Student Drug Testing and Positive School Climates: Testing the Relation Between Two School Characteristics and Drug Use Behavior in a Longitudinal Study

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ABSTRACT. Objective: Fostering positive school climates and student drug testing have been separately proposed as strategies to reduce student drug use in high schools. To assess the promise of these strategies, the present research examined whether positive school climates and/or student drug testing successfully predicted changes in youth substance use over a 1-year follow-up. **Method:** Two waves of panel data from a sample of 361 high school students, assessed 1 year apart, were analyzed. Changes in reported initiation and escalation in frequency of alcohol, cigarette, and marijuana use as a function of perceived student drug testing and positive school climates were analyzed, while we held constant prior substance use. **Results:** Perceived student drug testing was not associated with changes in substance use, whereas perceived positive school climates were associated with a reduction in cigarette and marijuana initiation and a reduction in escalation of frequency of cigarette use at 1-year follow-up. However, perceived positive school climates were not associated with a reduction in alcohol use. **Conclusions:** Student drug testing appears to be less associated with substance use than positive school climates. Nevertheless, even favorable school climates may not be able to influence the use of alcohol, which appears to be quite normative in this age group. (*J. Stud. Alcohol Drugs, 75,* 65–73, 2014)

DESPITE VARIOUS PREVENTION EFFORTS, substance use among U.S. adolescents remains common (Johnston et al., 2011) and a risk for psychological, physical, and social harms (Baskin-Sommers and Sommers, 2006; Brook et al., 2004; Ellickson et al., 2003; Oesterle et al., 2004; Swadi, 1999). Thus, identifying approaches to reduce adolescent substance use remains an important policy and research goal. Not surprisingly, schools are valuable settings for preventing adolescent substance use (Sloboda, 2008).

Some universal school drug-prevention efforts, which aim to improve knowledge and encourage students to "say no," have shown disappointing results; however, other approaches that provide social life-skill training have shown positive effects (Faggiano et al., 2005, 2008). Of late, two divergent approaches to school drug prevention have been developed, namely fostering a positive school climate (PSC; Blum and Libbey, 2004; Flay et al., 2004; Libbey, 2004) and requiring students to submit to drug testing (DuPont et al., 2013; Office of National Drug Control Policy [ONDCP], 2004; Sznitman., 2013a; Yamaguchi et al., 2003). In this study, we examined the association that perceptions of school climate and drug testing have with the initiation and escalation of substance use in U.S. high school students over a 1-year period.

Cross sectional and longitudinal studies (Booth et al., 2008; Catalano et al., 2004; Guo et al., 2001; Henry and Slater, 2007; LaRusso et al., 2008; Simons-Morton et al., 1999; Sznitman et al., 2012) have demonstrated that PSC is a strong predictor of adolescent substance use, and experimental interventions (Catalano et al., 2004; Hawkins et al., 2001) have shown that PSC can reduce substance use (Fletcher et al., 2008). Although most studies focus on the protective effect of PSC on drug use in general (Flay et al., 2004; Hawkins et al., 2001; Henry and Slater, 2007; Simons-Morton et al., 1999), a few studies have examined specific patterns of use. These studies specify that PSC is protective of both drug use initiation (Catalano et al., 2004) and escalation into more problematic use (Guo et al., 2001).

School climate can be measured in various ways, but social relations among students, teachers, and administrators have consistently been a focus of investigation (Libbey, 2004). Studies from the United States have found that school connectedness, which includes indicators such as feeling close to others at school and teachers caring about students, is associated with lower levels of tobacco, marijuana, and alcohol use (Bonny et al., 2000; Resnick, 1997). Similarly, international studies have found that smoking and drinking are positively associated with school alienation (Nutbeam, 1993) and negatively associated with school satisfaction

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and positive school perceptions of the school psychological environment (Samdal, 2000).

The mechanism underlying the protective effects of school climate on adolescent substance use follows from social control theory (Hirschi, 1969; Libbey, 2004), which predicts that students who are attached to schools refrain from substance use behaviors because they internalize the pro-social expectations and norms encouraged by schools (Catalano et al., 2004). Building on this framework, research has found that high schools that treat students with respect and that explain and enforce drug use policies are more likely to encourage healthy norms of behavior (including reduced substance use) than schools that focus on control of behavior without respect for student needs and perspectives (LaRusso et al., 2008).

Student drug testing (SDT) is a somewhat controversial policy that has nevertheless been upheld by the U.S. Supreme Court as a legitimate student drug-prevention intervention. SDT may be implemented on suspicion of use (for cause) or as part of a mandatory random testing requirement for enrollment in certain school activities, such as sports or clubs (DuPont et al., 2013; Ringwalt et al., 2008; Terry-McElrath et al., 2013). When tests are positive, students are referred to treatment and counseling and are often barred from participation in extracurricular activities (DuPont et al., 2013; ONDCP, 2004). Schools most often test for marijuana, although testing for alcohol, nicotine, and other substances is also common.

Proponents of SDT suggest that testing will deter the initiation and use of substances by giving students a reason to reject peer drug use offers (DuPont et al., 2013; Sznitman, 2013a). Furthermore, a spillover effect to the entire student body is expected as students are influenced by the behavior of their peers (Institute of Education Sciences, 2013; James-Burdumy et al., 2012; National Drug Prevention Alliance, 2011). Finally, adolescents who may be at risk for adverse effects of drugs can be identified and referred for help.

The effectiveness of SDT, however, is not clear. One 2009 review found little support for SDT in deterring use (Roche et al., 2009). In one large-scale randomized controlled trial (James-Burdumy et al., 2012), students who were eligible for random SDT in test schools reported slightly lower current use of illegal drugs, but there were no effects on students' intentions to use drugs in the future or on current use in students not subject to testing. SDT appeared, therefore, to be rather ineffective at educating students to avoid drug use.

Other studies have found mixed results. A prospective randomized controlled trial with 11 high schools found no SDT effect on recent substance use (Goldberg et al., 2007), and a national cross-sectional study found that SDT's association with lower student substance use was limited to females and depended on school climate (Sznitman et al., 2012). A previous national cross-sectional study based on Monitoring the Future data failed to find any evidence of SDT effectiveness (Yamaguchi et al., 2003). However, a more recent cross-sectional study using updated Monitoring the Future data (Terry-McElrath et al., 2013) found that SDT was associated with moderately lower marijuana use but increased use of illicit drugs other than marijuana.

In addition to the lack of research evidence for the effectiveness of SDT, critics of SDT have pointed out that drug testing in school is likely to lead to unintended negative consequences—such as false-positive test results, labeling students as drug users, and expulsion from school—that can lead to poorer academic performance (Fletcher, 2011; Gilvarry, 2013; McKeganey, 2005). These unintended consequences may reduce the well-being of students and thus lead to increased risk of future drug use (Cox et al., 2007). Despite potential negative unintended consequences, lack of clear research support for the practice, and repeated opposition from public health, education, and civil liberty groups (Committee on Substance Abuse and Council on School Health, 2007; Kern et al., 2006), schools continue to be encouraged to implement SDT, and by 2006, 20% of U.S. high schools had done so (Centers for Disease Control and Prevention [CDC], 2006). Terry-McElrath et al. (2013) estimated that at least 28% of high school students are currently exposed to SDT.

This state of affairs is surprising because other whole-school approaches, such as creating a more positive antidrug school climate, appear to have more support in research (Sznitman et al., 2012). The objective of the current study was to examine the separate effects of both perceived SDT and PSC on initiation and escalation of drug use over a 1-year period in a sample of high school youths. This study was thought to provide a more stringent comparison of the two strategies because most studies of PSC and drug use are cross-sectional, and few studies attempt to distinguish between initiation and increase in frequency of use over time.

Based on previous research, we expected that adolescents who reported PSC would be less likely to initiate and increase their substance use over the study period. Based on the underlying assumption that SDT can reduce students' substance use by giving them a reason to "say no," we expected that if perceived SDT was found to be associated with substance use, the association would be strongest for reducing initiation of use.

Method

Participants and procedure

The current study used data from the National Annenberg Survey of Youth (NASY), an annual telephone survey conducted by the Annenberg Public Policy Center at the University of Pennsylvania and approved by the Institutional Review Board of that institution. NASY uses random-digit-

dialing telephone procedures to obtain a nationally representative sample of adolescents (for detailed description, see Dunlop et al., 2011). The current study used data from a cohort of high school students who were interviewed in 2008 and reinterviewed in 2009 (n = 361). The follow-up rate among 2008 high school respondents (N = 688) was 53%. Another 27 participants were excluded from the multivariate models because of missing data on the covariates of interest. One further respondent was excluded from the cigarette use models because of missing data on the dependent variable. This left a total sample of 334 for alcohol and cannabis use models and 333 for the cigarette use models.

Analyses showed that respondents who remained in the panel were slightly younger than those who did not, but no other differences in demographics or reports of drug use, perceived PSC, or SDT in 2008 were found. Thus, the data are best described as missing at random, and listwise deletion was applied (Little and Rubin, 2002) while controlling for age and other demographics.

Although all recruitment and interviewing in 2008 were done by telephone, 49% of the reinterviewing was done using online survey methodology. Online survey responders were less likely to be male, be younger, report smoking, report negative climates, and be in schools that were larger and without SDT. Because of these differences, we controlled for reinterview mode in the multivariate models.

Respondents were ages 14–18 years at initial interview. For respondents younger than 18, parents/guardians were asked for permission to interview their child, and interviews were given in Spanish when required (n = 2). Surveys were conducted at the end of each school year, making it likely that students would be aware of SDT policies in their schools. Youths were compensated $10 for their first interview and $25 for follow-up interviews. The overall response rates for the original NASY interviews were approximately 50%, comparable to rates of other national telephone health surveys of adults (CDC, 2011).

Measures

Substance use initiation was assessed at baseline and at follow-up and was based on responses to the question, "Have you ever: (a) smoked a cigarette? (b) had a drink of beer, wine or liquor? (c) smoked marijuana or hashish?"

Substance use frequency was assessed at baseline and follow-up by asking respondents who reported lifetime use whether they had engaged in the behavior in the last 30 days and, if yes, on how many days in the last 30 they had engaged in the behavior. For cigarettes, respondents were also asked how many cigarettes they smoked on an average smoking day. Respondents were classified on a scale from 0 (*never used*) to 5 (*indicating increasing number of days in the last month that the substance was used*). For cigarettes, the scale also indicates increasing amounts of daily use.

Perceived student drug testing. At follow-up, respondents were asked if their current school asks students to participate in drug screening tests (0 = no, 1 = yes). Those who reported not knowing (n = 10) were coded as 0 because if they were not aware of an SDT policy, it is unlikely that they would have been affected by its potential existence.

Perceived positive school climate. At follow-up, respondents were asked how well five items described their school: (a) the rules in the school are clear, (b) teachers can handle problems in the school, and the level of respect between (c) students, (d) teachers for students, and (e) students for teachers is high. Respondents used a scale from 1 (*not at all*) to 4 (*very well*). Responses to these questions were summed (range: 0–10, α = .74). Missing cases on individual variables were coded as missing on the final composite PSC measure (n = 12).

Background variables included race/ethnicity, age, gender, grade point average, region of the country, urban versus rural or suburban residence, school size, and private versus public school. The data file was supplemented with data from the U.S. Census to assess the median income level of the respondent's neighborhood based on postal zip code (1 = *low-income neighborhood* to 5 = *high-income neighborhood*).

Statistical analysis

Three separate robust logistic regressions were run to study the predictors of change in alcohol, cigarette, and marijuana initiation at follow-up, and three different robust linear regression models were run to study change in alcohol, cigarette, and marijuana frequency of use. In the initiation models, substance use initiation at follow-up was the dependent variable, with substance use initiation at baseline, perceived PSC, perceived SDT, and background individual characteristics as covariates. In the frequency of use models, substance use frequency at follow-up was the dependent variable, with substance use frequency at baseline, initiation at follow-up, perceived PSC, perceived SDT, and background individual characteristics as covariates. This allowed us to determine if perceived SDT and/or perceived PSC were associated with changes in substance use between the baseline and follow-up surveys. Analyses were done with the Stata Version 12 (StataCorp LP, College Station, TX) "robust" option for estimating the standard errors using Huber–White sandwich estimators. The robust option adjusts standard errors to take into account heterogeneity and lack of normality (UCLA: Statistical Consulting Group, 2013).

Results

Respondents' ages at follow-up ranged from 14 to 20 years (M = 16, SD = 1.2), with 182 (50.4%) females. Chi-square tests showed that in the 1-year follow-up period, alcohol initiation increased from 53% to 66%, cigarette ini-

TABLE 1. Background and individual level variables by drug testing and positive school climate

Background variables	Student drug testing (*n* = 124, 34%) *n* (%)	Positive climate[b] (*n* = 155, 43%) *n* (%)	Total (*n* = 361) *n*
Residence			
Urban[a]	22 (28)	39 (48)	83
Suburb	68 (34)	89 (44)	208
Rural	34 (53)**	27 (41)	70
Region			
South[a]	49 (45)	49 (44)	115
Northeast	26 (38)	33 (47)	72
Midwest	33 (33)	43 (41)	107
West	16 (26)**	30 (47)	67
School size			
≤1,000 pupils	114 (37)	68 (42)	172
>1,000 pupils	10 (36)	84 (46)	183
School type			
Public	134 (37)	134 (42)	322
Private	14 (47)	21 (75)**	37
Income			
Below sample mean	67 (37)	83 (44)	195
Above sample mean	48 (35)	63 (45)	142
Individual level variables			
Gender			
Male	67 (39)	94 (54)	179
Female	57 (34)	61 (35)***	182
Age[a]			
14–15	50 (43)	64 (53)	123
16–17	62 (34)	78 (42)*	194
18–20	12 (28)	13 (30)*	44
Race/ethnicity			
White[a]	87 (37)	108 (45)	248
Black	10 (26)	17 (44)	40
Hispanic	117 (37)	19 (40)	49
Other	10 (50)	11 (52)	23
Grade point average			
A[a]	54 (41)	66 (48)	144
B	51 (34)	71 (46)	159
C–D	18 (33)	17 (32)	55

*Notes: N*s do not always add up to 361 because of missing data. *P* values are based on bivariate logistic regression. [a]Denotes referent category; [b]positive school climate captures respondents who reported positive climate above the median.
*$p < .05$; **$p < .01$; ***$p < .001$.

tiation increased from 21% to 34%, and marijuana initiation increased from 15% to 25% ($p < .001$). One-sample *t* tests showed that mean monthly drinking frequency increased from 0.79 at baseline to 1.25 at follow-up, mean monthly cigarette frequency increased from 0.37 to 0.66, and mean monthly marijuana frequency increased from 0.24 to 0.54 ($p < .001$).

The bivariate analyses in Table 1 show that perceived SDT, which was reported by 34% of respondents, was less prevalent among students in the West than in other parts of the country and that students in rural schools were the most likely to report SDT. Perceived SDT did not differ by students' reports of school size or between students in public and private schools.

The Monitoring the Future Study (Terry-McElrath et al., 2013) and the 2006 School Health Policies and Program Study (SHPPS; CDC, 2006) enabled a check of whether student reports of drug testing were consistent with those reported in national surveys of school staff. The 2006 SHPPS found that 20% of high schools had implemented drug testing. Terry-McElrath et al. (2013) reported that, between 1998 and 2011, 28% of high school students attended schools with SDT, which was somewhat lower than the rate in our study (34%). The SHPPS confirmed our results that drug testing was more common in nonurban areas, least common in the West, and unrelated to private versus public schools and school size.

Table 1 shows that respondents in private schools reported more perceived PSCs. Females and older adolescents were less positive about their school climate than other students.

Table 2 shows the multivariate logistic regressions of substance use initiation over the 1-year study period. Specific to the model predicting initiation of alcohol use (Model 1), results show that neither perceived PSC nor perceived SDT was associated with lower rates of substance use. Perceived SDT was also not associated with lower rates of initiation of cigarette or marijuana use. In contrast, perceived PSC was associated with a reduced likelihood of cigarette and marijuana initiation over the 1-year period (Models 2 and 3). Students in the South were the least likely to initiate marijuana use, and older adolescents were more likely to initiate marijuana and cigarette use than younger adolescents.

Table 3 shows the multivariate linear regressions of frequency of substance use over the 1-year study period. Specific to the models predicting frequency of alcohol and marijuana use (Models 1 and 3), neither perceived PSC nor perceived SDT was associated with reduced likelihood of escalation of use. Perceived SDT was also not associated with reduced likelihood of escalation of cigarette use, whereas perceived PSC was (Model 2). In terms of other background variables, older adolescents were more likely than younger adolescents to escalate frequency of alcohol use. Hispanics and adolescents of "other" ethnic minorities were less likely to increase marijuana use than White adolescents, and adolescents in the West and in suburbs increased marijuana frequency more than adolescents in the South or in urban environments.

Discussion

Despite widespread implementation of different school drug-prevention strategies, adolescent substance use in the United States continues to be a public health concern (Johnston et al., 2011). It is crucial that research continues to examine different approaches to prevent student substance use because this can play an important role in informing a more effective drug preventive strategy. The current study is a step in this direction, because it examined the association between changes in substance use over a 1-year period and perceived PSC and perceived SDT,

Table 2. Robust logistic regression predicting initiation of self-reported substance use at Time 2

	Model 1: Alcohol initiation			Model 2: Cigarette initiation			Model 3: Marijuana initiation		
Predictors	OR	[95% CI]	*p*	OR	[95% CI]	*p*	OR	[95% CI]	*p*
Time 1 initiation									
Alcohol	15.916	[8.071, 31.384]	<.001						
Cigarette				20.554	[9.195, 45.947]	<.001			
Marijuana							47.015	[19.424, 113.798]	<.001
Residence									
Urban[a]									
Suburb	1.102	[0.591, 2.053]	.760	1.489	[0.732, 3.032]	.272	0.735	[0.330, 1.638]	.452
Rural	1.232	[0.481, 3.153]	.664	1.105	[0.435, 2.809]	.834	0.313	[0.093, 1.050]	.060
Region									
South[a]									
Northeast	1.563	[0.683, 3.579]	.291	1.672	[0.727, 3.845]	.227	3.223	[1.274, 8.155]	.013
Midwest	0.985	[0.448, 2.164]	.970	1.666	[0.781, 3.553]	.187	2.777	[1.139, 6.771]	.025
West	1.462	[0.618, 3.459]	.388	2.378	[0.940, 6.018]	.067	3.443	[1.222, 9.705]	.019
School size									
>1,000 pupils	1.149	[0.608, 2.169]	.669	1.082	[0.561, 2.090]	.814	1.824	[0.880, 3.781]	.106
Public school	1.080	[0.335, 3.481]	.898	0.525	[0.127, 2.161]	.372	0.519	[0.093, 2.892]	.454
Income	1.029	[0.821, 1.291]	.804	0.877	[0.686, 1.121]	.295	1.012	[0.759, 1.350]	.933
Female	1.085	[0.580, 2.031]	.797	1.157	[0.615, 2.177]	.650	1.498	[0.740, 3.032]	.262
Age	1.407	[0.878, 2.256]	.156	2.096	[1.249, 3.517]	.005	2.510	[1.413, 4.459]	.002
Race/ethnicity									
White[a]									
Black	1.001	[0.385, 2.600]	.999	0.801	[0.290, 2.207]	.667	0.641	[0.164, 2.497]	.521
Hispanic	0.595	[0.254, 1.396]	.233	0.734	[0.253, 2.128]	.569	0.312	[0.073, 1.341]	.117
Other	0.594	[0.097, 3.623]	.573	1.485	[0.356, 6.199]	.587	0.287	[0.082, 1.002]	.050
Grade point average	1.329	[0.861, 2.052]	.199	1.378	[0.893, 2.127]	.147	1.208	[0.713, 2.044]	.482
Web interview	1.021	[0.537, 1.941]	.950	0.509	[0.251, 1.033]	.061	0.411	[0.191, 0.883]	.023
PSC	0.942	[0.819, 1.083]	.401	0.849	[0.728, 0.989]	.036	0.801	[0.676, 0.949]	.010
SDT	1.266	[0.677, 2.370]	.145	1.057	[0.549, 2.035]	.096	1.843	[0.933, 3.641]	.079
n		334			333			334	

Notes: OR = odds ratio; 95% CI = 95% confidence interval; PSC = positive school climate; SDT = student drug testing. [a]Denotes referent category.

both of which are relevant to prevention strategies for student substance use.

SDT may be for cause or random for certain groups (e.g., students participating in sports, clubs) (DuPont et al., 2013; Ringwalt et al., 2008; Terry-McElrath et al., 2013). Regardless, it may be implemented with the expectation that effects will transfer to other students not directly affected by the testing policy (Institute of Education Sciences, 2013; James-Burdumy et al., 2012; National Drug Prevention Alliance, 2011). Consistent with previous research (Goldberg et al., 2007; Yamaguchi et al., 2003), results of the current study show that perceived SDT is not associated with a reduction in initiation or escalation of substance use in the general student population.

This study did not examine the association of substance use and perceived SDT among students directly targeted for testing, nor did it examine its ability to detect and refer students to treatment and counseling. A cross-sectional study, however, has found that students in extracurricular activities that were subjected to SDT reported less marijuana use than those not tested. However, the same study also found that SDT was associated with increased use of other substances (Terry-McElrath et al., 2013).

Another recent randomized controlled trial (James-Burdumy et al., 2012) that tested the effects of random SDT on students who were and who were not directly subjected to testing echoed the findings of this study of no spillover effect. However, the study did find that students who were in extracurricular activities covered by the SDT program reported less use of the substances covered by the program than comparable students in high schools without SDT. These effects, however, must be interpreted with caution, as there appeared to be greater drug-prevention efforts (e.g., increased counseling and education programs) in SDT schools compared with those not selected for the SDT intervention. Because the study did not control for these differences, it is not certain that the lower drug consumption found in targeted students in SDT schools can fully be attributed to the SDT program and not to other parallel prevention programs. Furthermore, the study found no effects on intentions to use drugs in the future. As such, even among those subjected to testing, SDT failed to improve one of the strongest risk factors of future substance use in adolescents (Kuther, 2002).

One of the stated goals of SDT is that it will detect students who have already started using drugs and refer them to treatment or counseling (Sznitman, 2013a). Also in this

Table 3. Robust linear regression predicting frequency of self-reported substance use at Time 2

	Model 1: Drinking frequency			Model 2: Cigarette frequency			Model 3: Marijuana frequency		
Predictors	Coef.	Robust *SE*	*p*	Coef.	Robust *SE*	*p*	Coef.	Robust *SE*	*p*
Alcohol									
Frequency Time 1	0.222	0.073	.003						
Initiation Time 2	1.576	0.093	<.001						
Cigarette									
Frequency Time 1				0.570	0.082	<.001			
Initiation Time 2				1.370	0.108	<.001			
Marijuana									
Frequency Time 1							0.391	0.163	.017
Initiation Time 2							1.796	0.170	<.001
Residence									
Urban[a]									
Suburb	-0.118	0.135	.381	-0.017	0.088	.844	0.222	0.102	.031
Rural	-0.132	0.183	.472	-0.126	0.126	.317	0.031	0.121	.798
Region									
South[a]									
Northeast	0.335	0.173	.054	0.160	0.122	.192	0.024	0.118	.840
Midwest	0.053	0.132	.686	0.030	0.090	.740	-0.016	0.118	.893
West	0.205	0.166	.217	0.001	0.092	.987	0.310	0.124	.013
School size									
>1,000 pupils	0.160	0.106	.132	0.015	0.085	.865	0.003	0.083	.970
Public school	-0.259	0.163	.112	-0.028	0.094	.769	-0.168	0.133	.209
Income	0.008	0.043	.845	-0.022	0.033	.508	-0.047	0.039	.224
Female	-0.007	0.104	.947	-0.063	0.069	.361	-0.146	0.079	.067
Age	0.257	0.078	.001	0.084	0.071	.239	0.005	0.068	.947
Race/ethnicity									
White[a]									
Black	-0.192	0.127	.132	-0.069	0.100	.490	-0.002	0.128	.987
Hispanic	-0.164	0.131	.209	-0.153	0.096	.114	-0.218	0.103	.034
Other	0.026	0.276	.925	-0.043	0.252	.863	-0.434	0.157	.006
GPA	0.023	0.085	.970	-0.032	0.056	.565	-0.014	0.066	.827
Web interview	0.066	0.113	.562	-0.129	0.087	.140	0.066	0.089	.459
PSC	-0.026	0.026	.301	-0.056	0.020	.006	-0.026	0.020	.193
SDT	-0.120	0.113	.288	-0.019	0.068	.777	-0.075	0.072	.303
n		334			333			334	

Notes: Coef. = coefficient; GPA = grade point average; PSC = positive school climate; SDT = student drug testing. [a]Denotes referent category.

respect, SDT is likely to be a weak prevention strategy. In the randomized controlled trial mentioned above (James-Burdumy et al., 2012), only 1% of students tested positive, which was lower than the rate at which students reported using substances. Furthermore, SDT programs typically do not test for use of alcohol, which is harder to detect through biological tests than illegal drugs. In effect, SDT is likely to miss screening of drug users and of the drug that is the major source of immediate impairment in youths (Boden and Fergusson, 2011).

In addition to perceived SDT, the current study also examined the association between perceived PSC and changes in student drug use. Results provide further evidence that holding schools accountable for improving school climates (National School Climate Center et al., 2009) is a promising strategy for preventing student substance use. The current results show that perceived PSC is associated with lower likelihood of initiation of cigarette and marijuana use and escalation of cigarette use, but it may not be associated with initiation or escalation of alcohol use or with escalation of marijuana use. Thus, although this study underscores the potential for school climate interventions to reduce substance use, it also indicates that additional programs may be needed to target youths who have started using marijuana and for alcohol use prevention in general.

The failure to find positive associations of perceived PSC on either of the alcohol outcomes may indicate that perceived PSC has limits concerning a behavior that may be normative in this age group. According to many theories, drug use, including underage drinking, is a marker of deviance (Chakroun et al., 2010). However, when use of a certain drug becomes normative, in the sense that more than half of adolescents have tried it, it may actually become associated with adjustment in the youth population (Parker, 2002; Sznitman, 2013b).

In our sample, more than 50% had tried alcohol at baseline, and almost 70% had tried alcohol at follow-up, a sign that its use among high school students is common and not

regarded as a violation of norms. It is possible that when normalization occurs, the relative power of PSC to prevent substance use becomes weakened. This is in line with a recent study (Perra et al., 2012) that found that school-related experiences and attitudes were particularly influential in terms of less normative substance use behaviors. Beside this study, educational and other social factors have been largely overlooked in the normalization literature (Sznitman, 2013b), and future research is needed to examine the hypothesis that the deterrent effect of PSC may be limited when substance use behavior becomes normalized.

Limitations

Although this study offers valuable new findings, it also has limitations. Our measure of SDT was restricted to student reports. Although the correlates of perceived SDT found in this study mirror those found in a nationally representative sample of school staff (CDC, 2006), it would be desirable for future studies to collect drug testing information from school staff. Furthermore, we did not have a measure of whether respondents were personally subject to SDT and at which student population it was aimed. The recent study by Terry-McElrath et al. (2013) found stronger effects for marijuana use among students directly affected by SDT and some differential associations between SDT and students in athletic and nonathletic extracurricular activities. Thus, differential effects of SDT depending on which student population it is targeting should be examined more carefully in future studies.

Another limitation of the current study is that it did not control for other prevention efforts, which may have obscured associations between drug use and SDT and PSC. Finally, self-reported substance use data can be influenced by memory or motivational biases; however, research has shown that youths' reports of drug use have high reliability and validity (Bachman et al., 2011).

Conclusions

The current research reinforces previous conclusions that SDT is a relatively ineffective drug-prevention policy (Goldberg et al., 2007; Sznitman, 2013a; Yamaguchi et al., 2003). On the other hand, interventions that improve school climate may have greater efficacy. Indeed, "whole school" health promotion efforts and interventions that work with students, teachers, and parents to develop positive school staff–student relationships and promote students' security have been found to reduce substance use (Bond et al., 2004; Fletcher et al., 2008).

Certainly, schools are important as social and learning environments affecting not only academic achievement but also health behaviors. Young people whose relationships with their fellow students and teachers lack respect are more likely to initiate and escalate use of drugs, as evidenced in this and other studies (Fletcher et al., 2008) and to be subject to other mental health problems (Blum and Libbey, 2004; Catalano et al., 2004; LaRusso et al., 2008). Therefore, the potential consequences of poor school climates for young people's health are far reaching and deserving of attention.

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