



Impact of age at onset of cannabis use on cannabis dependence and driving under the influence in the United States



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ARTICLE INFO

Article history:

Received 9 January 2014

Received in revised form 15 December 2014

Accepted 16 December 2014

Available online xxx

Keywords:

Cannabis

Driving under the influence

Survey

Dependence

Age at onset

NESARC

ABSTRACT

Background and aims: There is growing evidence that driving under the influence of cannabis is associated with a higher risk of motor vehicle crash. Cannabis dependence has been reported to be associated with a three-fold increased risk of motor vehicle crash. The impact of the age at onset of cannabis use on the risk of both cannabis dependence and driving under the influence of cannabis has not been evaluated so far. **Methods:** Data were drawn from the 2001–2002 National Epidemiological Survey on Alcohol and Related Conditions (NESARC), a survey of 43,093 adults aged 18 years and older. We limited our analyses to the sample of participants who reported having ever used cannabis ($n = 8172$), of whom 8068 had a known age at onset of cannabis use.

Results: Of the 8068 participants included, 5.15% reported having driven under the influence of cannabis. Among those, only a minority (14.46%) were diagnosed with cannabis dependence.

Compared to those who start using cannabis at age 21 years or after, participants who used cannabis before the age of 14 years were 4 times more likely to have a history of cannabis dependence and 3 times more likely to reported having driven under the influence of cannabis. An inverse relationship between the age at onset of cannabis use and driving under the influence and risk of cannabis dependence was found.

Conclusions: Starting to smoke cannabis younger than 21 years is associated with both cannabis dependence and driving under the influence of cannabis.

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1. Introduction

Cannabis is the most widely illicit substance used in the United States (Compton et al., 2004). There is growing evidence that driving under the influence of cannabis is associated with a higher risk of motor vehicle crashes (Ch'ng et al., 2007; Laumon et al., 2005; Lenne et al., 2010; Mann et al., 2010; Ramaekers et al., 2004). Driving under the influence has been associated with self-report collisions (Asbridge et al., 2005), history of unsafe driving (Bedard et al., 2007) as well as with fatal crashes (Laumon et al., 2005). After alcohol, cannabis is the drug most often found in young

injured drivers (Ch'ng et al., 2007; Lacey et al., 2011; Laumon et al., 2005). Cannabis is increasingly detected in fatally injured drivers (Brady and Li, 2014). An in-depth review of the literature on marijuana use and traffic crash has been described elsewhere (Asbridge et al., 2012; Li et al., 2012).

Cannabis dependence has been reported to be associated with a nearly three-fold increased risk of motor vehicle crash (Mann et al., 2010), suggesting that cannabis dependence may account for a significant proportion of collisions related to cannabis use.

An early age at onset of alcohol use has been consistently associated with an elevated rate of alcohol dependence (Grant, 1998; Hingson et al., 2000, 2006), and independently with an increased risk of driving under the influence of alcohol (Hingson et al., 2002, 2003). However, the impact of the age at onset of cannabis use on the risk of both cannabis dependence and driving

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under the influence of cannabis has not been evaluated so far in a national representative sample.

We therefore (i) estimated the prevalence of driving under the influence of cannabis in the National Epidemiological Survey on Alcohol and Related Conditions (Grant et al., 2003) (NESARC), (ii) investigated whether participants who started using cannabis at an early age are more likely to develop cannabis dependence and (iii) estimated whether an early age at onset of cannabis use is associated with a higher risk of driving under the influence of cannabis after controlling for cannabis dependence and other personal characteristics.

2. Methods

2.1. Sample

We analyzed cross-sectional data from a population based national representative sample, the NESARC (Grant et al., 2003). The NESARC is a face-to-face survey of 43,093 adults (response rate, 81%), aged 18 years and older from the civilian non-institutionalized population residing in the United States, conducted by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) from 2001 to 2002. Recruitment and informed consent procedures received full ethical review and approval from the U.S. Census Bureau and the Office of Management and Budget. The NESARC oversampled Blacks, Hispanics, and young adults aged 18–24 years old. Data were adjusted for oversampling and household- and person-level non-response. The weighted data were then further adjusted to represent the civilian United States population based on the 2000 census.

2.2. Measures

2.2.1. Driving under the influence of cannabis

Driving under the influence of cannabis was assessed with 2 questions. Participants were asked “did you more than once drive a car, motorcycle, truck, boat, or other vehicle when you were under the influence of a medicine or drug?”

Participants responding positively to this question were then asked which medicines or drugs this happened with. Participants answering positively to the first question and mentioning marijuana in their answer to the second question were considered as having driven under the influence of cannabis.

2.2.2. Age at onset of alcohol or cannabis use

The lifetime use of cannabis was assessed by asking “have you ever used marijuana, hash, THC, or grass?”. Those responding positively were asked “How old were you when you FIRST used marijuana, hash, THC, or grass?”

The age at onset of cannabis use was categorized as younger than 14 years, separately for each year from 14 to 20 years old, and 21 years and older.

2.2.3. Lifetime cannabis dependence and heaviest use

The National Institute on Alcohol Abuse and Alcoholism’s Alcohol Use Disorder and Associated Disabilities Interview Schedule – DSM-IV (AUDADIS-IV) was used by interviewers to assess lifetime cannabis dependence as defined by DSM-IV criteria. The diagnosis of cannabis dependence required that at least 3 criteria from a list of 6 be met, including (1) tolerance; (2) persistent desire or unsuccessful attempts to reduce use; (3) time spent using cannabis or recovering from its effects; (4) giving up or reducing occupational, social and/or recreational activities to use; (5) impaired control; and (6) continued cannabis use despite physical or psychological problems.

Cannabis heaviest use was quantified by asking “At the time you were using marijuana the most, about how many joints did you usually smoke in a single day?” Participants reporting having smoked more than one joint of cannabis per day during heaviest use period were considered as having a history of heavy use.

2.3. Other measures

When mentioned, we included sociodemographic characteristics, including age, race, educational level, household income, region of residence, and urbanicity as covariates. Age at interview was categorized into: (i) 18–29, (ii) 30–44, (iii) 45–64 and (iv) ≥ 65 years old. Race/ethnicity was categorized into: (i) White, (ii) Black, (iii) Asian/Native Hawaiian/Pacific Islander, (iv) Hispanic/Latino, and (5) American Indian/Alaska Native. Educational level was classified into: (i) less than high school, (ii) high school graduate, and (iii) some college or higher. Total household income was classified into: (i) \$0–19,999, (ii) \$20,000–34,999, (iii) \$35,000–59,999, and (iv) \$60,000 or greater. Region of residence was classified into: (i) Northeast, (ii) Midwest, (iii) South, and (iv) West. Urbanicity was classified into: (i) rural and (ii) urban.

When mentioned, we also considered lifetime alcohol use disorders and nicotine dependence as covariates. The AUDADIS-IV included an extensive list of symptom questions that separately assessed DSM-IV criteria for nicotine dependence, and alcohol-abuse and dependence. Diagnoses of alcohol-abuse and dependence were derived using the same algorithm and were aggregated to produce a measure of “any alcohol use disorder.”

2.4. Statistical analyses

Weighted prevalence estimates and SEs were computed using SUDAAN, version 10.01 (Research Triangle Park, NC). This software implements a Taylor linearization to adjust SEs of estimates for complex survey sampling design effects including clustering data. Multivariate logistic regressions were conducted with simultaneous entry of sociodemographics covariates. Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) are presented to reflect association strength and significance.

3. Results

There were 43,093 participants in the NESARC sample. Of these, 8172 reported having ever used cannabis in their lifetime. Of those, 104 participants did not know their age at onset of cannabis use, and were removed from the analysis. The remaining participants in the NESARC were included in the analysis ($n = 8068$). The majority of them reported having ever used before the age of 21 years (83.24%, SE 0.47), while a minority reported having ever used cannabis before the age of 14 years (7.94%, SE 0.40). A small proportion of the sample reported lifetime cannabis dependence (6.09%, SE 0.35). Of the 8068 participants included, 409 (5.15%, SE 0.28) reported having been driving under the influence of cannabis.

A history of cannabis dependence and heavy use of cannabis during the period where participants used cannabis the most were associated with greater risk of driving under the influence of cannabis. In the subgroup of participants with cannabis dependence, 72.19% (SE 2.66) reported having driving under the influence of cannabis compared with 27.70% (SE 0.73) of cannabis users without cannabis dependence ($p < 0.001$). Among the respondents who smoked more than one joint per day during the period when they used cannabis the most, 53.13% (SE 1.18) reported having driving under the influence of cannabis compared with 18.98% (SE 0.69) of cannabis users who did not smoked more than one joint per day during the period when they used cannabis the most ($p < 0.001$).

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