Graduate Student Journal of Psychology
2012, Vol. 14

School Violence Exposure and Adolescent Substance Use: A Rural Investigation

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The purpose of this study was to examine the relationship between school violence exposure and adolescent substance use. The study looked at three types of school violence (witnessed violence, violent victimization, and violence perpetration) and their relationship to substance use frequency (marijuana use and the use of other illicit substances) during adolescence. A total of 766 high school students from a rural school district participated in this study by completing a survey used to assess youth risk behaviors over the past 12 months. Although results found that overall school violence exposure and adolescent substance use were highly correlated, increased frequency of witnessing violence at school in particular were related to increased frequency of substance use. No significant relationships were identified between violence perpetration or victimization at school and adolescent substance use. Potential implications of these findings for substance use prevention, particularly for adolescents residing in rural areas, are discussed.

Recent findings from the National Survey on Drug Use and Health (Substance Abuse and Mental Health Services Administration [SAMHSA], 2009) indicate a connection between youth violence and substance abuse. Results from the SAMHSA study suggest that adolescents between the ages of 12 and 17 who engage in violent behavior are more likely to have also used illicit substances within the last 30 days (SAMHSA, 2009). Violence exposure in community settings has demonstrated a severe emotional impact on children, resulting in impaired social relationships and externalizing problems (Cooley-Quille, Turner, & Beidel, 1995), and according to Timmermans and colleagues (2008), externalizing behaviors are linked to adolescent substance use. Additionally, experiencing acts of physical and sexual assault have been shown to increase the risk for adolescent alcohol and substance use and lower the age of substance use onset (Kilpatrick et al., 2000).

Sullivan et al. (2007) suggest that exposure to violence results in numerous negative outcomes for youth, including substance use. Specifically, research suggests that those who report having witnessed violence at a greater frequency also report higher levels of substance use (Sullivan et al., 2007), and witnessing violence almost triples the risk of substance use disorders in adolescence (Kilpatrick et al., 2000). Witnessing violence has also proven to be a better predictor of externalizing behavior problems than victimization (Cooley-Quille et al., 1995; Janosz et al., 2008).

Recent statistics on violence and substance use suggest high prevalence rates among adolescents (SAMHSA, 2009). In 2003, nearly one-tenth of high school students reported being threatened or injured with a weapon at school (Brener, Lowry, Barios, Simon, & Eaton, 2004), and in 2007, 1.5 million students between the ages of 12 and 18 were victims of nonlethal crimes at school (Dinkes, Kemp, Baum, & Synder,,2009). According to Dinkes and colleagues (2009), school crime rates for students between the ages of 12 and 18 remained constant from 1992 to 2007, illustrating that school violence remains a persistent problem. In addition, adolescence is the developmental period that assumes the greatest risk for substance use onset (Perkonigg et al., 2006), and early adolescence is a distinct period of vulnerability for youth, with rates of substance use increasing drastically (Abbey, Jacques, Hayman, & Sobeck, 2006).

According to Perkonigg and colleagues (2006), the overall prevalence of adolescent substance use in the United States is exceptionally high in comparison to some European countries, with about half of all adolescents in the U.S. having tried at least one illicit substance prior to graduating. A study funded by the National Institute on Drug Abuse, the Monitoring the Future Study (National Institute on Drug Abuse [NIDA], 2009), suggests that current rates of substance use among youths are a cause for concern. Between 10.3% and 31.7% of students in grades 8-12 have used marijuana at least once in the year prior to being surveyed, while 3.7% to 8.3% had used inhalants, 1.8% to 4.4% had used cocaine, and 1.5% to 4.5% had used MDMA (ecstasy). These results indicate that marijuana use among adolescents is reported more often than all other illicit substances, a finding which has been supported by other studies showing that marijuana is the most popular illicit substance among students (McCrystal, Percy, & Higgins, 2006). Therefore, it is important to explore

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marijuana and illicit substance use as separate entities to better understand substance use behaviors in adolescence as well as the relationship between the use of marijuana and other illicit substances, if any.

According to Sussman and Ames (2001), it is important to explore trends of adolescent substance use because substance use among adolescents differs from adult substance use in several ways. First, frequent substance use in adolescence may be classified as abuse more readily because of the potential for such use to impede developmental growth and to compromise adjustment tasks, whereas similar use may or may not be considered abuse in adults. Secondly, adolescents may display less physical dependence and fewer physical symptoms in relation to substance use and can also use a smaller amount to achieve a similar effect. Substance use during adolescence has been linked to many negative outcomes, including continued substance use, lower educational attainment, and frequent displays of delinquent behavior such as violence (Abbey et al., 2006).

Furthermore, it is essential to study the effects of violence exposure as a whole, as well as the effects of exposure to individual types of violence because individual types of violence exposure have been found to have differential effects on substance use, such as increased risk for developing a substance use disorder and increased impairment in cognitive coping abilities (Kilpatrick et al., 2000; Brady, Tschann, Pasch, Flores, & Ozer, 2009). Previous research studies have not examined all types of violence-related behaviors simultaneously. Thus, this study examined school violence exposure and substance use among adolescents, and specifically investigated whether overall school violence exposure or a specific category of school violence exposure (witnessed violence, experienced violence, or perpetrated violence) had any impact on the frequency with which adolescents reported using illicit substances.

Martino, Elickson, and McCaffrey (2008) suggest that living in a rural area might serve as a protective factor against various forms of substance use because adolescent substance use has primarily been an issue in metropolitan areas. However, rates of substance use among urban and rural youths are becoming more comparable as rates of violence are beginning to increase in rural communities (Martino et al., 2008). Geographic estimates of prevalence have also been confounded by the relative dearth of research in rural areas. Historically, much of the research on violence exposure in adolescence has been conducted within community settings and has focused on violence within that community (i.e., drive-by shootings, murders, etc.). Thus, little is known about the types of violence and the extent to which youth are exposed to violence in rural areas (Slovak & Singer, 2002). However, frequent community violence is likely an uncommon experience for adolescents living in rural areas. Therefore, in order to evaluate the extent to which adolescents are being exposed to violence in rural areas and how this exposure might be related to substance use frequency, it is important to study these factors in an environment in which adolescents spend much of their time, such as the school. According to researchers, current research in schools is lacking, especially in rural areas (Reid, Peterson, Hughey, & Garcia-Reid, 2006; Lowry et al., 1999).

Based on the existing literature, it was expected that as rates of overall school violence exposure increased, rates of substance use would also increase. It was also expected that students who reported frequent incidents of witnessing school violence would report using substances more frequently than those who reported perpetrating violence at school and those who reported experiencing violent victimization at school. Comparing violence-related behaviors in this way may provide unique findings about violence exposure at school and its relationship to illicit substance use in adolescence.

Method

Participants

The sample for this study included participants from a federally funded prevention and intervention program for youth risk behaviors and consisted of all students attending public high schools (grades 9-12) in a rural county in Florida, excluding students enrolled in Educable Mentally Handicapped classes. All students in attendance on the day of testing were asked to complete an anonymous questionnaire during the first class period of the day; only students who were absent on the day of testing or who chose not to fill out the survey were excluded from this study. A total of 1859 surveys were collected from the 2,720 students enrolled in grades 9-12 in 2008, resulting in an initial response rate of approximately 68%. The following criteria were used as validity checks to identify invalid surveys:

1. The endorsement of the use of a fictional drug (i.e., "xanthidol").
2. The use of an invalid response pattern (e.g., entering the same response for each question or "Christmas Treeing" responses).
3. Reports of "daily" use of cocaine, hallucinogen, or ecstasy use, or the "daily" occurrence of being physically hurt by a student with a knife (extremely unlikely over a 12-month period).
4. Answering "no" to the question, "Have you answered the items on this questionnaire truthfully?"
5. The occurrence of mismatching demographic information (i.e., reporting an age of 20 and reporting being in the 6th grade).

As a result of these screening procedures, a total of 288 surveys (approximately 15% of the surveys collected) were discarded and not included in the data set for the federally funded program from which the data for this study were obtained. This left a total of 1571 valid surveys. For the purposes of this study, however, only surveys completed by high school students that assessed for substance use and violence-related behaviors within the past 12 months were used. This resulted in a total of 766 valid surveys. A breakdown of participants by grade level and demographic characteristics is provided in Table 1.

Table 1

Summary Statistics for Demographic Variables (N=766)

	n	%
Grade		
9	242	31.6
10	220	28.7
11	206	26.9
12	98	12.8
Total	766	100.0
Race/Ethnicity		
White	506	66.2
African American	152	19.9
Hispanic	50	6.5
Other	56	7.4
Total	764	100.0
Sex		
Male	355	46.7
Female	405	53.3
Total	760	100.0
Age		
14	68	9.0
15	191	25.2
16	226	29.8
17	181	23.9
18	75	9.9
19	13	1.7
20	3	0.5
Total	757	100.0

While questions regarding socioeconomic status were not included due to school board policies and doubts regarding adolescents' abilities to accurately estimate family income, it is important to note that data was collected in a rural school district with a relatively low socioeconomic status. Approximately 24% of the county's population under the age of 18 falls below the poverty level and 60% of students in this particular district qualify for free or reduced lunch (Education Information and Accountability Services, 2009).

Materials and Procedure

The data used for this study were collected as part of a larger questionnaire designed to evaluate a federally funded prevention and intervention program for youth risk behaviors. The measure used in this study was the Risk Incidence for Schools Inventory (RIScI). This measure was developed by faculty in the department of Clinical and Health Psychology at the University of Florida. Questions used in this measure were adapted from measures shown to be reliable and valid when used in the Monitoring the Future Survey and other studies evaluating substance use among adolescents (Bachman, Johnston, & O'Mally, 2001). The university's Institutional Review Board approved the use of this data for research purposes. Per school district policy, parents are informed that their children will be asked to participate in district-wide surveys and are given the opportunity to decline participation. Students were also provided with the opportunity to choose not to complete the questionnaire.

This study includes data collected during the spring semester of 2008 as part of an ongoing program evaluation that began in 2003. Students were asked to anonymously report the frequency with which each behavior occurred over the last 12 months. The 2008 RIScI consisted of 84 questions. For the purposes of this study, eight questions related to substance use frequency and 12 questions related to violence exposure were selected as the primary foci for analyses. Hierarchical linear regression analyses were performed to determine which outcome variables were influenced by overall school violence exposure and to examine any relationships between specific school violence-related behaviors and adolescent substance use. Analyses were conducted in two parts: once using marijuana use frequencies as the dependent variable, and once using illicit substance use frequencies as the dependent variable.

Results

Race/ethnicity, age, and sex were collected from all participants (N = 766). These data are presented in Table 1. Race/ethnicity was collapsed into four categories: White, African American, Hispanic, and Other (Asian/Pacific Islander, Native American, and Mixed Origin). The majority of participants identified as White (66.2%, or n = 506). Breakdowns of race/ethnicity for this sample (66.2% White, 19.9% African American, 6.5% Hispanic, and 7.4% Other) appear to be relatively similar to demographic information gathered on this particular school district from the Department of Education (DOE): 69.67% White, 21.45% African American, 4.14% Hispanic, and 4.73% Other (Florida Department of Education, Education Information & Accountability Services, 2010). The average age of respondents was 16.1 (SD = 1.23) and the male to female ratio was very close with 46.7% of the participants being male (n = 355) and 53.5% being female (n = 405). According to information gathered by the DOE on high schools in this county, the gender breakdown found within this sample is similar to that of the population, which is 48.85% male and 51.15% female (Florida Department of Education, Education Information & Accountability Services, 2010). Therefore, the sample included in this study should be considered a representative sample of the population from which it was drawn.

Frequencies of substance use behaviors and violence-related behaviors were determined using a response scale ranging from 1 ("never") to 6 ("daily"). Substance use was divided into two variables: the use of marijuana and the use of other illicit substances (cocaine, ecstasy, inhalants, and hallucinogens). Given that students reported more frequent use of marijuana than other illicit substances, separate analyses were conducted for each substance use variable to reduce effects on results. For marijuana use, possible scores ranged from 1 to 6. Actual sample scores ranged from 1 to 6, with a mean of 1.48 (SD = 1.19). The illicit substance use

variable was created for each student by adding their answers to each of the four illicit substance use questions and using the total score in the analysis, resulting in a possible range of 4 to 24. Actual sample scores ranged from 4 to 12, with a mean of 4.13 (SD = 0.77).

Types of violence were identified as witnessed violence, violent victimization, or violence perpetration. Items used to assess witnessing violence involved students witnessing violent acts committed by another student (e.g., "In the past 12 months, in general, how often have you seen another student carrying a knife, gun, or other weapon?"). Items used to assess violent victimization involved students experiencing violence at the hands of a fellow student (e.g., "In the past 12 months, in general, how often have you been threatened with a gun, knife, or other weapon by a student?") and items used to assess violence perpetration involved students admitting to committing violence against a fellow student (e.g., "In the past 12 months, in general, how often have you hurt a student by using a knife, gun, or other weapon?"). Again, responses for each item ranged from 1 ("never") to 6 ("daily").

Violence category scores were created for a particular student by summing their answers to each question within that category and using the total score in the analysis. The possible range for the witnessing violence category was 5 to 30, the possible range for the violent victimization category was 4 to 24, and the possible range for the violence perpetration category was 4 to 24. Actual scores ranged from 5 to 30 for witnessed violence (M = 8.00, SD = 4.12), from 4 to 22 for violent victimization (M = 4.91, SD = 1.98), and from 4 to 19 for violence perpetration (M = 5.48, SD = 2.68). To determine the internal consistency of these variables, inter-item reliability tests were conducted. The Cronbach's α for each category of violence are as follows: witnessing violence, α = .828; violent victimization, α = .637; and violence perpetration, α = .641.

Correlations between demographic information, type of violence, and substance use frequencies are presented in Tables 2 and 3. These correlational analyses suggest that all types of violence were highly correlated with one another and were also highly correlated with the outcome variables (frequency of marijuana use [Table 2] and frequency of illicit substance use [Table 3]). Next, two sets of hierarchical regression analyses were conducted. In spite of the large sample size, the data were positively skewed. Based on tolerance values for the data, there was no evidence of multicollinearity among variables. Variables were introduced into the regression model in the following order: (a) demographic variables (i.e., race/ethnicity, age, and sex); (b) witnessing violence; (c) violent victimization; and (d) violence perpetration. These analyses were run once using frequency of marijuana use as the dependent variable and once using frequency of illicit substance use as the dependent variable. Hierarchical regression results indicate a significant relationship between overall school violence exposure and marijuana use frequencies, f^2 = 0.06, p < .001 (Table 4) as well as illicit substance use frequencies, f^2 = 0.12, p < .001 (Table 5).

Table 2

Marijuana Use Frequency Correlations

	(1)	(2)	(3)	(4)
(1) Marijuana Use Frequency	--	.222*	.113*	.182*
(2) Witness		--	.535*	.568*
(3) Victimization			--	.535*
(4) Perpetration				--

Notes. N = 766. Reported marijuana use and exposure to violence-related behaviors were assessed using a 12-month time frame. *p < .001.

Table 3

Illicit Substance Use Frequency Correlations

	(1)	(2)	(3)	(4)
(1) Illicit Substance Use Frequency	--	.326*	.174*	.222*
(2) Witness		--	.534*	.568*
(3) Victimization			--	.533*
(4) Perpetration				--

Notes. N = 766. Reported illicit substance use and exposure to violence-related behaviors were assessed using a 12 month time frame. * p < .001

Table 4

Hierarchical Regression for Marijuana Use Frequency

	R^2	ΔR^2	β	95% CI
Step 1	.008	.012		
Race/Ethnicity[a]			.066	[-.007, .131]
Sex			-.092	[-.389, -.043]
Age[b]			.014	[-.059, .086]
Step 2	.056	.051*		
Witness			.188*	[.026, .077]
Victimization			-.042	[-.079, .028]
Perpetration			.090	[.000, .082]

Notes. N = 766. [a]Race/Ethnicity = White, African American, Hispanic/Latino(a), Asian/Pacific Islander, Native American, Mixed Origin, and other; [b]Age = 10-20; CI= Confidence Interval. All information, including reported marijuana use and exposure to violence-related behaviors were assessed using a 12 month time frame. *p < .001.

Table 5

Hierarchical Regression for Illicit Substance Use Frequency

	R^2	ΔR^2	β	95% CI
Step 1	.003	.007		
Race/Ethnicity[a]			.049	[-.016, .076]
Sex			-.056	[-.202, .027]
Age[b]			.042	[-.020, .076]
Step 2	.106	.106*		
Witness			.300*	[.038, .017]
Victimization			-.019	[-.042, .027]
Perpetration			.060	[-.009, .045]

Notes. N = 766. [a]Race/Ethnicity = White, African American, Hispanic/Latino(a), Asian/Pacific Islander, Native American, Mixed Origin, and other; [b]Age= 10-20; CI= Confidence Interval.
reported marijuana use and exposure to violence-related behaviors were assessed using a 12 month time frame. *$p < .001$.

These relationships suggest that increased exposure to overall school violence is related to increased marijuana and illicit substance use. The addition of witnessing violence, specifically, accounted for a significant amount of variance over and above the relationship between demographic variables and outcome variables, suggesting a relationship between witnessing violence and increased marijuana use, $sr^2 = 0.03$, $p < .001$ (Table 4) and illicit substance use, $sr^2 = 0.05$, $p < .001$ (Table 5). Thus, increased levels of witnessing violence were related to increased frequencies of marijuana use and illicit substance use. Results did not suggest any significant relationships between substance use frequencies and violence perpetration or violent victimization.

Discussion

The purpose of this study was to examine the relationships between school violence exposure and adolescent substance use. The study explored the relationship between overall school violence, as well as specific violence-related behaviors, and adolescent substance use frequencies. The violence-related behaviors examined in this study included witnessed violence, violent victimization, and violence perpetration. In addition, adolescent substance use was divided into two categories: the use of marijuana and the use of other illicit substances.

The first hypothesis posited that as overall exposure to school violence increased, the frequency of substance use would also increase. Results showed that the addition of overall school violence exposure into the regression models for both marijuana use and other illicit substance use frequencies accounted for a significant amount of variance. Thus, findings indicate that overall school violence exposure was related to increased frequencies of marijuana use and increased frequencies of other illicit substance use. Next, it was hypothesized that students who reported high levels of witnessing violence at school would report using substances more frequently than those who reported perpetrating violence or being victimized by violence at school.

Findings from this study indicate that witnessing violence was significantly related to both increased marijuana use and increased illicit substance use. These findings are consistent with other research (Cooley-Quille et al., 1995; Janosz et al., 2008) on witnessing violence in adolescence. However, no significant relationships were found between violence perpetration or violent victimization and adolescent substance use when witnessing violence was included in the model.

Although research suggests that physical aggression, which can be associated with violence perpetration, appears to be the best predictor of health risk behaviors in adolescence (Timmermans et al., 2008), the current study did not support a relationship between violence perpetration and substance use behaviors when accounting for witnessing violence. Other research suggests that violent victimization is not associated with adolescent substance use (Brady et al., 2009); these conclusions were supported from the findings of this study.

The finding that witnessing violence is related to increased frequencies of substance use is supported by previous research, which suggests that witnessing violence is among the most influential risk factors for substance use (Kilpatrick et al., 2000) and that witnessing violence and substance use may share a common set of risk factors (Sullivan, Kung, & Farell, 2004). However, these risk factors have not yet been identified. Previous research has also shown that witnessing violence is a strong risk factor for poor adolescent adjustment, and that this exposure often results in feelings of powerlessness, insecurity, and fear (Janosz et al., 2008). Poor adjustment and increased feelings of powerlessness and fear may be a reflection of poor coping skills that may potentially result in increased substance use, whereby substances are used as a coping method. Therefore, the relationship between witnessing violence and substance use should be examined further to determine underlying mechanisms that link these two variables (Sullivan et al., 2004).

In addition, increased exposure to overall school violence was related to increased frequencies of substance use, for both marijuana use and other illicit substance use. Although previous research in this area has not examined how all three types of school violence exposure are related to adolescent substance use, results from this study highlight the importance of understanding the consequences associated with exposure to witnessing violence because of its relationship to increased frequency of substance use. It may be true that those who are more likely to witness violence at school associate with violent classmates and may also be more likely to participate in other deviant behaviors, such as substance use. Findings from this study suggest a relationship between the two; however, these results do not prove causality or directionality in any way. Therefore, it is impossible to know whether violence exposure leads to increased substance use or whether increased substance use

leads to violent behaviors, or if there is any causal relationship at all.

As with all studies, this study had several limitations. First, although we attempted to obtain a representative sample of an adolescent population by providing surveys to all high schools located within this rural county, no measures were taken to ensure that students absent on the day of testing were able to fill out surveys later. This could pose a threat to the generalizability of this study, because those students who were absent on the day of testing may have provided unique responses regarding substance use and violent behaviors in relationship to their peers.

In addition, data presented in Table 1 reveal that students in the 12th grade were underrepresented in comparison to other grades. Participation in on-the-job training (a program in which students receive vocational training off-site during school hours) could help to explain this discrepancy, but a more representative sample of this grade level could have provided useful responses for both substance use behaviors and school violence exposure. Given that substance use behaviors were more common among older students, the inclusion of more high school seniors may have provided more data on these behaviors in particular. However, it is expected that overall absences occurred randomly and in small numbers, so it is not expected that this missing data should seriously impact results.

Second, although many validity checks were employed to ensure that data included in the study was accurate, the use of self-reported data can sometimes compromise the validity of results. However, according to Sullivan et al. (2007), self-reported data may provide the best source of information on witnessing violence and violent victimization as well as an important perspective on adolescents' experience of externalizing behaviors. Additionally, although the sample size of the study was relatively large, the number of students who reported the use of illicit substances other than marijuana was fairly low, which most likely impacted the results of this study. To reduce these effects, separate analyses were conducted for marijuana use and for the use of all other illicit substances.

Next, types of violence explored in this study differed somewhat from previous research. Violence-related behaviors identified within this study are strictly related to the school environment. Previous research involving violence exposure in adolescents typically dealt with more extreme types of violence within the community and within the home. Experiencing extreme exposure to violence in this context may have a very different impact on adolescents than typical violence experienced at school. Furthermore, the sample included in this study involved adolescents from one rural county. The type of violence exposure and the availability of substances for potential use may deviate from those experienced in a more metropolitan area, or in other parts of the country. These factors could potentially limit the generalizability of the findings from this study; however, they may also provide a unique perspective on school violence exposure and substance use behaviors in a rural school setting.

Future research in this area should consider focusing on identifying the set of risk factors common to those who experience violence and substance use during adolescence in hopes of understanding more fully the repercussions associated with violence exposure and its relationship to adolescent substance use. Specifically, longitudinal studies that assess risk behaviors, violence exposure, and substance use may be useful in determining a causal link between violence exposure and frequency of substance use. Findings from this study suggest that there are differences in substance use behaviors for marijuana relative to other illicit substances; adolescents reported using marijuana more often and more frequently than other illicit substances. Therefore, it would also be important to evaluate perceptions about marijuana use relative to other illicit substances and to determine what protective factors exist to deter adolescents from using any and all substances.

Findings from this study may also play an important role for violence and substance use prevention programs within schools. Results suggest that witnessing violence bears a significant relationship to adolescent substance use, specifically in its association with increased frequencies of use of marijuana and other illicit substances. Witnessing violence has become an important area of interest for school personnel and counselors and should be incorporated as a risk factor in substance use prevention programs to address the needs of students who witness threats and fights at school (Flannery, Wester, & Singer, 2004), as well as to educate students on how to avoid unsafe areas and to handle adaptively thoughts and emotions associated with witnessing violence (Sullivan et al., 2007).

Substance use during adolescence remains a cause for concern in today's society. There are many factors related to the frequency with which adolescents use substances. Students who witness violence are at risk for more frequent substance use. Exposure to violence-related behaviors may affect individuals in very different ways, but results from this study suggest a relationship between witnessing violence and adolescent substance use. In essence, it is important to understand the developmental pathways associated with adolescent substance use in order to reduce any long-term consequences or health-risks accompanying these behaviors. In order to reduce the impact of substance use in adolescence, we must understand what factors contribute to this phenomenon and work to minimize their effects.

Acknowledgment

The data used for this study were collected as part of Project CATCh, which was funded by Safe Schools/Healthy Students Initiative (S184L020327).

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