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Risk Factors for Substance Misuse and Adolescents' Symptoms of Depression

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Abstract

Purpose—Depressive symptoms during adolescence are positively associated with peer-related beliefs, perceptions, and experiences that are known risk factors for substance misuse. These same risk factors are targeted by many universal substance misuse prevention programs. This study examined whether a multicomponent universal substance misuse intervention for middle schoolers reduced the associations between depressive symptoms, these risk factors, and substance misuse.

Methods—The study used data from a place-randomized trial of the PROSPER (PROmoting School-Community-University Partnerships to Enhance Resilience) model for delivery of evidence-based substance misuse programs for middle schoolers. Three-level within-person regression models were applied to four waves of survey and social network data from 636 adolescents followed from 6th through 9th grades.

Results—When adolescents in control school districts had more symptoms of depression, they believed more strongly that substance use had social benefits, perceived higher levels of substance misuse among their peers and friends, and had more friends who misused substances, although they were not more likely to use substances themselves. Many of the positive associations of depressive symptoms with peer-related risk factors were significantly weaker or not present among adolescents in intervention school districts.

Conclusions—The PROSPER interventions reduced the positive associations of adolescent symptoms of depression with peer-related risk factors for substance misuse.

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Keywords

depression; risk factors; substance use prevention

By the end of adolescence, 10–20% of youth will experience a major depressive episode, and up to 25% will experience subthreshold symptoms of depression [1,2]. Youth depression is positively associated with substance misuse [3–5], or the use of drugs and alcohol in ways that are illegal or not medically prescribed. The co-occurrence of depression and substance misuse is associated with greater severity and duration of both problems [3,6]. It thus is important to understand sources of this co-occurrence that may be modifiable through intervention.

Theoretically, adolescents with depression engage in more substance misuse partly because they experience more peer problems [7] and believe that substance misuse has social benefits [8]. Indeed, compared with adolescents with fewer symptoms of depression, adolescents with more symptoms are more likely to believe that smoking cigarettes and drinking alcohol are common among their peers [9,10]. They also perceive that more of their friends smoke [11] and approve of smoking [12]. In addition, adolescents with more internalizing symptoms have more friends who smoke, drink, and use marijuana [8]. Adolescents with depression thus appear more likely to overestimate the social importance of substance misuse and to experience peer contexts that may encourage use.

These same peer-related risk factors for substance misuse are targeted by many universal substance misuse prevention programs. One added benefit of such programs thus may be a reduction in important risk factors, and ultimately a reduction in substance misuse, among a set of adolescents who are especially likely to experience harmful outcomes. Such programs can have benefits beyond their targeted outcomes, including “crossover” effects on adolescent depression [13,14], particularly when they target social skills affecting peer relationships or peer influence [15,16]. Yet it is unclear whether risk factors like attitudes, beliefs, and peer affiliations are as malleable—or perhaps more malleable—among adolescents with depression as they are among non-depressed adolescents. If adolescents with depression are especially likely to misperceive social cues and norms about substance misuse, then programs targeting those misperceptions could be especially beneficial for those adolescents. Alternatively, symptoms of depression, such as hopelessness or concentration difficulties, could hinder uptake of prevention program content, reducing program effects among adolescents with depression [10].

Findings from two school-based randomized trials of smoking prevention programs suggest that universal interventions might reduce harmful outcomes among adolescents experiencing depression. A study of California youth found greater program effects on trying smoking among highly depressed middle schoolers, but only in predominantly Hispanic/Latino schools (versus racially/ethnically heterogeneous schools) [17]. Those analyses were adjusted for best friends’ smoking and for perceived smoking norms, making it unclear whether the program affected those proximal outcomes. A study of seventh-graders in China found program effects on recent smoking [18] and on affiliation with smoking friends [19] only among boys who were both highly depressed and already smokers. That study used a

self-report measure of friends' smoking, so the authors could not determine whether the program changed perceptions, actual friend affiliations, or both [19].

We use within-person analyses and data from a school district-randomized trial of a multicomponent universal substance misuse intervention for middle schoolers to examine whether the intervention moderated any associations between depressive symptoms and substance misuse expectancies, perceived peer substance misuse, exposure to substance-misusing peers, and substance misuse itself. We examine cigarette-, alcohol-, and marijuana-related outcomes separately, allowing us to compare our findings with past studies of depression and smoking prevention programs. We hypothesized that depressive symptoms would be positively associated with our outcomes, and that these associations would be weaker in intervention school districts.

Methods

Participants

Our data are from PROSPER (*P*RO*M*oting *S*chool-Community-University *P*artnerships to *E*nhance *R*esilience), a place-randomized substance abuse prevention trial in 28 public school districts in rural Pennsylvania and Iowa [20–24]. Fourteen districts within each state were paired on geographic area and size. One district from each pair was randomly assigned to receive the intervention. Control districts received no PROSPER-supported programming. The trial and analyses were approved by the Iowa State University and Pennsylvania State University Institutional Review Boards; data analysis was also approved by Florida State University's Human Subjects Committee. One intervention district did not provide social network information; we excluded that district and its paired control from this study.

The full PROSPER youth sample was comprised of all adolescents from two successive 6th grade cohorts ($N \sim 11,000$) who provided assent and whose parents or guardians did not return a form excluding them from the study. Adolescents completed in-school surveys in the fall of 6th grade and again each spring through 12th grade. The in-school surveys also collected social network information. A random sample of 2,267 families from Cohort 2 (adolescents in 6th grade in 2003) was recruited for an in-home portion of the study conducted concurrently with the in-school surveys from 6th through 9th grades. Of these families, 977 (43%) provided active written consent and completed in-home surveys. The in-home surveys covered more topics than the in-school surveys, which were kept shorter to reduce administration time. Prior analyses revealed that these in-home participants resembled the larger sample on demographic characteristics and substance use but were slightly less delinquent and perceived fewer benefits of use, indicating that they were at slightly lower risk for problem behavior [25,26].

This study used the in-home, in-school, and social network data. We began with the 932 adolescents (547 intervention, 385 control) who were from the 26 included school districts and provided in-home data in fall of 6th grade (the pretest). We excluded 19 adolescents (7 intervention, 12 control) who did not complete in-school pretest surveys, and 204 (115 intervention, 89 control) who did not provide social network information at the pretest. Of the remaining 709 adolescents, 636 (387 intervention, 249 control) provided in-home, in-

school, and social network information at one or more follow-up waves from 6th through 9th grades (74% completed at least 3 of the 4 follow-ups). These 636 adolescents, together providing 2,624 observations across waves, were our analytical sample.

At pretest, compared to the full PROSPER sample, adolescents in our analytical sample had less positive social expectancies for substance misuse, were more likely to be White, and were less likely to have smoked or drank in the past month, but were equivalent on the other study variables. Additional checks for pretest differences revealed that adolescents in included (versus excluded) school districts perceived lower cigarette and marijuana use norms and were less likely to be from two-parent families; adolescents with (versus without) social network information had more positive alcohol expectancies and were more likely to receive free or reduced cost school lunch; and adolescents who did (versus did not) complete any follow-up surveys were less likely to receive free lunch and had less positive alcohol and marijuana use expectancies. In our analytical sample, relative to control adolescents, intervention adolescents were slightly less likely to be White and had more drinking friends. There were no significant depressive symptoms-by-condition interactions in predicting any pretest variable. Nine percent of our analytical sample was missing values on one or more study variables. We addressed item-missingness with multiple imputation. We created twenty complete data sets with imputed values for missing cases and combined estimates across them using Rubin's [27] rules.

Study Intervention

Interventions delivered via the PROSPER system included family and classroom components. In the spring of 6th grade, families of adolescents in intervention school districts were invited to participate in the Strengthening Families Program: For Parents and Youth 10–14 (SFP 10–14) [28]; 17% of families participated. At the beginning of 7th grade, intervention districts implemented their choice of one of three universal prevention programs: 4 chose the Life Skills Training program (LST) [29], 4 chose Project ALERT [30] (one of the four did not provide network data and was excluded), and 6 chose All Stars [31]. All four programs include peer resistance training. The three school-based interventions have modules that promote prosocial skills, beliefs, and attitudes, are delivered in 11–15 sessions, and aim to reduce substance misuse acceptance and modify perceptions of the consequences and prevalence of misuse. Additional program-specific content addresses factors such as interpersonal skills (SFP and LST), self-confidence and coping (LST), and peer and school bonding (All Stars). Both the family and the classroom components of the intervention had individual and schoolwide effects on substance misuse risk factors, peer relationships, and substance misuse outcomes [21,22,32,33]. Supplemental analyses revealed no differences between the effects of All Stars, LST, and Project Alert on our outcomes.

Measures

Depressive symptoms—The in-home surveys included items from the Diagnostic and Statistical Manual of Mental Disorders (DSM)-Oriented Affective Problems Scale of the Youth Self-Report (YSR) [32, 33]. The items correspond with clinical criteria for major depression and dysthymia. Our measure of depressive symptoms is the wave-specific

average of 5 items assessing whether in the past 6 months adolescents cried a lot, deliberately tried to hurt or kill themselves, felt worthless or inferior, thought about killing themselves, and felt unhappy, sad, or depressed (0 = not true, 1 = somewhat or sometimes true, 2 = very true or often true; $\alpha = .73$).

Intervention—We created a dichotomous indicator of whether the adolescent attended an intervention or control condition school district (0 = control, 1 = intervention).

Positive social expectancies for substance misuse—The in-school surveys included items addressing how much respondents agreed that teens who use cigarettes, alcohol, and marijuana have more friends, and how much they agreed that using each substance makes you look cool (6 items; for each, 1 = strongly disagree; 5 = strongly agree). Adolescents also were asked how much they agreed that drinking helps you get along with other people. We standardized and averaged the items for each substance to create scales of positive social expectancies for smoking (2 items, $r = .66$), drinking (3 items, $\alpha = .92$), and marijuana use (2 items, $r = .79$).

Perceived schoolwide norms for substance misuse—Three items from the in-home surveys asked adolescents how many students at their school smoked cigarettes; drank beer, wine or liquor; and smoked marijuana (1 = none or almost none, 5 = all or almost all). These items are our measures of perceived schoolwide norms for cigarette use, alcohol use, and marijuana use.

Perceived friends' substance misuse—Three items from the in-home survey asked adolescents to report how many of their close friends in the past 12 months had smoked tobacco; drunk beer, wine, wine coolers or liquor; and used marijuana or pot (1 = none of them, 5 = all of them). These items are our measures of perceived friends' cigarette, alcohol, and marijuana use.

Proportion of friends who misuse substances—The in-school surveys asked adolescents to nominate up to two best friends and five additional close friends in their grade. Since the entire grade-level was asked to complete in-school surveys, we could link adolescents with their friends' scores on in-school survey items. For each adolescent, we identified peers who named the adolescent as a friend or were named as a friend by the adolescent. We then directly measured each friend's substance misuse using their answers to in-school survey items asking how often they had smoked any cigarettes, had any alcohol, or smoked marijuana during the past month (recoded so that 0 = no, 1 = yes). We calculated for each adolescent wave-specific measures of the proportion of friends who smoke, drink, and use marijuana.

Substance misuse—Using the same in-school items just described, we created dichotomous measures of whether adolescents themselves had smoked any cigarettes, had any alcohol, or smoked marijuana during the past month.

Control variables—We control for demographic factors because we found some differences between our analytical sample and the larger in-home and in-school samples, and

between intervention and control adolescents in our analytical sample. We control for whether the adolescent was male, White, eligible for free or reduced-cost school lunch, and from a two-parent family (for each, 0 = no, 1 = yes), and for number of waves observed. We also control for wave of data collection, and for wave² in all models except the models of friends' drinking and of substance misuse, which had linear relationships with wave. Table 1 shows descriptive statistics.

Analytic Strategy

We estimated three-level (district, adolescent, wave) random effects models predicting each outcome across all four posttest waves from depressive symptoms, intervention district, the interaction of symptoms with intervention district, pretest scores on the outcome, and the control variables. For example, the smoking expectancies equation was (where t_i indicates "this wave" and ranges from 2–5):

$$\text{smoking expectancies}_{t_i} = \text{depressive symptoms}_{t_i} + \text{intervention district} + \text{depressive symptoms}_{t_i} * \text{intervention district} + \text{smoking expectancies}_{\text{pretest}} + \text{wave}_{t_i} + \text{wave}_{t_i}^2 + \text{controls}_{t_i}$$

The coefficients indicate whether during waves when adolescents had more symptoms of depression they also believed more strongly that smoking has social benefits, and if this association depended on whether adolescents attended an intervention school district.

We also controlled for adolescents' means across waves on depressive symptoms, the interaction term, and the wave polynomial, which leaves the coefficients for the time-varying versions of these variables to be determined only by within-individual change [35,36]. This technique compares adolescents to themselves under different conditions, eliminating the influence of all time-stable potential sources of spuriousness [37]. At some waves, a small number of adolescents made and received no friendship nominations; models of friends' substance use exclude those observations. Linear models were used for risk factor outcomes, and logistic models for substance misuse outcomes. Our random effects models addressed dependence arising from the clustering of observations within adolescents and adolescents within school districts. Tests indicated that variance components for district were not needed in the substance misuse models. We included variance components for wave in the models of smoking expectancies and perceived peer drinking, because tests indicated these were needed to address temporal autocorrelation in the data.

Results

Table 2 shows coefficients predicting each posttest outcome from symptoms of depression, intervention status, and their interaction, controlling for pretest scores on the outcome and the control variables (full tables available upon request). The coefficients for depressive symptoms capture the association of symptoms with the outcome in control school districts (i.e., when intervention = 0), and the coefficients for intervention school district capture the intervention-control difference among adolescents with no symptoms of depression (i.e., when depressive symptoms = 0). The middle column shows that among adolescents with no

symptoms, attending an intervention district had a negative (beneficial) impact on substance misuse expectancies and substance misuse. The other intervention coefficients also were negative, but were non-significant.

The first three rows of table 2 show results for positive social expectancies for substance misuse. During waves when adolescents had more symptoms of depression, they had more positive expectancies for drinking and marijuana use, but not for smoking. The interaction terms indicate that the associations of symptoms with alcohol and marijuana expectancies were weaker in intervention districts. Figure 1, which illustrates these results at different levels of depressive symptoms, indicates that in intervention districts, more symptoms of depression were associated with less positive expectancies.

The next three rows of table 2 show results for perceived schoolwide norms outcomes. These results reveal significant positive associations of symptoms of depression with perceived drinking and marijuana norms, and significant negative symptoms-by-intervention interactions in predicting drinking and marijuana norms. This pattern was not present for smoking norms. Figure 2 illustrates the interaction. In control districts, more symptoms were associated with higher perceived norms for drinking and using marijuana. In intervention districts, these associations were far weaker.

We found less evidence that the intervention moderated harmful effects of depressive symptoms on friends' substance misuse and perceptions of that misuse. Table 2 shows that depressive symptoms were positively associated with perceptions of friends' smoking, drinking, and marijuana use, but only one of the negative interaction terms (for perceived friends' marijuana use) reached even marginal statistical significance. Also, when adolescents had more depressive symptoms they had more friends who smoked and drank, but the interaction term predicting friends' drinking was only marginally significant, and the one significant interaction term was from the model for friends' marijuana use, which was not associated with depressive symptoms in control districts.

Finally, table 2 shows results for substance misuse outcomes. The coefficients for depressive symptoms were positive in all three models, but although they were moderate to large in size (OR = 2.44, 1.45, and 5.13 in predicting smoking, drinking, and marijuana use respectively), none was statistically significant. The symptoms-by-intervention interaction terms predicting drinking and marijuana use, but not smoking, were negative and large enough to offset the positive depressive symptoms coefficients (e.g., in predicting drinking in control schools, $b_{\text{symptoms}}=0.37$; in intervention schools, $b_{\text{symptoms}}=0 [0.37+-0.37]$). Still, only in the marijuana model was the interaction even marginally significant. Thus, this pattern should be interpreted with caution.

Discussion

Symptoms of depression among adolescents are associated with peer-related beliefs, perceptions, and experiences that are known risk factors for substance misuse. Those risk factors are targeted proximal outcomes of many effective universal substance misuse prevention programs. If such programs can alter outcomes among adolescents experiencing

depression, then they may offer a way to prevent negative outcomes among an at-risk subgroup of youth without the expense and time commitment of an additional targeted intervention.

We found that a proven multicomponent universal intervention delivery system had enhanced effects for adolescents with depressive symptoms. In control school districts, depressive symptoms were positively associated with beliefs that substance misuse has social benefits, perceptions that more of one's friends and schoolmates misuse substances, and actual affiliation with peers who misuse substances. This confirms findings from observational studies of community samples [9–11]. In intervention school districts, many of these associations were significantly weaker. This result indicates that multicomponent universal substance misuse interventions may be especially effective for adolescents experiencing depression. Importantly, our analyses were not meant to represent omnibus tests of PROSPER on these outcomes; rather, they examined PROSPER as a moderator of the harmful effects of depressive symptoms.

Contrary to expectations, depressive symptoms were not significantly associated with substance misuse and did not significantly moderate program effects on substance misuse. However, the results for drinking and marijuana use were in the expected direction. Because the PROSPER system had long-term overall effects on substance misuse [24], it is possible that the expected moderation pattern would be visible at later ages when both depressive symptoms and substance misuse became more common. Also, a different measure of substance use, such as one with the same six-month reference period as the depression measure, could have yielded different results. Nonetheless, we found no evidence that symptoms of depression reduced program effects on substance misuse, which suggests that universal programs may be effective among this at-risk subgroup.

We found that depressive symptoms were associated with multiple outcomes related to the perceived social acceptance and importance of substance misuse. Many past studies have focused on perceived norms [8,10,11]. Our results confirmed that symptoms of depression were positively associated with perceived norms and friends' self-reported substance misuse. Also, symptoms were associated with the expectation that using alcohol and marijuana would help adolescents make friends and look cool. This suggests that adolescents with depression not only have different perceptions of the prevalence of substance misuse, but also are more likely to view substance misuse as a means of increasing peer acceptance.

Although PROSPER influenced the association of depressive symptoms with several alcohol- and marijuana-related outcomes, this was not true of smoking-related outcomes. This could be because depressive symptoms were associated with only two smoking-related outcomes, leaving fewer effects to be moderated. Alternatively, the pervasive anti-smoking messaging in society could have swamped intervention effects on smoking-related outcomes. Prior studies of smoking prevention programs reported that depression moderated program effects on smoking [17,18], but those interventions specifically targeted smoking.

We found that adolescents with depressive symptoms were more likely to endorse social acceptance motives for substance misuse. Other studies have emphasized negative affect

regulation as a motive for substance misuse among these adolescents [38,39]. Adolescents with depression thus could be more likely to endorse both social and coping motives for substance misuse, a combination that is associated with higher levels of substance misuse, delinquency, and other problems [40]. Future research should examine this possibility.

Our study had limitations. Our sample was a subset of participants from a larger experiment, and were not individually randomly assigned to conditions. Unobserved differences between conditions could have confounded our results, and our results may not generalize to the larger population. Also, the school-based interventions were delivered through structured, interactive lessons, and that structured activity itself could have produced beneficial effects. Future research should disentangle the effects of program content from program activities. In addition, our sample was from rural and predominately White school districts with large proportions of low-income families. Future research should examine whether our results generalize to different populations.

In conclusion, our findings suggest that universal substance misuse prevention programs can be effective among adolescents experiencing depression. If that observation extends to other prevention domains (e.g., delinquency prevention), then a wide range of prevention efforts could have the added beneficial effect of improving outcomes among an especially high-risk group.

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List of abbreviations

DSM	Diagnostic and Statistical Manual of Mental Disorders
LST	Life Skills Training program
PROSPER	<u>P</u> RO <u>M</u> oting <u>S</u> chool-Community-University <u>P</u> artnerships to <u>E</u> nhance <u>R</u> esilience
SFP 10–14	Strengthening Families Program: For Parents and Youth 10–14
YSR	Youth Self-Report

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Implications and Contribution

When adolescents have more symptoms of depression, they perceive that substance misuse is more common and has more social benefits, and they have more substance-misusing friends. A proven multicomponent universal substance misuse intervention reduced the associations of depressive symptoms with many peer-related risk factors for substance use.

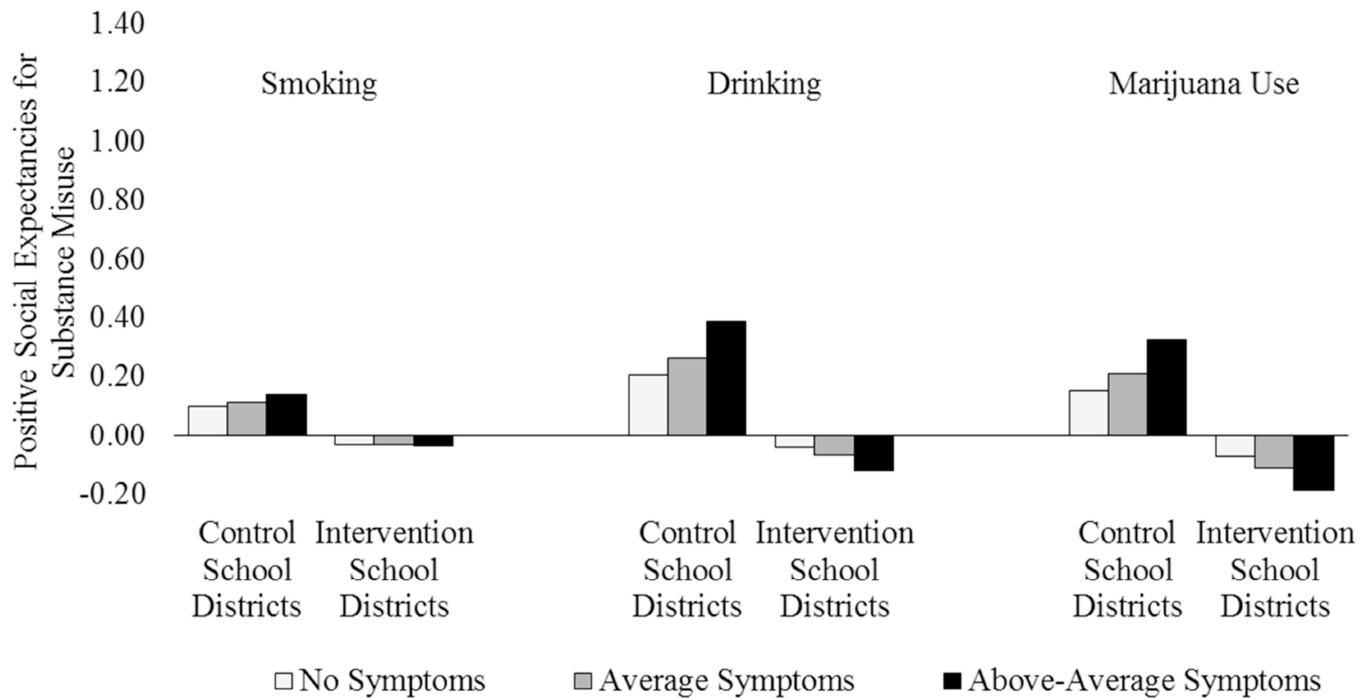


Figure 1.

Predicted positive substance misuse expectancies at posttest, by adolescent's symptoms of depression and intervention condition. No symptoms = no reported symptoms of depression; average symptoms = mean depression score; above-average symptoms = 1 standard deviation above the mean depression score.

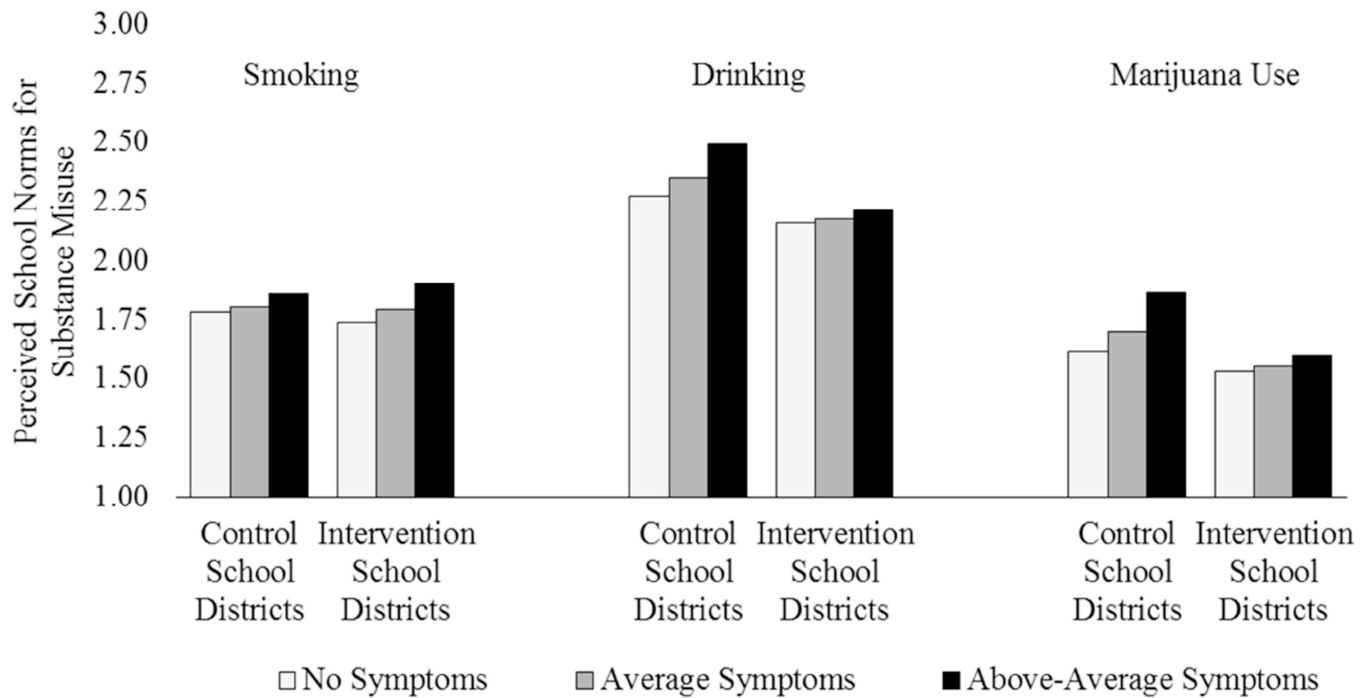


Figure 2.

Predicted perceived schoolwide substance misuse norms at posttest, by adolescent's symptoms of depression and intervention condition. No symptoms = no reported symptoms of depression; average symptoms = mean depression score; above-average symptoms = 1 standard deviation above the mean depression score.

Table 1

Descriptive Statistics for Study Variables (N = 2,624 observations on 636 adolescents)

Variable	Mean/%	SEM	Minimum	Maximum
Focal dependent variables				
Positive social expectancies for smoking	0.00	0.02	-0.47	5.47
Positive social expectancies for drinking	0.00	0.02	-0.52	5.22
Positive social expectancies for marijuana use	-0.02	0.02	-0.38	6.14
Perceived schoolwide norms for cigarette use	1.65	0.02	1	5
Perceived schoolwide norms for alcohol use	2.02	0.02	1	5
Perceived schoolwide norms for marijuana use	1.49	0.02	1	5
Perceived friends' cigarette use	1.18	0.01	1	5
Perceived friends' alcohol use	1.43	0.02	1	5
Perceived friends' marijuana use	1.17	0.01	1	5
Proportion of friends who smoke ^a	0.06	0.00	0	1
Proportion of friends who drink ^a	0.17	0.00	0	1
Proportion of friends who use marijuana ^a	0.03	0.00	0	1
Any past month smoking	6%	--	0	1
Any past month drinking	14%	--	0	1
Any past month marijuana use	2%	--	0	1
Focal independent variable				
Depression	0.14	0.01	0	2
Focal moderating variable				
Intervention school district	61%	--	0	1
Control variables				
Male	46%	--	0	1
White	88%	--	0	1
Two-parent family	76%	--	0	1
Free or reduced lunch	29%	--	0	1
Waves observed	4.40	0.02	2	5

^aN = 2,563 observations

Source: PROSPER Peers Study

Table 2

Linear and Logistic Random Effects Coefficients Predicting Posttest Substance Misuse Social Expectancies, Perceptions, Peer Exposure, and Past Month Involvement from Depressive Symptoms, by Intervention Condition (N = 1,988 observations on 636 adolescents)

Outcome	Predictor								
	Depressive Symptoms			Intervention					
	b	SE		b	SE	b	SE		
Social expectancies for substance misuse									
Positive expectancies for smoking	0.09	(0.15)		-0.13	(0.06)	*	-0.10	(0.19)	
Positive expectancies for drinking	0.43	(0.16)	**	-0.24	(0.06)	***	-0.63	(0.20)	**
Positive expectancies for marijuana use	0.41	(0.17)	*	-0.23	(0.06)	***	-0.68	(0.22)	**
Perceived schoolwide substance use norms									
Perceived schoolwide smoking	0.19	(0.13)		-0.04	(0.11)		0.20	(0.17)	
Perceived schoolwide drinking	0.52	(0.15)	***	-0.12	(0.10)		-0.39	(0.19)	*
Perceived schoolwide marijuana use	0.59	(0.13)	***	-0.09	(0.09)		-0.42	(0.16)	**
Perceived friends' substance misuse									
Perceived friends' smoking	0.37	(0.11)	***	-0.05	(0.05)		-0.18	(0.14)	
Perceived friends' drinking	0.35	(0.14)	**	-0.11	(0.06)	†	-0.03	(0.18)	
Perceived friends' marijuana use	0.29	(0.10)	**	-0.05	(0.04)		-0.23	(0.13)	†
Friends' substance misuse ^a									
Proportion who smoke	0.07	(0.03)	*	-0.02	(0.01)		-0.06	(0.04)	
Proportion who drink	0.09	(0.04)	*	-0.03	(0.02)		-0.09	(0.05)	†
Proportion who use marijuana	0.02	(0.02)		-0.01	(0.01)		-0.05	(0.02)	*
Respondent's substance misuse ^b									
Any past month smoking	0.89	(0.74)		-0.76	(0.35)	*	0.00	(0.94)	
Any past month drinking	0.37	(0.61)		-0.54	(0.27)	*	-0.37	(0.78)	
Any past month marijuana use	1.63	(1.21)		-1.40	(0.60)	*	-3.29	(1.73)	†

Notes. Models included controls for pretest scores on the outcome, wave and wave squared as needed, the control variables shown in Table 1, and adolescents' means across waves on depressive symptoms, the wave polynomial, and the interaction term. Models included variance components for school district, adolescent, and wave as needed.

^a Among adolescents with in-school friendships at this wave (N = 1,951 observations)

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Logistic coefficients shown; linear coefficients shown for all other models

$p < .10,$

* $p < .05,$

** $p < .01,$

*** $p < .001$

Source: PROSPER Peers Study