Full length article

Excess mortality among people who report lifetime use of illegal drugs in the United States: A 20-year follow-up of a nationally representative survey

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ABSTRACT

Objective: The purpose of this study was to determine the mortality risks, over 20 years of follow-up in a nationally representative sample, associated with illegal drug use and to describe risk factors for mortality.
Methods: We analyzed data from the 1991 National Health Interview Survey, which is a nationally representative household survey in the United States, linked to the National Death Index through 2011. This study included 20,498 adults, aged 18–44 years in 1991, with 1047 subsequent deaths. A composite variable of self-reported lifetime illegal drug use was created (hierarchical categories of heroin, cocaine, hallucinogens/inhalants, and marijuana use).
Results: Mortality risk was significantly elevated among individuals who reported lifetime use of heroin (HR = 2.40, 95% CI: 1.65–3.48) and cocaine (HR = 1.27, 95% CI: 1.04–1.55), but not for those who used hallucinogens/inhalants or marijuana, when adjusting for demographic characteristics. Baseline health risk factors (smoking, alcohol use, physical activity, and BMI) explained the greatest amount of this mortality risk. After adjusting for all baseline covariates, the association between heroin or cocaine use and mortality approached significance. In models adjusted for demographics, people who reported lifetime use of heroin or cocaine had an elevated mortality risk due to external causes (poisoning, suicide, homicide, and unintentional injury). People who had used heroin, cocaine, or hallucinogens/inhalants had an elevated mortality risk due to infectious diseases.
Conclusions: Heroin and cocaine are associated with considerable excess mortality, particularly due to external causes and infectious diseases. This association can be explained mainly by health risk behaviors.

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1. Introduction

Illegal drug use significantly contributes to years lived with disability and to excess mortality (Degenhardt et al., 2013; Whiteford et al., 2013). These studies suggest that heroin and cocaine use, in particular, are associated with premature mortality (Degenhardt et al., 2011a, 2011b; Mathers et al., 2013), while results for cannabis and amphetamines are more equivocal (Calabria et al., 2010; Singleton et al., 2009). However, most of the existing studies have focused on clinical populations or cohorts of people who used illegal drugs.

Only a few studies have examined illegal drug use and mortality in the general United States population. Using data from the Epidemiologic Catchment Area (ECA) study, Eaton et al. (2013) found that both drug and alcohol abuse and dependence are associated with elevated mortality risk. Another study that used ECA data demonstrated that heroin use, including infrequent use, was associated with about a 3.5 fold excess risk of mortality, with the cause of death most commonly due to infections or injury (Lopez-Quintero

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et al., 2015). In two population-based studies, cocaine (Muhuri and Gfroerer, 2011; Qureshi et al., 2014) or heroin use (Muhuri and Gfroerer, 2011) were associated with elevated mortality risk; although, in one study, the association between cocaine use and mortality was no longer significant once the model adjusted for socioeconomic status, cigarette use, and alcohol use (Muhuri and Gfroerer, 2011).

There has been little examination of the factors that may explain the association between illegal drug use and mortality in the general population. Muhuri and Gfroerer (2011) reported that demographic and socioeconomic status factors, as well as current smoking and drinking, partially accounted for elevated mortality among individuals with substance use disorders. Additional factors that may also play a role in explaining the association between substance use and mortality have yet to be examined using population-based data. First, there are high rates of comorbidity of drug use and mental disorders (Compton et al., 2007; Grant et al., 2004; Kessler et al., 2005). Mental disorders are consistently associated with elevated risks of mortality (Walker et al., 2015) and, therefore, may be a risk factor for premature death among people who use drugs. Second, people who use illegal drugs may be less likely to engage in health promoting behaviors (Harrell et al., 2012) or to receive regular and quality healthcare (Benjamin-Johnson et al., 2009).

Given the paucity of population-based research on this topic, we used a nationally representative survey, the National Health Interview Survey (NHIS), to determine the mortality risks associated with illegal drug use over 20 years of follow-up. We examined the potential contributions of demographic, socioeconomic, health status, health risk factors, and health systems factors to the association between illegal drug use and mortality. We also describe mortality due to particular causes of death—external causes (including suicide, homicide, and unintentional injuries), drug poisoning, infectious disease, HIV, heart disease, and cancer.

2. Methods

2.1. Data source and population

The 1991 NHIS was a nationally representative, cross-sectional, household survey of the civilian, noninstitutionalized population of the United States, with interviews conducted continuously throughout the year by interviewers from the U.S. Census Bureau under contract for the National Center for Health Statistics (NCHS). Basic health and demographic information was collected on all household members in a basic core questionnaire, with additional information collected in special topic supplements. The core and each supplement data file were weighted to account for probability of selection and non-response and post-stratified to Census controls to be representative of the US population. Details of the NHIS methodology for data years 1985–1994 have been published elsewhere (Adams and Benson, 1992; Massey et al., 1989).

We used the public-use 1991 NHIS Drug and Alcohol Use supplement (NHIS-DAU; NCHS, 1992a), which was the only year in which this supplement was administered. The NHIS-DAU was self-administered in the home, using paper and pencil, and no telephone follow-up was permitted. For this analysis, we also used selected variables from another supplement from the same year—the Health Promotion and Disease Prevention supplement—and from the core questionnaire (NCHS, 2016a, 1992b). The 1991 NHIS-DAU was administered only to adults aged 18–44, with a final sample of 21,174 people. The final response rate for the NHIS-DAU was 75.4%, calculated by multiplying the NHIS household response rate (95.7%) by the NHIS-DAU sample person conditional response rate (78.8%) (NCHS, 1992a).

2.2. Outcome

The 1991 NHIS data was linked with the restricted-use mortality files through December 31, 2011. Information about data linkage and access is available on the NCHS website (NCHS, 2016b,c). The NCHS Research Ethics Review Board approved the linkage of NHIS participants to National Death Index data. The mortality files include information on vital status, cause of death, and date of death. Briefly, to determine eligibility for matching, records are screened to determine if they contained particular combinations of identifying information (e.g., last name, first name, and social security number; NCHS Office of Analysis and Epidemiology, 2013). Mortality status is then established through probabilistic record matching with the National Death Index; the matching methodology is described elsewhere (NCHS Office of Analysis and Epidemiology, 2013). Of the 21,174 individuals who completed the NHIS-DAU, 20,984 people had linked data on mortality status. All analyses were conducted on the 20,498 respondents who had both linked mortality and complete illegal drug use data.

The outcome variable is time to death. Follow-up time is defined as time from interview to death for decedents and interview to December 31, 2011 for survivors. The mean length of follow-up was 12.45 years for decedents and 20.52 years for survivors.

2.3. Illegal drug use variable

Respondents were asked if they had ever used (yes or no) heroin, cocaine, inhalants, hallucinogens, and marijuana. A composite variable of illegal drug use was created based on self-reported lifetime use of these drugs. The variable included a hierarchy of mutually exclusive categories of drug use: 1) heroin use (regardless of use of the other drugs), 2) cocaine use, no heroin (regardless of use of inhalants, hallucinogens, and marijuana), 3) inhalant or hallucinogen use, no heroin or cocaine (regardless of marijuana use), 4) marijuana use, no other drug use, and 5) no drug use.

2.4. Covariates

We examined five sets of factors that may be associated with mortality: demographics, socioeconomic factors, health status, health risk factors, and health systems factors. Demographic information included sex, age (18–24, 25–34, 35–44), and race/ethnicity (Hispanic, non-Hispanic Black, non-Hispanic White, and other). Socioeconomic factors included marital status, family income, and education. Health status included self-rated health (fair/poor, good, and very good/excellent) and negative mood. Negative mood, which was used as a proxy for mental health status, was assessed by 5 questions on how often participants felt bored, restless, depressed or low, upset by something said about them, and lonely in the past 2 weeks. The response options ranged from "never" (0) to "very often" (4), resulting in a summed score of 0–20 (Schoenborn and Horm, 1993). The negative mood variable was then categorized into low (0–2), moderate (3–9), and high (≥10) scores. Health risk factors included cigarette smoking status (never, former, or current smoker); episodic heavy alcohol use (no alcohol use in the past 12 months, alcohol use but no episodic heavy drinking days (days with 5 or more drinks), 5 or more drinks in a single day less than once a month, or 5 or more drinks in a single day once a month or more in the past year); physical activity (categorized by average daily kilocalorie (kcal) expenditure as sedentary (<1.5 kilocal.), moderately active (1.5–<3 kcal), or very active (≥3 kcal)); and body mass index (BMI) calculated from self-reported height and weight. Health systems factors included time since last routine check-up at the doctor (<1 year ago, 1–3 years ago, or 4 or more years ago), health insurance status, and whether or not the participant had a usual place of care.