Journal of Interpersonal Violence
1–24

DOI: 10.1177/0886260517715024
journals.sagepub.com/home/jiv
SAGE

Are Polydrug Users More Physically and Verbally Aggressive? An Assessment of Aggression Among Mono- Versus Polydrug Users in a University Sample

Jennifer L. Steele, PhD[1] and Robert L. Peralta, PhD[2]

Abstract

Early research has revealed that patterns of aggression and antisocial behavior are present among polydrug users. Often missing from this discourse is the examination of whether polydrug users are quantitatively different from monodrug users in their use of aggression. Theoretical perspectives are often centered on the psychopharmacological effects of substance use on behavior. Consideration of possible poly- versus monodrug use differences and their impact on aggression has not been investigated. Data from this study were derived from a sample of Midwestern university students (*N* = 793). The relationship between violence, aggression, and concurrent polydrug use in the last year is assessed with a series of multivariate ordinary least squares (OLS) regression models. Results demonstrate that higher incidents of physical and verbal aggression are reported among polydrug users compared to monodrug users and abstainers. When analyses were

[1]Ohio University Lancaster, OH, USA
[2]The University of Akron, OH, USA

Corresponding Author:
Jennifer L. Steele, Ohio University Lancaster, 1570 Granville Pike, Lancaster, OH 43130, USA.
Email: steelej2@ohio.edu

broken down by polydrug users (those who engaged in alcohol/marijuana and alcohol/NMUPD [nonmedical use of prescription drugs] stimulants), polydrug users reported higher levels of physical aggression compared to monodrug users. Similarly, monodrug users reported higher levels of physical aggression compared to nonusers. This research extends our understanding of aggression among users from two different subcategories: polydrug users in comparison to those who only engage in one form of substance use. Scholars and practitioners who work with violent offenders should consider patterns of drug use behavior when addressing substance use–related aggression.

Keywords
polydrug use, aggression, violence, verbal aggression, nonmedical use of prescription stimulants, marijuana use

Introduction

The co-occurrence of substance use and aggressive behavior is a pressing social problem given its delirious impact on the individual user and the general public. While the link between alcohol use and violence is well established in the literature (Shorey, Stuart, & Cornelius, 2011; Tomlinson, Brown, & Hoaken, 2016), less is known about subcategory forms of substance use, including polydrug use. Polydrug users, those use multiple substances at the same time, have more negative and severe social and health consequences compared to monosubstance users (monodrug users; Egan, Reboussin, Blocker, Wolfson, & Sutfin, 2013; McCabe, Cranford, Morales, & Young, 2006). Whether polydrug use is defined as simultaneous (co-ingested at the same time in the same setting) or concurrent (taken within a set time frame but not co-ingested in the same setting), polydrug use leads to increased risk for alcohol- and drug-related problems including physical violence, blacking out, becoming physically ill, unplanned sex, sexual assault, depression, and suicidal thought (Earleywine & Newcomb, 1997; Egan et al., 2013; Hermos, Winter, & Heeren, 2009; McCabe et al., 2006; Midanik, Tam, & Weisner, 2007).

According to the Drug Abuse Warning Network, most drug-related emergency room visits include alcohol and the use of another drug (usually prescription stimulants) and is most common among those aged 18 to 25 (Substance Abuse and Mental Health Services Administration [SAMHSA], 2013). While college students have the highest rates of simultaneous use of alcohol and nonmedical use of prescription drugs (NMUPD) compared to young adults in the general population, research is lacking with only a few

studies providing basic descriptive information regarding polydrug use trends and consequences (Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2015; Quintero, 2009). This article addresses the gap in the literature concerning the association of polydrug use and aggressive behavior using data collected from college students at a Midwestern university.

Substance Use and Violence

A notable substance use–related risk factor is violence perpetration and aggression among users. The relationship between substance use and violence is complex and multifaceted. Two theoretical frameworks lend support to the correlation between polydrug use and violence. Goldstein's (1985) tripartite model suggests that the psychopharmacological effects of drugs may lead to irrational behavior and the inhibition of anxieties or perceived risk of punishment, which increases the risk for aggressive behavior (Boles & Miotto, 2003; Goldstein, 1985; Moore et al., 2008; Pihl & Hoaken, 1997). This framework thus suggests that violence may be the result of short- or long-term effects of drugs and may contribute to an individual acting violently or in a manner that may precipitate their own violent victimization (Boles & Miotto, 2003). Problem behavioral theory or general deviance theory, a second theoretical possibility, argues that individuals who engage in substance use are more likely to be involved in several types of deviant behavior. Accordingly, substance use does not cause aggression or vice versa; instead aggression and substance use are simply two types of co-occurring behaviors under the same constellation of deviant behaviors (Harrison, Erickson, Adlaf, & Freeman, 2001; Jessor, 1987; Osgood, Johnston, O'Malley, & Bachman, 1988).

Several studies have concluded that alcohol is a risk factor in physical aggression between intimate partners, acquaintances, and strangers in college populations (Hines & Straus, 2007; Riggs, Caulfield, & Street, 2000; Shorey et al., 2011). A number of different measures on alcohol and intimate partner violence (IPV) have been used: Results suggest that those with a diagnosable alcohol problem (Cogan & Ballinger, 2006; Hove, Parkhill, Neighbors, McConchie, & Fossos, 2010) or those who use alcohol frequently (Hove et al., 2010; Rapoza & Baker, 2008; Wells, Giesbrecht, Ialomiteanu, & Graham, 2011) are at an increased risk for violence perpetration. Shook, Gerrity, Jurich, and Segrist (2000) and Roudsair, Leahy, and Walters (2009) have also demonstrated that alcohol was consumed in a close time frame to aggressive acts. Similarly, research has found support for the association between physical violence toward strangers and engaging in heavy episodic alcohol use among college student populations (Cogan & Ballinger, 2006; de Bruijn & de Graaf, 2016; Peralta, Callanan, Steele, & Chervenak, 2011; Riggs et al., 2000).

A limited number of studies have examined the role of specific drugs and intimate partner violence (IPV): Results from these studies indicate that similar to alcohol use, the use of illicit drugs, including marijuana, is correlated with physical violence in dating (de Bruijn & de Graaf, 2016; Moore et al., 2008; Reingle, Staras, Jennings, Branchini, & Maldonado-Molina, 2012; Shorey et al., 2011; Tomlinson et al., 2016) and interpersonal violence (Moore & Stuart, 2005). However, while marijuana users are more likely to use physical aggression than nonusers, it is unclear whether the violence is due to withdrawal or an unknown confounding variable (Moore & Stuart, 2005; Moore et al., 2008; Nabors, 2010; Shorey et al., 2011; Tomlinson et al., 2016). A number studies, including self-report and laboratory studies, have consistently demonstrated that marijuana withdrawal may lead to irritability and aggression (Budney, Moore, Vandrey, & Hughes, 2003; Chung, Martin, Cornelius, & Clark, 2008; Haney, Ward, Comer, Foltin, & Fischman, 1999; Lee et al., 2014; Moore & Stuart, 2005; Moore et al., 2008; N. T. Smith, 2002; Tomlinson et al., 2016). One of the most comprehensive early studies on marijuana withdrawal demonstrated that self-reported aggression increased significantly on Day 4 of marijuana abstinence and reached its highest point on Day 6 compared with aggression levels of regular marijuana users (Budney et al., 2003). Similar results were found in Lee et al. (2014) and P. H. Smith, Homish, Leonard, and Collins (2013).

Although less studied, verbal aggression has emerged as an area of violence research. A few studies have examined the relationship between substance use and verbal aggression. Recently, Farrell, Sullivan, Goncy, and Le (2015) using the Problem Behavior Frequency Scale (PBFS) demonstrated that physical and verbal aggression are two different constructs and that a combination of the two different measures lead to a decrease in model fit. Interestingly, an increase in verbal aggression, as a separate measure from physical aggression, has been associated with alcohol use (Shook et al., 2000; Wells et al., 2011) as well as the co-ingestion of alcohol and energy drinks (Miller, Quigley, Eliseo-Arras, & Ball, 2016). Research on verbal aggression and drug use is sparse; however, at least one study found that in a sample of high school students, marijuana and alcohol use (measured separately) were higher among those who engaged in verbal bullying (Radliff, Wheaton, Robinson, & Morris, 2012).

Because previous work has established that interpersonal violence perpetration and substance use behavior are gendered behavior, we briefly highlight that literature here. The preponderance of evidence suggests that males tend to engage in interpersonal violence with more frequency and severity compared with women (Kimmel, 2002). The same is true for substance use behavior (Christie-Mizell & Peralta, 2009; Hingson & Rehm, 2014; White &

Hingson, 2014). National survey data suggest that when men drink, they are more likely to engage in heavy episodic drinking compared with women. Heavy episodic drinking, in turn, is a significant risk factor for aggression (Brewer & Swahn, 2005), and alcohol use in general appears to be more frequently associated with violence compared with other forms of drug use (Reiss & Roth, 1993). It is important to note that the association between aggression and forms of substance use other than alcohol appears to occur for both men and women (Bachman & Peralta, 2002; Shorey, Stuart, Moore, & McNulty, 2014). Some scholars argue that major differences in substance use (and especially for alcohol) are based on male–female sex differences (see Wilsnack et al., 2000, for an excellent review), while others argue that sociostructural or social-psychological explanations are better suited to explain gendered patterns in violence perpetration and substance use behavior (see Anderson & Umberson, 2001; Courtenay, 2000; Locke & Mahalik, 2005; Peralta & Tuttle, 2013).

Polydrug Use and Aggression Among College Students

Relatively few studies on polydrug use among college students and its explicit connection to aggression and violence exist. McCabe et al. (2006) and Egan et al. (2013) found that college students engaging in polydrug use that consisted of "stimulants combined with alcohol" and "alcohol combined with marijuana" (McCabe et al., 2006) were more likely to get into a verbal argument and report physical aggression (i.e., fighting) compared with individuals who only used alcohol. However, both studies measured aggression using a relatively wide spectrum of behaviors that included various activities and consequences such as damaging property, urinating in public, and poor academic performance, which confounds our understanding of whether violence as a single measure is associated with polydrug use. A similar limitation emerges when examining drug use and violence in the general population. One study examined the simultaneous use of marijuana and alcohol: this form of polydrug use was associated with negative consequences measured using a 15-item scale that included problems associated with legal concerns, health, fighting, accidents, and relationships in a single measurement (Midanik et al., 2007).

In addition, recent studies on substance abuse and treatment in clinical populations have moved toward a more nuanced examination of polydrug use. Researchers are now examining whether there are substantial demographic and behavioral differences between (a) nonusers (i.e., those who did not report any substance use), (b) monodrug users (i.e., those who reported

one type of substance use), and (c) polydrug users (i.e., those who reported two or more types of substance use) (Kedia, Sell, & Relyea, 2007; Martinotti et al., 2009). When examining the difference between mono- and polydrug users, Kedia et al. (2007) found that there were significant race and age differences between the two groups. Specifically, White respondents were more likely to be monodrug users compared with African Americans who reported an increased prevalence of polydrug use while Hispanics were equally likely to belong to either category (which is contrary to previous research on Hispanic ethnicity and polydrug use; Kedia et al., 2007). In addition, Kedia et al. found that polydrug use was most likely to be reported between ages 18 and 44, whereas respondents younger than age 18 or older than age 44 were more likely to engage in monodrug use. Similarly, Martinotti et al. (2009) found polysubstance users had significantly higher reports of aggression, impulsivity, and suicidal ideation compared to monodrug users. These findings demonstrate that there may be important differences between mono- versus polydrug users and highlight the need for research that examines polydrug and monodrug use differences in nontreatment populations.

The present research fills significant gaps in the literature by examining the relationship between polydrug use, physical aggression, and verbal aggression among college students using nonuser, monodrug, and polydrug user subcategory distinctions. Our research question is: Does physical and verbal aggression occur more often and at a higher frequency among polydrug users compared to monodrug users?

Based on our review of the literature, we present four specific hypotheses:

Hypothesis 1 (H1): Polydrug users will be more likely to report physical aggression than their monodrug using counterparts.

Hypothesis 2 (H2): Polydrug users will be more likely to report verbal aggression compared to their monodrug using counterparts.

Hypothesis 3 (H3): Physical aggression will occur more frequently among polydrug users compared to monodrug users.

Hypothesis 4 (H4): Verbal aggression will occur at a higher incidence among polydrug users compared to monodrug users.

Method

The data were collected from undergraduates attending a medium-sized Midwestern university using a 50-min online survey (SurveyGizmo). After Institutional Review Board approval was granted, the survey was advertised to Introduction to Sociology courses during the semesters of fall 2013 and spring 2014. Students were offered extra-credit for taking part in the survey.

The survey was anonymous and no personal identifying information were collected except for standard demographic information. Only the primary investigator and members of the research team had access to the study data. Students were provided with counseling and heath behavior referral information at the conclusion of the study. Participants were also provided with contact information of the principal investigator so that participants could obtain aggregated results of the study should individual participants be interested in receiving such information. Data collection concluded with an initial sample size of 1,026 participants, yielding an approximate response rate of 44%.[1] Adjusting for missing data yielded a final study sample size of 793. Data were analyzed using SPSS.

Measures

Potential confounding variables. Potential confounding covariates of physical and verbal aggression were age, sex, race, on- or off-campus residence, and parent's highest level of education (see Table 1 for descriptive statistics). Race, sex, and living arrangement were coded as dichotomous variables. Similar to the overall demographics of the university, the majority of respondents were White (75%; "White" coded "1" and non-White coded "0"). Sex was coded male "1" and female "0." Living on-campus was coded "1"; living off-campus coded "0." As a proxy for socioeconomic status, we included both Father's Education and Mother's Education coded 0 = some high school, 1 = high school, 2 = some college, 3 = bachelor's degree, 4 = master's degree or higher, and then combined (range = 0-8). The Center for Epidemiological Studies–Depression Scale (CES-D) was included to account for possible depressive symptoms confounds (see Radloff, 1977). The CES-D was used to measure the presence of depression: It had satisfactory levels of internal consistency ($\alpha = .73$).

Outcome variables: Physical and verbal aggression. Physical and verbal aggression in the last month were derived from the Centers for Disease Control Youth Risk Behavior Survey (Aggression–PBFS) to allow for comparisons with national data (see Brener, Kann, McManus Kinchen, Sundberg, & Ross, 2002; Brener et al., 2004, for a review of measure reliability and validation). We used only a subset of questions from the Youth Risk Behavior Surveillance System, that measure aggressive behavior. These items measure the frequency of physical aggression, verbal (nonphysical aggression), and relationship aggression. Respondents are asked to indicate how often a particular problem behavior has occurred in the last month. Questions for physical aggression were as follows: (a) Thrown something at someone to hurt them?

Table 1. Descriptive Statistics (*N* = 793).

	n	*M*/%	SD	Range	α
Outcome variables					
Verbal aggression	750	15.85	5.11	11-33	.89
Physical aggression	716	4.00	3.60	0-11	.89
Predictor variables: Last year					
Nonuser (yes = 1)	180	23	0.25	0-1	
Monodrug user	93	12	0.13	0-1	
Polydrug user	454	57	0.62	0-1	
Marijuana + alcohol nonuser	201	26	0.44	0-1	
Marijuana + alcohol monodrug user	283	37	0.48	0-1	
Marijuana + alcohol polydrug	288	37	0.48	0-1	
Stimulants + alcohol nonuser	213	28	0.45	0-1	
Stimulants + alcohol monodrug user	444	58	0.49	0-1	
Stimulants + alcohol polydrug	103	14	0.34	0-1	
Control variables					
Age (18 = 0, 25 = 7)	796	1.65	1.71	0-7	
Sex			0.49	0-1	
Male (1)	314	0.40			
Female (0)	476	0.60			
Race (White = 1, Other = 0)			0.76	0-1	
White (1)	603	0.76			
Non-White (0)	188	0.24			
Parent's education	768	4.43	4.43	0-8	
Living on-campus		0.62	0.47	0-1	
Yes (1)	300	0.38			
No (0)	490	0.62			
CES-D	769	8.71	4.45	0-21	.74

Note. CES-D = Center for Epidemiological Studies–Depression Scale. Variables that are dichotomous (0-1) are percents in decimal form in column three (M/%).

(b) Been in a fight in which someone was hit? (c) Threatened to hurt a teacher? (d) Shoved or pushed another person? (e) Threatened someone with a weapon (gun, knife, club, etc.)? (f) Hit or slapped another person? (g) Threatened to hit or physically harm another person? All of the items had response options: 1 (0 times), 2 (1-2 times), 3 (3-5 times), 4 (6-9 times), 5 (10-19 times), and 6 (20 or more). Combined items had a range of 0 to 11, a mean of 4.0, and a Cronbach's alpha of .89.

Verbal aggression in the last month was measured using the following questions: (a) Insulted someone's family? (b) Teased someone to make them

angry? (c) Put someone down to their face? (d) Gave mean looks to another student? (e) Picked on someone? (f) Didn't let another student be in your group anymore because you were mad at them? (g) Told another person you wouldn't like them unless they did what you wanted them to do? (h) Tried to keep other from liking another person by saying mean things about him or her? (i) Spread a false rumor about someone? (j) Left another person out on purpose when it was time to do an activity? (k) Said things about another student to make other students laugh? All of the items had response options: 1 (0 times), 2 (1-2 times), 3 (3-5 times), 4 (6-9 times), 5 (10-19 times), and 6 (20 or more). Combined items had a range of 11 to 33, a mean of 15.9, and a Cronbach's alpha of .89.

Predictor variables: Substance use in the last year. Questions for substance use were derived from Monitoring the Future Study (2010) to allow for comparisons. All items from the Monitoring the Future study that pertained to substance use questions were include in our survey and in our analysis. Response categories for all substance use were as follows: 0 occasions, 1 to 2, 3 to 5, 6 to 9, 10 to 19, 20 to 39, 40 or more. The question used to assess alcohol use in the last year was as follows: "On how many occasions (if any) have you been drunk or very high from drinking alcoholic beverages . . . during the last 12 months?" Respondents were then asked about marijuana use: "On how many occasions (if any) have you used marijuana (weed, pot) or hashish (hash, hash oil) . . . during the last 12 months?" The category of drug use was nonmedical use of prescription stimulants; two separate questions were combined: "During the *last* 12 *months*, on how many occasions (if any) have you taken . . . (a) taken Adderall (without a doctor's order), (b) taken Ritalin (without a doctor's order)." Illicit drug use was asked about separately but combined into a single "illicit drug use" category because last 12-month illicit drug use was a rare phenomenon. This illicit drug use category included the use of lysergic acid diethylamide (LSD), powder cocaine, crack cocaine, ecstasy (MDMA), steroids, inhalants, meth, and heroin. Questions about nonmedical prescription use of narcotics, sedatives, and tranquilizers were also used: "(a) There are a number of narcotics other than heroin, such as methadone, opium, morphine, codeine, Demerol, Vicodin, OxyContin, and Percocet. These are sometimes prescribed by doctors. On how many occasions (if any) have you taken narcotics other than heroin on your own—that is, without a doctor telling you to take them . . . (b) Sedatives, including barbiturates, are sometimes prescribed by doctors to help people relax or get to sleep. They are sometimes called downs or downers, and include phenobarbital, Tuinal, Nembutal, and Seconal. On how many occasions (if any) have you taken sedatives on your own—that is, without a doctor telling you to take

them . . . (c) Tranquilizers are sometimes prescribed by doctors to calm people down, quiet their nerves, or relax their muscles. Librium, Valium, and Xanax are all tranquilizers. On how many occasions (if any) have you taken tranquilizers on your own—that is, without a doctor telling you to take them." (Monitoring the Future, 2010).

Polydrug use (all drugs). All the substance use variables were combined together and recoded into three categories: (a) nonusers (i.e., those who did not report any substance use in the last 12 months), (b) monodrug users (i.e., those who reported one type of substance use in the last 12 months), and (c) polydrug users (i.e., those who reported two or more types of substance use in the last 12 months).

Marijuana and alcohol polydrug use. Polydrug use was also analyzed according to the three most commonly used drugs in the study: alcohol, marijuana, and NMUPD stimulants. The three subcategories were as follows: (a) nonusers (i.e., those who did not report any marijuana or alcohol use in the last 12 months), (b) monodrug users (i.e., those who reported one type of substance use, either marijuana or alcohol use, in the last 12 months), and (c) polydrug users (i.e., those who reported using both marijuana and alcohol in the last 12 months).

Nonmedical prescription drug use (NMUPD) stimulants and alcohol polydrug use. The three subcategories were as follows: (a) nonusers (i.e., those who did not report any prescription stimulant or alcohol use in the last 12 months), (b) monodrug users (i.e., those who reported one type of substance use, either prescription stimulant or alcohol use, in the last 12 months), and (c) polydrug users (i.e., those who reported using both prescription stimulant and alcohol in the last 12 months).

Results

The overall sample was composed of 793 undergraduates (Table 1). There were more female respondents (60%) than males (40%), with an average sample age of 19.7. The majority of respondents were White (76%) compared to non-White (24%). The mean for depression was 8.71 (range = 0-21), and the mean for parent's education level was 4.43. The three most commonly used drugs were alcohol (71%) followed by marijuana (40%) and NMUPD: Stimulants such as Adderall or Ritalin (14%) were the most common. Data were also collected for nonmedical use of narcotics (8.6%), sedatives (3.5%), and tranquilizers (4%). Illicit drug use included the use of one

Table 2. OLS Regression: Physical Aggression in the Last Month (N = 793).

	Model 1		Model 2	
	b	*SE*	*b*	*SE*
Male (= 1)	1.91	0.27***	1.58	0.26***
White (= 1)	−1.33	0.32***	−1.39	0.30***
On-campus (= 1)	−0.07	0.30	0.17	0.29
Age	0.30	0.08***	0.21	0.08**
Highest level of parent's education	−0.13	0.07	−0.11	0.07
CES-D	0.08	0.03**	0.06	0.03*
Nonuser (Ref.: Monodrug user)			0.54	0.43
Polydrug user (Ref.: Monodrug user)			2.64	0.38***
R^2		.13		.22

Note. OLS = ordinary least squares; CES-D = Center for Epidemiological Studies–Depression Scale.
*p < .05. **p < .01. ***p < .001.

of the following drugs: LSD, powder cocaine, crack cocaine, MDMA, steroids, inhalants, meth, and heroin and combined accounted for only 11% of the sample (n = 84).

When examining drug use and physical aggression, there was a statistically significant difference between groups as determined by one-way ANOVA (F = 49.81, p = .001). A Scheffé post hoc test for significance indicated that the physical aggression was significantly higher among polydrug users compared with monodrug users (M = 2.87, SD = .385, p = .001) and compared with nonusers (M = 2.44, SD = .301, p = .001). Analysis for verbal aggression indicated there was a statistically significant difference between groups as determined by one-way ANOVA (F = 6.16, p = .01). A Scheffé post hoc test for significance indicated that the verbal aggression was significantly higher among polydrug users compared with monodrug users (M = 1.69, SD = .591, p = .05) and compared with nonusers (M = 1.21, SD = .460, p = .05).

Physical Aggression in the Last Month

Similar to the control model (Model 1), in Model 2 those who engaged in physical aggression in the last month were more likely to be male (b = 1.58, p < .001), non-White (b = −1.39, p < .001), and older in age (b = 0.21, p < .01), and to report higher levels of depression (b = 0.03, p < .05) (see Table 2). Those respondents who engaged in any form of polydrug use reported higher levels of physical aggression compared with monodrug users (b = 2.64, p < .001), after

Table 3. OLS Regression: Verbal Aggression in the Last Month (N = 793).

	Model 1		Model 2	
	b	*SE*	*b*	*SE*
Male (= 1)	1.77	0.39***	1.38	0.41***
White (= 1)	−0.06	0.46	0.01	0.48
On-campus (= 1)	−0.58	0.43	−0.54	0.45
Age	−0.05	0.12	−0.06	0.13
Highest level of parent's education	0.03	0.11	0.03	0.11
CES-D	0.15	0.04***	0.14	0.05**
Nonuser (Ref.: Monodrug user)			0.20	0.69
Polydrug user (Ref.: Monodrug user)			1.19	0.61*
R^2		.05		.05

Note. OLS = ordinary least squares; CES-D = Center for Epidemiological Studies–Depression Scale.
*p < .05. **p < .01. ***p < .001.

controlling for other variables in the model. There were no significant differences between nonusers and monodrug users and their level of physical aggression. The R^2 increased from the demographic model (Model 1, R^2 = .13) to Model 2, R^2 = .22. A regression was also run examining drug use and aggression in a 1-month time frame. Results indicate similar patterns to Model 2: Respondents who engaged in any form of polydrug use reported higher levels of physical aggression compared with monodrug users (b= 0.157, p < .01), after controlling for other variables in the model. However, there were also significant differences between nonusers and monodrug users and their level of physical aggression (b= −0.119, p < .05), with nonusers being less likely to engage in physical aggression compared to monodrug users. In comparison to the results for the 1-year measurement of drug use, using the 1-month time frame resulted in a significantly lower number of respondents reporting polydrug use (292). Because this research recognizes that the combination of drugs in polydrug use is important for predicting aggression, further analysis of polydrug use combinations (i.e., alcohol and stimulants, alcohol and marijuana combinations) was conducted using the 1-year measurement of drug use.

Verbal Aggression in the Last Month

Those who engaged in verbal aggression in the last month were more likely to be male (b = 1.38, p < .001) and reported higher levels of depression (b = 0.14, p < .01) (Table 3). Those respondents who engaged in any form of

Table 4. OLS Regression: Physical Aggression in the Last Month (N = 793).

	Model 1		Model 2		Model 3	
	b	*SE*	*b*	*SE*	*b*	*SE*
Male (= 1)	1.91	0.27***	1.72	0.26***	1.79	0.26***
White (= 1)	−1.33	0.32***	−1.35	0.31***	−1.57	0.31***
On-campus (= 1)	−0.07	0.30	0.13	0.29	0.08	0.30
Age	0.30	0.08***	0.25	0.08**	0.23	0.08**
Highest level of parent's education	−0.13	0.07	−0.07	0.07	−0.10	0.07
CES-D	0.08	0.03**	0.07	0.03*	0.06	0.03*
Nonuser (Ref.: Monodrug user)			−0.93	0.33**		
Polydrug user Alcohol + Marijuana (Ref.: Monodrug user)			1.17	0.30***		
Nonuser (Ref.: Monodrug user)					−1.08	0.30***
Polydrug user Alcohol + Stimulants (Ref.: Monodrug user)					1.26	0.39***
R^2	.13		.18		.17	

Note. OLS = ordinary least squares; CES-D = Center for Epidemiological Studies–Depression Scale.
*p < .05. **p < .01. ***p < .001.

polydrug use reported higher levels of verbal aggression compared with monodrug users (b = 1.19, p < .05), after controlling for confounding variables in the model. There was no significant difference between nonusers and monodrug users and their level of verbal aggression. There was no change in the R^2 from the demographic model (Model 1, R^2 = .05) to Model 2. A regression was also run examining drug use and verbal aggression in a 1-month time frame and found that there were no significant differences in polydrug or nonuser compared with monodrug user.

Physical and Verbal Aggression in the Last Month for the Two Largest Drug Categories

Substance use was also broken down by the specific drugs used in polydrug use for the two largest categories reported in the study, marijuana + alcohol use and NMPD stimulants + alcohol (see Table 4). The results for the demographic information remained the same compared with the previous models. In Model 2, those respondents who reported *marijuana + alcohol use* polydrug use reported higher levels of physical aggression compared with monodrug users (b = 1.17, p < .001). Likewise, nonusers reported lower levels of physical aggression compared with monodrug users of marijuana or alcohol

($b = -0.93$, $p < .05$). In Model 3, those respondents who reported *stimulant + alcohol use* polydrug use reported higher levels of physical aggression compared with monodrug users ($b = 1.26$, $p < .001$). Nonusers reported lower levels of physical aggression compared with monodrug users of stimulants or alcohol ($b = -1.08$, $p < .001$). Analysis for marijuana + alcohol use and NMPD stimulants + alcohol and the association with verbal aggression was conducted but neither combination were predictive.

Discussion

This study makes a unique contribution to the interpersonal violence and substance abuse literatures by examining unambiguous forms of aggression (i.e., verbal aggression and physical aggression) and specific forms of substance use (mono- vs. polydrug use) in an undergraduate population. Although previous research has found associations between polydrug use and aggression, much of the literature has not distinguished between nonusers, monodrug users, and polydrug users and their respective utilization—if any—of aggression. One study has found that college students are less likely to engage in violence compared with noncollege peers (21% college, 23% noncollege; Schwartz, Beaver, & Barnes, 2015). However, Schwartz et al. (2015) also found that college populations were more likely to report that violent behavior and bullying acts were associated with alcohol use compared with nonstudent populations.

Results from the current study indicate that polydrug users reported more physical and verbal aggression compared to their monodrug using counterparts, as determined by one-way ANOVA. Physical aggression occurred more frequently among polydrug users compared to monodrug users in both the 30-day and 1-year substance use models. Multivariate analyses demonstrated that "polydrug user" status was predictive of higher levels of verbal and physical aggression compared to monodrug users: There were no significant differences between those who abstained from substance use or only used a single drug (i.e., monodrug users). We attribute the lack of significant difference due to the 1-year measurement of substance use because nonusers were significantly less likely to engage in physical aggression compared to monodrug users using a 1-month time frame. When polydrug use was analyzed according to the most commonly used drug combinations, (a) alcohol and marijuana and (b) alcohol and stimulants, there were no significant differences between these two drug combinations for verbal aggression. However, both categories of polydrug use were predictive of a more frequent use of physical aggression compared with monodrug use. Furthermore, there were differences in physical aggression scores between monodrug use and

abstention, where monodrug users reporting more frequent use of physical aggression compared to nonusers. Consistent with previous studies on polydrug use in college populations, the combination of stimulant and alcohol use is predictive of physical aggression (Egan et al., 2013; McCabe et al., 2006), although this previous research measured aggression on a scale with other health-risk behaviors and consequences such as declining academic performance.

The use of alcohol and stimulants was predictive of physical aggression among mono- and polydrug users compared with nonusers. This is consistent with previous research, which has found that the use of stimulant drugs used in high doses or chronic use, including prescription stimulants, can induce delusions, paranoia, and irritability (Boles & Miotto, 2003). In addition, alcohol is a well-established predictor of aggression and violence (Hines & Straus, 2007; Riggs et al., 2000; Shorey et al., 2011). Although, the timing and dosage of the drugs used in this study were not measured, if these drugs were taken simultaneously the effects of stimulant medication may conceal the effects of alcohol intoxication longer, thus leading to a greater amount of alcoholic beverages consumed and an increase in the likelihood of aggression (Egan et al., 2013). It is also possible that higher levels of aggression could be attributed to other factors not measured in this research such as childhood neglect and abuse. At least one study in a clinical treatment sample found that polydrug users had significantly higher levels of aggression and emotional/physical neglect in childhood compared to monodrug users (Martinotti et al., 2009).

The findings regarding marijuana and alcohol polydrug use association with a higher level of physical aggression were unexpected and perhaps signify a complex association. Previous studies show that marijuana tends to decrease violence or has no effect on violent behavior (Boles & Miotto, 2003; Denson & Earleywine, 2006; Moore et al., 2008; Wei, Loeber, & White, 2004). However, early studies did not examine the effects of marijuana withdrawal on violence perpetration. More recent studies have consistently demonstrated that marijuana withdrawal may lead to irritability and aggression (Budney et al., 2003; Chung et al., 2008; Haney et al., 1999; Lee et al., 2014; Moore & Stuart, 2005; Moore et al., 2008; N. T. Smith, 2002; Tomlinson et al., 2016). Theoretically, individuals could be using alcohol to self-medicate the withdrawal symptoms of marijuana, which could increase the likelihood of aggression and violence even further. Additional evidence in support of this association was found by Mercado-Crespo and Mbah (2013): They examined marijuana and alcohol polydrug use among high school students and reported that polydrug users were more likely to be physically aggressive compared to those who used only one substance—either alcohol or marijuana. There is also the possibility that the association between the poly-use

of marijuana and alcohol and aggression is spurious. It is possible that heavy drinkers who are more prone to violence compared to moderate drinkers are more likely to suffer from an alcohol-induced hangover the next day and may use marijuana to alleviate hangover symptoms such as nausea. The association between aggression and polydrug use (marijuana and alcohol) could be due to the effects of heavy episodic drinking, not the combination of the two drugs. Although there is no research addressing this possible phenomenon, marijuana's effects on nausea are well established (Crowell, 2015).

Finally, our findings in regard to sex support existing literature. We find that males were significantly more likely to engage in both physical and verbal aggressive behavior across all of our models. We postulate that gender socialization is being manifested in aggressive behavior whereby males are socialized to utilize aggression to express frustration, anger, or other emotions and whereby women are socialized to avoid aggressive behavior (Peralta, 2007; West & Zimmerman, 1987). Of course, biological aspects of being male versus female may explain the sex differences reported here as well. Likely, the intersection of sex status (i.e., being male or female) and gender orientation (e.g., being feminine or masculine) may be an important source of the behavior under investigation. Unfortunately, we are unable to explain why sex differences emerged; we can only speculate as to why men were found to exhibit aggressive behavior more so than women.

Limitations and Directions for Future Research

These results should be considered in light of several limitations. Below, we discuss our study's limitations and offer suggestions for future research. First, the causal relationship and directionality between forms of substance use behavior and aggression cannot be determined due to the cross-sectional nature of the study. Therefore, we cannot answer whether polydrug use triggers aggression or is simply an expression or an association of overall risky behaviors. However, one could theoretically argue that if polydrug use was an additional expression of risky behavior, then we should not see any difference in aggression levels when comparing poly- versus monodrug users. This line of thinking lends support to the "psychopharmacological effects of drug use on aggression" theory.

Second, this research examined substance use–related aggression using *two* different time frames (30 days and last year). Regardless, a 30-day time frame is still problematic in determining whether aggression and substance use occurred simultaneously or in close temporal proximity. This relationship can only be truly established by asking explicit questions that address the

incidence of aggression and the time of substance use. It is also important to note that the number of times substances are used is not the same as dosage per use: Future surveys on aggression and substance use should ask questions differentiating between frequency and quantity of use per sitting.

Third, due to data limitations, we cannot distinguish between simultaneous and concurrent polydrug use. Recent research has demonstrated that simultaneous polydrug use is thought to be of greater mental, social, and health consequence compared with concurrent polydrug use (Baggio et al., 2014). Future research should examine possible differences in aggression between concurrent and simultaneous polydrug users versus monodrug users.

In addition, our inclusion of race/ethnicity as a binary variable is a limitation because the non-White category included a diverse number of ethnoracial subgroups (i.e., African American composed 14% of the sample; Hispanics, Asians, Native Americans, and self-identified "biracial" groups accounted for only 9% of our sample). We dichotomized "race" due to too few responses from each of the aforementioned minority groups. In a recent study, Mercado-Crespo and Mbah (2013) found that physical aggression varied not only due to the extent of alcohol and/or marijuana use but also by race/ethnicity with the highest reports of physical aggression for Black and Hispanic adolescents. Therefore, future research should take into account sociological theories that prioritize positionality in social structures and hierarchies as conditions which shape and pattern aggressive behavior differently by ethnoracial standing and among substance using individuals (LaFree, Drass, & O'Day, 1992).

Finally, we cannot account for antisocial personality disorder in the present analysis due to our lack of antisocial personality disorder measures. Studies have documented that antisocial personality disorder is a major risk factor for drug intake (Compton, Conway, Stinson, Colliver, & Grant, 2005) and aggression (Reingle, Jennings, Connell, Businelle, & Chartier, 2014; Sijtsema, Baan, & Bogaerts, 2014; Stuart, Moore, Gordon, Ramsey, & Kahler, 2006) and is an important predictive clinical variable in violent reoffending (Bonta, Law, & Hanson, 1998; Phillips et al., 2005). Although the connection between antisocial personality disorder and aggression may be circular due to the diagnosis being dependent upon a patterned history of aggression (Phillips et al., 2005). Nevertheless, it is important to consider individual-level psychosocial aspects of aggression in that antisocial personality disorder is associated with drug use behavior.

This study is the first to examine the levels of aggression among three categories: nonusers, monodrug users, and polydrug users. Our results indicate that polydrug users are significantly different in use of aggression compared

with mono- and nonusers. We note that polydrug use may be particularly dangerous given that most drug-related emergency room visits are the result of the co-ingestion of alcohol and another drug (SAMHSA, 2013). We also note that our results are congruent with findings from other studies that highlight the need for prevention efforts to focus on polydrug use at the collegiate level.

Current prevention efforts at the college level primarily focus on alcohol use and decreasing binge drinking (Quintero, 2009). Prevention efforts should perhaps respond to specific patterns of drug use—especially polydrug use. Sex differences should also be taken into account in prevention and intervention strategies. College officials responsible for college health and violence prevention/intervention should be aware of the important distinction potentially associated with mono- versus polydrug use. Finally, our work informs policy by providing a framework to help inform academic adminstrators and support staff, researchers, and public health practitioners in their understanding about potential underlying sources of violence and aggression among college students. Prevention, intervention, and treatment approaches to aggression should include an assessment of subcategories of drug use, which include the mixing of alcohol, stimulants, and other forms of drug use to determine risk for future aggression and interpersonal violence perpetration. We caution that more research needs to be conducted before formal protocols should be put into place—Yet, polydrug use appears to be a risk factor for violence perpetration and should thus be in consideration as more research sheds much-needed light on the nexus between the criminal justice and public health aspects of interpersonal violence.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study is supported by NIDA R25DA030310; K05DA015799 (J. C. Anthony, sponsor).

Note

1. A precise response rate cannot be calculated due to the anonymous nature of the study and the convenience sampling frame. Those over age 25 and those under age 18 were dropped from the analysis to focus on a traditionally aged college population.

References

Anderson, K. L., & Umberson, D. (2001). Gendering violence: Masculinity and power in men's accounts of domestic violence. *Gender & Society*, *15*, 358-380.

Bachman, R., & Peralta, R. L. (2002). The relationship between drinking and violence in an adolescent population: Does gender matter? *Deviant Behavior: An Interdisciplinary Journal*, *23*, 1-19.

Baggio, S., Deline, S., Studer, J., N'Goran, A., Mohler-Kuo, M., Daeppen, J., . . . Gmel, G. (2014). Concurrent versus simultaneous use of alcohol and non-medical use of prescription drugs: Is simultaneous use worse for mental, social, and health issues? *Journal of Psychoactive Drugs*, *46*, 334-339.

Boles, S. M., & Miotto, K. (2003). Substance abuse and violence: A review of the literature. *Aggression and Violent Behavior*, *8*, 155-174.

Bonta, J., Law, M., & Hanson, K. (1998). The prediction of criminal and violent recidivism among mentally disordered offenders: A meta-analysis. *Psychological Bulletin*, *123*, 123-142.

Brener, N. D., Kann, L., Kinchen, S. A., Grunbaum, J., Whalen, L., Eaton, D., . . . Ross, J. G. (2004). Methodology of the youth risk behavior surveillance system. *Recommendations and Reports: Morbidity and Mortality Weekly Report/Centers for Disease Control*. Alanta, GA. *53*(RR-12), 1-13.

Brener, N. D., Kann, L., McManus Kinchen, S. A., Sundberg, E. C., & Ross, J. G. (2002). Reliability of the 1999 Youth Risk Behavior Survey Questionnaire. *Journal Adolescent Health*, *31*, 336-342.

Brewer, R. D., & Swahn, M. H. (2005). Binge drinking and violence. *The Journal of the American Medical Association*, *294*, 616-618.

Budney, A. J., Moore, B. A., Vandrey, R. G., & Hughes, J. R. (2003). The time course and significance of cannabis withdrawal. *Journal of Abnormal Psychology*, *112*, 393-402.

Christie-Mizell, A. C., & Peralta, R. L. (2009). The gender gap in alcohol consumption during late adolescence and young adulthood: Gendered attitudes and adult roles. *Journal of Health and Social Behavior*, *50*, 410-426.

Chung, T., Martin, C. S., Cornelius, J. R., & Clark, D. B. (2008). Cannabis withdrawal predicts severity of cannabis involvement at 1-year follow-up among treated adolescents. *Addiction*, *103*, 787-799.

Cogan, R., & Ballinger, B. C. (2006). Alcohol problems and the differentiation of partner, stranger, and general violence. *Journal of Interpersonal Violence*, *21*, 924-935.

Compton, W. M., Conway, K. P., Stinson, F. S., Colliver, J. D., & Grant, B. F. (2005). Prevalence, correlates, and comorbidity of DSM-IV antisocial personality syndromes and alcohol and specific drug use disorders in the United States: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *The Journal of Clinical Psychiatry*, *66*, 677-685.

Courtenay, W. H. (2000). Constructions of masculinity and their influence on men's well-being: A theory of gender and health. *Social Science & Medicine*, *50*, 1385-1401.

Crowell, T. (2015, October 31-November 4). *Pain relief and overall wellbeing of patients using medical marijuana*. 2015 APHA Annual Meeting & Expo, American Public Health Association, Chicago, IL.

de Bruijn, D. M., & de Graaf, I. M. (2016). The role of substance use in same-day intimate partner violence: A review of the literature. *Aggression and Violent Behavior*, *27*, 142-151.

Denson, T. F., & Earleywine, M. (2008). Self-reported use of alcohol, marijuana, and hard drugs and aggression: A structural equation modeling analysis of an internet survey of long-term marijuana users. *Journal of Aggression, Maltreatment & Trauma*, *16*, 164-180.

Earleywine, M., & Newcomb, M. D. (1997). Concurrent versus simultaneous polydrug use: Prevalence, correlates, discriminant validity, and prospective effects on health outcomes. *Experimental and Clinical Psychopharmacology*, *5*, 353-364.

Egan, K. L., Reboussin, B. A., Blocker, J. N., Wolfson, M., & Sutfin, E. L. (2013). Simultaneous use of non-medical ADHD prescription stimulants and alcohol among undergraduate students. *Drug and Alcohol Dependence*, *13*, 71-77.

Farrell, A. D., Sullivan, T. N., Goncy, E. A., & Le, A.-T. H. (2015). Assessment of adolescents' victimization, aggression, and problem behaviors: Evaluation of the Problem Behavior Frequency Scale. *Psychological Assessment*, *28*, 702-714.

Goldstein, P. J. (1985). The drugs/violence nexus: A tripartite conceptual framework. *Journal of Drug Issues*, *15*, 493-506.

Haney, M., Ward, A. S., Comer, S. D., Foltin, R. W., & Fischman, M. W. (1999). Abstinence symptoms following oral THC administration to humans. *Psychopharmacology*, *141*, 385-394.

Harrison, L. D., Erickson, P. G., Adlaf, E., & Freeman, C. (2001). The drugs-violence nexus among American and Canadian youth. *Substance Use & Misuse*, *36*, 2065-2086.

Hermos, J., Winter, M., & Heeren, R. (2009). Alcohol-related problems among younger drinkers who misuse prescription drugs: Results from the National Epidemiologic Survey of Alcohol and Related Conditions (NESARC). *Substance Abuse*, *30*, 118-116.

Hines, D. A., & Straus, M. A. (2007). Binge drinking and violence against dating partners: The mediating effect of antisocial traits and behaviors in a multinational perspective. *Aggressive Behavior*, *33*, 441-457.

Hingson, R., & Rehm, J. (2014). Measuring the burden: Alcohol's evolving impact. *Alcohol Research: Current Reviews*, *35*, 122-127.

Hove, M. C., Parkhill, M. R., Neighbors, C., McConchie, J. M., & Fossos, N. (2010). Alcohol consumption and intimate partner violence perpetration among college students: The role of self-determination. *Journal of Studies on Alcohol and Drugs*, *71*, 78-85.

Jessor, R. (1987). Problem-behavior theory, psychosocial development, and adolescent problem drinking. *British Journal of Addition*, *82*, 331-342.

Johnston, L. D., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Miech, R. A. (2015). *Monitoring the future national survey results on drug use, 1975-2014:*

Volume 2, college students and adults ages 19-55. Ann Arbor: Institute for Social Research, The University of Michigan.

Kedia, S., Sell, M. A., & Relyea, G. (2007). Mono- versus polydrug abuse patterns among publicity funded clients. *Substance Abuse Treatment, Prevention, and Policy*, *2*(33), 1-9.

Kimmel, M. S. (2002). "Gender symmetry" in domestic violence: A substantive and methodological research review. *Violence Against Women*, *8*, 1332-1363. doi:10.1177/107780102237407

LaFree, G., Drass, K. A., & O'Day, P. (1992). Race and crime in post-war America: Determinants of African-American and White rates, 1957-1988. *Criminology*, *30*, 157-188.

Lee, D., Schroeder, J. R., Karschner, E. L., Goodwin, R. S., Hirvonen, J., Gorelick, D. A., & Huestis, M. A. (2014). Cannabis withdrawal in chronic, frequent cannabis smokers during sustained abstinence within a closed residential environment. *The American Journal on Addictions*, *23*, 234-242.

Locke, B. D., & Mahalik, J. R. (2005). Examining masculinity norms, problem drinking, and athletic involvement as predictors of sexual aggression in college men. *Journal of Counseling Psychology*, *52*, 279-283.

Martinotti, G., Carli, V., Tedeschi, D., Di Giannantonio, M., Roy, A., Janiri, L., & Sarchiapone, M. (2009). Mono- and polysubstance dependent subjects differ on social factors, childhood trauma, personality, suicidal behavior, and comorbid Axis I diagnoses. *Addictive Behaviors*, *34*, 790-793.

McCabe, S. E., Cranford, J. A., Morales, M., & Young, A. (2006). Simultaneous and concurrent polydrug use of alcohol and prescription drugs: Prevalence, correlates, and consequences. *Journal of Studies on Alcohol*, *67*, 529-536.

Mercado-Crespo, M. C., & Mbah, A. K. (2013). Race and ethnicity, substance use, and physical aggression among U.S. high school students. *Journal of Interpersonal Violence*, *28*, 1367-1384.

Midanik, L. T., Tam, T. W., & Weisner, C. (2007). Concurrent and simultaneous drug and alcohol use: Results of the 2000 National Alcohol Survey. *Drug and Alcohol Dependence*, *90*, 72-80.

Miller, K. E., Quigley, B. M., Eliseo-Arras, R. K., & Ball, N. J. (2016). Alcohol mixed with energy drink use as an event-level predictor of physical and verbal aggression in bar conflicts. *Alcoholism, Clinical, & Experimental Research*, *40*, 161-169.

Moore, T. M., & Stuart, G. L. (2005). A review of the literatures on marijuana and interpersonal violence. *Aggression and Violent Behaviour*, *10*, 171-192.

Moore, T. M., Stuart, G. L., Meehan, J. C., Rhatigan, D. L., Hellmuth, J. C., & Keen, S. M. (2008). Drug abuse and aggression between intimate partners: A meta-analytic review. *Clinical Psychology Review*, *28*, 247-274.

Nabors, E. L. (2010). Drug use and intimate partner violence among college students: An in-depth exploration. *Journal of Interpersonal Violence*, *25*, 1043-1063.

Osgood, D. W., Johnston, L. D., O'Malley, P. M., & Bachman, J. G. (1988). The generality of deviance in late adolescence and early adulthood. *American Sociological Review*, *53*, 80-92.

Peralta, R. L. (2007). College alcohol use and the embodiment of hegemonic masculinity among European American men. *Sex Roles*, *56*, 741-756.

Peralta, R. L., Callanan, V. J., Steele, J. L., & Chervenak, L. (2011). The effects of gender identity and heavy episodic drinking on alcohol-related violence. *Gender Issues*, *28*, 111-133.

Peralta, R. L., & Tuttle, L. A. (2013). Male perpetrators of heterosexual-partner-violence: The role of threats to masculinity. *The Journal of Men's Studies*, *21*, 255-276.

Phillips, H. K., Gray, N. S., MacCulloch, S. I., Taylor, J., Moore, S. C., Huckle, P., & MacCulloch, M. J. (2005). Risk assessment in offenders with mental disorders: Relative efficacy of personal demographic, criminal history, and clinical variables. *Journal of Interpersonal Violence*, *20*, 833-847.

Pihl, R. O., & Hoaken, P. N. S. (1997). Clinical correlates and predictors of violence in patients with substance use disorders. *Psychiatric Annals*, *27*, 735-740.

Quintero, G. (2009). Controlled release: A cultural analysis of collegiate polydrug use. *Journal of Psychoactive Drugs*, *41*, 39-47.

Radliff, K. M., Wheaton, J. E., Robinson, K., & Morris, J. (2012). Illuminating the relationship between bullying and substance use among middle and high school youth. *Addictive Behaviors*, *37*, 569-572.

Radloff, L. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, *1*, 385-401.

Rapoza, K. A., & Baker, A. T. (2008). Attachment styles, alcohol, and childhood experiences of abuse: An analysis of physical violence in dating couples. *Violence and Victims*, *23*, 52-65.

Reingle, J. M., Jennings, W. G., Connell, N. M., Businelle, M. S., & Chartier, K. (2014). On the pervasiveness of event-specific alcohol use, general substance use, and mental health problems as risk factors for intimate partner violence. *Journal of Interpersonal Violence*, *29*, 2951-2970.

Reingle, J. M., Staras, S. A., Jennings, W. G., Branchini, J., & Maldonado-Molina, M. M. (2012). The relationship between marijuana use and intimate partner violence in a nationally representative, longitudinal sample. *Journal of Interpersonal Violence*, *27*, 1562-1578.

Reiss, A. J., & Roth, J. A. (1993). Alcohol, other psychoactive drugs and violence. In A. J. Reiss & J. A. Roth (Eds.), *Understanding and preventing violence* (pp. 182-220). Washington, DC: National Academies Press.

Riggs, D. S., Caulfield, M. B., & Street, A. E. (2000). Risk for domestic violence: Factors associated with precipitation and victimization. *Journal of Clinical Psychology*, *56*, 1289-1318.

Roudsair, B. S., Leahy, M. M., & Walters, S. T. (2009). Correlates of dating violence among male and female heavy-drinking college students. *Journal of Interpersonal Violence*, *24*, 1892-2905.

Schwartz, J. A., Beaver, K. M., & Barnes, J. C. (2015). The association between mental health and violence among a nationally representative sample of college students from the United States. *PLoS ONE*, *10*(10), 1-19.

Shook, N. J., Gerrity, D. A., Jurich, J., & Segrist, A. E. (2000). Courtship violence among college students: A comparison of verbally and physically abusive couples. *Journal of Family Violence*, *15*, 1-22.

Shorey, R. C., Stuart, G. L., & Cornelius, T. L. (2011). Dating violence and substance use in college students: A review of the literature. *Aggression and Violence*, *16*, 541-550.

Shorey, R.C., Stuart, G.L., Moore, T.M., & McNulty, J.K. (2014). The temporal relationship between alcohol, marijuana, angery affect, and dating violence perpetration: A dailty diary study with female college students. *Psychology of Addictive Behaviors*, *28*(2), 516-523.

Sijtsema, J. J., Baan, L., & Bogaerts, S. (2014). Associations between dysfunctional personality traits and intimate partner violence in perpetrators and victims. *Journal of Interpersonal Violence*, *29*, 2418-2438.

Smith, N. T. (2002). A review of the published literature into cannabis withdrawal symptoms in human users. *Addiction*, *97*, 621-632.

Smith, P. H., Homish, G. G., Leonard, K. E., & Collins, R. L. (2013). Marijuana withdrawal and aggression among a representative sample of U.S. marijuana users. *Drug and Alcohol Dependence*, *132*, 63-68.

Stuart, G. L., Moore, T. M., Gordon, K. C., Ramsey, S. C., & Kahler, C. W. (2006). Psychopathology in domestic violence. *Journal of Interpersonal Violence*, *21*, 376-389.

Substance Abuse and Mental Health Services Administration. (2013). *Drug Abuse Warning Network, 2011: National estimates of Drug-Related Emergency Department visits* (HHS Publication Number (SMA), 13-4760). Rockville, MD: U.S. Department of Health and Human Services.

Tomlinson, M. F., Brown, M., & Hoaken, P. N. S. (2016). Recreational drug use and human aggressive behavior: A comprehensive review since 2003. *Aggression and Violent Behavior*, *27*, 9-29.

Wei, E. H., Loeber, R., & White, H. R. (2004). Teasing apart the developmental associations between alcohol and marijuana use and violence. *Journal of Contemporary Criminal Justice*, *20*, 166-183.

Wells, S., Giesbrecht, N., Ialomiteanu, A., & Graham, K. (2011). The association of drinking pattern with aggression involving alcohol and with verbal versus physical aggression. *Contemporary Drug Problems*, *38*, 259-279.

West, C., & Zimmerman, D. H. (1987). Doing gender. *Gender & Society*, *1*, 125-151.

White, A., & Hingson, R. (2014). The burden of alcohol use excessive alcohol consumption and related consequences among college students. *Alcohol Research: Current Reviews*, 35, 201-218. Retrieved from http://pubs.niaaa.nih.gov/publications/arcr352/201-218.pdf

Wilsnack, R. W., Vogetltanz, N. D., Wilsnack, S. C., Harris, T. R., Ahlstrom, S., Bondy, S., . . . Weiss, S. (2000). Gender differences in alcohol consumption and adverse drinking consequences: Cross-cultural patterns. *Addiction*, *95*, 251-265.

Author Biographies

Jennifer L. Steele, PhD, is an assistant professor of sociology and criminal justice at Ohio University Lancaster. She earned her PhD from the University of Akron in 2011. Her areas of research interest and expertise include substance use and abuse, gender, social inequality, and interpersonal violence. She has several peer-reviewed publications that have appeared in *Addiction Research and Theory, Journal of Drug Issues, Substance Use & Misuse, Violence Against Women, Feminist Criminology, Journal of Ethnicity in Substance Abuse*, and *Gender Issues*.

Robert L. Peralta, PhD, is an associate professor of sociology at the University of Akron. The aim of his research is to understand sources of interpersonal violence and substance use. Specifically, his research in part tests and refines criminological and sociological theories to better understand the onset and development of heavy episodic drinking behavior, other substance use behavior, and interpersonal violence. His recent publications have examined the influence of gender orientation (i.e., attitudes, beliefs, gendered characteristics, and gendered behavioral expectations) and race/ethnicity (i.e., impact of marginalization) on alcohol use, other drug use, and interpersonal violence.