



Marijuana-, alcohol-, and drug-impaired driving among emerging adults: Changes from high school to one-year post-high school



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ABSTRACT

Introduction: Driving while impaired (DWI) increases the risk of a motor vehicle crash by impairing performance. Few studies have examined the prevalence and predictors of marijuana, alcohol, and drug-specific DWI among emerging adults. **Methods:** The data from wave 3 (W3, high school seniors, 2012, $N = 2407$) and wave 4 (W4, one year after high school, $N = 2178$) of the NEXT Generation Health Study with a nationally representative cohort. W4 DWI (≥ 1 day of past 30 days) was specified for alcohol-specific, marijuana-specific, alcohol/marijuana-combined, illicit drug-related DWI. Multinomial logistic regression models estimated the association of W4 DWI with W3 covariates (perceived peer/parent influence, drinking/binge drinking, marijuana/illicit drug use), and W4 environmental status variables (work/school/residence) adjusting for W3 overall DWI, demographic, and complex survey variables. **Results:** Overall DWI prevalence from W3 to W4 changed slightly (14% to 15%). W4 DWI consisted of 4.34% drinking-specific, 5.02% marijuana-specific, 2.41% drinking/marijuana combined, and 3.37% illicit drug-related DWI. W3 DWI was significantly associated with W4 alcohol-related and alcohol/marijuana-combined DWI, but not other DWI. W3 marijuana use, binge drinking, and illicit drug use were positively associated with W4 marijuana-specific, alcohol/marijuana-combined, and illicit drug-related DWI, respectively. W3 friend drunkenness and marijuana use were positively associated with W4 alcohol-specific and marijuana-related DWI, respectively. W3 peer marijuana use was negatively associated with W4 alcohol-specific DWI. **Conclusions:** Driving under the influence of alcohol, marijuana, and illicit drugs is a persistent, threatening public health concern among emerging U.S. adults. High school seniors' binge drinking as well as regular alcohol drinking and marijuana/illicit drug use were independently associated with respective DWI one year after high school. Peer drunkenness and marijuana use in high school may be related to subsequent DWI of emerging adults. **Practical applications:** The results support the use of injunctive peer norms about getting drunk and smoking marijuana in guiding the development of prevention programs to reduce youth DWI.

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1. Introduction

Motor vehicle crashes are the leading cause of death among U.S. teenagers (Centers for Disease Control and Prevention [CDC], 2009a). Driving while alcohol- or illicit drug-impaired (DWI) increases the risk of a motor vehicle crash by impairing performance (Hingson, Heeren, Levenson, Jamanka, & Voas, 2002). This effect is particularly problematic among adolescents; alcohol-impaired youth are five times more likely to experience a motor vehicle crash compared to alcohol-impaired adults (Peck, Gebers, Voas, & Romano, 2008). Among high school (HS) students, the national prevalence estimates of drinking and driving range from 9% (Centers for Disease Control and Prevention, 2009b;

O'Malley & Johnston, 2013) to 12.5% (Li, Simons-Morton, & Hingson, 2013) in the past 30 days. Less data, however, are available on the prevalence of substance-specific DWI. One nationally representative study reported the prevalence of driving after marijuana, illicit drug, or alcohol use among HS seniors (O'Malley & Johnston, 2013). However, prevalence studies drawing conclusions from nationally representative samples are scarce with regard to substance-specific DWI among emerging adults (Fromme, Wetherill, & Neal, 2010; Kohn, Saleheen, Borrup, Rogers, & Lapidus, 2014; Whitehill, Rivara, & Moreno, 2014).

Findings from previous studies have identified several individual and social factors associated with adolescent DWI, including male gender (Sabel, Bensley, & Van Eenwyk, 2004), risky driving (Li et al., 2013), riding with an alcohol/drug-impaired driver (Sabel et al., 2004), poor family relationships (Dols et al., 2010), and previous driving offenses (Copeland, Shope, & Waller, 1996). Studies examining factors associated with DWI are lacking among young adults.

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In addition, there is a large body of research investigating socio-environmental predictors of substance abuse among young adults. It is well known that the transition from HS to post-HS is characterized by increased levels of substance use (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 2013). Facilitating factors, such as leaving home and going to college, are associated with increased levels of substance use. Previous research has identified factors protective against this detrimental trend, such as having fewer substance-using friends and higher parental monitoring (White et al., 2006). It is possible that risk and protective factors influencing substance use such as alcohol use/heavy drinking (Schulenberg & Maggs, 2002), smoking (Anda et al., 1999), drug use (Kandel & Logan, 1984), may be in turn related to DWI during the transition from HS to emerging adulthood. To our knowledge, no studies have examined the predictive association between socio-environmental variables and DWI one year after HS.

Accordingly, it is reasonable to hypothesize, that environmental changes occurring during the transition from HS to post-HS may influence levels of DWI. Previous research has indicated that both facilitating and protective factors associated with substance use may be modified by environmental changes (Bertrand et al., 2013; Sloboda, Glantz, & Tarter, 2012). However, the extent to which changes in post-HS environment may affect DWI is unclear.

Given the paucity of research examining DWI among young adults, the purpose of this study was to examine the prevalence and predictors of DWI in the 12th grade, the first year most study participants were fully licensed to drive (no restrictions), and one year after HS using a nationally representative sample of U.S. youth.

2. Methods

2.1. Sampling

Data for this study were from waves 3 (W3) and 4 (W4) (12th grade and one year after HS) of the NEXT Generation Health Study, a nationally representative longitudinal study with a probability cohort starting in the 2009–2010 school year in the United States (Li, Iannotti, Haynie, Perlus, & Simons-Morton, 2014; Li, Simons-Morton, Brooks-Russell, Ehsani, & Hingson, 2014). Primary sampling units were stratified by the nine census divisions. Within each census division, the sample of primary sampling units was first selected with probability proportional to the total enrollment. Within each selected primary sampling unit, 137 schools with 10th grade (W1) were randomly recruited, and 81 agreed to participate. We then randomly selected 10th grade classes within each selected school and recruited 3796 students to participate. From W1 to W4, a total of 2785 participants completed the survey. Out of a total of 2785 participants, 86% ($N = 2407$) and 78% ($N = 2178$) completed the survey in W3 and W4. Parental consent or participant's assent was obtained; participant consent was obtained upon turning 18. African American participants were oversampled to provide better population estimates and to provide an adequate sample to examine racial/ethnic differences. The study protocol was approved by the Institutional Review Board of the Eunice Kennedy Shriver National Institute of Child Health and Human Development, and the questionnaires were administered in the spring semester in each school year.

2.2. Measures

2.2.1. Driving while alcohol- or illicit drug-impaired (DWI, W3, and W4)

In W3, DWI was assessed with a single overall DWI item which asked participants how many days they drove after drinking alcohol or using illicit drugs in the past 30 days (recoded as a dichotomous variable due to the high skewness of the distribution: DWI ≥ 1 day vs. no DWI in the past 30 days). In W4, three substance-specific DWI items were collected to individually capture driving after alcohol, marijuana, or illicit drug use in the past 30 days. We created a 5-group categorical variable (alcohol-specific [did not include any other drugs], marijuana-

specific [did not include any other drugs], alcohol/marijuana-combined, illicit drug-related [illicit drug only or illicit drug + alcohol or/and marijuana] DWI ≥ 1 day vs. no DWI in the past 30 days) as the outcome variable. W4 DWI was used as the outcome variable and W3 DWI was used as a covariate.

2.2.2. Parental monitoring knowledge (W3)

Adolescents reported perceptions of their mother's and father's monitoring knowledge (separate items) from a 5-item scale (Brown, Mounts, Lamborn, & Steinberg, 1993) including who their friends were, how they spent their money, what they did with their free time, where they were after school, and where they went at night, with four response options (1 = don't have/see father or mother/guardian; 2 = he/she doesn't know anything; 3 = he/she knows a little; and 4 = he/she knows a lot).

2.2.3. Parental support of not using alcohol (W3)

One item was used to measure student-perceived parental support of not using alcohol. The question was derived from the National Survey on Drug Use and Health (United States Department of Health and Human Services. Substance Abuse and Mental Health Services Administration. Center for Behavioral Health Statistics and Quality, 2013) and asked participants how important it was to their parents/guardians that he or she does not use alcohol (response options from 1 = not at all to 7 extremely).

2.2.4. Alcohol drinking (W3)

Drinking alcohol was measured using one question, "On how many occasions (if any) have you drunk alcohol in last 30 days?" with response options 1 = never to 7 = 40 times or more. Due to a severe floor effect and non-normal distribution of the data (the same reason for substance use and heavy episodic drinking below), the scores were then dichotomized to at least once vs. none. This question was derived from the Health Behavior in School-aged Children questionnaire (Currie et al., 2004) and measured all four waves.

2.2.5. Binge drinking (W3)

Teens were asked, "Over the last 30 days, how many times (if any) have you had four (for females)/five (for males) or more drinks in a row within two hours?" with response options from 1 = none to 6 = 10 or more times. The scores were dichotomized: at least once vs. none. This question was adapted from the Monitoring the Future National Survey (Johnston, O'Malley, Bachman, & Schulenberg, 2010) and measured all four waves.

2.2.6. Substance use (W3)

Substance use was measured by asking participants 10 questions derived from the Monitoring the Future National Survey (Johnston et al., 2010) on how often they have ever used drugs (e.g., marijuana, ecstasy, medication to get high) in the last 12 months for all four waves with seven options from 1 = never to 7 = 40 times or more. Two dichotomous variables were then generated to indicate: (a) have used marijuana as least once vs. none in the last 12 months; and (b) have used illicit drug rather than marijuana as least once vs. none in the last 12 months.

2.2.7. Drunk and marijuana-smoking peer (W3)

The extent to which peers of the participant got drunk and smoked marijuana were measured by separate questions derived from the National Longitudinal Study of Adolescent Health (Harris et al., 2009) on how often they thought their five closest friends got drunk and smoked/used marijuana with options from 1 = never to 5 = almost always.

2.2.8. Driving licensure (W4)

Driving licensure was generated based on students' reporting if they had a license allowing independent, unsupervised driving. The analysis

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