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Spring 5-5-2016

## **Relationships Between Delinquency and Substance Use Among Adolescents Emancipating from Foster Care**

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### **MSU Digital Commons Citation**

Shpiegel, Svetlana; Lister, Jamey J.; and Isralowitz, Richard, "Relationships Between Delinquency and Substance Use Among Adolescents Emancipating from Foster Care" (2016). *Department of Social Work and Child Advocacy Faculty Scholarship and Creative Works*. 152.

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To cite this article: Svetlana Shpiegel, Jamey J. Lister & Richard Isralowitz (2016) Relationships Between Delinquency and Substance Use Among Adolescents Emancipating from Foster Care, *Journal of Social Work Practice in the Addictions*, 16:1-2, 113-131, DOI: [10.1080/1533256X.2016.1164059](https://doi.org/10.1080/1533256X.2016.1164059)

To link to this article: <https://doi.org/10.1080/1533256X.2016.1164059>



Published online: 05 May 2016.



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## **Relationships Between Delinquency and Substance Use Among Adolescents Emancipating from Foster Care**

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*Adolescents emancipating from foster care exhibit high rates of both delinquency and substance use, although it is less clear how these behaviors relate to one another. We aimed to examine the reciprocal relationships between these risk behaviors while accounting for relevant child welfare factors. We use data from the Multi-Site Evaluation of Foster Youth Programs to explore longitudinal associations between delinquent behaviors and substance use (tobacco, alcohol, and marijuana) among youths ages 17 and 18 (N = 429). Delinquency at age 17 was a positive predictor of substance use at age 18, after controlling for baseline use of substances. In contrast, substance use at age 17 was not predictive of increased delinquency at age 18 after baseline delinquency was controlled. Findings indicate that among youths emancipating from the foster care system, delinquent behavior might increase vulnerability for future substance use, as opposed to the latter.*

**KEYWORDS** *adolescents, aging out, delinquency, foster care, substance use*

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Received September 16, 2015; revised January 31, 2016; accepted February 25, 2016.

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Every year, about 25,000 youth emancipate from foster care in the United States after reaching the age of maturity (U.S. Department of Health and Human Services, 2014). Foster youth tend to experience multiple challenges during the period of transition to adulthood, including educational underachievement, unemployment, housing instability, and dependence on public assistance (e.g., Courtney, 2009; Stott & Gustavsson, 2010; Yates & Grey, 2012). In addition, these youth exhibit heightened involvement in various problem behaviors, such as risky sexual conduct, delinquency, and substance use (Braciszewski & Stout, 2012; Shpiegel & Cascardi, 2015; Svoboda, Shaw, Barth, & Bright, 2012; Vaughn, Shook, & McMillen, 2008).

Delinquency and substance use<sup>1</sup> are of particular concern among this population, as these behaviors could negatively impact youths' trajectories as they embark on independent adulthood (Cusick & Courtney, 2007; Kim & Leve, 2011; Traube, James, Zhang, & Landsverk, 2012). Although numerous studies indicate that delinquency and substance use might cooccur among current and former foster youth (Kim & Leve, 2011; Vaughn et al., 2008), little is known about the temporal relationship between these risk behaviors. The purpose of this study is to examine prospective associations between delinquency and substance use in a sample of adolescents transitioning from foster care to independence.

#### RATES OF DELINQUENCY AND SUBSTANCE USE AMONG FOSTER YOUTH

Several studies explored the rates of delinquency and substance use among foster youth and recent foster care alumni (Barn & Tan, 2015; Barth, 1990; Braciszewski & Stout, 2012; Cusick & Courtney, 2007). The majority of studies indicate that rates of criminal involvement are disproportionately high among this population (Courtney et al., 2005; Cusick & Courtney, 2007; Vaughn et al., 2008). For instance, 16- and 17-year-olds from three Midwestern states were nearly twice as likely to engage in delinquent behavior (e.g., property offenses, using a weapon, participating in fights) as adolescents in a community sample (Cusick & Courtney, 2007). Similarly, 18- and 19-year-olds from Missouri presented disproportionately high rates of arrests compared to peers in the general population (Vaughn et al., 2008).

When substance use was examined, a less consistent picture emerged, in part, due to variations in definitions (i.e., collapsing types of substances, examining one substance and generalizing to others, inconsistent assessments of substance use severity, etc.; Braciszewski & Stout, 2012). According to some

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<sup>1</sup> For purposes of consistency, the term *substance use* refers to the use of any legal and illegal substances.

studies, foster youth used substances at disproportionately high rates, especially when lifetime use was examined (Kohlengerg, Nordlund, Lowin, & Treichler, 2002; Pilowsky & Wu, 2006). Nevertheless, these youths have demonstrated relatively similar rates of current substance use (i.e., past year, past month) compared to adolescents in community samples (Braciszewski & Stout, 2012). To illustrate, Narendorf and McMillen (2010) reported that rates of current alcohol and marijuana use among foster youth did not differ substantially from youth in the general population. Shin (2004) reported similar findings for current alcohol and drug use. By contrast, rates of more severe forms of substance use (i.e., disordered) have typically been higher among foster youth compared to non-foster-care peers (Braciszewski & Stout, 2012). In sum, the literature regarding substance use and misuse has produced mixed findings, although more evidence points to this population being at increased risk than the general population.

## RELATIONSHIPS BETWEEN DELINQUENCY AND SUBSTANCE USE

Numerous studies documented a strong association between delinquency and substance use among adolescents and young adults (Becker et al., 2012; D'Amico, Edelen, Miles, & Morral, 2008; Doherty, Green, & Ensminger, 2008; Ford, 2005). Nevertheless, the temporal relationship between these risk behaviors is not well understood (Becker et al., 2012; Ford, 2005). According to some studies, delinquency could lead to future use of substances (Becker et al., 2012; Doherty et al., 2008; Hayatbakhsh et al., 2008; Lister, Milosevic, & Ledgerwood, 2015). Becker et al. (2012) suggested that "delinquent behavior provides both a peer group and social context that increase the propensity towards substance use" (p. 2). Associations with delinquent peers, in particular, might grant access, encouragement, and accepting social settings for experimentation with illicit substances (Van Den Bree & Pickworth, 2005). Furthermore, engagement in delinquent acts could weaken youths' social and interpersonal bonds (i.e. to family, school, etc.) and facilitate deviant behavior, including substance use (Ford, 2005).

By contrast, other studies suggest that substance use is likely to precede delinquent behaviors (Ford, 2005; Loeber & Farrington, 2000). The proposed theoretical mechanisms by which substance use could lead to delinquent behavior include adverse psychopharmacological effects (e.g., poor impulse control, increased aggression, or both while under the influence of specific types of substances; Menard & Mihalic, 2001; Parker & Auerhahn, 1998), weakening of prosocial bonds (Ford, 2005), and committing violent or criminal acts to facilitate obtaining alcohol or drugs (Goldstein & Herrera, 1995).

Empirical evidence on the temporal relationship between delinquency and substance use has been inconsistent (D'Amico et al., 2008; Ford, 2005; Van Den Bree & Pickworth, 2005). For instance, Becker et al. (2012) reported

that delinquency predicted future marijuana use, but not vice versa. In contrast, Ford (2005) reported that substance use had a direct effect on future delinquency, but delinquency did not have a direct effect on future substance use. In other studies, delinquent behavior was predictive of using alcohol, marijuana, and other drugs (Bui, Ellickson, & Bell, 2000; Henry, Thornberry, & Huizinga, 2009; Mason, Hitchings, & Spoth, 2007; Van Den Bree & Pickworth, 2005). Finally, some investigations provided evidence for bidirectional relationships between these risk behaviors, such that delinquency predicted future substance use, which, in turn, predicted future delinquency (e.g., Dembo et al., 2002; Manson & Windle, 2002). Taken together, investigations of the temporal relationship between delinquent behaviors and substance use have offered mixed findings.

## RELATIONSHIPS BETWEEN DELINQUENCY AND SUBSTANCE USE IN CHILD WELFARE SAMPLES

Among child-welfare-involved youth, explorations of longitudinal relationships between delinquency and substance use have been even less frequent (Casanueva, Stambaugh, Urato, Goldman Fraser, & Williams, 2014; Lalayants & Prince, 2014; Shook et al., 2011). The majority of evidence comes from the National Survey of Child and Adolescent Wellbeing (NSCAW<sup>2</sup>), the only nationally representative study of families involved with the U.S. child welfare system. In a series of inquiries using NSCAW I and II, both unidirectional and bidirectional relationships between these risk behaviors were reported. For instance, in a study focused on tobacco use, a link between delinquency and future smoking emerged (Fettes & Aarons, 2011). In two other investigations, delinquency was a significant predictor of future substance use (Casanueva et al., 2014; Traube et al., 2012). Finally, in a study focused on adolescent females, delinquency predicted later substance use disorder diagnosis, whereas being diagnosed with a substance use disorder was predictive of future delinquency (Lalayants & Prince, 2014).

Among foster youth and recent foster care alumni, a link between delinquency and substance use has been reported in both cross-sectional and longitudinal investigations (Kim & Leve, 2011; Kolivoski, Shook, Goodkind, & Kim, 2014; Shook et al., 2011; Vaughn et al., 2008). Nevertheless, no known studies have focused specifically on comparing the temporal relationship between substance use and delinquent behaviors in a prospective sample of older foster youth. Factors specific to these youths could influence the nature of this relationship (e.g., different stability and reciprocal effects for youths in out-of-home care compared

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<sup>2</sup> Two NSCAW studies have been conducted to date (NSCAW I started in 1999, and NSCAW II started in 2008).

to those residing with biological families). Differential effects might be particularly likely during the period of transition to adulthood, as youth face the pressures of becoming independent and experience diminished social supports (Greeson, Garcia, Kim, & Courtney, 2014). For instance, it has been well established that emancipation at an earlier age constitutes a risk factor for both delinquency and substance use, perhaps due to reduced supervision and oversight on the part of child welfare officials (e.g., Narendorf & McMillen, 2010; Shpiegel, 2012). Placement instability and past victimization experiences could exacerbate youths' difficulties during this vulnerable time period and increase the likelihood of problematic behaviors (Narendorf & McMillen, 2010; Price et al., 2008). Overall, unravelling the nature of the relationship between delinquency and substance use as youth transition out of foster care and into young adulthood is necessary to design effective intervention strategies to address these problems.

## THIS STUDY

The goal of this study is to examine reciprocal relationships between delinquency and substance use among adolescents emancipating from the foster care system. We focused on the three most commonly used substances among youth (i.e., tobacco, alcohol, and marijuana), which additionally fills a gap in the literature that often excludes tobacco or alcohol in favor of illicit substances (Casanueva et al., 2014; Vaughn et al., 2008). Furthermore, we examine frequency of substance use, as opposed to any use only, to provide a measure of severity for these risk behaviors. To increase precision, we account for relevant child welfare factors, including past victimization, placement instability, and emancipation status at age 18, as well as major demographic indicators, such as gender, race, and ethnicity. Based on analysis of the available literature, we hypothesize a bidirectional relationship between delinquency and substance use, such that (a) delinquency at age 17 will be uniquely associated with substance use at age 18; and (b) substance use at age 17 will be uniquely associated with delinquency at age 18.

## METHODS

### Data set and procedure

This research is based on a secondary analysis of data from the Multi-Site Evaluation of Foster Youth Programs (MEFYP), a randomized-controlled trial designed to assess the effectiveness of four independent living programs in California and Massachusetts. This investigation uses data from the Life Skills Training (LST) program of Los Angeles County. The LST program provides life skills instruction, outreach, and case management to foster youth ages 16 and older. As part of the evaluation project, youth were interviewed at baseline (age 17) and once each year after that (i.e., ages 18 and 19). The sample was

accumulated between September 2003 and June 2004 (U.S. Department of Health and Human Services 2008).

Youth were considered eligible for MEFYP if they were 17 years old, placed in out-of-home care, and deemed appropriate for LST. A total of 482 youth were eligible for inclusion; 97% of the eligible youth were interviewed at baseline ( $n = 469$ ). Of those interviewed at baseline, 91% were interviewed at the first follow-up (i.e., age 18) and 88% were interviewed at the second follow-up (i.e., age 19). Detailed information about the design and procedures of the MEFYP evaluation can be found in previously published work (see Greenson, Garcia, Kim, Thompson, & Courtney, 2015; U.S. Department of Health and Human Services, 2008).

## Sample

All youth who completed baseline and first follow-up interviews (i.e., ages 17 and 18) were included in this analysis ( $n = 429$ , 91.5% of the original sample). No differences in gender, race, or ethnicity were found between participants and the excluded youth. The final sample consisted of 175 males and 254 females (40.8% and 59.2%, respectively). The majority of youths were African American ( $n = 190$ , 44.3%), followed by Whites ( $n = 143$ , 33.3%), American Indians or Alaska Natives ( $n = 41$ , 9.6%), multiracial ( $n = 30$ , 7.0%), Native Hawaiian or other Pacific Islander ( $n = 10$ , 2.3%), and Asian ( $n = 1$ , 0.2%). In addition, 183 youth (42.7%), irrespective of race, identified as Hispanic or Latino.

## Measures

Four sets of variables were included in the analysis: (a) demographic indicators, (b) child welfare factors, (c) delinquency, and (d) substance use. Information about demographics and child welfare factors was obtained from the baseline interview (i.e., age 17; with the exception of emancipation status, assessed at age 18). Data about delinquency and substance use behaviors were obtained from baseline and first follow-up interviews (i.e., ages 17 and 18). There were relatively few cases of missing data (ranged from 0%–3% for each variable).

### DEMOGRAPHICS

Gender was coded as either male (0) or female (1). Race and ethnicity were recoded to include four categories: (1) non-Hispanic White, (2) Hispanic (of any race), (3) African American, and (4) other (including unknown). Dummy coding was used in regression analyses (non-Hispanic Whites served as the reference category).



## CHILD WELFARE FACTORS

We controlled for four relevant child welfare factors: victimization by caregivers (nonsexual), sexual abuse by adults or peers, placement instability while in foster care, and emancipation status at age 18. Victimization was measured as a continuous variable by using a sum of 16 dichotomous (yes–no) items ( $\alpha = .86$ ) asking about ways in which caregivers might have mistreated the youth before their first entry into foster care. Examples included “Did your caregivers often fail to provide regular meals for you so that you had to go hungry or ask other people for food”; “Did any of your caregivers ever throw or push you, for example, push you down a staircase or push you into a wall”; and “Did any of your caregivers ever lock you in a room or closet for several hours or longer?” Higher summative scores on this scale were indicative of increased victimization.

To measure lifetime sexual abuse, youth were asked if anyone had ever touched or kissed them against their will, or attempted to do so, and if anyone ever had intercourse, oral sex, or anal sex with them against their will, or attempted to do so. Youth who responded “yes” to any of these questions were designated as having a history of sexual abuse.

Placement instability was measured as a continuous variable by tallying the total number of foster homes, group homes, and residential treatment facilities youth lived in since first entering foster care.

Finally, emancipation status was a dichotomous variable indicating whether a youth still lived under the care and supervision of the child welfare system (0), or was legally emancipated (1).

## SUBSTANCE USE

At ages 17 and 18, we measured past-month use of tobacco, alcohol, and marijuana. For each substance, participants responded to the following question: “On how many days have you used this substance in the last 30 days?” The number of days each substance was consumed was used as an outcome variable in our analyses. Furthermore, we included any versus no past month use for each substance in our descriptive results.

## DELINQUENCY

At ages 17 and 18, youth were asked about their past-year engagement in 16 delinquent behaviors (yes–no). Examples included acting loud or unruly; being drunk in a public place; carrying a gun; stealing something from a store, person, or house; participating in a gang fight; purposely damaging or destroying property; and attacking someone. Higher summative scores on this scale ( $\alpha = .79$ ) were indicative of increased delinquency. We also included any versus no delinquency in our descriptive results.

## Analytic Strategy

Data analysis was conducted in several steps. First, univariate analyses were performed to describe youths' demographics and child welfare factors, as well as delinquency and substance use at ages 17 and 18. Next, bivariate analyses (i.e., *t* tests, one-way analyses of variance) were performed to explore demographic differences in delinquency and substance use. The final step consisted of conducting negative binominal regression analyses, which examined the contribution of delinquency at age 17 to substance use at age 18 (controlling for demographics, child welfare factors, and baseline substance use). A similar analysis was performed to examine the contribution of substance use at age 17 to delinquency at age 18 (accounting for the same control variables). Past-month use of tobacco, alcohol, and marijuana were evaluated separately to obtain a more precise understanding of the relationships between substance use type and delinquent behavior. Negative binominal regression models were preferred over linear regression models because our dependent variables were counts (i.e., number of days used substances, number of delinquent acts), characterized by a large number of zeroes and a small number of very high values. Furthermore, the distributions were overdispersed such that the variance exceeded the mean for each dependent variable. In prior research, negative binominal regression analysis has been the strategy of choice with dependent variables possessing similar characteristics (Cui, Ueno, Finchman, Donnellan, & Wickrama, 2012; Snyder & Merritt, 2014). All analyses were performed in SPSS version 21.0.

**TABLE 1** Descriptive Statistics for the Study Sample

Variable	Age 17 % or <i>M</i> ( <i>SD</i> )
Demographics	
Female	59.2
White	8.2
Hispanic	39.6
African American	40.8
Other	11.4
Child welfare factors	
Victimization (No. of types)	2.39 (3.20)
Long-term history of sexual abuse	33.6
No. of placements	4.37 (5.21)
Baseline placement type	
With relatives	41.7
Nonrelative foster home	33.6
Group home/residential	21.9
Other setting	2.8
Legally emancipated	41.0

Note: *N* = 429. Missing data for each variable ranged from 0% to 3%.

## RESULTS

### Sample Description

The description of the current sample is summarized in Table 1. Approximately 60% of youths were female; 40% were Hispanic, 41% were African American, 8% were White, and 11% were of other races. On average, participants reported two or more victimization experiences prior to entering foster care, and approximately one in three reported a history of sexual abuse. At age 17, participants typically lived with relatives (42%) or in nonrelative foster homes (34%), although a sizable proportion were placed in group homes or residential treatment facilities (22%). The typical participant reported approximately five different placements during his or her stay in foster care (i.e., foster homes, group homes, or residential treatment facilities), pointing to a considerable placement instability. At age 18, 59% were still under the care and supervision of the child welfare system, whereas 41% were legally emancipated.

At ages 17 and 18, nearly 50% of youths reported at least one delinquent behavior in the past year, although the average number of behaviors was relatively low ( $M = 1.5$  and  $M = 1.1$ , respectively). At both time periods, the most commonly reported behaviors were lying about one's age, acting loud or unruly in a public place, and avoiding paying for movies, bus or train rides, food or clothing, and so on. Among the more serious offenses, involvement in gang fights and attacking someone with the idea of hurting them were reported most often.

Past-month use of tobacco, alcohol, and marijuana was also relatively common in this sample. At age 17, 20% used tobacco, 23% used alcohol, and 15% used marijuana in the past 30 days. The average rate of consumption for each substance was less than 2 days per month ( $M = 1.99$  for tobacco;  $M = 0.75$  for alcohol;  $M = 1.21$  for marijuana). At age 18, past-month use of each substance increased to 26% for tobacco, 33%, for alcohol and 19% for marijuana. The frequency of consumption also increased to 2 or 3 days per month across substances, with tobacco ( $M = 3.88$ ), alcohol ( $M = 1.54$ ), and marijuana ( $M = 2.19$ ), respectively.

### Demographic Differences in Delinquency and Substance Use

Demographic differences in delinquency and substance use are summarized in Table 2. Females engaged in fewer delinquent behaviors at age 18 ( $t = 3.95$ ,  $p < .001$ ), but not at age 17. Similarly, females used alcohol less frequently at age 18 ( $t = 2.08$ ,  $p = .03$ ), but not at age 17. No gender differences emerged for tobacco use at either time period, whereas the differences in marijuana use were significant at both periods (age 17,  $t = 2.17$ ,  $p = .030$ ; age 18,  $t = 2.78$ ,  $p = .006$ ).

We did not find differences by race or ethnicity for engagement in past-year delinquency, or for frequency of marijuana use. Nevertheless, at ages 17 and 18, significant differences emerged for tobacco use,  $F(3, 418) = 14.85$ ,  $p < .001$ , and  $F$

**TABLE 2** Demographic Differences in Delinquency and Substance Use at Ages 17 and 18

Variables	Gender Race/Ethnicity Total						
	Male M	Female M	White M	Hispanic M	Black M	Other M	M
<i>Age 17:</i>							
Tobacco (PM)	1.92	1.90	8.05	1.56	1.23	1.06	1.91
Alcohol (PM)	.97	.60	1.28	1.02	.43	.58	.75
Marijuana (PM)	1.80	.80	2.00	1.32	1.00	1.00	1.21
Delinquency (PY)	1.72	1.34	1.57	1.51	1.39	1.78	1.50
<i>Age 18:</i>							
Tobacco (PM)	4.26	3.62	9.40	4.00	2.62	4.04	3.88
Alcohol (PM)	2.01	1.22	2.14	2.06	.75	2.14	1.54
Marijuana (PM)	3.32	1.41	.91	2.28	2.41	2.00	2.19
Delinquency (PY)	1.58	.84	1.22	1.17	.98	1.59	1.14

*Note:*  $N = 429$ . Missing data for each variable ranged from 0% to 3%. See the results section for significance testing information. Tobacco, alcohol, and marijuana use rates reflect average number of days each substance was used in the past month (PM). Delinquency rates reflect average number of delinquent behaviors committed during the past year (PY).

(3, 424) = 5.72,  $p = .001$ , respectively, as well as alcohol use,  $F(3, 419) = 3.05$ ,  $p = .028$ , and  $F(3, 424) = 4.44$ ,  $p = .004$ , respectively. At both time periods, Whites used tobacco and alcohol more frequently than other racial and ethnic groups.

### Negative Binominal Regression Analyses

Results from regression analyses examining reciprocal relationships between delinquency and substance use are summarized in Table 3. The first analysis predicted delinquency at age 18 from tobacco, alcohol, and marijuana use at age 17, accounting for covariates (i.e., demographics, child welfare factors, and baseline delinquency). Results revealed that rates of tobacco, alcohol, and marijuana use at age 17 were not predictive of delinquency at age 18 after baseline delinquency and other variables were accounted for. The final model also indicated that females engaged in fewer delinquent behaviors than males, independent of all other predictors ( $OR^3 = .43$ ,  $p < .001$ ). Similarly, there was a trend for youths with histories of sexual abuse to engage in more delinquent acts at age 18 ( $OR = 1.41$ ,  $p = .058$ ).

<sup>3</sup> In negative binominal regression, OR represents the percentage change (i.e., increase or decrease) in the dependent variable as a function of each unit of increase in the independent variable, holding other variables constant.

**TABLE 3** Predicting Delinquency and Substance Use at Age 18: Negative Binominal Regression Analyses

Predictor variables (age 17)	Tobacco (age 18) OR	Alcohol (age 18) OR	Marijuana (age 18) OR	Delinquency (age 18) OR
1. Demographics				
Female	.76 <sup>^</sup>	.54 <sup>***</sup>	.31 <sup>***</sup>	.43 <sup>***</sup>
Hispanic	1.67 <sup>^</sup>	1.32	4.99 <sup>***</sup>	.87
Black	.85	.49 <sup>*</sup>	8.31 <sup>***</sup>	.84
Other	1.91 <sup>*</sup>	1.17	5.89 <sup>***</sup>	1.21
2. Child welfare				
Victimization	.92 <sup>***</sup>	1.02	1.13 <sup>***</sup>	1.03
Sexual abuse	1.69 <sup>***</sup>	1.50 <sup>*</sup>	1.46 <sup>*</sup>	1.41 <sup>^</sup>
No. of placements	1.01	1.01	.98	.99
Emancipated	1.45 <sup>**</sup>	1.03	1.64 <sup>***</sup>	1.00
3. Main predictors				
Tobacco (PM)	1.09 <sup>***</sup>	1.04 <sup>**</sup>	1.05 <sup>***</sup>	1.01
Alcohol (PM)	1.02	1.08 <sup>*</sup>	1.04	.96
Marijuana (PM)	.98	1.02	1.05 <sup>***</sup>	.99
Delinquency (PY)	1.18 <sup>***</sup>	1.12 <sup>**</sup>	1.20 <sup>***</sup>	1.32 <sup>***</sup>

Note: N = 398. Sample size decreased to 398 due to listwise deletion of missing data employed in negative binominal regression analyses. Male gender and White race served as reference categories. Tobacco, alcohol, and marijuana use rates reflect average number of days each substance was used in the past month (PM). Delinquency rates reflect average number of delinquent behaviors committed during the past year (PY). OR – odds ratio.

\**p* < .05. \*\**p* < .01. \*\*\**p* < .001. <sup>^</sup>Trend.

Next, we examined the contribution of delinquency at age 17 to the use of tobacco, alcohol, and marijuana at age 18 (each substance was evaluated separately). A greater degree of delinquency at age 17 was predictive of more frequent use of tobacco at age 18, after controlling for baseline tobacco use and other covariates (OR = 1.18, *p* < .001). There was a trend for females to use tobacco less frequently than males (OR = .76, *p* = .053). Additionally, youths of other races reported more frequent smoking than Whites (OR = 1.91, *p* = .036), and a trend in the same direction was present for Hispanics (OR = 1.67, *p* = .059). Finally, sexual abuse history (OR = 1.69, *p* = .001), and being legally emancipated from foster care (OR = 1.45, *p* = .003) were both associated with more frequent tobacco use, whereas increased victimization by caregivers was associated with less frequent tobacco use (OR = .92, *p* < .001).

Increased delinquency at age 17 was a significant predictor of more frequent alcohol use at age 18, controlling for baseline use of alcohol and other covariates (OR = 1.12, *p* = .001). In addition, females (OR = .54, *p* < .001) and African Americans (OR = .49, *p* = .015) were characterized by less frequent alcohol use independent of all other predictors. Finally, those with histories of sexual abuse

were characterized by more frequent alcohol use, even when all other variables were accounted for (OR = 1.50,  $p = .016$ ).

Finally, a greater degree of delinquency at age 17 served as an independent predictor of marijuana use at age 18, controlling for baseline marijuana use and other predictors (OR = 1.20,  $p < .001$ ). Females reported less frequent use of marijuana (OR = .15,  $p < .001$ ), whereas African Americans (OR = 8.31,  $p < .001$ ), Hispanics (OR = 4.99,  $p < .001$ ), and youths of “other” races (OR = 5.89,  $p < .001$ ) reported more frequent use of this substance. Histories of sexual abuse (OR = 1.46,  $p = .033$ ), increased victimization by caregivers (OR = 1.13,  $p < .001$ ), and legal emancipation from foster care by age 18 (OR = 1.64,  $p < .001$ ) were also associated with more frequent marijuana use.

## DISCUSSION

The purpose of this study was to explore longitudinal relationships between delinquency and substance use among adolescents emancipating from foster care. These findings provide a better understanding of two important risk behaviors among a vulnerable group of youths transitioning from foster care to independence. Detailed practice knowledge on the extent of these behaviors and their relationship to one another over time yields important implications for designing and implementing effective intervention strategies for this population.

### Rates of Delinquency and Substance Use

The rates of delinquency in this sample were slightly lower than those reported in past investigations (e.g., Cusick & Courtney, 2007; Vaughn et al., 2008). Although about half of youths engaged in at least one delinquent act in the past year, the average number of such acts was relatively low. Furthermore, youths typically reported engaging in low-severity behaviors, such as lying about one’s age or acting loud and unruly. Relatively few youths engaged in serious offenses (e.g., assault or rape). Possible explanations for lower rates of delinquency in our sample compared to past studies of foster youth might involve variations in measurement strategies, as well as sample characteristics. For instance, status offenses, such as running away from a foster care placement, were not included in the current measure of delinquency. Furthermore, because many youth were still in foster care at age 18, they might have had increased oversight on the part of child welfare staff, and fewer opportunities to engage in delinquent acts.

The rates of tobacco, alcohol, and marijuana use in this sample were roughly similar to those reported in past research on foster youth (e.g., Fettes & Aarons, 2011; Narendorf & McMillen, 2010; Thompson & Auslander, 2007).

Furthermore, past-month use of each of these substances was slightly lower than reported in the general population. According to data from Monitoring the Future Survey, 25% of 12th-graders in the United States reported past-month use of tobacco, 48% reported past-month use of alcohol, and 20% reported past-month use of marijuana (Johnston, O'Malley, Bachman, Schulenberg, & Meich, 2014). One possible explanation for such differences involves variation in racial and ethnic composition. The majority of youths in our sample were African Americans or Hispanics, and less than 10% were non-Hispanic Whites. According to the Monitoring the Future Survey, African Americans and Hispanics generally report less substance use compared to Whites, which might explain the lower rates of consumption observed in this investigation (Johnston et al., 2014).

### Delinquency and Substance Use: Associations and Relationships Over Time

We found support for our first hypothesis, indicating that delinquent behavior at age 17 is uniquely associated with substance use at age 18. Increased delinquency was associated with more frequent tobacco, alcohol, and marijuana use (after baseline substance use was accounted for). In contrast, using each of these substances at age 17 was not an independent predictor of increased delinquency at age 18; thus, our second hypothesis was not supported. Overall, these findings provide evidence for a unidirectional, rather than bidirectional, relationship between these risk behaviors. Several prior studies reported similar findings (e.g., Becker et al., 2012), although others reported opposite patterns (e.g., Ford, 2005). These differences might be accounted for by heterogeneity in the types of behaviors studied (e.g., types of substances, types of delinquency), as well as variations in sample type and composition (e.g., age, gender, etc.). Additionally, most existing investigations did not specifically examine foster youth, reflecting a dearth of research on this population. This investigation provides valuable preliminary data on this topic, although additional research is needed.

### Vulnerable Cohorts Among Older Foster Youth

Our findings demonstrate that certain youth might be at higher risk for both delinquency and substance use as they transition out of the child welfare system. Male youth reported higher rates of these behaviors, especially at age 18. Similar trends have been reported in other research, although the magnitude of differences varied considerably between investigations (Shook et al., 2011; Traube et al., 2012; Vaughn, Ollie, McMillen, Scott, & Munson, 2007; Vaughn et al., 2008). Prior research also revealed that males were less likely to engage in services designed for child-welfare-involved youth, which could

account for higher rates of negative outcomes (Courtney et al., 2005; Shpiegel & Cascardi, 2015). In general, developing intervention programs specifically targeting males can help fill service gaps for this population. Based on findings from this investigation, purposefully targeting and engaging male youths in interventions designed to address delinquency could provide secondary benefits for reducing future substance use.

Adolescents with histories of sexual victimization were at higher risk for substance use and demonstrated a trend for increased delinquency, whereas nonsexual victimization had a less consistent effect on these risk behaviors. Past studies reported that childhood victimization (and sexual abuse, in particular) could be associated with a range of problematic outcomes among adolescents and young adults (Cicchetti & Valentino, 2006). Assessing the presence and severity of these risks is important for identifying youths most in need of prevention and intervention efforts. Future research should examine whether youths with sexual abuse histories who experience resultant posttraumatic stress disorder are at even greater risk for future substance use and delinquency than those who develop less severe symptoms.

Finally, our findings point to a considerable stability of both delinquency and substance use over a period of 1 year. This relative stability has been reported in prior studies on adolescents and young adults leaving foster care (Cusick & Courtney, 2007; Narendorf & McMillen, 2010), highlighting the need for developing effective strategies to address these risk behaviors. Providing evidence-based interventions for reducing delinquency and substance use could be particularly helpful during early adolescence, while youth are still in care of the public child welfare agency, and can access supportive staff and a broad range of services.

### Implications, Limitations, and Future Directions

This study provides valuable practice implications. First, our findings indicate that delinquency might heighten risk for future substance use, as opposed to the latter. In this respect, child-welfare programs should increase their screenings of delinquent behavior when working with these youth. In general, the use of validated and reliable assessment tools or supplemental sections (behavioral, substance use, trauma, and stressor related) from standardized clinical interviews can be conducted in a relatively short period of time, and could help identify individuals at risk for future problem behaviors. In addition, case workers, foster parents, and independent living services providers should be mindful that some youth might already be engaged in delinquency, substance use, or both by the time they reach legal emancipation. Male youth could be at the highest risk for these problem behaviors, thus, particular attention should be given to males in screening and access to services. Youths with sexual abuse histories should also receive increased attention and specialized support (i.e., trauma-informed care).



The findings of this study should be interpreted in light of its limitations. First, the sample is restricted to a single county in one state, and might not be representative of all youths in foster care. Second, although sample size is adequate overall, a slight decrease has occurred due to listwise deletion of missing data in multivariate analyses. Third, the period of time investigated is relatively brief (i.e., 12 months), which might increase the likelihood of spurious correlations among the study variables. Despite this limitation, using multiple time points and not simply relying on cross-sectional data strengthens our analyses. Fourth, other unexamined factors might have contributed to both substance use and delinquency in this sample. For instance, we did not directly examine youths' mental health, psychological characteristics, or peer factors, although some of our variables likely overlap (e.g., sexual abuse history might overlap with mental health problems or disorders). Future research should examine the wealth of heretofore-unexamined psychosocial characteristics (e.g., impulsivity, exposure to community violence) that might influence both substance use and delinquent behaviors. Last, we used self-reported data for assessing both delinquency and substance use. Future research should include administrative data (e.g., detailed information on criminal record) and standardized substance use measures to reinforce the validity of the findings.

Future research should also include more detailed information about the extent of substance use (e.g., disordered use, age of onset) and delinquency (e.g., whether offenses were conducted alone or among peers, whether they resulted in arrests or incarcerations). Examining other types of substance use is also necessary (e.g., prescription opioids and heroin). Examining substance use disorders, in addition to regular use, is particularly important, as delinquency could serve as means of supporting an addiction (i.e., illegal behaviors conducted solely to facilitate regular substance use). Furthermore, examining peer influences and connections to both biological and foster families can provide additional information about youths' experiences. Finally, conducting moderation analyses to examine whether the association between delinquency and substance use varies by gender is an important next step.

## CONCLUSION

This study aimed to better understand the relationship between delinquency and substance use in a sample of adolescents emancipating from the foster care system. Current findings highlight considerable risk for adolescents who commit delinquent acts to be vulnerable to both continued delinquency and future use of tobacco, alcohol, and marijuana. Furthermore, male youth, and those with histories of sexual abuse, might be at highest risk to engage in these behaviors. Interventions should include appropriate screenings and service provision, preferably in early adolescence.

## ACKNOWLEDGMENTS

The data used in this publication were made available by the National Data Archive on Child Abuse and Neglect, Cornell University, Ithaca, NY, and have been used with permission. Data from the Multi-Site Evaluation of Foster Youth Programs (Chafee Independent Living Evaluation Project), 2001–2010, were originally collected by Mark E. Courtney, Matthew W. Stagner, and Michael Pergamit.

## FUNDING

Funding for the project was provided by the Office of Planning, Research, and Evaluation and the Children's Bureau Administration for Children and Families, U.S. Department of Health and Human Services, Washington, DC (Award Number 233-02-0059). The collector(s) of the original data, the funder (s), NDACAN, Cornell University, and their agents or employees bear no responsibility for the analyses or interpretations presented here.

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