	14	0.44	1.65
Marijuana	14	0.45	1.68
Other drugs	16	1.07	4.82

Note. Past-month use of alcohol, cigarettes, marijuana, and other drugs represents number of times ranging from "*0 times*" to "*70 or more times.*"

[a]Based on Rural-Urban Commuting Area Codes (a Census tract-based classification system) according to participants' zip codes.

[b]Mostly A's=1, Mostly B's=2, Mostly C's=3, Mostly D's=4, Mostly F's=5.

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

Table 2

Bivariate and Multivariate Associations between General and Gender-Specific Factors for Past-Month Substance Use (N = 788)

	Alcohol			Cigarettes			Marijuana			Other Drugs		
	r	B	SE	r	B	SE	r	B	SE	r	B	SE
General												
Goal setting	0.051	0.022	0.048	0.095 **	0.039	0.042	0.071 *	0.012	0.042	0.067	0.024	0.047
Problem solving	0.138 ***	0.233 ***	0.065	0.173 ***	0.215 ***	0.057	0.087 *	0.092	0.058	0.187 ***	0.278 ***	0.064
Refusal skills[b]	0.432 ***	0.417 ***	0.033	0.405 ***	0.360 ***	0.032	0.362 ***	0.273 ***	0.028			
Peer use	0.554 ***	0.177 ***	0.010	0.498 ***	0.135 ***	0.010	0.444 ***	0.117 ***	0.010	0.425 ***	0.137 ***	0.011
Self-efficacy	0.110 **	0.143 *	0.060	0.125 ***	0.118 *	0.053	0.095 **	0.072	0.053	0.164 ***	0.186 **	0.059
Gender-Specific												
Communication												
Aggressive	0.183 ***	0.148 ***	0.030	0.115 ***	0.076 **	0.027	0.116 ***	0.055 *	0.028	0.127 ***	0.094 ***	0.030
Assertive	0.106 **	0.083 **	0.031	0.134 ***	0.088 ***	0.028	0.091 *	0.068 *	0.027	0.110 **	0.077 *	0.031
Coping	0.187 ***	0.305 ***	0.063	0.179 ***	0.219 ***	0.056	0.156 ***	0.183 ***	0.056	0.227 ***	0.323 ***	0.062
Self-esteem	0.158 ***	0.218 ***	0.056	0.148 ***	0.127 *	0.050	0.114 ***	0.082	0.050	0.190 ***	0.262 ***	0.056
Body image	0.114 ***	0.099 *	0.040	0.099 **	0.060	0.035	0.104 **	0.058	0.035	0.120 ***	0.121 **	0.039
Stress	0.154 ***	0.182 ***	0.047	0.123 ***	0.086 *	0.042	0.126 ***	0.096 *	0.042	0.187 ***	0.178 ***	0.046
Anxiety	0.243 ***	0.187 ***	0.030	0.141 ***	0.068 *	0.027	0.161 ***	0.093 ***	0.027	0.254 ***	0.193 ***	0.030
Depression	0.243 ***	0.191 ***	0.032	0.185 ***	0.104 ***	0.029	0.164 ***	0.087 **	0.029	0.263 ***	0.198 ***	0.032

Note. General and gender-specific risk and protective factors coded as lower scores are better. Bivariate relationship is represented as Pearson product-moment correlation coefficient (*r*). Multivariate relationship between risk and protective factors and substance use (*B* and *SE*) controls for age, race/ethnicity, average letter grade in school, living arrangement, geographic area, and parent education.

[a]Club drugs, cocaine, ecstasy, hallucinogens, heroin, inhalants, methamphetamines, steroids, and/or prescription drugs.

[b]Refusal skills were not assessed for "Other Drugs."

*
  p < .05,

**
  p < .01,

***
  p < .001