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Temporal associations between substance use and delinquency among youth with a first time offense

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Abstract

OBJECTIVE—Substance use and delinquency among adolescents has been shown to be positively associated; however, the temporal relationship is not well understood. Examining the association between delinquency and substance use is especially relevant among adolescents with a first-time substance use related offense as they are at-risk for future problems.

METHOD—Data from 193 adolescents at time of diversion program entry and six months later was examined using cross-lagged path analysis to determine whether substance use and related consequences were associated with other types of delinquency across time.

RESULTS—Results demonstrated that delinquency at program entry was related to subsequent reports of heavy drinking and alcohol consequences, but not marijuana use or its consequences. In contrast, alcohol and marijuana use at program entry was not related to future reports of delinquency.

CONCLUSIONS—Findings emphasize the need to build in comprehensive assessments and interventions for youth with a first time offense in order to prevent further escalation of substance use and criminal behaviors.

Keywords

adolescents; delinquency; alcohol use; marijuana use; temporal associations

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Contributors

Authors Hunter, D'Amico and Miles designed the study. Miles and Ewing conducted the statistical analysis. Pedersen contributed to the literature review and writing of the manuscript. All authors contributed to and approved the final manuscript.

Conflict of Interest

All others declare that they have no financial conflict of interest.

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1. Introduction

Positive associations between alcohol, other drug use and delinquency among youth have been well documented (Barnes, Welte, & Hoffman, 2002; Huizinga, Loeber, & Thornberry, 1993). For example, arrested adolescents are more likely to use alcohol and other drugs than non-arrestees (Horowitz, Sung, & Foster, 2006), and studies suggest that over two-thirds of incarcerated adolescents exhibit at least one substance use disorder (Teplin, Abram, McClelland, & Dulcan, 2002). The longitudinal association between substance use and delinquency, however, is not clearly understood. For example, some studies demonstrate that substance use precedes delinquency (Brook, Whiteman, Finch, & Cohen, 1996; Loeber, 1988) whereas other studies show that delinquency precedes substance use (Deitch, Koutsenok, & Ruiz, 2000; Doherty, Green, & Ensminger, 2008; White & Gorman, 2000). Further, some studies have found reciprocal relationships between delinquency and substance use (Mason & Windle, 2002) whereas other studies have not (Dembo et al., 1995; Dembo, Williams, Wothke, & Schmeidler, 1994). In general, studies in this area differ in terms of the substances examined (e.g., alcohol, drugs, or some combination), the time periods investigated, and samples utilized, such as school based youth (e.g., Barnes et al., 2002; Mason & Windle, 2002), high risk, juvenile justice involved youth (e.g., Clingempeel, Henggeler, Pickrel, Brondino, & Randall, 2005; D'Amico, Edelen, Miles, & Morral, 2008), homeless youth (e.g., Paradise & Cauce, 2003); and youth with mental health concerns (e.g., Becker et al., 2012). Understanding the temporal ordering of substance use and delinquency in adolescence is critical in order to effectively intervene and prevent these behaviors from further escalation (Dembo, Wareham, Greenbaum, Childs, & Schmeidler, 2009).

The association between delinquency and substance use is particularly important to understand for adolescents who have committed a first time offense for a substance-related event. Youth who engage in delinquent behavior at early ages are at risk for future substance use and further delinquency (Mason et al., 2010; R. L. Simons, Stewart, Gordon, Conger, & Elder, 2002); thus it likely that youth with a first time offense may be at risk for continued substance use and delinquent behaviors. However, there is little research on this at-risk population, which makes it difficult to understand how early delinquency may lead to future problems (Rasmussen, 2004; Smith & Chonody, 2010). In addition, adolescents with a first time misdemeanor offense (i.e., non serious offenses) are typically not formally prosecuted and/or detained and therefore rarely receive further intervention (Rasmussen, 2004). However, given that these youth are just starting to experience negative consequences from their use, this is a critical juncture in which to intervene with early intervention and prevention efforts. Targeting interventions for youth early in their criminal justice careers may offer an efficient and effective means to prevent the further escalation of problem behaviors (Carney, Myers, Louw, Lombard, & Flisher, 2013; D'Amico, Osilla, & Hunter, 2010; D'Amico, Hunter, Miles, Ewing, & Osilla, 2013; Feldstein & Ginsburg, 2007; Schmiedege, Broaddus, Levin, & Bryan, 2009). Thus, research describing the temporal association between early delinquency and subsequent substance use among at-risk youth can help inform intervention and prevention efforts.

Few studies have looked at the short-term association (i.e., within a six month period) between substance use and delinquency. Studying this time period may be advantageous to

understanding the immediate, clinically relevant and reciprocal effects (Paradise & Cauce, 2003) as compared to studies that look at these associations over longer periods of time. Analyses that focus on year or longer time periods may fail to capture the more immediate fluctuations in behavior and may miss important information during a critical time of development when teens move from a first time offense to more serious offenses. That is, capturing this association closer in time to a first time alcohol or drug offense for at-risk youth is important given the potential impact of this offense on subsequent behavior.

In the field of substance use prevention, programs are classified as ‘universal’, designed for the general population; ‘selective’, designed for at-risk subgroups, such as youth are experimenting with substance use; or ‘indicated’, designed for youth who have been treated but are at high risk for relapse (Institute of Medicine, 1994) (National Institute on Drug Abuse, 1997). This paper presents secondary analyses from a randomized clinical trial (RCT) where youth with a first-time alcohol or other drug offense received one of two group selective interventions in the context of a juvenile justice diversion program called Teen Court (D’Amico et al., 2013). Teen Courts are typically utilized by communities for youth with a first-time nonviolent offense as an alternative to formal processing (Butts, Buck, & Coggeshell, 2002). We examined self-reported delinquent behaviors and substance use upon entry into the program and then six months later. Secondary analyses from randomized clinical trials may help to identify potential predictors of substance use and related behaviors that could lead to enhancements in intervention strategies and help inform theories of behavioral change (Clingempeel, Henggeler, Pickrel, Brondino, & Randall, 2005).

The goal of this paper is to understand whether adolescents who have experienced some negative consequences from their substance use (i.e., a first time offense), show a temporal relationship between their alcohol and other drug use and other delinquent behaviors over the short-term (i.e., six month period). This study examines longitudinal associations between alcohol use, marijuana use, and reported consequences from alcohol or marijuana use with other delinquent behaviors using a cross lagged regression design (Finkel, 1995; Kenny, 2005). The cross-lagged model explains the amount of variation in one variable at time t that is associated with change in a second variable at time $t+1$. We examine the effects of alcohol and marijuana use separately from consequences from use, as recent research has demonstrated that these constructs appear to be distinct (Becker et al., 2012; Blanchard, Morgenstern, Morgan, Lobouvie, & Bux, 2003; Paradise & Cauce, 2003). Thus, it is worth determining if the association between consequences from use and delinquency is different from the association between delinquency and reported use. Moreover, studies have shown that problematic substance use may be more strongly related to delinquency than frequency of use (Mason, Hitchings, & Spoth, 2007), thus we examine both frequency of drinking and alcohol-related consequences. Furthermore, many studies have examined the association between a combination of substances with delinquency that may obfuscate the association and temporal ordering (e.g., Paradise & Cauce, 2003). We therefore examined alcohol and marijuana use separately. We hypothesized that use of both substances (i.e., alcohol and marijuana) and related consequences would be associated with delinquency over time.

2. Method

2.1 Setting

The study was conducted in collaboration with the Santa Barbara Teen Court, a diversion program operated by the Council on Alcoholism and Drug Abuse (CADA), a nonprofit community-based organization. The Teen Court program is offered to youth who commit a first-time alcohol or other drug offense and are deemed not in need of more serious intervention or treatment by the local probation department. The program consists of an intake interview of the teen and guardian(s) with teen court staff followed by a court hearing in front of a peer jury where sanctions that include psychoeducational group sessions, peer jury and community service are determined for the offending adolescent. The adolescent is given up to 90 days to address the sanctions and in our sample, 95% of youth completed the sanctions within 90 days. This study was part of a randomized controlled trial examining the efficacy of groups that utilized Motivational Interviewing approach compared to usual care psychoeducational groups delivered to teens in this setting, which is accounted for in the analyses (D'Amico et al., 2010; D'Amico et al., 2013). Study protocols were approved by the institution's internal human subjects review board.

2.2 Participants

Adolescents between 14 and 18 years old referred between January 2009 and September 2011 for a first-time AOD offense (e.g., possession of alcohol or other drugs, driving under the influence, driving with an open container) to the Teen Court were recruited for participation. Study inclusion criteria included English proficiency; study exclusion criteria included multiple offenses, referral to another program or possession of a medical marijuana card. We enrolled 193 adolescents out of 216 eligible youth during the enrollment period (11% were either not interested or unable to participate). There appeared to be no demographic differences between those who refused and those who participated in the study; the sample was too small to test for differences statistically. The sample consisted of 67% males, 45% non-Hispanic White, 45% Hispanic, and 10% mixed or other race/ethnicity. Alcohol offenses made up 56% of the cases and marijuana offenses made up 38% of cases, with the remainder of youth cited for concurrent alcohol and marijuana use infractions (4%) or other drug offenses (2%). The mean age of participants at intake was 16.64 ($SD = 1.05$). Ninety-seven percent of the sample completed a follow-up assessment six months later.

2.3 Procedures

Data Collection: Adolescents completed a baseline survey administered by trained research staff after the Teen Court intake interview and before their court hearing. Participants completed a follow-up survey approximately 6 months from the time of the baseline survey (and approximately 3 months following the group program). Participants were compensated \$25 at baseline and \$45 at follow-up. A National Institute of Health Certificate of Confidentiality was obtained to protect participant privacy. As a result, all participants were informed that the data collected were confidential and not to be shared with the Probation or

criminal justice system, the Teen Court program, their parents or other individuals not associated with the research staff.

2.4 Measures

Participants completed measures of demographic information, substance use and delinquency. Demographic information included items about age, gender, and race/ethnicity. Other related measures (not analyzed for this study) were also collected (e.g., attitudinal measures regarding self efficacy and substance use expectancies, employment, parental factors, and sexual behaviors) and are reported elsewhere (D'Amico et al., 2013; Osilla et al., 2013; Pedersen et al., 2013).

2.4.1 Delinquency—We used items from previous adolescent surveys (Ellickson, McCaffrey, Ghosh-Dastidar, & Longshore, 2003) that asked adolescents how often they participated in delinquent behaviors. A 7-item scale queried whether participants had: “been involved in fights” (endorsed by 34% of respondents), “stolen or tried to steal things worth \$50 or more” (12%), “carried a hidden weapon other than a plain pocket knife” (9%), “been suspended or expelled from school” (29%), “taken a vehicle for a joy ride without the owner’s permission” (8%), “sold marijuana or hashish” (19%), “damaged something on purpose that did not belong to you” (18%), and “cheated on a test at school,” (50%) in the past year was used at baseline (i.e., Time 1). An 8-item scale (including an additional item querying whether participants had “gotten into trouble with the police because of something you did” in past 90 days) was used at the follow-up time point. Since all adolescents had “gotten into trouble with the police” at baseline, this item was not included in the baseline scale (i.e., only included in the follow up scale). Each item ranged from 1 (not at all) to 6 (20 or more times). The mean of the items was calculated, to give a score that was used in analysis (baseline $\alpha = .62$; follow-up $\alpha = .61$).

2.4.2 Substance use—We assessed past month frequency of alcohol and marijuana use using items from the RAND Adolescent/Young Adult Panel Study (Ellickson, Tucker, & Klein, 2001; Tucker, Orlando, & Ellickson, 2003). These measures were developed based on established items and scales from Monitoring the Future (Johnston, O'Malley, Bachman, & Schulenberg, 2012) and DSM-IV criteria (American Psychiatric Association, 1994). We assessed frequency of consumption using “In the past 30 days, how many days did you have alcohol [use marijuana]?” Respondents were also queried about heavy drinking in the past month by asking how frequently they had drunk “five or more drinks of alcohol in a row, that is, within a couple of hours.” A “drink” was defined as one whole drink of alcohol (not including a few sips of wine for religious purposes). Eight response options between 0 days to 21 to 30 days were given.

2.4.3 Negative consequences from use—Items based on DSM-IV criteria queried whether participants had experienced consequences due to alcohol or marijuana use (Tucker et al., 2003). Six items assessed negative consequences from alcohol use in the past 30 days (e.g., “missed school”, “felt really sick because of drinking alcohol”, $\alpha=0.81$) and five items were used to assess consequences from marijuana use (e.g., “got into trouble at school or home”, “had difficulty concentrating”) over same time period (i.e., past 30 days) at the

baseline and follow-up time points ($\alpha=0.77$) (Tucker et al., 2003). Both scales were rated on a 4-point scale (0='Never' to 3='3 or more times'). Items were summed with a higher score indicating more consequences experienced.

2.5 Analytic Approach

To determine the stability of the measures, we first examined the correlation matrix of the measures over time, focusing on correlations of the same measures in different waves. Next, we employed cross-lagged correlation analysis to determine the temporal association between the delinquency measures and the other substance-related measures. Our general approach to modeling involved the implementation of cross-lagged path analysis (Finkel, 1995; Mayer & Carroll, 1987) using Mplus 6.11 (Muthén & Muthén, 2011). At each wave, the variables of interest were regressed on the same variables measured at the previous wave. This modeling technique is widely used to assess causal models in data derived from non-experimental, longitudinal research designs (Mayer & Carroll, 1987). We use a maximum likelihood estimator, and used bias corrected bootstrapping (with 5000 replications) to estimate standard errors and statistical significance. A model path diagram representation is shown in Figure 1. To account for sample attrition, we conducted all analyses using full information maximum likelihood estimation (Arbuckle, 1996; Raykov, 2005), which provides consistent and unbiased estimates in the presence of data that are missing at random or missing completely at random.

3. Results

3.1 Preliminary analyses

First we examined the distributions across the key study variables (see Table 1), showing higher correlation among variables measuring same constructs than variables measuring different constructs. Next, we examined the correlations at baseline and follow-up for the substance use and delinquency measures (see Table 2). As expected, within data collection wave correlations (e.g., examining baseline and baseline variables) were generally larger than across wave correlations (i.e. comparing baseline to follow-up variables). At baseline, we found moderate correlations between alcohol use and delinquency (days used, $r = .37$, $p < 0.001$; heavy drinking, $r = .37$, $p < .001$) and high correlations between alcohol consequences and delinquency ($r = .57$, $p < .001$). At baseline, we found moderate correlations between marijuana use and delinquency (days used, $r = .30$, $p < .001$) and between marijuana consequences and delinquency ($r = .30$, $p < .001$). Alcohol and marijuana use, consequences and delinquency at follow-up (i.e., Time 2) were not as strongly associated as at baseline (i.e., Time 1).

3.2 Temporal effects

To examine the temporal associations between variables, we examined three cross-lagged models to investigate the association between delinquency and the different alcohol-related measures: 1) alcohol use; 2) heavy drinking and 3) negative consequences from alcohol use. In the consequences from alcohol use model, we controlled for Time 1 (i.e., baseline) alcohol use. We examined two cross-lagged models to investigate the association between delinquency and 1) marijuana use and 2) negative consequences from marijuana use. Similar

to alcohol, in the consequences from marijuana model, we controlled for Time 1 marijuana use. In all models, we controlled for age, gender, race/ethnicity, and intervention condition. Note that all models were saturated, and therefore fit statistics are not presented. Results (i.e., standardized estimates and p-values) are presented in Table 3.

3.2.1 Alcohol and Delinquency—We did not find evidence that reported days of alcohol use was temporally associated with delinquency in the cross lagged models. As shown in Table 3, the standardized effect from delinquency at Time 1 (i.e., baseline) to alcohol use at Time 2 (i.e., follow-up) was 0.17 and the standardized estimate from Time 1 alcohol use to Time 2 delinquency was -0.01 .

We did find a statistically significant effect from Time 1 delinquency to Time 2 heavy drinking days, whereas Time 1 heavy drinking days to Time 2 delinquency was not significant. Similar effects were found for alcohol consequences; Time 1 delinquency to Time 2 alcohol consequences was statistically significant, but Time 1 alcohol consequences to Time 2 delinquency did not achieve statistical significance.

3.2.2 Marijuana and Delinquency—As shown in Table 3, neither marijuana use nor marijuana consequences were found to be significantly associated with delinquency across time.

3.2.3 Sensitivity Analyses—As a sensitivity check we also estimated models in which the consequences (from alcohol or marijuana use) variable was regressed on use at the same time point (instead of correlated as in the previous models). Our conclusions were unchanged.

4. Discussion

This study examined the temporal association between alcohol and marijuana use, consequences from use, and delinquency among youth with a first time alcohol or drug offense. We did not find evidence that alcohol or marijuana use reported at program entry was associated with later delinquency. There was some evidence that delinquency reported at program entry was associated with later reports of problematic alcohol use (i.e., heavy drinking and reported consequences from alcohol use). Contrary to hypotheses, no associations were found between marijuana use, reported consequences from marijuana use and delinquency among this sample.

These findings are consistent with other research (Dembo, Williams, Fagan, & Schmeidler, 1993; Paradise & Cauce, 2003) that has demonstrated that among at-risk and high risk adolescent samples, delinquency is related to subsequent heavier alcohol use and consequences; however alcohol use in at-risk samples is not typically associated with subsequent delinquency. Within our sample, delinquency was not related to marijuana use and its associated consequences. Note that these findings differ from those for psychiatric hospitalized adolescents aged 12–15 that showed delinquency was related to later marijuana use following hospitalization (Becker et al., 2012). Our sample was older on average than Becker et al.'s and showed fewer mental health problems (Pedersen et al., 2013), which may

help explain the differences in findings between the two studies. Also, Becker et al.'s study was conducted over a longer time frame (i.e., 18 months). These findings highlight the value of taking into account the age, mental health and criminal justice status of youth when examining substance use and delinquency.

Our findings also suggest that it is important to consider the specific substances (i.e., alcohol or marijuana) reported when examining the association between substance use and delinquency, rather than utilizing a composite or aggregate measure of substance use as temporal associations may vary by the type of substance. In addition, these findings emphasize the importance of distinguishing between amount of drinking and frequency of use. For example, delinquency was related to later problematic alcohol use (i.e., heavy drinking and related consequences), but not frequency of use, similar to findings reported in Mason et al., (2007). Thus, youth who engage in delinquent behavior and continue to drink alcohol at high levels may experience more negative consequences.

In contrast, our findings indicated that delinquency was not associated with marijuana use or its consequences. Part of this may be due to the nature of marijuana-related consequences. Among college student samples, overt consequences related to violence, injuries, getting into trouble, or damaging property are reported less frequently as a result of marijuana use than more internal consequences such as feeling guilty or paranoid, embarrassing oneself, relationship difficulties or using more than one had planned (J. S. Simons, Dvorak, Merrill, & Read, 2012; Stein et al., 2010). The most frequently reported consequences from marijuana use in this sample were having trouble concentrating and doing something you felt sorry for; which are also more internal and probably less likely to be related to other types of overt delinquent behavior.

Overall, the results emphasize the need to intervene early with adolescents who show delinquent-types of behavior. Specifically, youth with a first time offense for alcohol or drugs should be screened for both substance use and delinquent behaviors as the offense is a useful indicator for considering a multiple problem focused intervention where delinquency may be an important risk factor for further heavy drinking and alcohol consequences. In contrast, youth with a first time marijuana offense with no previous delinquent history may be in need of a different type of intervention.

4.1 Limitations

Certain limitations should be considered in interpreting the study's results. First, self-report data that may be subject to bias were used; however the amount of bias resulting from the use of self-report has often been exaggerated (Chan, 2008). In fact, much research has shown that self-report among youth is valid when procedures, such as those used in the current study are implemented, for example, discussing confidentiality and providing a private space to complete the survey. In addition, the association between substance use and delinquency may partially be accounted for by unmeasured variables (Becker et al., 2012). For example, Mason et al. (2007) reported that the association between alcohol use and delinquency was partially mediated by peer substance use. Further, others have found a strong link between reports of peer delinquency, including substance use, and self-reported alcohol and marijuana use among youth in late adolescence (Ferguson, 2011). Thus, other

factors may have played a role in these associations in this at-risk sample. Future work could include these types of factors to gain a better understanding of how peer or family use, for example, may affect these associations (Curcio, 2013).

4.2 Conclusions

In summary, to the best of our knowledge, this is the first study to provide evidence of the short-term temporal relationship between substance use, its consequences and delinquency among a sample of youth with a first time alcohol or drug offense. Findings strongly suggest the need to address delinquent behaviors among substance using youth, possibly through interventions that address multiple problem behaviors. There was a strong association between delinquency and subsequent heavy drinking and consequences but little association between delinquency and marijuana use. Results highlight the importance of screening for substance use and other problems and further suggest that targeting interventions for adolescents who are just entering the criminal justice system may provide a more efficient means to prevent further escalation of problem behaviors.

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Figure 1.

Path diagram representation of model. Substance use variable is either 1) number of days used alcohol, 2) number of heavy drinking days, 3) number of alcohol consequences, 4) number of days used marijuana or 5) number of marijuana consequences.

Table 1

Descriptive statistics (means and standard deviations) for the substance use and delinquent behavior variables at each wave

	Baseline n =193	6 Month Follow-Up n = 187
Days alcohol use (0–7 scale)	1.51 (1.61)	1.57 (1.54)
Days heavy drinking (0–7 scale)	0.92 (1.52)	0.83 (1.38)
Alc. consequences (0–18 scale)	1.37 (2.55)	1.02 (1.81)
Marijuana use (0–8 scale)	2.07 (2.30)	1.60 (2.15)
Marijuana consequences (0–15 scale)	1.13 (2.18)	0.63(1.45)
Delinquency (1–6 scale)	1.32 (0.38)	1.18 (0.27)

Table 2

Correlations among the substance use variables and delinquency variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Alcohol Use at Baseline	1.00											
2. Alcohol Use at Follow-Up	0.41	1.00										
3. Heavy Drinking at Baseline	0.85	0.33	1.00									
4. Heavy Drinking at Follow-Up	0.35	0.79	0.33	1.00								
5. Alcohol Consequences at Baseline	0.61	0.33	0.51	0.30	1.00							
6. Alcohol Consequences at Follow-Up	0.22	0.49	0.20	0.51	0.27	1.00						
7. Marijuana Use at Baseline	0.45	0.20	0.41	0.16	0.27	0.10	1.00					
8. Marijuana Use at Follow-Up	0.24	0.49	0.24	0.45	0.07	0.24	0.41	1.00				
9. Marijuana Consequences at Baseline	0.27	0.18	0.19	0.17	0.43	0.16	0.49	0.22	1.00			
10. Marijuana Consequences at Follow-Up	0.09	0.16	0.10	0.11	0.04	0.09	0.05	0.41	0.14	1.00		
11. Delinquency at Baseline	0.37	0.24	0.37	0.33	0.57	0.31	0.30	0.13	0.30	0.03	1.00	
12. Delinquency at Follow-Up	0.10	0.12	0.10	0.26	0.22	0.27	0.12	0.11	0.20	0.04	0.50	1.00

Note: Correlations over 0.14 are significant at $p < 0.05$

Table 3

Regression results from the cross-lagged models (standardized estimates and probability values)

	Std. Estimate	P-value
Alcohol use (days)		
Time 1 Delinquency to Time 2 Alcohol use	0.17	0.130
Time 1 Alcohol use to Time 2 Delinquency	−0.01	0.916
Heavy drinking (days)		
Time 1 Delinquency to Time 2 Heavy drinking	0.32	0.007
Time 1 Heavy drinking to Time 2 Delinquency	−0.04	0.601
Alcohol Consequences		
Time 1 Delinquency to Time 2 Alcohol consequences	0.28	0.030
Time 1 Alcohol consequences to Time 2 Delinquency	0.05	0.656
Marijuana use (days)		
Time 1 Delinquency to Time 2 Marijuana use	0.06	0.582
Time 1 Marijuana use to Time 2 Delinquency	0.00	0.945
Marijuana Consequences		
Time 1 Delinquency to Time 2 Marijuana consequences	−0.01	0.919
Time 1 Marijuana consequences to Time 2 Delinquency	0.06	0.394