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Comparisons of Cocaine-Only, Opioid-Only and Users of Both Substances in the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC)

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Abstract

Background—Cocaine and opioid co-use is a notable public health concern, but little is known about correlates of this behavior. Most prior findings come from treatment samples and concern cocaine and heroin. Findings from a nationally-representative sample involving primarily prescription opioid misuse would expand knowledge.

Methods—Past-12-month cocaine and/or opioid users in Wave 1 of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) formed the sample (*N*=839). Cocaine-only, opioid-only and cocaine/opioid co-users were compared regarding sociodemographics, other substance involvement, psychiatric and medical conditions/events.

Results—Opioid-only users were the largest group (*n*=622), followed by cocaine-only (*n*=144) and co-users (*n*=73). The vast majority of opioid misuse was of prescription opioids (1.4% with past-12-month use of heroin). Notably, co-users did not differ from single drug users in frequency of use of either drug. Co-users did not have significantly greater incidence of any psychiatric conditions, medial conditions or events.

In preliminary analyses, co-users were more likely than either single use group to report several classes of other drug use. However, for most comparisons, opioid use did not add substantial risk beyond cocaine use. Differences on multiple sociodemographic variables suggested opioid-only

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users were at lowest risk of negative outcomes. These results may relate to a finding that opioid-only users were less likely to have sought treatment.

Conclusions/Importance—This sample of past-12-month cocaine and/or opioid users had greater involvement with other substances, more psychiatric and medical conditions compared to the general population. Co-users had greater involvement with other substances than opioid-only users in particular.

Keywords

cocaine; opioid; heroin; comorbidity; alcohol use disorder; poly-substance use; epidemiology; nicotine; cannabis; help-seeking

INTRODUCTION

Background on cocaine and opioid co-use

Concurrent use of cocaine and opioids is a notable public health concern. Across several studies, prevalence of cocaine use among heroin users, including treatment and non-treatment samples, has been between 30–80% (Leri, Bruneau, & Stewart, 2003). For instance, in a methadone program in Los Angeles designed to limit the spread of HIV/AIDS, just over half of patients had used cocaine both before and during a course of methadone treatment (Grella, Anglin, & Wugalter, 1997). In a study of New York City methadone clinics, among newly admitted patients, 73% of urines were cocaine-positive, with this rate declining later in treatment but remaining substantial at 43% in months 34–36 (Magura, Kang, Nwakeze, & Demsky, 1998). Studies in other countries (e.g., Australia) have also found substantial levels of cocaine use upon initiation of treatment for heroin (40% in Williamson, Darke, Ross, & Teesson, 2007). Studies in non-treatment samples, which have been less common than treatment studies, have also shown frequent cocaine use among heroin users. In a Canadian sample, about 70% of heroin users also injected cocaine (Leri, Stewart, Tremblay, & Bruneau, 2004). In a separate Canadian study, 57% of opioid-dependent individuals reported past week use of opioids (primarily heroin but with substantial prescription opioid use) and cocaine (Leri et al., 2005).

Concurrent cocaine/opioid use presents particular personal and public health costs. This includes simultaneous use of cocaine and opioids (often referred to as “speedballing”) and non-simultaneous use (Leri et al., 2003). For instance, in Australia, heroin users who also used cocaine exhibited a greater likelihood of homelessness, unemployment, crime and needle sharing, but were not more likely to suffer from severe physical disabilities (Williamson, Darke, Ross, & Teesson, 2007). Cocaine/opioid co-use has also been associated with increased likelihood of psychiatric diagnosis. For example, Malow and colleagues found that speedball users had greater depression and anxiety than cocaine-only users (Malow, West, Corrigan, Pena, & Lott, 1992) though the aforementioned Williamson et al. (2007) study did not find increased incidence of psychiatric conditions. Higher likelihood of relapse in treatment is another important negative consequence of cocaine and opioid co-use. Cocaine use has been related to negative outcomes in heroin treatment in multiple studies, including those in the United States (Magura et al., 1998), the Netherlands

(Temorshuizen, Kroo, Prins, Geskus, van den Brink, & van Ameijden, 2005) and Australia (Williamson et al., 2007). Initial evidence shows that opioid use may undermine the efficacy of treatment for cocaine use as well (Greenwald, Lundahl, & Steinmiller, 2010).

Cocaine and prescription opioid co-use

Less is known about co-use of cocaine and prescription opioids. In the United States, since the 1980's, there has been a 400% increase in prescriptions for opioids, along with a parallel 400% increase in opioid overdose deaths and 600% increase in treatment admissions for prescription opioid misuse (CDC, 2011). With this shift toward greater prescription opioid use and abuse, focus on co-use of cocaine and prescription opioids is of increasing importance. In the 2003 National Survey on Drug Use and Health, compared to those who abstained from cocaine, past-year cocaine users had a significantly greater likelihood of past-year prescription opioid use for non-medical purposes (18 times more likely among women and 14 times more likely among men) (Tetrault, Desai, Becker, Fiellin, Concato, & Sullivan, 2008).

Correlates of cocaine and opioid co-use

Due to the negative impact of cocaine and opioid use and, in particular, co-use, it is important to know more about correlates of cocaine and opioid use and specifically, characteristics that distinguish users of one substance from co-users. Correlates of co-use may contribute to enhanced risk associated with this behavior. Key correlates include use of other substances and meeting criteria for other substance use disorders. Prior reports have suggested that use of other substances is common among cocaine and opioid users (Frank & Galea, 1996; Monga et al., 2007). However, precise information regarding use of which substances and which types of substance use disorders are more common among cocaine and opioid co-users, compared to users of one or the other drug, are lacking.

In general, little is known about correlates of cocaine/opioid co-use, particularly among community samples, given that most recent findings come from treatment samples. In addition, much of our knowledge about cocaine/opioid co-use pertains to heroin, not prescription opioids. Therefore, findings from a representative community sample where the majority of opioid misuse was of prescription opioids rather than heroin would enhance completeness of knowledge in this area. The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) is an outstanding source of data to learn more about correlates of cocaine use, opioid use and concurrent use of both substances.

The NESARC as a source of data on cocaine and opioid co-use

The large size of the NESARC offers an advantage, as does its representativeness of the United States population. While the NESARC is a two-wave prospective study, we opted to use only Wave 1 data. Wave 2 retention differed based on drug use status with rates significantly lower among cocaine-only compared to opioid-only users. The cocaine/opioid co-use group declined from 73 to only 54 in Wave 2, thus we had concerns about the small size of this group. These findings introduced concerns about validity of prospective analyses, thus we opted to utilize Wave 1 data only.

The present study is unique among prior published NESARC reports. We found no published analyses of the NESARC data that focused on cocaine and opioid co-use. Also, most prior Wave 1 NESARC analyses have focused on lifetime substance use and/or diagnoses (e.g., Florez-Salamanca et al., 2013; Grella, Karno, Warda, Niv, & Moore, 2009; Lev-Ran, Imtiaz, Rehm, & Le Foll, 2013; Saha et al., 2012; Vaughn, Fu, Perron, Bohnert, & Howard, 2010; Wu Woody, Yang, & Blazer, 2010; 2011; Yoon, Westermeyer, Warwick, & Kuskowski, 2012), however current status arguably has greater clinical relevance. Two investigations by Wu et al. (2010; 2011) are most relevant to the present study. Using Wave 1 data, they reported results involving data-driven (2010) and a priori (2011) groupings based on opioid misuse and reported on cocaine use among members of these groups, however no groupings centered on cocaine/opioid co-use and they focused on lifetime use. A report by Grella et al. (2009) from the Wave 1 data is also relevant. They examined gender differences and co-morbidity among those with lifetime diagnoses of opioid use disorder. They reported that almost half of these individuals met lifetime criteria for cocaine use disorder and that other psychiatric comorbidities were common as well with about 70% meeting lifetime criteria for mood or anxiety disorder. Prior NESARC studies have shown that lifetime prescription opioid misuse was associated with major depression and anxiety disorders (Martins, Fenton, Keyes, Blanco, Zhu, & Storr, 2012) and co-morbidity with other drug use disorders (Huang et al., 2006).

The present study

This study utilized data from Wave 1 of the NESARC. Specifically, we compared past-12-month users of cocaine only, opioids only and co-users with regard to sociodemographics, involvement with other substances, other psychiatric conditions and medical conditions/events. Our overall hypothesis was that co-users would be most likely to report a pattern of sociodemographics indicative of greater risk of negative outcomes (e.g., less likely to be married, less education). We also predicted that co-users would be more likely to use other substances, meet criteria for other substance use disorders and other psychiatric conditions and be more likely to suffer from various medical conditions.

METHODS

Sample

The NESARC is the largest, most comprehensive comorbidity survey to date (Grant et al., 2004). Wave 1 data collection (N = 43,093) occurred from 2001–2002. The main purposes of the NESARC included documenting prevalence rates for the Diagnostic and Statistical Manual of Mental Disorders, Fourth Revision (DSM-IV) substance use, mood, anxiety and personality disorders, along with medical conditions and events among the non-institutionalized population 18 years and older in the United States. The survey gathered information from individuals living in households, group living conditions and off base as military personnel. The Census Supplementary Survey (C2SS) provided the sampling frame for the household component of the NESARC. Within primary sampling units, households were systematically selected, and one adult respondent age 18 or older was selected at random from each sample household. To ensure appropriate representation, young adults, Hispanics and non-Hispanic blacks were over-sampled.

Data were gathered through face-to-face interviews conducted by U.S. Census workers in participants' homes, utilizing computer-assisted methods that protected confidentiality (Grant & Dawson, 2006). Individual, household and overall response rates were 93%, 89% and 82%, respectively. Informed consent and other research procedures received full review and approval from the U.S. Office of Management and Budget and the U.S. Censure Bureau. See Grant et al. (2004) for detailed methods.

The present study involves only those who self-reported use of cocaine and/or opioids at least once in the past 12 months. Opioid use was defined as use of heroin and/or opioid-based medications for non-medical purposes.

Measures

Sociodemographic—We examined several variables including sex; marital status (married or not); employment (employed full/part-time or unemployed) and age. Prescription opioid misuse is particularly common among both active military members (Jeffrey et al., 2013) and veterans (Barry et al., 2011), making military/veteran status an important sociodemographic variable to account for in the present study. We created a military affiliation variable by combining reports of current VA/military health care, indication of military job occupation or the armed forces as one's employer. A recent report stated that about 60% of veterans of recent wars have utilized VA health care since 2002, thus this variable should capture a substantial proportion of current military and veterans (Dept of Veterans Affairs, 2015).

Substance use—Participants were asked about use of substances without a prescription; more often, in greater amounts, or for longer than prescribed; or for a purpose not prescribed by a physician. We created a 3-category grouping to examine use of cocaine only, opioids only and both substances at least once in the past 12 months. Reports of powder and crack cocaine use were combined. Use of heroin and prescription opioids were covered in separate questions but were combined for this study. Given added risk of exposure to HIV/AIDS and other diseases due to needle-based administration (Degenhardt & Hall, 2012), we also compared whether or not participants reported needle-based administration between the cocaine and co-use groups (parallel opioid questions were not included in the NESARC).

For alcohol, we focused on incidence of past-12-month heavy drinking days (≥5 drinks for men, ≥4 for women), typical drinks per drinking day and peak number of drinks in a 24-hour period. For other substances (e.g., cannabis, see Table 2), we examined whether or not participants reported using each at least once in the past 12 months.

Substance use disorder, family history and other psychiatric diagnoses—Substance use disorders, other psychiatric disorders and family history of drug problems were assessed using the Alcohol Use Disorders and Associated Disabilities Interview Schedule-DSM-IV (AUDADIS-IV), a reliable and valid structured diagnostic interview (Grant, Dawson, Stinson, Chou, Kay, & Pickering, 2003). Participants also reported whether or not they have ever sought help for drug use.

Participants were asked about familial history of problems with drugs among any biological family members. We defined positive family history as reporting at least one first-order relative had a drug problem.

We considered 4 classes of other, current psychiatric diagnoses as binary variables: current major depression; mania; anxiety disorder due to stress; and any anxiety disorder. The anxiety disorder due to stress variable was a combination of reports of single or multiple episodes of panic, generalized anxiety, social or specific phobia(s) "when thinking about an extremely stressful experience" (no PTSD diagnosis was available in Wave 1 of the NESARC). For parsimony, individuals were considered to have a current anxiety disorder if they met criteria for panic disorder, agoraphobia, social phobia, any specific phobia, or generalized anxiety disorder. We also considered two classes of lifetime personality disorder: conduct or antisocial and any other personality disorder assessed in Wave 1 of the NESARC. Individuals were considered to have met criteria for a lifetime other personality disorder if they met criteria for dependent, obsessive compulsive, schizoid, paranoid or histrionic personality disorder.

We selected for analysis a priori medical conditions/events that were particularly likely to be related to cocaine and/or opioid use. We considered past-12-month incidence of arthritis (as an example of a painful condition that may be related to opioid use), any liver condition, any cardiac condition, serious injury that "caused you to seek medical help or to cut down your usual activities for more than half a day," overnight hospital stay and emergency room (ER) visit. The cardiac variable was a combination of items concerning hardening of arteries/atherosclerosis, high blood pressure/hypertension, chest pain/analgesia, rapid heartbeat/tachycardia, heart attack/myocardial infarction and other heart disease. The liver variable was a combination of items on cirrhosis and any other liver condition.

Statistical analyses

SAS, Version 9.3 was used. Distributions were examined for continuous variables. Where variables were skewed, winsorization down to mean + 3 SD, followed by transformation was attempted. Where this did not reduce skew substantially (typically due to a large number of zeros), binary versions were created (i.e., past-12-month heavy drinking, cigarette smoking, emergency room visit, serious injury). In preliminary analyses, we compared each variable across cocaine/opioid use groups, weighted to be representative of the US population. We used chi-square tests to evaluate differences across groups with the exception of *t*-tests when comparing two of the groups on continuous variables and *ANOVA* to compare across all groups. Comparisons were made using the SURVEYFREQ and SURVEYMEANS procedures, respectively, which enabled us to account for sample weights and strata based on certain sociodemographic criteria in the NESARC.

A subsequent series of logistic and linear regression models were conducted to determine which differences across cocaine/opioid use groups remained when holding constant any sociodemographic variables found to differ across cocaine/opioid use groups at $p < .10$ in the preliminary analyses. We again accounted for sample weights and strata, using SURVEYLOGISTIC and SURVEYREG procedures. In logistic regression models, dependent variables were past-12-month use of other substances; past-12-month diagnosis of

other substance use disorders and other psychiatric disorders (e.g., major depression) with the exception of personality disorders, which were based on lifetime diagnosis; and various medical conditions/events (e.g., recent injuries). Independent variables were sociodemographic variables, family history and the cocaine/opioid use variable. In linear regressions, we modeled the continuous outcomes for number of drinks in a drinking day and peak number of drinks in a drinking day, including the same covariates. In all regression models, two dummy codes were utilized for the cocaine/opioid use variable: cocaine use only versus other and opioid use only versus other. Though sociodemographic variables were also included in these regression models, we report only on results involving cocaine and opioid use and family history for parsimony, however full regression results may be obtained from the authors. Due to multiple comparisons, we set alpha for statistical significance at .01.

To characterize race/ethnicity in the study sample, we reported on all classifications, however for preliminary comparison across cocaine/opioid use groups, we used a variable with 4 options: White, Black, Hispanic and “other.” For purposes of analysis in the main models, we utilized a binary White/non-White variable. Regarding education, for preliminary comparison across cocaine/opioid groups, we examined a 3-option variable of less than high school, high school/GRE and at least some college, however for parsimony, in the main models, we utilized a binary at least some college/not variable.

For descriptive purposes, we compared use of heroin and other opioids, frequency of combined opioid use and age of onset of any opioid use between the opioid-only and co-use groups. Similarly, we compared cocaine use frequency and age of cocaine use onset between the cocaine-only and co-use groups. Frequency of use items had 10 options ranging from every day to once a year, which were reversed for analysis.

The 3 cocaine/opioid use groups were compared with regard to their use of alcohol, cigarettes and other substances. In analyses involving substance use disorder diagnoses, we combined diagnosis of current DSM-IV abuse or dependence into a single classification, with the exception of nicotine for which there was no abuse diagnosis. For descriptive purposes, we compared whether or not participants met criteria for a current or lifetime cocaine or opioid use disorder. For alcohol, nicotine and other substances, we examined current diagnoses only. For parsimony, we also examined whether or not participants met diagnostic criteria for a substance use disorder for any of the remaining substances in the NESARC.

RESULTS

Sample description

Most of the sample was male and unmarried. About half had at least some college education. About one-third was unemployed. A similar proportion had a positive family history of drug problems (Table 1). Whites made up 73%, followed by Hispanics (10.4%), Blacks (7.9%), mixed race (4%), Asian (2.6%), American Indian (1.7%) and Native Hawaiian/Pacific Islander (.4%).

In the full NESARC, 1.8% used opioids, while 0.5% used cocaine in the past 12 months (Table 2). Among NESARC Wave 1 respondents who reported past-12-month use of cocaine and/or opioid misuse (n=839), 84.2% used opioids while 25.9% used cocaine. Among past-12-month opioid users, 10.5% also used cocaine and among past-12-month cocaine users, 33.6% also used opioids (weighted estimates). The largest group was comprised of opioid users only (n=622, 74.1% of present study sample), followed by cocaine only (n=144, 17.2%) and co-users (n=73, 8.7%).

There were significant differences across cocaine/opioid use groups for age, sex, marital status and race, with a near significant trend for family history of drug problems. Cocaine/opioid co-users tended to be younger (Table 1) and were somewhat more likely than opioid-only users to have a family history of drug problems. The proportion of males was lowest in the opioid-only group, who were also the most likely to be married. Like co-users, opioid-only users had a high proportion of Whites and low proportion of Black respondents, compared to cocaine-only users.

Current substance use

Preliminary results—Prescription opioids made up the vast majority of opioid use with only 1.4% of the sample reporting past-12-month heroin use. Cocaine administration via needle was somewhat more common among cocaine/opioid co-users than among cocaine-only users (Table 2). There were no significant differences in cocaine use frequency between the cocaine-only and cocaine/opioid co-use groups. Similarly, there was no significant difference in opioid use frequency between the opioid-only and cocaine/opioid co-use groups. Co-users reported earlier ages of onset of use of each drug compared to single users (Table 3). The majority reported at least one heavy drinking day and cigarette smoking in the past 12 months. Heavy drinking rates were greater among co-users and cocaine-only users compared to opioid-only users. Number of drinks per drinking day and peak number of drinks were higher in co-users compared to opioid-only users with no significant differences from the cocaine-only group. Co-users were most likely to have smoked cigarettes, followed by the cocaine-only and the opioid-only group. Use of other substances was less common though nearly half reported past-12-month cannabis use. Co-users had the highest use rates of all other substances (Table 2).

Regression results—Based on logistic regressions holding key sociodemographics constant, cocaine/opioid co-users were significantly more likely than users of either substance alone to have taken tranquilizers and amphetamines. Co-users were more likely than cocaine-only users to have taken sedatives in the past 12-months, while the difference with opioid-only users was borderline significant. Cocaine/opioid co-users were more likely than opioid-only users to smoke cigarettes and cannabis and take hallucinogens and inhalants, while there was no significant difference from cocaine-only users for these substances (Table 4). Cocaine/opioid use did not relate significantly to past-12-month heavy drinking. Based on linear regressions, co-users reported significantly greater drinks per drinking day and peak number of drinks than opioid-only users with no significant difference from cocaine-only users (Table 5).

Substance use disorder diagnoses

Preliminary results—There were no significant differences between co-users and opioid-only users in likelihood of current or lifetime opioid use disorder or between co-users and cocaine-only users in likelihood of current or lifetime cocaine use disorder. Co-users had the highest rates of nicotine dependence. For alcohol and other substance use disorder and lifetime help-seeking for drug problems, rates were similar between co-users and cocaine only and noticeably higher than the opioid-only group (Table 2).

Regression results—Based on results from logistic regression models, co-users were significantly more likely than opioid-only users to meet criteria for current alcohol use disorder and other substance use disorder and also more likely to have sought help for drug problems. There were no significant differences with cocaine-only users. There were no significant differences for current nicotine dependence (Table 6).

Other psychiatric diagnoses

In preliminary analyses, the groups differed significantly with respect to lifetime conduct or antisocial personality disorder only, which was more common among cocaine-only than among opioid-only users (Table 2). As shown by logistic regression models, cocaine and/or opioid use was not significantly related to any of these psychiatric diagnoses (Supplemental Table 1).

Medical conditions/events

In preliminary analyses, the groups differed only with regard to likelihood of a past-12 month overnight hospital stay, which was more common among cocaine-only than the other groups and also more common among opioid-only than among co-users (Table 2). The significant difference between cocaine-only and co-users on this variable held in a logistic regression (Supplemental Table 2).

DISCUSSION

The sample had elevated incidence of all substance use, substance use disorders and psychiatric conditions compared to the population as a whole (Grant et al., 2004). Notably, co-users did not differ significantly from users of either cocaine or opioids only in frequency of use of cocaine or opioids, respectively. Thus, any findings indicating higher incidence among co-users was not likely to be due primarily to elevated use of cocaine or opioids compared to the single use groups. Opioid misuse was almost exclusively of prescription opioids and was more common than cocaine use. Accordingly, opioid use among cocaine users was more common than cocaine use among opioid users. Compared to the other two groups, opioid-only users had lower incidence for most variables. With the exception of lifetime conduct or antisocial personality disorder in a preliminary analysis only, there were no significant differences across cocaine/opioid use groups for other psychopathology. The only medical condition/event with a significant difference across groups was overnight hospital stay, which was most common among users of cocaine only in both preliminary and regression analyses.

As predicted, cocaine/opioid co-use was more problematic than use of either substance alone for multiple variables, notably past-12-month use of tranquilizers, amphetamines and sedatives, based on regression results. However, it was somewhat surprising that cocaine/opioid co-use was not associated with greater risk than current cocaine use alone in more of the regression models we tested. Indeed, with regard to multiple variables, past-12-month opioid use did not add substantially to the risk associated with past-12-month cocaine use. Examples included past-12-month use of cannabis and cigarettes; peak number of alcoholic drinks in a day and number of drinks per drinking day; current alcohol use disorder and other substance use disorder. These findings differ from the treatment literature where the addition of opioid use has been associated with substantially worse outcomes (Lions et al., 2014; Sullivan et al., 2010). The 10.5% rate of past-12-month cocaine use among opioid users in the present study was also noticeably lower than in prior studies of treatment samples (Leri et al., 2003; Termorshuizen, Krol, Prins, Geskus, van den Brink, & van Ameijden, 2005; Williamson et al., 2007).

With the exception of lifetime conduct or antisocial personality disorder in a preliminary analysis, there were no significant differences across cocaine/opioid use groups for other psychopathology. Similarly, the only significant difference among medical conditions/events was for a greater likelihood of a past-12-month overnight hospital stay among cocaine-only users, which was found in a preliminary analysis and a logistic regression model.

One possible reason for a lack of findings indicating greater risk among cocaine/opioid co-users has to do with family history of drug problems having relationships both to substance use and other psychiatric disorders. Psychopathology such as conduct/antisocial disorder is highly genetically influenced (Kendler et al., 2006; 2008), thus, it is not surprising that family history would have a stronger relationship to this condition than current cocaine use did.

Again, this sample as a whole had higher incidence of other substance use, substance use disorders, psychopathology and several medical conditions/events than the population as a whole. For instance, participants in this sample were almost 3 times more likely than the population as a whole to report major depression; more than 4 times more likely to report mania; and more than 5 times more likely to report an alcohol use disorder (Grant et al., 2004). Those in the sample were about 2.5 times more likely to have had an overnight hospital stay and more than 2.5 times more likely to have a serious injury in the past 12 months, compared to the general population (Adams, Kirzinger, & Martinez, 2013). Thus, in most cases, the differences between members of this sample and the general population in the likelihood of these conditions/events was much greater than among the individual substance use groups in this study, making it less likely to find significant differences among the substance use groups. Further, there is precedent in the literature for a lack of evidence of greater likelihood of psychiatric and medical conditions among cocaine and opioid co-users compared to other substance use groups (Williamson et al., 2007).

There was an interesting pattern of findings with regard to opioid misuse in the present study. The sociodemographic profile of opioid-only users suggested somewhat lower risk than the other two substance use groups, including a lower proportion of males, and greater

likelihood of being married. Thus, in a community sample, opioid misusers appear to be at elevated risk of myriad negative outcomes compared to the general population, but may face fewer negative outcomes compared to cocaine users and cocaine/opioid co-users. This pattern may also relate to the fact that opioid misuse was primarily of prescription opioids, which may be associated with different risk factors than heroin. For instance, a prior NESARC investigation found that lifetime prescription opioid users differed from heroin users with regard to which other drugs they endorsed using (Wu et al., 2011). The relatively lower risk profile among opioid-only users may have contributed to reduced perception of need for treatment, verified with their comparatively low rates of lifetime help seeking for drug problems in the present study. Reduced help-seeking may also relate to a perception that prescription opioid use is relatively safe (Manchikanti et al., 2012). The possibility that individuals who misuse prescription opioids are less likely to seek treatment is concerning and may contribute to the public health problem represented by these drugs. Clinical care providers should be made aware that opioid misusers may be less likely than users of other substances to present for treatment. In the present study, opioid users had elevated rates of overnight hospital stays and serious injuries compared to the general population. Thus, while these individuals may not be likely to present for treatment expressly for their substance use, they appear to be likely to present for other types of care, representing an opportunity for caregivers to intervene with these individuals.

The present investigation had limitations. These analyses were cross-sectional and thus do not speak to the extent to which cocaine/opioid co-use predicts subsequent outcomes. There are limitations in the assessment of treatment for pain and its relation to prescription opioid use in the NESARC. Data are not available regarding whether participants have received medical treatment for pain and further, whether their use of prescription opioids originated with treatment for a medical condition. We would have liked to have addressed these issues to learn more about the opioid-only group in comparison with the cocaine/opioid co-use group. We opted to combine prescription opioid misuse with heroin use into one category of opioid use in the present study, however given that there are likely to be differences between the group of prescription opioid and heroin users, this could also be considered a limitation. The military affiliation variable could be considered a limitation given that this was a variable we created based on reports of current VA/military health care, military job occupation or listing the armed forces as one’s employer and not an item posed directly in Wave 1 of the NESARC.

CONCLUSIONS

This study was unique in multiple respects. Cocaine and opioid co-use is a public health concern but under-addressed in research. In addition, most prior findings come from treatment samples and concern co-use of cocaine and heroin, whereas the present study utilized a community sample in which opioid misuse was primarily of prescription opioids. Cocaine/opioid co-users were more likely than single users of cocaine or opioids to have used multiple other substances in the past 12 months. However, in a number of other respects, use of opioids did not appear to add substantial risk above and beyond use of cocaine. It is important to note that in the sample as a whole, incidence of substance use, substance use disorders, other psychopathology and recent medical conditions/events was

elevated compared to the general population. It was also notable that elevated risk was observable based only on use of cocaine and opioids rather than on meeting criteria for a substance use disorder for these drugs. Given prior findings that cocaine use can persist or even increase after opioid use declines due to treatment (e.g., Cunningham Giovanniello, Kunins, Roose, Fox, & Sohler, 2013; Sullivan et al. 2010), there is merit to addressing both addictive behaviors simultaneously in treatment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Categorical sociodemographic characteristics for respondents ($N = 839$) reporting past 12-month use of cocaine only ($n = 144$), opioids only ($n = 622$) or both ($n = 73$): percentages within each grouping listed

Variables	Cocaine Only	Opioid Only	Co-use	Overall	Chi-sq p-val
Sociodemographic variables					
Male	69.6% [a]	54.5% [b]	68.2%	58.2%	.003
Married	22.1% [b]	35.3% [a]	11.2% [b]	30.8%	<.001
Highest Educational Attainment 1. <High School 2. High School/GED 3. At least some college	 1. 22.8% 2. 33.1% 3. 44.1%	 1. 14% 2. 30.8% 3. 55.2%	 1. 25.9% 2. 32.1% 3. 42%	 1. 16.6% 2. 31.3% 3. 52.1%	 .086
Unemployed not accounting for student status	37.4%	35.5%	42.1%	36.5%	.665
Unemployed and not a current student	25.7%	28.5%	26%	27.8%	.554
Military affiliation	21%	11.4%	19.2%	13.7%	.081
Race 1. White 2. Black 3. Hispanic 4. Other	 1. 61.2% [b] 2. 17.3% 3. 14.2% 4. 7.3%	 1. 75.9% [a] 2. 6.4% 3. 9.2% 4. 8.5%	 1. 70% [b] 2. 3.9% 3. 13.6% 4. 12.5%	 1. 73% 2. 7.9% 3. 10.4% 4. 8.7%	 .005
Drug family history	36.2%	29.8% [b]	48.3% [a]	32.7%	.018

Groups with differing superscript letters differed at $p \leq .01$

[1] comparison between opioid-only and co-use group

[2] comparison between cocaine and co-use group

Table 2

Categorical substance use, other psychopathology and medical conditions/events for respondents (N = 839) reporting past 12-month use of cocaine only (n = 144), opioids only (n = 622) or both (n = 73): percentages within each grouping listed

Variables	Cocaine Only	Opioid Only	Co-use	Overall	Chi-sq p-val
Percent with heavy drinking and use of cigarettes at least once in the past 12 months					
≥ 1 heavy drinking day	80% [a]	59% [b]	85% [a]	65.4%	<.001
Past-year cigarette use	72.6% [b]	58.2% [c]	84.8% [a]	63.2%	<.001
Percent using categories of drugs at least once in the past 12 months					
Prescription opioids	0%	99.4%	93.4%	83.1%	.133
Heroin	0%	0.8%	8.1%	1.4%	.088
Cocaine	100%	0%	100%	25.9%	n/a
Sedatives	15% [b]	22.5% [b]	44.7% [a]	23.6%	.002
Tranquilizers	12.6% [b]	21.1% [b]	51% [a]	22.8%	<.001
Amphetamines	11.4% [b]	7.7% [b]	46.8% [a]	12.2%	<.001
Cannabis	75.8% [a]	34.9% [b]	86.8% [a]	46.6%	<.001
Hallucinogens	29.2% [b]	5.9% [c]	51.1% [a]	14.2%	<.001
Inhalants	10.2% [a]	1.4% [b]	12.9% [a]	3.9%	.001
Substance use disorders—current (past 12 months) unless noted (met criteria for abuse or dependence)					
Opioid [1]	0%	19%	31.1%	17.2%	.091
Opioid: lifetime	5.1% [b]	31% [a]	46.4% [a]	28.4	<.001
Cocaine [2]	47%	0%	48.6%	12.3%	.809
Cocaine: lifetime	59.8% [a]	13.6% [b]	60.6% [a]	25.6%	<.001
Alcohol	67.4% [a]	40.9% [b]	76.1% [a]	48.6%	<.001
Nicotine dependence	45.5% [b]	43.2% [b]	65.1% [a]	45.8%	.010
Other substance	44.2% [a]	20.4% [b]	55.4% [a]	27.7%	<.001
Other drug-related variables					
Needle-based route of cocaine administration	3.6%	—	17%	8.7%	.015
Lifetime drug help-seeking	29.8% [a]	14% [b]	32.4% [a]	18.4%	<.001
Other psychopathology					

Variables	Cocaine Only	Opioid Only	Co-use	Overall	Chi-sq p-val
Current major depression	24.2%	16.9%	26.1%	19%	.136
Current any anxiety disorder	22.1%	24.4%	29.1%	24.8%	.706
Lifetime anxiety disorder due to stress	16.4%	11.5%	18.5%	13%	.346
Current mania	10.8%	6.8%	6.3%	7.4%	.526
Lifetime conduct or antisocial personality disorder	34.1% [a]	18.3% [b]	32.7%	22.2%	.002
Lifetime any other personality disorder	34.5%	29.6%	28.6%	30.2%	.629
Medical conditions/events occurring at least once within the past 12 months					
Arthritis	14.7%	22.4%	12.3%	20.2%	.070
Liver condition	5.7%	4.1%	7.9%	4.7%	.615
Cardiac condition	29.8%	28.8%	26.2%	28.7%	.900
Serious injury	26.1% [b]	32.8%	39.1% [a]	32.4%	.250
Emergency room visit	34.7%	32.5%	41.7%	33.8%	.470
Overnight hospital stay	28.7% [a]	14.4% [b]	4.8% [c]	15.7%	<.001

Groups with differing superscript letters differed at $p \leq .01$

[1] comparison between opioid-only and co-use group

[2] comparison between cocaine and co-use group

Table 3

Non-categorical sociodemographic and substance use characteristics for respondents ($N = 839$) reporting past 12-month use of cocaine only ($n = 144$), opioids only ($n = 622$) or both ($n = 73$): means and standard errors listed

Variables	Cocaine Only	Opioid Only	Both	Overall	*Anova p*-val
Sociodemographic variable					
Age	31.18 (0.95)	34.98 (0.62)[a]	27.88 (1.62)[b]	33.66 (0.50)	<.001
Age of onset of drug use					
Cocaine	22.18 (0.44)	—	19.51 (0.45)	21.14 (0.37)	<.001
Opioids	—	25.72 (0.57)	19.31 (0.69)	24.94 (0.51)	<.001
Past 12-month frequency of drug use					
Cocaine[1]	4.28 (0.22)	0	3.81 (0.30)	4.09 (0.19)	.312
Opioids[1]	0	2.62 (0.21)	3.51 (0.65)	2.73 (0.20)	.218
Past 12-month alcohol use					
Drinks per drinking day	5.75 (0.53)	3.96 (0.24)[b]	7.35 (0.91)[a]	4.59 (0.20)	<.001
Peak drinks in a day	11.17 (1.03)	8.02 (0.43)[b]	16.37 (1.63)[a]	9.37 (0.38)	<.001

Groups with differing superscript numbers differed at $p \leq .01$

[1]2 = 2 times per year, 3 = 3–6 times per year, 4 = 7–11 times per year

Table 4

Logistic regression analyses comparing respondents ($N = 839$) reporting past 12-month use of cocaine only ($n = 144$), opioids only ($n = 622$) or both ($n = 73$) with regard to past 12-month use of other substances and lifetime help-seeking for problems with drug use

	Heavy drinking			Cigarettes			Sedatives		
Variable	**OR**	**95% CI**	***p* value**	**OR**	**95% CI**	***p* value**	**OR**	**95% CI**	***p*-value**
Family history	2.01	1.32–3.07	.001	1.11	0.73–1.68	.620	1.75	1.15–2.66	.009
Cocaine use only	1.03	0.31–3.47	.961	0.54	0.22–1.32	.177	0.25	0.10–059	.002
Opioid use only	0.43	0.15–1.21	.110	0.33	0.15–0.72	.005	0.43	0.22–0.82	.011
	Tranquilizers			Cannabis			Amphetamines		
Family history	1.57	1.02–2.34	.040	1.40	0.91–2.17	.127	1.54	0.90–2.62	.114
Cocaine use only	0.15	0.07–034	<.001	0.60	0.27–1.32	.204	0.16	0.07–0.36	<.001
Opioid useonly	0.31	0.17–0.55	<.001	0.11	0.06–0.23	<.001	0.13	0.06–026	<.001
	Hallucinogens			Inhalants			Life time drug help seeking		
Family history	1.55	0.82–2.93	.177	0.90	0.33–2.44	.828	1.72	1.07–2.77	.021
Cocaine use only	0.53	0.22–1.26	.153	1.07	0.33–3.52	.910	0.83	0.39–1.76	.630
Opioid use only	0.07	0.03–0.15	<.001	0.16	0.05–0.48	.001	0.32	0.16–0.63	.001

Notes: For each model, dependent variable was at least one Incidence in the past 12 months compared to no incidences with the exception of lifetime drug help seeking where the dependent variable was at least one lifetime Incidence compared to no incidences. Cocaine use only and opioid use only were dummy codes with cocaine/oploid co-use as the reference group. Family history was coded 1 for at least one first-order relative with a history of a drug problem and 0 for no first-order relative with a history of a drug problem In each model, the following variables were held constant: sex, mantal status (currently married or unmarried), military status, educational attainment (at least some college or not), race/ethnicity (White or non-White), and age. Full results including findings for these covariates are available from the authors. OR: odds ratio, CI: confidence Interval.

Table 5

Linear regression analyses comparing respondents ($N = 839$) reporting past 12-month use of cocaine only ($n = 144$), opioids only ($n = 622$) or both ($n = 73$) with regard to past-12-month alcohol use

	Drinks per drinking day			Peak number of drinks in a day		
Variable	**beta**	**S.E.**	***p*-val**	**beta**	**S.E.**	***p*-val**
Family history	0.07	0.03	.01	0.10	0.03	.001
Cocaine use only	−0.02	0.05	.730	−0.07	0.06	.241
Opioid use only	−0.11	0.04	.009	−0.18	0.05	.001

Notes: Both alcohol variables winsorized, then log transformed to reduce skew. Cocaine use only and opioid use only were dummy codes with cocaine/opioid co-use as the reference group. Family history was coded 1 for at least 1 first order relative with a history of a drug problem and 0 for no first order relative with a history of a drug problem In each model, the following variables were held constant: sex, marital status (currently married or unmarried), military status, educational attainment (at least some college or not), race/ethnicity (White or Non-White) and age. Full results including findings for these covariates are available from the authors.

Table 6

Logistic regression analyses comparing respondents (N = 839) reporting past 12-month use of cocaine only (n = 144), opioids only (n = 622) or both (n = 73) with regard to diagnosis of current (past-12-month) DSM-IV alcohol use disorder, nicotine dependence and other substance use disorders.

	Alcohol Use Disorder			Nicotine Dependence			Other Substance Use Disorder		
Variable	**O.R.**	**95% C.I. for O.R.**	***p*-val**	**O.R.**	**95% C.I. for O.R.**	***p*-val**	**O.R.**	**95% C.I for O.R.**	***p*-val**
Family history	1.44	0.93–2.23	.100	1.31	0.90–1.90	.156	2.02	1.32–3.09	.001
Cocaine use only	0.85	0.39–1.85	.679	0.50	0.26–0.96	.039	0.85	0.41–1.74	.648
Opioid use only	0.37	0.19–0.73	.004	0.58	0.32–1.03	.064	0.33	0.17–0.61	<.001

Notes: Other substance use disorder included diagnosis of current (past-12-month) abuse or dependence for sedatives, tranquilizers, cannabis, inhalants, hallucinogens, amphetamines or other drugs. Cocaine use only and opioid use only were dummy codes with cocaine/opioid co-use as the reference group. Family history was coded 1 for at least 1 first order relative with a history of a drug problem and 0 for no first order relative with a history of a drug problem In each model, the following variables were held constant: sex, marital status (currently married or unmarried), military status, educational attainment (at least some college or not), race/ethnicity (White or Non-White) and age. Full results including findings for these covariates are available from the authors. O.R.: odds ratio, C.I.: confidence interval