A Comparison of National, State, and Local Drug Use Surveys: The Youth Risk Behavior Survey and the Rx for Addiction and Medication Safety Program

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ABSTRACT

OBJECTIVE: To understand adolescent substance use and its known risk factors at the local and state level; to inform the development of future programs to reduce substance misuse among adolescents.

METHODS: Survey data collected from a convenience sample of Rhode Island 9th-grade students prior to administration of the RAMS curriculum in 2016 and 2017 was compared to 2017 Rhode Island and National Youth Risk Behavior Survey Data.

RESULTS: Seventeen percent (2016 RAMS), 10% (2017 RAMS), 6% (RIYRBS) and 11% (NYRBS) of students reported ever using prescription pain reliever without a physician prescription. One percent (2016 RAMS, 2017 RAMS), 3% (RIYRBS), and 2% (NYRBS) reported ever using heroin. Seven percent (2016 RAMS, 2017 RAMS), and 12% (RIYRBS, NYRBS) reported using cannabis in previous 30 days.

CONCLUSION: These findings highlight a unique need for targeted education based on school and community risk and protective factors and misuse differences.

KEYWORDS: adolescent, Youth Risk Behavior Survey (YRBS), substance use prevention, prescription opioid misuse

INTRODUCTION

Substance use trends among adolescents are in constant flux; however, statistics from the 2016 National Survey on Drug Use and Health found that 23.6% in 2015 and 22.1% in 2016 of youths aged 14 and 15 years old have misused illicit drugs in their lifetime.[1] In 2016, 3.6% of adolescents reported misusing opioids over the past year, where the vast majority of this misuse was due to prescription opioids. Though an estimated lower prevalence of misuse compared to the prevalence of opioid misuse among adults (i.e., 7.8%), prescription opioid misuse has become a leading cause of unintentional injury and overdose deaths among adolescents in the United States.[2–4] Cannabis use among adolescents has steadily increased and currently exceeds daily tobacco use.[5] This trend is most likely associated with the increase in legalization coinciding with the declining perception that regular use of cannabis may be harmful.[5,6] Much is unknown about the risks of long-term cannabis use in youth; however, for those who initiate before the age of 18 years, 1 in 6 will have cannabis use disorder.[7]

Known risk factors contribute to these trends of misuse among adolescents. Education (i.e., poor academic performance and truancy), interpersonal behaviors and attitudes towards misuse, and mental health, including major depressive disorder, stress disorder and anxiety and mood disorders, have been documented as risk factors for misuse in adolescents.[8–10] Other factors, specific to increased risk of opioid nonmedical misuse, include female biological sex, white race and previous or concurrent illicit drug use.[11] Educational programs and media campaigns that educate youth about risks have been and will continue to be important strategies for substance misuse prevention. Understanding adolescent substance use and its known risk factors at the local and state level will help direct specific policies and programs to reduce Rhode Island adolescent substance misuse. Therefore, the main objectives of this study were to compare data collected as part of the Rx for Addiction and Medication Safety (RAMS) program in 2016–2017 (i.e., 2016 RAMS) and RAMS-PEER program 2017–2018 (i.e., 2017 RAMS) to the publicly available data from the 2017 Rhode Island and the 2017 National Youth Risk Behavior Survey (YRBS), part of the Centers for Disease Control and Prevention (CDC) Youth Risk Behavior Surveillance System.[12,13] RAMS was a three-hour, on-site, school-based interactive opioid misuse curriculum. The curriculum included prescription medication safety, signs, symptoms, and risk factors for opioid misuse and withdrawal; opioid overdose identification and response; and local treatment and recovery resources. Both 2016 RAMS and 2017 RAMS programs have been more completely described in previous publications.[14,15]

METHODS

The study design for the 2016 RAMS program (i.e., Rx for Addiction and Medication Safety pilot program for the 2016–2017 school year) has been described in a previous publication.[14] Briefly, 9th-grade students at eight public Rhode Island high schools were administered a pre-intervention survey, received a three-hour curriculum which covered topics such as prescription medication safety; signs, symptoms, and risk

factors for opioid withdrawal; opioid overdose identification and response; and local treatment and recovery resources. Students were then administered a post-intervention survey. Several questions used in the RAMS pre-intervention survey were based on the 2015 Youth Risk Behaviors Survey (YRBS) from the CDC.[16] Many of the questions included in the 2015 YRBS questionnaire were also included in the 2017 YRBS questionnaire. For this reason, the analysis detailed in this paper will compare the publicly available data ascertained by the 2017 YRBS survey. The 2017 RAMS program (i.e., RAMS-PEER) was subsequently implemented during the 2017-2018 school year in six Rhode Island high schools to evaluate the implementation of a one-hour booster opioid misuse curriculum among 10th-graders, as compared to delivering the RAMS three-hour curriculum to 9th-graders every year. Three schools who participated in the pilot program were invited to participate in the program for a second year, and three new schools were recruited to participate in the program based on similar characteristics of returning schools. School committee approval of the curriculum and corresponding study for all six schools were obtained, as was approval from the Rhode Island Department of Education. The method of administration and the survey design have been described previously.[14] A pre-post comparison study was conducted to measure the 2017 RAMS intervention on student knowledge, perceptions, risk, and protective behaviors related to opioid misuse. Before 2017 RAMS program delivery (i.e., preintervention), 9th-graders completed a 20-minute survey that included risk and protective factors for substance misuse, past 30 days nonmedical use of opioids, alcohol use, and use of other substances; students' perceptions of risk or harm from prescription drugs and prescription drug overdose; awareness of resources and treatment of substance misuse, proper disposal and storage of prescription medications, and how to obtain and administer naloxone. These items were modified from the 2015 Youth Risk Behavior Survey from the CDC and the 2015 Ontario Study Survey from the Canadian Centre for Addiction and Mental Health and identical to surveys administered in the 2016 RAMS program. The same survey was administrated again one to two months after the 2017 RAMS curriculum was completed among the 9th- and 10th-graders (i.e., postintervention). In this analysis, the intervention was a booster for 10th-graders from returning schools and a full three-hour curriculum for 9th-graders from all six schools.

The national YRBS questionnaire and the 2017 Rhode Island YRBS questionnaire to the 2016 and 2017 RAMS pre-intervention survey results are reported. The National YRBS sampling, data collection and data processing methodology are described on the CDC website.[17] The National YRBS dataset is an independently administered questionnaire, separate from the state administered YRBS; however, schools that participate in the state administered survey may also participate in the nationally administered survey. The Rhode Island YRBS questionnaire was administered by the Rhode Island Department of Health in collaboration with Westat. Together, they identify and survey Rhode Island public high school students in grades 9–12. A state-representative sample was identified through a two-stage, cluster design. In 2017, 23 public high schools were selected systematically with probability proportional to enrollment in grades 9–12. In the second sampling stage, intact classes during the second period were selected systematically with equal probability using a random start for each sampled school. All students in sampled classes were eligible to participate.[18] Specific questions included on the 2016 and 2017 RAMS pre-intervention surveys that also appear on the 2017 Rhode Island (RIYRBS) and National YRBS (NYRBS) questionnaires can be found in **Table 1**. Table 1 also includes data collected for the 2016 RAMS and 2017 RAMS pre-intervention survey, the 2017 YRBS RI survey and the YRBS National Survey.

Statistical Analysis

Bivariate analysis was completed among pre-intervention 9th-grade survey respondents in the 2016 RAMS cohort and pre-intervention 9th-grade survey respondents in the 2017 RAMS cohort, and then among 9th-grade survey respondents in the 2017 RAMS cohort and 9th-grade RI YRBS survey respondents and 9th-grade National YRBS survey respondents, separately.

Differences between the three pairs of survey respondents were compared for each variable using a Chi-square test or Fisher's exact test, depending on expected cell sizes. YRBS survey data were weighted on biological sex and race/ethnicity to be representative of the overall public and private high school student population in Rhode Island and to adjust for the over sampling of white students; overall weights equaled the total sample size. All statistical tests were two-sided and performed at the 0.05 significance level. All statistical analysis was performed using SAS 9.4 (Cary, NC). Substantial missingness was noted in the 2017 RAMS cohort for the question regarding suicidality, complete cases analysis was completed to address this missingness; we assumed that missing data was missing completely at random.[19]

RESULTS

For 2016 RAMS pre-intervention survey was completed by 770 9th-grade students (**Table 1).** The majority were 14 years old (57%), 52% were female, and 65% were white. For 2017 RAMS pre-intervention survey was completed by 1,030 9th-grade students. This cohort was comparable in age and gender but included more white students than from the 2016 RAMS cohort. The majority were 14 years old (54%), 50% were female, and 80% were white. The 2017 RIYRBS was completed by 632 9th-grade students. The non-response rate was not reported. The majority were 15 years old (56%), 51%

Table 1. 2016 RAMS, 2017 RAMS, 2017 RI YRBS, and 2017 National YRBS Comparisons

		RAMS 2016	RAMS 2017	P-Value	YRBS RI 2017	YRBS National 2017	TOTAL
		N = 770 n (%)*	N = 1030 n (%)		N =632 n (%)	N = 3921 n (%)	n (%)
Gender	Female	397 (52)	493 (48)	0.2768	324 (51)	2015 (51)	3229 (51)
	Male	358 (46)	518 (50)		305 (48)	1891 (48)	3072 (48)
	Other	15 (2)	19 (2)		0 (0)	0 (0)	34 (1)
Age (years)	14	436 (57)	551 (54)		228 (37)	1889 (49)	3104 (49)
	15	315 (41)	462(45)		353 (57)	1817 (47)	2947 (46)
	Other	19 (2)	17 (2)		51 (8)	212 (5)	299 (5)
Race	>1	148 (19)	128(12)	<.0001	42 (7)	241 (6)	559 (9)
	Other	122 (16)	79(8)		209 (34)	1930 (50)	2270 (37)
	White	500 (65)	823(80)		370 (60)	1666 (43)	3359 (54)
	Missing	0	0		11	84	95
During the past 12 months, has anyone offered, sold, or given you an illegal drug on school property?							
	No	681 (92)	687 (90)	<.0001	NA	3060 (81)	4428 (83)
	Yes	61 (8)	76 (10)		NA	741(19)	878 (17)
	Missing	28	267		632	120	1047
During the past 30 days, have you used cannabis?							
	No	715 (93)	963 (94)	0.5942	531 (89)	3316 (87)	5525 (89)
	Yes	55 (7)	67 (7)		76 (13)	487 (13)	685 (11)
	Missing	0(0)	0		25	118	143
During your life, have you taken prescription pain medicine without a doctor's prescription or differently than how a doctor told you to use it?							
	No	629 (83)	880 (89)	<.0001	573 (94)	3403 (89)	5485 (89)
	Yes	127 (17)	107 (11)		40 (7)	421 (11)	695 (11)
	Missing	14	43		19	97	173
During your life, have you used heroin (also called smack, junk, or China White)?							
	No	754 (99)	987 (99)	0.0066	592 (97)	3730 (97)	5610 (98)
	Yes	7 (1)	7 (1)		21 (3)	70 (2)	105 (2)
	Missing	9	36		19	121	185
During the past 12 months, how would you describe your grades in school?							
	Mostly A's	287 (37)	444 (43)	.0001	232 (40)	1189 (40)	2152 (41)
	Mostly B's	339 (44)	464 (45)		224 (39)	1074 (36)	2101 (41)
	Mostly C's or lower	144 (19)	122 (12)		98 (17)	570 (19)	934 (18)
	Missing	0	0 (0)		53	939	992
During the past 12 months, did you ever seriously consider attempting suicide?							
	No	679 (92)	691 (90)	<.0001	516 (83)	3174 (82)	5060 (85)
	Yes	63 (9)	79 (10)		104 (17)	679 (18)	925 (15)

*Percentages may not add to 100 due to rounding; percentage is out of non missing. P-values relate to the 2016 RAMS and 2017 RAMS comparisons.

were female, and 59% were white. Lastly, the 2017 NYRBS was completed by 3,921 9th-grade students. Overall response rate for the NYRBS was 6% with the majority being 14 years old (48%), 51% female, and 43% white.[20]

Respondents who reported receiving grades of B or better in the past 12 months, 81% (2016 RAMS), 89% (2017 RAMS), 72% (RIYRBS), and 58% (NYRBS). Fewer students who responded to the RAMS surveys in both years reported seriously contemplating suicide in the previous 12 months as compared to YRBS surveys; 8% (2016 RAMS), 8% (2017 RAMS), 17% (RIYRBS), and 16% (NYRBS). Eight percent (2016 RAMS), 7% (2017 RAMS), and 19% (NYRBS) of students reported being offered, sold, or given an illegal drug on school property in the past 12 months. The RIYRBS did

not include this question in the 2017 survey. Seventeen percent (2016 RAMS), 10% (2017 RAMS), 6% (RIYRBS) and 11% (NYRBS) of students reported ever using a prescription pain reliever without a prescription from a physician. One percent (2016 RAMS, 2017 RAMS), 3% (RIYRBS), and 2% (NYRBS) reported ever using heroin. Seven percent (2016 RAMS, 2017 RAMS), and 12% (RIYRBS, NYRBS) reported using cannabis in the previous 30 days.

DISCUSSION

9th-graders included in the 2016 and 2017 RAMS surveys had a statistically significant higher prevalence of lifetime nonmedical use of prescription pain relievers as compared to students in the 2017 Rhode Island and national YRBS samples. However, among students in their early adolescence, 2016 and 2017 RAMS respondents reported lower lifetime use of heroin. This finding compares to other national studies of adolescents aged 14–15 years where reported heroin use is low.[1,5] However, nonmedical use of prescription opioids early in adolescence and lifetime nonmedical use have been associated with an increased risk of transition to heroin in young adulthood.[21,22] Past-month cannabis use in the RAMS cohort was lower than that reported in the 2017 RIYRBS and NYRBS surveys, though still of concern with 7.1% and 6.5% of mainly 14–15 years-old students reporting current cannabis use during 2016 and 2017, respectively.

The 2016 and 2017 RAMS cohorts had more white students compared to the 2017 RIYRBS and NYRBS findings. This observation is plausible as most RAMS schools were in smaller, suburban Rhode Island communities where the demographic has a higher population of white students compared to the larger cities in the state.[23] The RIYRBS data is derived from an anonymous survey of students from selected public, charter, special education, alternative, and vocational schools from all areas of Rhode Island, and thus is more likely to include a higher population of racial and ethnic diverse students.[24] Our findings of more misuse of prescription pain relievers among the 2016 and 2017 RAMS cohort coincides with similar findings observed among the white demographic in other studies where persons were more likely to misuse to self-treat anxiety and depression or other mental health disorders.[8,11,25]

There are several risk factors for substance misuse among teens. Some of the strongest risk factors include substance misuse among peers and adverse childhood experiences such as abuse, neglect, and drug use and mental illness among self, parents or household members.[26,27] Poor academic performance, access to drugs and mental health conditions are all known risk factors for substance misuse among adolescents.[8,9,25,26] Our survey observed higher incidence of certain protective factors among the RAMS cohort compared to the 2017 RIYRBS and NYRBS data in academic performance, drug diversion, and complementation of suicide. The 2016 and 2017 RAMS students self- reported higher grades, less past-year drug diversion on school campus and lower rates of serious complementation of suicide, although we acknowledge that 25% of respondents did not answer the suicidality question on the 2017 survey.

Having one or few protective factors as part of prevention measures for adolescent substance misuse may not be enough to curb misuse as observed with both RAMS cohort. Prevention efforts should be a multifaceted yet targeted approach for the most successful impact in schools and communities. This study provides an understanding of misuse and risk factors for local schools complementary to previous state and national data. These results highlight the need for early prevention strategies in Rhode Island schools and communities to target and bolster protective factors such as higher academic performance and lower drug diversion on campus but based on the findings schools and communities may consider additional resources for mental health with further evaluation of students' motivation to misuse opioids. Additional resources may also be considered to implement or build upon school programs for students to have meaningful engagement with teachers and peers to help them commit to a drug-free lifestyle.

Prevention outside of school must also involve parents and community members, including proper medication storage and disposal and educational awareness on the medical, legal, and ethical risks of use of opioids, cannabis, and other substances.[10,28] Beyond increasing support and training of parents and caregivers, the importance of screening and early identification is also key in adolescent prevention of substance use. Studies have found a high prevalence of past-month use of alcohol (66.9%) and cannabis (49.9%) among adolescents, if misusing opioids.[29] Individuals at increased risk of opioid misuse may be those with acute or chronic pain, physical health problems or a history of mental illness such as depression. Youth who have witnessed an overdose by a family member or who have a large peer group that misuses are other known risk factors. All adolescents who report misuse or who have associated risk factors should be referred to a health professional for screening and evaluation; however, all adolescents may be recommended for screening to increase the identification of those with a potential problem.[30]

School and communities must assess substance use and risk and protective factors for their unique population of students as they may differ based on geographic location or demographics. Using this knowledge will help build more effective substance use education directed towards different school and community needs.

LIMITATIONS

There are several limitations for this study. Both the 2016 and 2017 RAMS surveys were administered to a convenience

sample and are overall not representative of the demographic characteristics of Rhode Island High school students, which was a study design consideration based on the goals of the study, as well as practical considerations including location of schools to the University of Rhode Island and interest of schools' administration and board committees.

All the surveys administered did not capture students who were not in school or school-aged children who do not attend school. The data may underestimate the amount of drug use in this population, as well as suicidal ideation. Students were able to bypass questions on the surveys without providing an answer. There may be overlap between students surveyed on three of the surveys (2017 RAMS, RIYRBS and NYRBS); however, we have no knowledge of which schools were included in the two YRBS surveys.

CONCLUSION

In our comparison of an opioid misuse education program among 9th-graders, we found that students included in the RAMS participants had a higher rate of misuse of prescription pain relievers, but a lower past-month cannabis use compared to RI YRBS and NYRBS RAMS data. The RAMS cohort also reported higher incidence of select protective factors, including higher academic performance and less suicide ideation. Development of prevention strategies for schools and communities should be unique to different geographical locations and demographics based on students' misuse and their risks or protective factors.

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