

Higher Rates of Adolescent Substance Use in Child Welfare Versus Community Populations in the United States

DANIELLE L. FETTES, PH.D.,^{a,b,*} GREGORY A. AARONS, PH.D.,^{a,b} AND AMY E. GREEN, PH.D.^{a,b}

^aDepartment of Psychiatry, University of California, San Diego, San Diego, California

^bChild & Adolescent Services Research Center, Rady Children's Hospital, San Diego, California

ABSTRACT. Objective: Youth substance use exacts costly consequences for a variety of important health outcomes. We examined and compared prevalence rates and a common set of psychosocial factors of lifetime and current substance use among child welfare-involved youths and community youths from two nationally representative data sets. **Method:** Using the National Survey of Child and Adolescent Well-Being and the National Longitudinal Study of Adolescent Health, we compared prevalence rates and conducted logistic regression models for eight binary outcome measures of substance use: lifetime and current use of alcohol, inhalant, marijuana, and other illicit drugs to examine predictors of substance involvement in the two samples. **Results:** Substance use prevalence was higher among child welfare-involved youths than community youths for lifetime marijuana use, lifetime and current inhalant use, and lifetime and current other illicit drug use. Among both

child welfare-involved and community youths, delinquency was the factor most strongly associated with all lifetime substance use outcomes. Notably, family structure and parental closeness were important protective factors against current substance use among child welfare-involved youths. For community youths, poorer emotional health was the strongest indicator of current substance use. **Conclusions:** Substance use among all adolescents is a critical public health concern. Given the heightened vulnerability of child welfare-involved youths, it is particularly important to focus prevention and early intervention efforts on this population. Further research should explore additional factors associated with substance use among these youths so that child welfare and behavioral health systems may jointly target prevention and intervention efforts. (*J. Stud. Alcohol Drugs*, 74, 825–834, 2013)

ADOLESCENT SUBSTANCE USE is a leading public health concern in the United States (Center on Addiction and Substance Abuse, 2011; Fettes and Aarons, 2011). Adolescence is a crucial period for the initiation of alcohol and other drug use, setting the stage for a range of harmful consequences. Ninety percent of U.S. adults who suffer from chronic problematic use started smoking, drinking, or using other drugs before age 18 (Center on Addiction and Substance Abuse, 2011). The consequences of youth substance use are staggering in both financial and human terms. The financial costs of adolescent substance use include an estimated \$68 billion annually associated with underage drinking alone (Center on Addiction and Substance Abuse, 2011). Immediate health consequences of adolescent substance use include injuries (Spirito et al., 1997); sexual risk taking (Tapert et al., 2001); unintended pregnancies (Silverman et al., 2001); medical conditions such as asthma (Band et al.,

2002), depression (Brook et al., 2002), and anxiety (King et al., 2004); and impaired brain function (Tapert et al., 2002). Substance use also is a major contributor to three leading causes of death among adolescents—accidents, homicides, and suicides (Centers for Disease Control and Prevention, 2010). Substance use is linked to poor academic performance and educational achievement (Martins and Alexandre, 2009) and delinquency (Eklund and af Klinteberg, 2009).

Youths with public sector service involvement, such as those involved with the child welfare system, are at elevated risk for alcohol and drug use (Aarons et al., 2001, 2008). The lives of child welfare-involved youths are characterized by problems such as child abuse, neglect, poverty, domestic violence, and parental substance use problems (Burns et al., 2004). In 2011, more than 685,000 children and youths were victims of substantiated cases of child maltreatment (U.S. Department of Health and Human Services, 2012). Although

Received: July 18, 2012. Revision: April 15, 2013.

This work was supported by National Institute of Mental Health Grants R01MH072961 and R01MH092950 and by Centers for Disease Control and Prevention Grant R01CE001556. This research includes data from the National Survey on Child and Adolescent Well-Being, which was developed under contract with the Administration on Children, Youth, and Families, U.S. Department of Health and Human Services (ACYF/DHHS). The information and opinions expressed herein reflect solely the position of the author(s). Nothing herein should be construed to indicate the support or endorsement of its content by ACYF/DHHS.

This research also uses data from Add Health, a program project directed by Kathleen Mullan Harris and designed by J. Richard Udry, Peter S. Bearman,

and Kathleen Mullan Harris at the University of North Carolina at Chapel Hill, and funded by Grant P01-HD31921 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, with cooperative funding from 23 other federal agencies and foundations. Special acknowledgment is due to Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Information on how to obtain the Add Health data files is available on the Add Health website (<http://www.cpc.unc.edu/addhealth>). No direct support was received from Grant P01-HD31921 for this analysis.

*Correspondence may be sent to Danielle L. Fettes, Department of Psychiatry, University of California, San Diego, 9500 Gilman Drive, #0812, San Diego, California, 92093-0812, or via email at: dfettes@ucsd.edu.

most existing research on youth substance use is conducted with community samples, some evidence links child maltreatment to substance use problems (Dembo et al., 1988), including the development of substance use disorders (Clark et al., 1997) and the use of illicit drugs (Dube et al., 2003). Childhood maltreatment also is associated with a greater likelihood of having an alcohol use disorder (Goldstein et al., 2013) as well as illicit drug use (Huang et al., 2011) in early adulthood.

Previous studies have identified demographic, psychosocial, and contextual risk factors for substance use specifically among youths in child welfare, including gender, age, history of abuse, and mental health difficulties (Aarons et al., 2008; Vaughn et al., 2007). Although youths in the child welfare system are subject to unique experiences that may put them at high risk for substance use problems, research specific to substance involvement in this population is scarce (Ruffolo et al., 2003) and is virtually absent when aiming to understand substance use compared with nationally representative samples of youths. Most often, this research has been limited to specific populations (e.g., foster care) or regional data. In the current study, we compared national samples of child welfare-involved youths and community youths to address the public health concern over youth substance use, especially among vulnerable populations. To our knowledge, no other research has compared the prevalence of and risk factors for substance use between child welfare-involved youths and a normative population of U.S. community youths.

Multiple theoretical models highlight important factors associated with youth substance use, including socialization, stress/strain, disaffiliation, and transactional models, among others. In this study, we drew from the framework proposed by Wills and Yaeger (2003) that focuses on family factors and youth substance use. Consistent with this framework, we included background characteristics of youths and emphasized family characteristics and emotional and behavioral health as critical components to understanding youth substance use. We examined how these factors may differ for a vulnerable population of youths—those involved in child welfare—when compared with the general population of U.S. youths.

Among community youths, a number of factors such as demographics, individual characteristics, and environmental variables accentuate youth substance involvement. Previous research on demographic patterns associated with substance use has found increasingly similar patterns among males and females (Johnston et al., 2006; Wallace et al., 2003). White, American Indian, Cuban American, and biracial youths exhibit the highest rates of both lifetime and current prevalence of alcohol and illicit drug use, including the use of marijuana and inhalants (Wallace et al., 2003), whereas Black and Asian youths are less likely to initiate use compared with White and Hispanic youths (Donovan, 2004; Shih et al., 2010). Youths with lower socioeconomic status are

more likely to develop substance use disorders (Reinherz et al., 2000). Nonetheless, demographics alone account for a limited amount of variance in explaining the overall severity of youth substance involvement (Blum et al., 2000).

Family characteristics such as household structure and parental closeness are linked to the presence or absence of adolescent substance use. Youths whose families have experienced disruption are more likely to have ever used alcohol and marijuana (Flewelling and Bauman, 1990), with two-parent families being protective against drinking in the last year (Blum et al., 2000). Parental support is linked to overall lower substance use (Wills and Cleary, 1996). And, higher perceived emotional warmth and support are related to lower adolescent alcohol and illicit drug use (Zhang et al., 1999), whereas family connectedness is protective against both alcohol and marijuana use (Windle et al., 2008).

Additionally, certain psychosocial problems elevate the risk for youth alcohol and other drug involvement. Externalizing problems are consistent predictors of adolescent substance use (Helstrom et al., 2004), with delinquent behavior one of the most consistent risk factors for drinking initiation (Donovan, 2004). The relationship between substance involvement and internalizing problems such as depression or anxiety is less established, although several studies have found internalizing symptoms to be associated with adolescent substance use (Lewinsohn et al., 1995; McCarty et al., 2012).

Early substance use initiation has consistently been found to increase the risk of developing an addictive disorder (Brook et al., 2004; DeWit et al., 2000). For example, first use of alcohol at ages 11–14 years greatly heightens the risk of progression to the development of alcohol disorders and therefore is a reasonable target for intervention strategies that seek to delay first use as a means of averting problems later in life (DeWit et al., 2000). In addition, those who begin using any addictive substance before age 15 are six and a half times as likely to develop a substance use disorder as those who delay use until age 21 or older (Center on Addiction and Substance Abuse, 2011).

The purpose of the current study was to use parallel, national data sources to investigate whether child welfare-involved youths are at greater risk for substance use than community youths and to determine whether factors associated with substance involvement are similar between both populations. We focused explicitly on early adolescence because of the elevated risk of developing disorders among those first using alcohol and other substances at ages 11–14. We examined both lifetime and current use for four categories of substances: alcohol, marijuana, inhalants, and other hard drugs. Based on previous research using nonrepresentative samples of youths, we expected lifetime and current substance use to be higher for child welfare-involved than community youths. And, although prior work is limited, we anticipated that factors associated with adolescent substance use—such

as family features and emotional and behavioral health—also would be influential among child welfare-involved youths, although to what degree of similarity we could not foresee.

Method

Participants

Data were drawn from two U.S. national samples of youths: a child welfare sample—the National Survey of Child and Adolescent Well-Being (NSCAW), and a community sample—the National Longitudinal Study of Adolescent Health (Add Health). NSCAW examined the experiences of children and families involved in the child welfare system, with baseline data collected from 2000 to 2001. NSCAW used stratified, two-stage cluster sampling to select sampling units from a national sampling frame. This design resulted in child-level data collected in 96 counties from 36 states. A detailed NSCAW description can be found elsewhere (NSCAW Research Group, 2002). The present study used baseline data.

Add Health is a nationally representative, school-based sample of adolescents in the 7th through 12th grades, with baseline data collected during the 1994–1995 academic year (Harris, 2009). The Add Health primary sampling frame included all high schools in the United States that had an 11th grade and a minimum of 30 students. The final sample included 134 schools varying in size from fewer than 100 to more than 2,000 students. Data used for the present study were from the Wave 1 survey. This study was approved by the Institutional Review Boards at the University of California, San Diego, and Rady Children's Hospital.

Concern with the 6-year difference between baseline data collections is mitigated by the pattern that both lifetime and current alcohol and illicit drug use had lower rates of usage among early adolescents in 2000 than in 1994 (Johnston et al., 2011). Therefore, we expected that rates in NSCAW would be lower in 2000 than in 1994, making our approach conservative regarding child welfare risk.

The studies generate national estimates for child welfare-involved (NSCAW) and community (Add Health) youths. The current study samples included youths ages 12–14 at the time of the first interview, whose caregiver also participated, and for whom sample weights were available. The NSCAW sample size was 730 and the Add Health sample size was 4,445. No significant differences were found between those with missing data and those with complete data; thus, only cases with complete data were included.

Measures

Substance use involvement. We examined lifetime and current substance use in four categories: alcohol, marijuana, inhalants, and other illicit/hard drugs. Each variable was

based on youth report and was coded as binary. Because of slight differences in item wording, NSCAW items were categorized as substance use present for at least 1 day of use. For Add Health, substance use was categorized as present for at least one occurrence. Questions for both NSCAW and Add Health are included in Table 1. One notable difference occurred for current alcohol use. For the NSCAW data, current alcohol use was measured as past 30 days; Add Health asked about past 12 months use. Interpretation of differences between the samples regarding current alcohol use should be made with caution.

Demographics. Gender, age, and race/ethnicity were included in the analyses. Parental/caregiver education was coded in years of completed schooling based on the highest education level obtained. (Hereafter, parent and caregiver are referred to as *parent*.) Household structure was a binary measure indicating the presence of two parents.

Emotional and behavioral health. Three indices of emotional/behavioral health were used: perceived parental closeness, depression, and delinquency. For parental closeness, each youth was asked two questions about their relationship with their parent: (a) “How close do you feel to your (mother/father/caregiver/etc.)?” and (b) “How much do you think he/she cares about you?” The items were scored on a 5-point Likert scale (*not at all to a lot*). Items were combined and averaged, with the measure of closeness ranging from *not at all close to very close*. If the youth reported that one parent was not an active part of his or her life, only one parent was included (Harker, 2001).

Depression was measured with clinical scales. In NSCAW, depression was measured with the Children's Depression Inventory (CDI) long form, consisting of 27 items (Kovacs, 1992) (Cronbach's $\alpha = .87$ in this study). In Add Health, depression was measured with the 19-item, modified version of the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). The full CES-D consists of 20 items that assess depression symptoms for the previous week. Add Health used 16 of the 20 items as originally worded, plus 2 items whose wording is slightly altered from the original CES-D, and 1 item added by Garrison et al. (1991) for an adolescent adaptation. The modifications do not meaningfully affect the internal structure of the measure (Crockett et al., 2005) (Cronbach's $\alpha = .87$ in this study). Both the CDI and the CES-D are psychometrically sound instruments for the measurement of adolescent depressive symptoms (Kovacs, 1992; Radloff, 1991; Saylor et al., 1984). Because the measures were not identical, we used clinical cutoffs for depression. The clinical cutoff score for depression on the CES-D was 16 (Radloff, 1991); the clinical cutoff for depression on the CDI was $T > 65$ (Kovacs, 1992). Thus, depression was considered a dichotomous variable indicating not depressed or depressed.

Last, delinquency was assessed with 11 questions identical across the studies. Youths reported how often during the

TABLE 1. Survey items used to create substance use outcome measures for child welfare-involved (NSCAW) and community (Add Health) youths

Variable	NSCAW	Add Health
Lifetime alcohol use	"In your whole life, on how many days did you drink an alcoholic beverage, including beer, wine, wine coolers, and distilled spirits? Please do not include any sips you may have had from another person's drink."	"Have you had a drink of beer, wine, or distilled spirits—not just a sip or taste of someone else's drink—more than two or three times in your life?"
Current alcohol use	"In the last 30 days, on how many days did you drink an alcoholic beverage?"	"During the past 12 months, on how many days did you drink alcohol?" ^a
Lifetime marijuana use	"In your whole life, on how many days have you used marijuana (pot, grass) or hashish (hash)?"	"During your life, how many times have you used marijuana?"
Current marijuana use	"In the last 30 days, on how many days did you use marijuana or hashish?"	"During the past 30 days, how many times did you use marijuana?"
Lifetime inhalant use	"In your whole life, on how many days have you sniffed glue, gasoline, or other liquids and gases to get high?"	"During your life, how many times have you used inhalants, such as glue or solvents?"
Current inhalant use	"In the last 30 days, on how many days did you sniff glue, gasoline, or other liquids and gases to get high?"	"During the past 30 days, how many times did you use inhalants?"
Lifetime illicit drug use	"In your whole life, on how many days have you used hard drugs such as cocaine, crack, or heroin?"	"During your life, how many times have you used cocaine and/or tried any other type of illegal drug, such as LSD, PCP, Ecstasy, mushrooms, speed, ice, heroin, or pills, without a doctor's prescription?"
Current illicit drug use	"In the last 30 days, on how many days did you use hard drugs such as cocaine, crack, or heroin?"	"During the past 30 days, how many times did you use cocaine and/or how many times did you use any of these types of illegal drugs?"

Notes: NSCAW = National Survey of Child and Adolescent Well-Being; Add Health = National Longitudinal Study of Adolescent Health; LSD = lysergic acid diethylamide; PCP = phencyclidine; Ecstasy = 3,4-methylenedioxymethamphetamine. ^aCurrent alcohol use among community youths (Add Health) is coded as "yes" if youths responded that they had drunk "once a month or less, or between 3 and 12 times" or more in the past 12 months and were coded as "no" if they had drunk "1 or 2 days" or less in the past 12 months.

past 6 months (NSCAW) or past 12 months (Add Health) they had participated in the following activities: damaged property, shoplifted, ran away, stole something worth less than \$50, stole something worth \$50 or more, burglarized, stole a car, used/threatened to use a weapon, sold drugs, or participated in a group fight. Each delinquent act was coded as 0 = did not participate or 1 = participated, and the final delinquency measure was a summated scale. For more direct comparability, the Add Health scale was halved to represent a 6-month delinquency score. The Cronbach's α for the delinquency scale was .81 in the present NSCAW sample and .76 in the present Add Health sample.

Statistical analysis

Both NSCAW and Add Health have complex survey data, and both include adjustments for the stratification and clustering design, as well as individual grand sample weights. Accounting for the complex designs allows for generalization back to the national populations of youths in child

welfare (NSCAW) and U.S. adolescents (Add Health). First, we assessed the difference in proportions of alcohol use and the use of other substances for child welfare and community youths. *T*-tests were used to compare prevalence rates across the groups. We then examined factors associated with each substance use outcome via a series of logistic regressions. Data were analyzed separately for each data set using Stata Version 10 (StataCorp LP, College Station, TX), accounting for the complex designs and using appropriate sample weights.

Results

Descriptive information

As shown in Table 2, the NSCAW ($N = 730$) and Add Health ($N = 4,445$) samples had both similarities and differences. For example, the gender and age distributions of the group were similar, as were depression and delinquency. Both samples were racially/ethnically diverse, with NSCAW

TABLE 2. Youths' demographic characteristics and emotional and behavioral health: Child welfare (NSCAW) versus community (Add Health) youths

Independent variables	NSCAW (N = 730)	Add Health (N = 4,445)	Range	Sig. p
Female	.56 [.48, .65]	.51 [.49, .53]	0–1	n.s.
Age, in years	13.02 (0.78)	13.38 (0.66)	12–14	n.s.
White	.51 [.42, .59]	.70 [.63, .77]	0–1	<.001
Black	.28 [.19, .36]	.13 [.08, .19]	0–1	<.001
Hispanic	.15 [.08, .21]	.11 [.08, .15]	0–1	<.01
Another race	.07 [.04, .10]	.05 [.03, .07]	0–1	<.05
Parent/caregiver education, years	11.56 (2.47)	13.94 (2.45)	0–20	<.001
Two-parent/caregiver household	.32 [.25, .39]	.73 [.69, .76]	0–1	<.001
Parental closeness	4.27 (0.97)	4.72 (0.49)	1–5	<.001
Depression	.15 [.09, .20]	.14 [.13, .16]	0–1	n.s.
Delinquency	0.93 (1.91)	0.81 (0.96)	0–11	n.s.

Notes: Continuous measures include standard error in parentheses. Categorical measures include 95% confidence interval in brackets. NSCAW = National Survey of Child and Adolescent Well-Being; Add Health = National Longitudinal Study of Adolescent Health; sig. = significance; n.s. = not significant; weighted means are presented.

having lower proportions of Whites and higher proportions of Blacks, Hispanics, and other minorities. Household characteristics—education and structure—were significantly different for child welfare-involved youths compared with community youths. Only 32% of child welfare-involved youths resided in two-parent households compared with 73% in the community, and the average household education was just under 12 years for child welfare-involved youths compared with almost 14 years for the community sample.

Prevalence of substance use

As shown in Table 3, with the exception of alcohol use, the rates of substance use differed significantly in most cases when comparing the two samples. Child welfare-involved youths reported significantly higher rates of lifetime marijuana use (18%) than did community youths (14%); however, no substantial difference was found in current use between the two groups. Inhalant use was markedly higher among child welfare-involved youths. Twice as many child welfare-involved as community youths reported lifetime inhalant use (12% vs. 6%) and current inhalant use (5% vs. 2%). Although a relatively small proportion of youths used other illicit drugs such as cocaine and heroin, those in child welfare did so more often than community youths. Six percent of child welfare-involved youths reported lifetime hard drug use compared with 4% of community youths. Last, 3% of child welfare-involved youths reported current use compared with 2% of community youths, which is a statistically significant and meaningful 50% greater amount of reported hard drug use among child welfare-involved youths.

Indicators of substance use

To explain substance use for the two groups, a common set of factors was examined for their association with each

of the substance use outcomes. Table 4 presents odds ratios from the multivariate analyses for child welfare-involved and community youths, for each of the eight outcomes.

Alcohol use

Among child welfare-involved youths, delinquency was the primary factor associated with lifetime alcohol use, with youths who engaged in more delinquent acts significantly more likely to have ever had a drink. Delinquency also was strongly associated with lifetime alcohol use for community youths, as were age and ethnicity. Family structure was related to drinking among community youths, with those in dual-parent homes less likely to drink than peers from single-parent or other household arrangements.

The patterns for current alcohol use differed. For child welfare-involved youths, delinquency remained associated with drinking. Additionally, household structure and parental closeness were both strongly associated with drinking

TABLE 3. Substance use prevalence: Child welfare (NSCAW) versus community (Add Health) youths

Variable	NSCAW (N = 730)	Add Health (N = 4,445)	Sig. p
Alcohol			
Lifetime	43%	40%	n.s.
Current	16%	15%	n.s.
Marijuana			
Lifetime	18%	14%	<.01
Current	8%	7%	n.s.
Inhalant			
Lifetime	12%	6%	<.001
Current	5%	2%	<.001
Hard drug			
Lifetime	6%	4%	<.05
Current	3%	2%	<.10

Notes: NSCAW = National Survey of Child and Adolescent Well-Being; Add Health = National Longitudinal Study of Adolescent Health; sig. = significance; n.s. = not significant.

TABLE 4. Odds ratios from the logistic regressions of alcohol and other drug use for child welfare (NSCAW) and community (Add Health) youths

Variable	NSCAW		Add Health	
	Lifetime OR [95% CI]	Current OR [95% CI]	Lifetime OR [95% CI]	Current OR [95% CI]
Alcohol use				
Female	1.42 [0.71, 2.83]	1.12 [0.41, 3.04]	1.05 [0.89, 1.23]	1.39 [1.12, 1.74]**
Age	1.45 [0.98, 2.14]	1.32 [0.80, 2.17]	1.59 [1.41, 1.80]***	1.84 [1.49, 2.26]***
Black	1.14 [0.52, 2.50]	1.63 [0.61, 4.41]	0.60 [0.46, 0.76]***	0.47 [0.32, 0.69]***
Hispanic	1.00 [0.34, 2.92]	1.66 [0.37, 7.42]	0.89 [0.65, 1.22]***	0.60 [0.37, 0.97]*
Other race	1.68 [0.45, 6.25]	0.40 [0.08, 2.13]	0.83 [0.60, 1.16]	0.46 [0.30, 0.70]***
Parent education	1.10 [0.93, 1.29]	0.90 [0.75, 1.07]	0.98 [0.94, 1.02]	1.01 [0.96, 1.06]
Two-parent household	0.52 [0.26, 1.03]	0.35 [0.16, 0.77]*	0.80 [0.65, 0.99]*	0.64 [0.49, 0.82]***
Parental closeness	1.02 [0.69, 1.51]	0.51 [0.32, 0.81]**	0.86 [0.73, 1.02]	0.91 [0.76, 1.10]
Depression	0.99 [0.24, 4.10]	2.04 [0.53, 7.82]	1.41 [0.98, 2.05]	1.53 [1.05, 2.22]*
Delinquency	1.86 [1.17, 2.96]**	1.78 [1.35, 2.36]***	2.52 [2.22, 2.86]***	2.69 [2.40, 3.01]***
Marijuana use				
Female	2.51 [0.82, 7.67]	2.17 [0.84, 5.64]	1.11 [0.82, 1.50]	1.05 [0.75, 1.46]
Age	1.51 [0.81, 2.84]	2.42 [1.37, 4.28]**	1.73 [1.40, 2.13]***	1.61 [1.13, 2.28]**
Black	1.08 [0.42, 2.81]	3.27 [1.00, 10.67]	1.08 [0.67, 1.76]	1.02 [0.65, 1.61]
Hispanic	0.42 [0.17, 1.04]	0.11 [0.01, 0.76]*	0.97 [0.64, 1.47]	0.55 [0.32, 0.94]*
Other race	1.52 [0.48, 4.79]	6.07 [1.36, 27.21]*	1.48 [0.79, 2.75]	0.99 [0.47, 2.10]
Parent education	1.04 [0.88, 1.24]	0.81 [0.70, 0.93]**	0.98 [0.93, 1.03]	1.05 [0.98, 1.13]
Two-parent household	0.52 [0.20, 1.39]	0.38 [0.13, 1.12]	0.53 [0.40, 0.70]***	0.47 [0.33, 0.66]***
Parental closeness	0.79 [0.49, 1.25]	0.47 [0.28, 0.79]**	0.79 [0.61, 1.01]	0.80 [0.61, 1.04]
Depression	0.89 [0.30, 2.61]	1.11 [0.22, 5.64]	1.41 [0.93, 2.13]	2.19 [1.31, 3.66]**
Delinquency	1.66 [1.26, 2.20]***	1.74 [1.38, 2.19]***	2.90 [2.53, 3.34]***	2.82 [2.42, 3.29]***
Inhalant use				
Female	1.22 [0.37, 4.03]	0.43 [0.11, 1.63]	1.15 [0.80, 1.67]	1.09 [0.62, 1.91]
Age	0.78 [0.46, 1.31]	0.68 [0.38, 1.21]	0.71 [0.56, 0.89]**	0.47 [0.28, 0.78]**
Black	0.80 [0.14, 4.51]	8.09 [1.01, 64.58]*	0.34 [0.18, 0.65]**	0.47 [0.22, 1.00]*
Hispanic	1.03 [0.22, 4.80]	0.01 [0.00, 0.16]**	0.69 [0.36, 1.31]	0.37 [0.14, 0.97]*
Other race	0.52 [0.13, 2.04]	2.87 [0.54, 15.23]	1.10 [0.57, 2.11]	0.50 [0.15, 1.70]
Parent education	1.10 [0.85, 1.43]	0.84 [0.65, 1.09]	1.03 [0.96, 1.11]	0.97 [0.85, 1.10]
Two-parent household	0.49 [0.18, 1.35]	0.64 [0.18, 2.31]	0.98 [0.62, 1.54]	0.87 [0.47, 1.60]
Parental closeness	0.90 [0.34, 2.38]	0.31 [0.15, 0.66]**	0.86 [0.64, 1.15]	1.05 [0.71, 1.57]
Depression	2.14 [0.45, 10.11]	1.76 [0.36, 8.54]	1.95 [1.20, 3.17]**	2.03 [1.02, 4.06]*
Delinquency	1.83 [1.44, 2.33]***	1.86 [1.50, 2.29]***	2.56 [2.24, 2.93]***	2.76 [2.26, 3.37]***
Other illicit drug use				
Female	1.60 [0.46, 5.57]	0.06 [0.01, 0.56]*	1.49 [0.91, 2.44]	1.30 [0.65, 2.60]
Age	1.17 [0.67, 2.07]	1.22 [0.56, 2.66]	1.02 [0.76, 1.36]	1.00 [0.62, 1.60]
Black	2.70 [0.58, 12.71]	9.85 [1.14, 84.94]*	0.26 [0.11, 0.58]**	0.21 [0.09, 0.50]***
Hispanic	0.07 [0.01, 0.77]*	—	0.51 [0.25, 1.04]	0.43 [0.14, 1.30]
Other race	2.92 [0.37, 22.91]	—	0.99 [0.42, 2.36]	0.54 [0.23, 1.27]
Parent education	1.19 [0.83, 1.70]	1.13 [0.87, 1.47]	0.99 [0.91, 1.07]	1.03 [0.92, 1.15]
Two-parent household	1.89 [0.70, 5.07]	0.87 [0.17, 4.52]	0.81 [0.50, 1.31]	0.54 [0.28, 1.02]
Parental closeness	0.51 [0.19, 1.36]	0.81 [0.27, 2.42]	0.77 [0.57, 1.04]	0.78 [0.55, 1.12]
Depression	0.86 [0.20, 3.68]	1.57 [0.17, 14.51]	2.30 [1.45, 3.63]***	2.99 [1.65, 5.40]***
Delinquency	1.81 [1.48, 2.22]***	2.40 [1.45, 3.97]**	3.14 [2.62, 3.75]***	3.31 [2.56, 4.29]***

Notes: NSCAW = National Survey of Child and Adolescent Well-Being; Add Health = National Longitudinal Study of Adolescent Health; OR = odds ratio; CI = 95% confidence interval. Non-Hispanic White is the reference group; parent/caregiver education is in years; parental closeness is continuous; depression is binary—clinical cutoff for Center for Epidemiologic Studies Depression Scale [Add Health] and Children's Depression Inventory [NSCAW] used; delinquency is continuous and measured in 6-month increments.

* $p < .05$; ** $p < .01$; *** $p < .001$.

behavior, with youths living with two parents and youths who felt closer to their parents having significantly lower odds of current drinking. For community youths, many factors—age, gender, ethnicity, household structure, depression, and delinquency—were all significantly associated with current drinking. We found that girls, older youths, those with depressive symptoms, and those who engaged in delinquent behaviors drank more often. Additionally, ethnic minorities had significantly reduced odds of current drinking among community youths, as did youths living with two parents.

Marijuana use

The patterns for lifetime marijuana use were comparable to those for lifetime alcohol use. Among child welfare-involved youths, delinquency was the primary factor associated with lifetime marijuana use, with youths who engaged in more delinquent acts significantly more likely to have ever used marijuana. Older age, single-parent households, and delinquency were significantly associated with increased lifetime marijuana use among community youths.

Several factors were associated with current marijuana use among child welfare-involved youths, including age, ethnicity, parental education, and delinquency. In addition, parental closeness was found to be protective against current marijuana use, with child welfare-involved youths who reported higher perceived parental closeness being significantly less likely to have used marijuana in the last month. Among community youths, age and household structure were associated with current marijuana use, as was emotional health, with both youths who were depressed and those who engaged in more delinquent acts more likely to have recently used marijuana.

Inhalant use

Among child welfare-involved youths, delinquency was the sole factor associated with higher rates of lifetime inhalant use. Among community youths, older youths were less likely to have ever used inhalants, and Black youths were less likely than White youths to have done so. Depression and delinquency were both positively associated with lifetime inhalant use among community youths.

Several factors were significantly associated with current inhalant use among child welfare-involved youths. Blacks were significantly more likely and Hispanic youths less likely to have currently used inhalants than their White peers. Child welfare-involved youths who reported more parental closeness were less likely to have engaged in current inhalant use, and those who participated in more delinquent acts were more likely to have used inhalants in the last month. Among community youths, Black and Hispanic youths were less likely to have currently used inhalants than their White peers. Depression and delinquency were positively associated with current use among community youths.

Other illicit drug use

In the child welfare population, Hispanic youths were significantly less likely than Whites to have any lifetime hard drug use. Engaging in delinquent acts is again significantly associated with illicit drug use among child welfare-involved youths. Among community youths, Blacks were significantly less likely than Whites to have used hard drugs. Depression and delinquency also were positively associated with lifetime hard drug use among community youths.

Among those in the child welfare population, girls were less likely than boys and Black youths were significantly more likely than Whites to have used hard drugs in the last month. Delinquency remained a significant factor for current drug use among child welfare-involved youths. Among community youths, Blacks were significantly less likely than Whites to have used hard drugs, and both depression and delinquency were positively associated with current hard drug use.

Discussion

A main finding of the current study is that child welfare-involved youths are at higher risk for substance involvement relative to community youths. Except for alcohol, prevalence rates were higher among child welfare-involved youths for all but one lifetime and current substance use outcome. It is not overly remarkable that no significant difference was revealed for alcohol use. As was noted, the measures differed slightly in their wording, with community youths responding to a more liberal measure of current use. In addition, alcohol is legally obtained and more accessible, and experimentation with alcohol is normative across adolescence (Jessor, 1987). The higher occurrence of illicit substance use among child welfare-involved youths is consistent with prior research demonstrating higher rates of substance use disorders among youths who had experienced child maltreatment (Aarons et al., 2010; Clark et al., 1997). Of note, child welfare-involved youths reported a significantly higher rate of hard drug use than did their community counterparts, although using a more conservative category of hard drugs. The proportion of users would likely be much higher when substances such as prescription drugs were included (as was the case for community youths). Taken together, our findings add to the evidence that child welfare-involved youths are a high-risk population for substance involvement. These findings highlight the need for prevention and early intervention efforts to improve adolescent and early adulthood health outcomes in this population.

Although our analyses cannot speak to temporal linkages, we reveal several compelling associations among youth factors and substance use. In particular, delinquency was the sole significant factor associated with lifetime alcohol, marijuana, inhalant, and hard drug use for child welfare-involved youths. This result suggests that, although these youths are more likely to experiment with substances, delinquency is an important factor to consider in prevention and intervention efforts. During early adolescence, child welfare case-management practices may attend not only to parental behavior (a primary focus of child welfare systems) but also to youth risk behaviors such as delinquency. Prevention efforts targeting delinquency within child welfare services may forestall negative health behavior outcomes for child welfare-involved youths (Babor et al., 2007). In addition, delinquent activity may reflect such features as a lack of parental monitoring (e.g., Barnes et al., 2006), identification with like-minded peers (e.g., Haynie and Osgood, 2005), or lack of involvement in structured activities (e.g., Persson et al., 2007), which also serve as shared risk factors for adolescent substance use. Future research should consider examining how delinquency may act as a marker for a latent, malleable attribute, potentially revealing an additional means by which to better direct prevention efforts.

Of note, both two-parent families and high levels of perceived parental closeness were strongly, negatively related to current substance use for child welfare-involved youths, indicating a protective effect of family factors in youth substance use among this population. Raising awareness of the role of parental support among this high-risk population is central, as prevention programs could identify high-risk families and enhance these potentially protective features in order to buffer other risk factors (Hawkins et al., 2002). Where applicable, a family-centered treatment approach may be preferred, especially if it may strengthen youth-parental bonding. In addition, boosting emotional ties with significant family members deemed supportive by the youths and/or parents not directly involved in substantiated maltreatment may afford some protection for youths not in kinship care.

Also of importance, race/ethnicity was a significant factor for substance use in both the child welfare and the community populations. Among community youths and with the exception of marijuana use, racial and ethnic minority youths, and especially Black youths, were less likely than their White peers to engage in substance use—lifetime or current. However, among child welfare-involved youths, Blacks had a much greater tendency than their White peers to currently use inhalants or other illicit drugs. Important differences among racial/ethnic minority youths should be explored in future research regarding substance use in order to effectively address prevention and early intervention needs of these youths.

Some limitations of this study warrant consideration. First, some estimates must be interpreted with caution because of the very small number of youths in some of the categories (e.g., child welfare-involved racial/ethnic minority youths who have used inhalants or hard drugs). Second, the cross-sectional nature of the analyses hinders the ability to make causal inferences or to conduct a longitudinal examination of the factors associated with youth substance use. Similarly, the calculation of social support varied as a function of family structure, and family structure differed across groups. Future research using more comprehensive measurement tools is warranted. Finally, not all variables in the two data sources were identical. However, both included empirically sound assessments of the constructs of interest, and we carefully considered comparability in our formulation and analyses.

Conclusion

The use of alcohol and illicit substances by youths leads to adverse health outcomes, and, as is illustrated in the current study, youths involved with the child welfare system are at high risk for substance involvement. Youths who use substances are more likely to become dependent than those who initiate use as adults, and the increased personal and societal costs follow them for a lifetime (Center on Addic-

tion and Substance Abuse, 2011). Given the strong influence that youth substance use has on both adolescent and adult physical and emotional health, the increased rates of use among child welfare-involved youths appear particularly distressing. Screening, brief intervention, referral, and treatment for substance involvement should be a regular part of case management and clinical activities.

The risk of substance use involves the confluence of a number of risk factors (e.g., deviant attitudes and behaviors) and protective factors (e.g., parental support). The child welfare system may be an ideal venue within which to disseminate and implement evidence-based alcohol and other drug prevention programs (Aarons et al., 2011). The results of the current study illustrate the vulnerability of child welfare-involved youths concerning problematic substance use. Child welfare and behavioral health systems and professionals should work together to recognize and respond appropriately to risk factors present for a given youth (Aarons et al., 2001). Addressing risk factors, and substance involvement itself, should give child welfare-involved youths the best chance at positive health outcomes.

References

- Aarons, G. A., Brown, S. A., Hough, R. L., Garland, A. F., & Wood, P. A. (2001). Prevalence of adolescent substance use disorders across five sectors of care. *Journal of the American Academy of Child and Adolescent Psychiatry, 40*, 419–426.
- Aarons, G. A., Hazen, A. L., Leslie, L. K., Hough, R. L., Monn, A. R., Connelly, C. D., . . . Brown, S. A. (2008). Substance involvement among youths in child welfare: The role of common and unique risk factors. *American Journal of Orthopsychiatry, 78*, 340–349.
- Aarons, G. A., Hurlburt, M., & Horwitz, S. M. (2011). Advancing a conceptual model of evidence-based practice implementation in public service sectors. *Administration and Policy in Mental Health and Mental Health Services Research, 38*, 4–23.
- Aarons, G. A., James, S., Monn, A. R., Raghavan, R., Wells, R. S., & Leslie, L. K. (2010). Behavior problems and placement change in a national child welfare sample: A prospective study. *Journal of the American Academy of Child and Adolescent Psychiatry, 49*, 70–80.
- Babor, T. F., McRee, B. G., Kassebaum, P. A., Grimaldi, P. L., Ahmed, K., & Bray, J. (2007). Screening, brief intervention, and referral to treatment (SBIRT): Toward a public health approach to the management of substance abuse. *Substance Abuse, 28*, 7–30.
- Band, P. R., Le, N. D., Fang, R., & Deschamps, M. (2002). Carcinogenic and endocrine disrupting effects of cigarette smoke and risk of breast cancer. *The Lancet, 360*, 1044–1049.
- Barnes, G. M., Hoffman, J. H., Welte, J. W., Farrell, M. P., & Dintcheff, B. A. (2006). Effects of parental monitoring and peer deviance on substance use and delinquency. *Journal of Marriage and Family, 68*, 1084–1104.
- Blum, R. W., Beuhring, T., Shew, M. L., Bearinger, L. H., Sieving, R. E., & Resnick, M. D. (2000). The effects of race/ethnicity, income, and family structure on adolescent risk behaviors. *American Journal of Public Health, 90*, 1879–1884.
- Brook, D. W., Brook, J. S., Zhang, C., Cohen, P., & Whiteman, M. (2002). Drug use and the risk of major depressive disorder, alcohol dependence, and substance use disorders. *Archives of General Psychiatry, 59*, 1039–1044.

- Brook, J. S., Adams, R. E., Balka, E. B., Whiteman, M., Zhang, C., & Sugerman, R. (2004). Illicit drug use and risky sexual behavior among African American and Puerto Rican urban adolescents: The longitudinal links. *Journal of Genetic Psychology, 165*, 203–220.
- Burns, B. J., Phillips, S. D., Wagner, H. R., Barth, R. P., Kolko, D. J., Campbell, Y., & Landsverk, J. (2004). Mental health need and access to mental health services by youths involved with child welfare: A national survey. *Journal of the American Academy of Child and Adolescent Psychiatry, 43*, 960–970.
- Center on Addiction and Substance Abuse. (2011). *Adolescent substance use: America's #1 public health problem*. New York, NY: The National Center on Addiction and Substance Abuse at Columbia University.
- Centers for Disease Control and Prevention. (2010). Youth risk behavior surveillance—United States, 2009. *Surveillance Summaries, June 4, 2010. Morbidity and Mortality Weekly Report, 59*, No. SS-5, 1–148. Retrieved from <http://www.cdc.gov/mmwr/pdf/ss/ss5905.pdf>
- Clark, D. B., Lesnick, L., & Hegedus, A. M. (1997). Traumas and other adverse life events in adolescents with alcohol abuse and dependence. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*, 1744–1751.
- Crockett, L. J., Randall, B. A., Shen, Y. L., Russell, S. T., & Driscoll, A. K. (2005). Measurement equivalence of the center for epidemiological studies depression scale for Latino and Anglo adolescents: A national study. *Journal of Consulting and Clinical Psychology, 73*, 47–58.
- Dembo, R., Dertke, M., Borders, S., Washburn, M., & Schmeidler, J. (1988). The relationship between physical and sexual abuse and tobacco, alcohol, and illicit drug use among youths in a juvenile detention center. *International Journal of the Addictions, 23*, 351–378.
- DeWit, D. J., Adlaf, E. M., Offord, D. R., & Ogborne, A. C. (2000). Age at first alcohol use: A risk factor for the development of alcohol disorders. *American Journal of Psychiatry, 157*, 745–750.
- Donovan, J. J. (2004). Adolescent alcohol initiation: A review of psychosocial risk factors. *Journal of Adolescent Health, 35*, 529.e7–529.e18. Retrieved from <http://www.sciencedirect.com/science/article/pii/S1054139X04000667>
- Dube, S. R., Felitti, V. J., Dong, M., Chapman, D. P., Giles, W. H., & Anda, R. F. (2003). Childhood abuse, neglect, and household dysfunction and the risk of illicit drug use: The adverse childhood experiences study. *Pediatrics, 111*, 564–572.
- Eklund, J. M., & af Klinteberg, B. (2009). Alcohol use and patterns of delinquent behaviour in male and female adolescents. *Alcohol and Alcoholism, 44*, 607–614.
- Fettes, D. L., & Aarons, G. A. (2011). Smoking behavior of US youths: A comparison between child welfare system and community populations. *American Journal of Public Health, 101*, 2342–2348.
- Flewelling, R. L., & Bauman, K. E. (1990). Family structure as a predictor of initial substance use and sexual intercourse in early adolescence. *Journal of Marriage and Family, 52*, 171–181.
- Garrison, C. Z., Addy, C. L., Jackson, K. L., McKeown, R. E., & Waller, J. L. (1991). The CES-D as a screen for depression and other psychiatric disorders in adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 30*, 636–641.
- Goldstein, A. L., Henriksen, C. A., Davidov, D. M., Kimber, M., Pitre, N. Y., & Afifi, T. O. (2013). Childhood maltreatment, alcohol use disorders, and treatment utilization in a national sample of emerging adults. *Journal of Studies on Alcohol and Drugs, 74*, 185–194.
- Harker, K. (2001). Immigrant generation, assimilation, and adolescent psychological well-being. *Social Forces, 79*, 969–1004.
- Harris, K. M. (2009). *The National Longitudinal Study of Adolescent Health (Add Health), Waves I & II, 1994–1996; Wave III, 2001–2002; Wave IV, 2007–2009* [machine-readable data file and documentation]. Chapel Hill, NC: Carolina Population Center, University of North Carolina at Chapel Hill.
- Hawkins, J. D., Catalano, R. F., & Arthur, M. W. (2002). Promoting science-based prevention in communities. *Addictive Behaviors, 27*, 951–976.
- Haynie, D. L., & Osgood, D. W. (2005). Reconsidering peers and delinquency: How do peers matter? *Social Forces, 84*, 1109–1130.
- Helstrom, A., Bryan, A., Hutchison, K. E., Riggs, P. D., & Blechman, E. A. (2004). Tobacco and alcohol use as an explanation for the association between externalizing behavior and illicit drug use among delinquent adolescents. *Prevention Science, 5*, 267–277.
- Huang, S., Trapido, E., Fleming, L., Arheart, K., Crandall, L., French, M., . . . Prado, G. (2011). The long-term effects of childhood maltreatment experiences on subsequent illicit drug use and drug-related problems in young adulthood. *Addictive Behaviors, 36*, 95–102.
- Jessor, R. (1987). Problem-behavior theory, psychosocial development, and adolescent problem drinking. *British Journal of Addiction, 82*, 331–342.
- Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2006). *Monitoring the future: National results on adolescent drug use. Overview of key findings, 2005*. Bethesda, MD: National Institute on Drug Abuse.
- Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2011). *Monitoring the future: National survey results on drug use, 1975–2010. Volume I: Secondary school students*. Ann Arbor, MI: Institute for Social Research, The University of Michigan.
- King, S. M., Iacono, W. G., & McGue, M. (2004). Childhood externalizing and internalizing psychopathology in the prediction of early substance use. *Addiction, 99*, 1548–1559.
- Kovacs, M. (1992). *The children's depression inventory manual*. New York, NY: Multi-Health Systems.
- Lewinsohn, P. M., Gotlib, I. H., & Seeley, J. R. (1995). Adolescent psychopathology: IV. Specificity of psychosocial risk factors for depression and substance abuse in older adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 34*, 1221–1229.
- Martins, S. S., & Alexandre, P. K. (2009). The association of ecstasy use and academic achievement among adolescents in two U.S. national surveys. *Addictive Behaviors, 34*, 9–16.
- McCarty, C. A., Wymbs, B. T., King, K. M., Mason, W. A., Vander Stoep, A., McCauley, E., & Baer, J. (2012). Developmental consistency in associations between depressive symptoms and alcohol use in early adolescence. *Journal of Studies on Alcohol and Drugs, 73*, 444–453.
- NSCAW Research Group. (2002). Methodological lessons from the National Survey of Child and Adolescent Well-Being: The first three years of the USA's first national probability study of children and families investigated for abuse and neglect. *Children and Youth Services Review, 24*, 513–541.
- Persson, A., Kerr, M., & Stattin, H. (2007). Staying in or moving away from structured activities: Explanations involving parents and peers. *Developmental Psychology, 43*, 197–207.
- Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385–401.
- Radloff, L. S. (1991). The use of the Center for Epidemiologic Studies Depression Scale in adolescents and young adults. *Journal of Youth and Adolescence, 20*, 149–166.
- Reinherz, H. Z., Giaconia, R. M., Hauf, A. M., Wasserman, M. S., & Paradis, A. D. (2000). General and specific childhood risk factors for depression and drug disorders by early adulthood. *Journal of the American Academy of Child and Adolescent Psychiatry, 39*, 223–231.
- Ruffolo, M. C., Evans, M. E., & Lukens, E. P. (2003). Primary prevention programs for children in the social service system. *Journal of Primary Prevention, 23*, 425–450.
- Saylor, C. F., Finch, A. J., Jr., Spirito, A., & Bennett, B. (1984). The children's depression inventory: A systematic evaluation of psychometric properties. *Journal of Consulting and Clinical Psychology, 52*, 955–967.
- Shih, R. A., Miles, J. N. V., Tucker, J. S., Zhou, A. J., & D'Amico, E. J. (2010). Racial/ethnic differences in adolescent substance use: Mediation

- by individual, family, and school factors. *Journal of Studies on Alcohol and Drugs*, 71, 640–651.
- Silverman, J. G., Raj, A., Mucci, L. A., & Hathaway, J. E. (2001). Dating violence against adolescent girls and associated substance use, unhealthy weight control, sexual risk behavior, pregnancy, and suicidality. *Journal of the American Medical Association*, 286, 572–579.
- Spirito, A., Rasile, D. A., Vinnick, L. A., Jelalian, E., & Arrigan, M. E. (1997). Relationship between substance use and self-reported injuries among adolescents. *Journal of Adolescent Health*, 21, 221–224.
- Tapert, S. F., Aarons, G. A., Sedlar, G. R., & Brown, S. A. (2001). Adolescent substance use and sexual risk-taking behavior. *Journal of Adolescent Health*, 28, 181–189.
- Tapert, S. F., Baratta, M. V., Abrantes, A. M., & Brown, S. A. (2002). Attention dysfunction predicts substance involvement in community youths. *Journal of the American Academy of Child and Adolescent Psychiatry*, 41, 680–686.
- U.S. Department of Health and Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau. (2012). *Child Maltreatment 2011*. Retrieved from <http://www.acf.hhs.gov/sites/default/files/cb/cm11.pdf>
- Vaughn, M. G., Ollie, M. T., McMillen, J. C., Scott, L. D., Jr., & Munson, M. (2007). Substance use and abuse among older youth in foster care. *Addictive Behaviors*, 32, 1929–1935.
- Wallace, J. M., Jr., Bachman, J. G., O'Malley, P. M., Schulenberg, J. E., Cooper, S. M., & Johnston, L. D. (2003). Gender and ethnic differences in smoking, drinking and illicit drug use among American 8th, 10th and 12th grade students, 1976-2000. *Addiction*, 98, 225–234.
- Wills, T. A., & Cleary, S. D. (1996). How are social support effects mediated? A test with parental support and adolescent substance use. *Journal of Personality and Social Psychology*, 71, 937–952.
- Wills, T. A., & Yaeger, A. M. (2003). Family factors and adolescent substance use: Models and mechanisms. *Current Directions in Psychological Science*, 12, 222–226.
- Windle, M., Spear, L. P., Fuligni, A. J., Angold, A., Brown, J. D., Pine, D., . . . Dahl, R. E. (2008). Transitions into underage and problem drinking: Developmental processes and mechanisms between 10 and 15 years of age. *Pediatrics*, 121, Supplement 4, S273–S289.
- Zhang, L., Welte, J. W., & Wieczorek, W. F. (1999). The influence of parental drinking and closeness on adolescent drinking. *Journal of Studies on Alcohol*, 60, 245–251.