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Short communication

Unemployment and substance outcomes in the United States 2002–2010☆,☆☆

Wilson M. Compton[a,*], Joe Gfroerer[b], Kevin P. Conway[a], Matthew S. Finger[a]

[a] National Institute on Drug Abuse, National Institutes of Health, 6001 Executive Blvd., MSC 9581, Bethesda, MD 20892-9581, United States
[b] Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, 1 Choke Cherry Road, Rockville, MD 20857, United States

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ABSTRACT

Background: The economic shock of 2008–2009 provided an opportunity to study the robustness of observed statistical associations between unemployment and problematic substance use.
Methods: Data from 405,000 non-institutionalized adult participants in the 2002 to 2010 U.S. National Survey on Drug Use and Health were used to compare substance outcomes among unemployed and employed persons. Association of unemployment with substance outcomes was examined for the years 2002–2004, 2005–2007, 2008, and 2009–2010, corresponding to periods prior to and after the economic downturn of 2008. Multivariate logistic regression models adjusted for age, sex, race/ethnicity, education, urban/rural residence, current DSM-IV Major Depression, and local county unemployment rates.
Results: Higher rates of past month tobacco and illicit drug use, heavy alcohol use, and past-year drug or alcohol abuse/dependence were found among the unemployed. Markedly increased unemployment in 2009–2010 did not moderate the association between substance outcomes and employment. This association was not confounded by sex, age group, or race/ethnicity for tobacco and illicit drugs, although it varied for alcohol outcomes among 18–25 year-olds. Results based on retrospective data regarding marijuana use in the period prior to unemployment suggest its use was associated with future job loss.
Conclusions: Employment status was strongly and robustly associated with problematic use of substances. Prevention and treatment interventions are warranted for a group whose employment and resulting insurance status may impair access to much needed health care.

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1. Introduction

The connection between economic stress, substance use, and addiction is complex. Substance use and addiction can be both the cause and outcome of economic stresses (Davalos et al., 2012; French et al., 2011). For alcohol, results have been conflicting, suggesting either increased alcohol problems in response to economic stress (Arkes, 2007; Crawford et al., 1987; Davalos et al., 2012; Dee, 2001; Hammer, 1992; Janlert, 1997; Kriegbaum et al., 2011; Merline et al., 2004; Mossakowski 2008; Peck and Plant, 1986) or a moderating income effect (Ettner, 1997; Freeman, 1999; Johansson et al., 2006; Ruhm, 1995; Ruhm and Black, 2002). Studies highlighting the relationship between illicit drug use and employment, though few in number, have generally shown an inverse association of drug use to employment (De Simone, 2002; French et al., 2001; Platt, 1995). Studies have also addressed the implications for drug treatment (Platt, 1995) and have focused on the relationship between drug availability and employment (Gascon and Spiller, 2009).

In 2008 the world's economies, including that of the United States, collapsed (Hurd and Rohwedder, 2010; Mishel et al., 2012). The U.S. unemployment rate rose from 5.8% in 2008 to 9.3% in 2009 (Bureau of Labor Statistics, 2014). This economic shock provided a unique opportunity to study the impact of macroeconomic stressors on substance use and addiction. Thus, the present study used annual cross-sectional national surveys to estimate the statistical association of unemployment and problematic substance use during a period of high unemployment compared to earlier times of nearly full employment. The study examined the relationship of past month heavy alcohol use, use of illicit drugs, tobacco use, and past year DSM-IV alcohol and illicit drug abuse and dependence

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* Corresponding author. Tel.: +1 301 443 6504; fax: +1 301 443 2636.
E-mail address: wcompton@nida.nih.gov (W.M. Compton).

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Table 1
Unemployment, Past Month Heavy Alcohol Use, Illicit Drug Use and Tobacco Use, and Past Year Alcohol Abuse or Dependence, and Illicit Drug Abuse or Dependence among Employed and Unemployed Persons in the USA, Ages 18 and older, 2002–2010.

	Unemp. % (S.E.)	Employed % (S.E.)	Unemp. % (S.E.)	Employed % (S.E.)	Unemp. % (S.E.)	Employed % (S.E.)	Unemp. % (S.E.)	Employed % (S.E.)
Heavy Alcohol Use	**13.4 (0.64)**	**8.5 (0.14)**†	**11.4 (0.59)**	**8.5 (0.14)**†	**12.6 (1.06)**	**8.7 (0.23)*****	**11.2 (0.58)**	**8.4 (0.16)**†
Heavy Alc Use, age 18-25	16.4 (0.68)	15.8 (0.24)	14.6 (0.64)	16.2 (0.25)*	15.4 (0.96)	15.5 (0.44)	13.5 (0.57)	14.6 (0.31)
Heavy Alc Use, age 26-64	12.1 (0.90)	7.4 (0.16)†	9.9 (0.85)	7.4 (0.16)*	11.6 (1.58)	7.7 (0.27)*	10.5 (0.83)	7.6 (0.19)***
Illicit Drug Use	**18.3 (0.71)**	**8.5 (0.13)**†	**17.9 (0.72)**	**8.8 (0.14)**†	**19.5 (1.32)**	**8.5 (0.24)**†	**17.2 (0.66)**	**8.9 (0.18)**†
Tobacco Use	**49.4 (1.10)**	**33.8 (0.26)**†	**49.9 (1.05)**	**33.1 (0.26)**†	**47.3 (1.83)**	**32.0 (0.46)**†	**45.6 (0.98)**	**30.3 (0.31)**†
Alcohol Abuse or Dependence	**15.3 (0.72)**	**9.0 (0.13)**†	**14.4 (0.73)**	**9.0 (0.13)**†	**14.7 (1.04)**	**9.1 (0.25)**†	**12.4 (0.57)**	**8.3 (0.16)**†
Alcohol Ab/Dep, age 18–25/	19.7 (0.72)	18.0 (0.23)*	17.9 (0.73)	18.2 (0.25)	20.0 (1.11)	18.1 (0.42)	16.2 (0.65)	16.9 (0.30)
Alcohol Ab/Dep, age 26–64	13.4 (1.03)	7.6 (0.15)†	12.6 (1.05)	7b.6 (0.15)†	12.3 (1.48)	7.9 (0.29)**	10.8 (0.81)	7.1 (0.18)†
Illicit Drug Abuse or Dependence	**7.9 (0.50)**	**2.8 (0.07)**†	**8.8 (0.50)**	**2.6 (0.07)**†	**8.6 (0.80)**	**2.6 (0.11)**†	**6.6 (0.37)**	**2.5 (0.08)**†
Unemployment	**5.0 (0.10)**^{A} **2002–2004**		**4.6 (0.10)**^{A} **2005–2007**		**5.6 (0.20)**^{A} **2008**		**9.2 (0.18) 2009–2010**	

Notes: Employed includes persons working part-time or full-time.
Unemployment is calculated from NSDUH survey responses using BLS standards (i.e., calculated among those working or eligible for employment).
Unemployed v. Employed: $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$, $^{\dagger}p < .0001$.
Differences in Unemployment for Each Period v. 2009–2010: $^{A}p < .0001$.
Source: Substance Abuse and Mental Health Services Administration National Survey on Drug Use and Health, 2002-2010 Surveys.

to unemployment during 2002 through 2010. We hypothesized strong associations between unemployment and substance use outcomes. Consistent with the observation that higher prevalence can be associated with lesser influence of a risk factor (Helzer et al., 1992) we further hypothesized that the association between unemployment and problematic substance use would be moderated in 2009–2010. Finally, while the data in this study did not allow for prospective examination of the order of events, retrospective self-report information was available on the timing of both marijuana use and recent unemployment. Using these data, we conducted exploratory work on the timing of marijuana use and job loss.

2. Methods

2.1. Data

Data were from the Substance Abuse and Mental Health Services Administration (SAMHSA)'s 2002–2010 U.S. National Survey on Drug Use and Health (NSDUH), an annual national survey of civilian, non-institutionalized individuals (SAMHSA, 2013). Items in the NSDUH survey have good reliability and validity (SAMHSA, 2010; Jordan et al., 2008; Grucza et al., 2007). The nine years analyzed included data from approximately 405,000 respondents age 18 or older. Primary variables related to current employment status and the use of alcohol, tobacco, and illicit drugs. To adjust for potential confounders, models included data on education, demographics, location of residence, county-level unemployment rates, and past 12-month symptoms of major depression. Heavy alcohol use was defined as consumption of five or more drinks on the same occasion on each of five or more days within the 30 days prior to interview. Illicit drug use and tobacco use were defined as any reported use within the 30 days prior to interview. Abuse and dependence on alcohol and illicit drugs were based on DSM-IV criteria within the year prior to interview (American Psychiatric Association, 1994). For exploratory analysis of the timing of marijuana use in relation to onset of unemployment, self-report information about any use of marijuana during the period from 13 to 24 months prior to interview was used to determine whether or not marijuana use preceded the onset of unemployment in the past 12 months (Research Triangle Institute, 2011).

NSDUH employment questions generated estimates consistent with the U.S. Department of Labor's Bureau of Labor Statistics (BLS), which publishes the nation's official employment information (BLS, 2014). Respondents were categorized as unemployed if they were without a job, were actively looking for a job in the past four weeks, and were available for work at the time of the interview. Employed individuals included both full- and part-time workers. Local county-level unemployment rates from the BLS were used in multivariate models to adjust for the local macroeconomic environment.

2.2. Statistical analysis

Analysis was conducted using SAS with SUDAAN® to calculate standard errors adjusting for the complex sample design (Research Triangle Institute, 2008). Within both employed and unemployed groups, rates were calculated for five substance-use categories: (1) past-month heavy alcohol consumption, (2) past-month use of any illicit drug, (3) past-month tobacco use, (4) past-year DSM-IV alcohol abuse or dependence, and (5) past-year DSM-IV illicit drug abuse or dependence. Rates were combined across years 2002–2004, 2005–2007, 2008 and 2009–2010, and among age subgroups (18–25 years old, 26–64 years old, and 65 years old or older), males and females, and African American, Hispanic and white subgroups (other race/ethnic groups were too few in number for examination).

As a second step, multivariate logistic regression calculated odds ratios (OR) while controlling for demographic factors, educational level, urban/rural location, major depression, and local county employment rates. Past-year income was not included because confounding of income with past-year unemployment would make interpretation impossible. ORs for 2009–2010 were also compared to each of the earlier time periods using the z-statistic. 2009–2010 was chosen because it had the maximum unemployment. Although the recession started in late 2007 and ended in 2009 (Mishel et al., 2012), unemployment on a national level did not increase until the end of 2008. Conceptually, 2008 is the transition year, and the two time periods 2002–2004 and 2005–2007 are prior to the increase in unemployment.

To explore the sequence of timing of drug use and job loss, rates of marijuana use in the period from 13 to 24 months prior to the interview were compared for those with and without subsequent job loss within the 12 months prior to interview (i.e., "recently unemployed"). In addition, for persons who were not marijuana users during the period of 13–24 months prior to interview, the rate of past-month marijuana use was compared among the employed and recently unemployed. Data for these exploratory analyses were available starting with the 2005 survey, and only for marijuana use.

3. Results

Consistent with official U.S. rates (BLS, 2014), study subjects had markedly higher ($p < .0001$) rates of unemployment in 2009–2010 compared to earlier years (Table 1). For every time period, each category of problematic substance use was more prevalent among the unemployed (Table 1). Heavy alcohol use, illicit drug use, tobacco use, alcohol abuse or dependence, and illicit drug abuse or dependence were more prevalent among the unemployed before, at the start of, and during the 2009–2010 period of high unemployment. All of these differences were statistically significant at $p < .0001$ (except for one at $p < .001$).

The association between unemployment and substance use was consistent among race/ethnicity, sex, and age subgroups with the exception of alcohol abuse/dependence for the age 18–25 subgroup. For illicit drug use, tobacco use, and illicit drug abuse/dependence, a higher rate was found for the unemployed compared to the employed in every time period for race/ethnicity, sex. and age subgroups. By contrast (Table 1), for heavy alcohol use and alcohol abuse/dependence, the pattern was inconsistent for the age 18–25 subgroup, with no excess found for unemployed persons and, for the time period of 2005–2007, the rate of heavy alcohol use was higher among 18–25-year olds who were employed (16.2%) compared to the unemployed (14.6%, $p < .05$).

To examine the stability of the association between unemployment and substance use across time, adjusting for potential confounders, logistic regression was used to calculate the odds

Table 2
Odds Ratios (O.R.) for Past Month Heavy Alcohol Use, Illicit Drug Use and Tobacco Use, and Past Year Alcohol Abuse or Dependence, and Illicit Drug Abuse or Dependence among Unemployed (Full and Part-time Employed Combined, Reference, O.R. = 1.0) in the USA, Ages 18 and older, 2002–2010, controlling for Age, Sex, Race/Ethnicity, Education and Urban/Rural Location.

	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Heavy Alcohol Use	**1.41** (**1.25–1.59**)	**1.18** (**1.04–1.34**)	**1.29** (**1.04–1.61**)	**1.17** (**1.03–1.33**)
Illicit Drug Use	**1.79** (**1.61–1.99**)	**1.61** (**1.44–1.79**)	**1.96** (**1.63–2.36**)	**1.60** (**1.44–1.78**)
Tobacco Use	**1.60** (**1.46–1.75**)	**1.62** (**1.48–1.77**)	**1.51** (**1.29–1.77**)	**1.56** (**1.44–1.69**)
Alcohol Abuse or Dependence	**1.46** (**1.30–1.65**)	**1.37** (**1.20–1.56**)	**1.35** (**1.13–1.62**)	**1.28** (**1.14–1.44**)
Illicit Drug Abuse or Dependence	**1.96** (**1.68–2.28**)	**2.26** (**1.96–2.61**)	**2.20** (**1.75–2.76**)	**1.79** (**1.55–2.07**)
	2002–2004	**2005–2007**	**2008**	**2009–2010**

ratio as a measure of the magnitude of the association. As seen in Table 2, adjusting for the potential impact of age, sex, race/ethnicity, education, and urban/rural location across the different time periods, unemployed compared to employed persons were more likely to report heavy alcohol use (ORs 1.17–1.41), illicit drug use (ORs 1.60–1.96), tobacco use (ORs 1.51–1.62), alcohol abuse or dependence (ORs 1.28–1.46), and drug abuse or dependence (ORs 1.79–2.26). None of the odds ratios from 2009–2010 were significantly different than odds ratios from earlier time periods for any outcome.

To assess the potential that depression and macro-economic factors may have confounded the association between unemployment and substance use, additional logistic regression models adjusted not only for socio-demographic variables, but also for major depression (from the individually administered questionnaire) and rates of unemployment in the local county of each respondent. Results are only available for 2005–2010 because the questionnaire lacked items for major depression in earlier surveys. Although the odds ratios were reduced in magnitude, all remained significant: unemployed persons were more likely to report heavy alcohol use (ORs 1.15–1.28), illicit drug use (ORs 1.52–1.86), tobacco use (ORs 1.44–1.55), alcohol abuse or dependence (ORs 1.21–1.27), and drug abuse or dependence (1.67–2.05). None of the odds ratios varied significantly from 2009–2010 to earlier time periods for any of the outcomes (See Supplementary e-Table).

Regarding temporal differences in the association between employment and substance use, marijuana use 13–24 months prior to interview was strongly associated with past 12-month job loss. For every time period where data were available (i.e., 2005–2007; 2008; and 2009–2010) recently unemployed persons had 13–24 month marijuana use rates of 24.7% (S.E.0.90), 25.7% (S.E.1.82) and 23.9% (S.E.0.97), respectively, compared to the currently employed population's 13–24 month rates of 12.4% (S.E.0.16, $p < .00001$), 11.9% (S.E.0.29, $p < .00001$) and 12.6% (S.E.0.21, $p < .00001$). For those who reported no use of marijuana 13–24 months prior to interview, the rate of past-month use was higher for the recently unemployed. Among those denying marijuana use 13–24 months prior to interview, past-month use rates for the recently unemployed were 3.4% (S.E.0.54), 3.0% (S.E.0.76), and 2.8% (S.E.0.41), compared to 1.0% (S.E.0.04, $p < .0001$), 1.1% (S.E.0.11, $p = .014$), and 1.0% (S.E.0.06, $p < .0001$) for those employed. No similar 13–24 month data were available for the other substance-use outcomes.

4. Discussion

Consistent with prior literature, unemployment is associated with higher rates of tobacco use, heavy alcohol use, illicit drug use, alcohol use disorders, and illicit drug use disorders. Inconsistent with our hypothesis, we found that during a period of macro-economic distress, when the unemployment rate soared, the relationship of unemployment to problematic substance use persisted.

Findings were consistent across most subgroups with one exception: unemployment was not associated with higher rates of heavy drinking and DSM-IV alcohol abuse/dependence among 18–25 year olds. This distinct finding for alcohol consumption among young adults may reflect the high degree of acceptance of alcohol use in this age group. Additional longitudinal studies may be warranted that could help elucidate the pathways for alcohol consumption among young adults (Davalos et al., 2012).

Although associations alone cannot adequately inform the etiology relationships between employment and problematic substance use, we offer potential explanations deserving additional research attention. On the one hand, a pre-existing substance-use problem may increase the likelihood of losing employment. Alternatively, job loss may precipitate the onset or relapse of substance use. Still another explanation is that of correlated liability, where a third factor—perhaps an underlying trait such as stress-reactivity or impulsivity—may be related to both unemployment and problematic substance use. These contrasting explanations for the association could not be fully explicated in the current data because of their cross-sectional nature and the difficulties in identifying plausible measures to populate a structural model (French and Popovici, 2011). However, two of our findings regarding timing of marijuana use and loss of employment allowed some exploration of these issues. First, past-year job loss preceded past-month marijuana use (among those who were not using marijuana previously), suggesting a low-rate pathway from job loss to marijuana use. The second and more compelling finding was that prior marijuana use preceded unemployment, implicating marijuana use as a risk factor for job loss.

4.1. Limitations

Use of cross-sectional data did not allow tests of causality among the reported associations. This limitation notwithstanding, exploratory analysis of the timing of marijuana use and job loss suggested that use of marijuana may have been an important contributor to job loss even during a time of extraordinary economic difficulties. The retrospective ascertainment of these data limited their certainty, and the lack of information about timing of job loss in relation to use of other substances did not allow a test of the generalizability of this association.

An additional question was whether being employed full- or part-time influenced the results. Our study focused on overall unemployment because of the acuteness with which Americans lost their jobs entirely during the recession. To partly address this limitation, we excluded those employed part-time and examined the odds ratios for substance outcomes among unemployed compared to full-time employed. We found results for the full-time only group were nearly identical to the results for the combined full-time and part-time categories. However, this did not constitute a complete examination of part-time employment as an issue. A related limitation was the lack of examination of "underemployment" (i.e., individuals working fewer hours or working in lower paying jobs than they prefer) and whether underemployment was also associated with problematic substance use. More detailed examination of the types of jobs lost and comparison of

full- and part-time employment was beyond the scope of this study and remains open for further research.

4.2. Conclusions

Unemployment was associated with higher rates of tobacco, heavy alcohol and illicit drug use as well as alcohol and illicit drug use disorders, and this association persisted during an historical period of extraordinary economic shock. At the very time when health insurance may be particularly vulnerable and public funding for services may contract, the need for prevention and treatment services remains high, yet may be particularly difficult to access.

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Contributors

Compton, Gfroerer and Conway designed the research. Gfroerer supervised the data analysis and statistical analysis. Finger and Compton produced final tables for publication. Finger conducted literature searches for the background. Compton produced the first full draft of the manuscript. All authors provided critical editing and contributed to the final manuscript. All authors approve the final manuscript.

Conflict of interest

All authors affirm that there are no conflicts of interest with any people or organizations that could be perceived to have influenced this work. This research was conducted as part of official work at SAMHSA (JG) and the National Institute on Drug Abuse (WC, KC, MF).

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.drugalcdep.2014.06.012.

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