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Examining gender differences in substance use and age of first use among rural, Appalachian drug users in Kentucky

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Abstract

Background/Objective—Past research suggests gender differences exist in types of substances used and age of first use. Recent studies exploring contextual differences in substance use between rural Appalachian and urban environments show different patterns of substance use in rural environments. This study explores whether previously established differences in gender and age of first use exist within a rural Appalachian environment.

Methods—Data are from a community-based study of drug users in rural Appalachia (N=400). Self-reported substance use was recorded via an interviewer-administered questionnaire with questions from the Addiction Severity Index.

Results—On average, participants were 32 years old ($\bar{X}$ = 32.33; median = 31.00; IQR = 12) and the majority were male (59%). Examining past 30 day use, more males reported alcohol (AOR: 2.11, 95% CI: 1.36, 3.23; p = .001) and any illegal drug use (AOR: 1.85, 95% CI: 1.16, 2.95; p = .010) which included heroin, cocaine, crack cocaine, methamphetamine, marijuana, and hallucinogens, after controlling for socio-demographic characteristics. ANCOVA analyses showed that males reported use of alcohol (p = .000), marijuana (p = .007), and hallucinogens (p = .009) at a significantly younger age than females.

Conclusion/Scientific Significance—Findings suggest more men report use of alcohol and “street” drugs including: heroin, crack cocaine, methamphetamine, marijuana, and hallucinogens. Further, males report the use of alcohol, marijuana, and hallucinogens at a significantly younger age. Understanding gender differences in substance use as well as other differences among individuals living in rural, Appalachia presents important opportunities to incorporate this knowledge into substance abuse early intervention, prevention and treatment efforts.

Keywords

gender; substance use; rural; Appalachia

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1. Introduction

Substance Use and Gender Differences

Extant research suggests gender differences may exist in use of alcohol and illegal drugs, as well as with illicit use of prescription drugs. Alcohol has consistently been identified in the literature as having differing use patterns among men and women. Based on data from the 2004 and 2005 National Survey on Drug Use and Health (NSDUH), males were more likely than females to report past month: alcohol use, binge drinking (i.e. 5 or more drinks on the same occasion), and heavy alcohol use (i.e., 5+ drinks on the same occasion for 5 or more days¹). Further, the 2008 NSDUH suggests 58% of males aged 12 or older were current drinkers compared with only 46% of females². A synthesis of data from the Epidemiologic Catchment Area (ECA) study, the Longitudinal Alcohol Epidemiologic Survey, and the National Comorbidity Survey suggests higher rates of alcohol abuse disorders among men³. Other reviews of the literature, including one focused on studies from 1966 to 2000 also suggests a higher prevalence rate of alcohol use disorders among men⁴.

Associations between gender and illegal/illicit drug use appear more complicated. Previous research suggests when given the opportunity to use drugs for the first time both men and women are equally likely to do so⁵. However, epidemiologic data from the ECA study, the National Comorbidity Study, and the 1996 National Household Survey on Drug Abuse (NHSDA) show higher rates of lifetime drug use and drug use disorders among men³. Data from the 2008 NSDUH also suggests rates of illegal drug use were higher for males than for females². Gender differences in drug use have narrowed slightly in recent years⁶. While overall trends may show more drug use among men, women are more likely to report the use of specific classes of illicit drugs. Specifically, past research suggests women are more likely than men to report non-medical use of prescription drugs, including narcotic analgesics and tranquilizers^{5,7,8}. One study based on NHSDA data (from 1991 through 1993) suggests women were 1.5 times more likely to report problem use of prescription drugs in the past year and twice as likely as men to report past year problem use of narcotic analgesics and tranquilizers⁸.

Substance Use and Age of First Use

Past research suggests women typically use alcohol and report problem-drinking at a later age than men^{9,10}. However, data indicate gender differences in alcohol initiation have become insignificant in recent years⁶.

Findings on differences in age of initiation for drug use vary based on the population under study. For example, in one study of middle-aged drug users with or at-risk of HIV infection, age of heroin and cocaine initiation occurred later for women compared with men¹¹. Another study of individuals receiving methadone maintenance suggests women used hallucinogens, methadone, tranquilizers and PCP at a younger age compared with men¹². Finally, among a sample of individuals addicted to opiates, age of first use was roughly equivalent for men and women¹³.

Gender, Age of First Use, and Rural Appalachia

In recent years there has been a growing interest in better understanding substance use, particularly in rural environments. Rural Appalachia is a particular area of interest given the recent attention and focus on the misuse and nonmedical use of prescription opiates^{14–16}. More specifically, the 2005 NSDUH identifies many of the rural, Appalachian areas of Kentucky in the highest prevalence group when examining illicit drug use other than marijuana for persons aged 12 and older¹⁷. Recent studies have suggested differences in substance use patterns in rural Appalachia as compared with more urban environments^{16,18}.

The purpose of this study is to examine differences in self-reported lifetime and past 30 day substance use as well as age of first use among a community sample of rural Appalachian drug users in Kentucky. The objective of this paper is to explore whether established differences in gender and age of first use exist within a rural Appalachian environment.

2. Methods

Data for this study were collected as part of a larger longitudinal study of social networks and HIV risk among rural Appalachian drug users funded by the National Institutes of Health, National Institute on Drug Abuse. The primary aims of the study are to examine HIV and other infectious complications associated with drug use.

2.1. Participants

This study focuses on baseline data from 400 individuals. There were three eligibility criteria for study participation: 1) aged 18 and older, 2) living in a rural Appalachian Kentucky county, and 3) had used prescription opioids, cocaine, heroin or methamphetamine to get high in the past 30 days. The participants (N = 400) who were screened for study baseline participation reported using: prescription opioids (96.6%), cocaine (87%), methamphetamine (40%), and heroin (29.3%) to get high.

2.2. Measures

Addiction Severity Index (5th edition)—Measures from the Addiction Severity Index (ASI¹⁹) provided information on social and demographic characteristics, as well as lifetime, past 30 day, and age of first substance use. Slight modifications were made to the ASI categories of drugs to better examine prescription and other drugs of abuse within the study geographic area. For example, the ASI category “Other Opiates/Analgesics” was broken out into Oxycontin, other oxycodone, and hydrocodone. Additionally, crack cocaine and methamphetamine were included as specific categories. For each substance the participant endorsed ever using, follow-up questions were asked about the age of first use and the number of days of use in the past 30 days.

2.3. Procedure

Participants were recruited using respondent driven sampling (RDS). RDS has been used in other studies recruiting rural substance users²⁰ and has benefits for recruiting and identifying those who would remain unidentified through other sampling techniques^{21,22}. Flyers were posted in public locations to recruit the initial participants (i.e., seeds). One of the main aims of the larger study focuses on examining risk factors for HIV and other infectious complications associated with drug use, thus flyers specifically seeking injection drug users were utilized. Seeds were asked to participate in the study if they reported injection drug use in the past six months in addition to meeting all other eligibility criteria outlined above. Once the seeds were interviewed, drug-using friends were eligible to be sampled regardless of injection status. Each seed was given three coupons and asked to give them to his/her friends. If those who came into the study from a coupon were deemed eligible and subsequently interviewed, they were given three coupons and so on. For each coupon that was redeemed, the original participant was compensated \$10. A similar RDS procedure is described in a publication by Wang and colleagues²⁰. The procedure utilized in the current study is also described in detail in another forthcoming publication²³.

Data were collected between November 2008 and February 2010. After consenting to participate, individuals completed an interviewer administered questionnaire. Responses were entered directly into a computer assisted personal interviewing (CAPI) program. Participants were primarily interviewed in the study office to ensure confidentiality of

responses. Participants were compensated \$50 for completing the questionnaire. The study received a full review and was approved by the University of Kentucky's medical Institutional Review Board.

2.4. Statistical analysis

For the descriptive analysis, men and women were compared across demographic and drug use characteristics using chi-square and t-tests, where appropriate. All data were screened prior to analyzing to ensure analytic assumptions were met. No data transformations were necessary. Analyses for lifetime substance use included the entire sample ($N = 400$). Age of first use and past 30 day use analyses only included those who reported lifetime substance use. Logistic regression analyses were used to examine substance use controlling for social and demographic characteristics including: age, race, employment status, insurance status, and education level (see Table 1 for a more detailed description). ANCOVA analyses were used to examine age of first use controlling for the social and demographic factors described above, excluding age. In the multivariate analyses, the first category was the reference group for the categorical variables. STATA, version 10.0 was used for all analyses (College Station, TX). Significance is indicated by ***, ** or * for p values less than .001, .01 or .05, respectively.

3. Results

As shown in Table 1, participants were 32 years old ($\bar{X} = 32.33$; median = 31.00; IQR = 12). The majority were Caucasian (94%) and male (59%). Significantly more females reported being unemployed ($p = .049$), having some college or more education ($p = .007$), and receiving Medicaid/Medicare ($p = .000$) when compared with males.

Substance Use

Rates of reported lifetime and past 30 day substance use were high. As shown in Table 2, more males reported lifetime use of alcohol ($p = .038$), heroin ($p = .011$), crack cocaine ($p = .001$), methamphetamine ($p = .001$), marijuana ($p = .032$), and hallucinogens ($p = .000$). More females reported lifetime use of hydrocodone ($p = .042$). Examining past 30 day substance use, more males reported any illegal drug use ($p = .006$) which included heroin, cocaine, crack cocaine, methamphetamine, marijuana, and hallucinogens. Specifically, more males reported past 30 day use of alcohol ($p = .000$), heroin ($p = .004$), and marijuana ($p = .001$). There were no gender differences in past 30 day use of prescription drugs.

Further examination of the number of days in the past 30 substances were used suggested that males reported more days of alcohol ($\bar{X}$ males = 4.2, 95% CI = 4.1 – 6.3; $\bar{X}$ females = 2.3, 95% CI = 1.4 – 3.2; $p = .000$) and marijuana ($\bar{X}$ males = 13.2, 95% CI = 11.5 – 14.9; $\bar{X}$ females = 9.2, 95% CI = 7.5 – 11.4; $p = .004$) use when compared to females. There were no significant differences in the number of days of use in the past 30 for any prescription drugs.

Age of First Use

Examining the age when each substance was first used, males reported use of alcohol ($\bar{X}$ males = 13.6 (95% CI: 13.2, 14.0); $\bar{X}$ females = 15.1 (95% CI: 14.6, 15.7; $p = .000$), cocaine ($\bar{X}$ males = 20.9 (95% CI: 20.2, 21.8); $\bar{X}$ females = 22.3 (95% CI: 21.2, 23.4; $p = .042$), marijuana ($\bar{X}$ males = 13.9 (95% CI: 13.5, 14.5); $\bar{X}$ females = 15.7 (95% CI: 14.9, 16.4; $p = .0004$), and hallucinogens ($\bar{X}$ males = 18.1 (95% CI: 17.6, 18.7); $\bar{X}$ females = 19.8 (95% CI: 18.6, 20.9; $p = .002$) at a significantly younger age than females. There were no significant differences for age of first use for any prescription drugs.

Multivariate Analyses

Logistic regression analyses were used to examine substance use in the past 30 days. After adjustment for socio-demographic characteristics, males were significantly more likely to report alcohol (AOR: 2.11, 95% CI: 1.36, 3.29) and any illegal drug use (AOR: 1.85, 95% CI: 1.16, 2.95) in the past 30 days, including heroin (AOR: .132, 95% CI: .028, .628) and marijuana (AOR: .501, 95% CI: .321, .784). ANCOVA analyses were used to examine age of first use, adjusted means are shown in Table 3 and suggest that males were significantly younger than females for reported first use of: alcohol ($p = .000$), marijuana ($p = .007$), and hallucinogens ($p = .009$) after controlling for socio-demographic characteristics.

4. Discussion

Rural Appalachia has influential cultural (i.e., poverty, educational attainment, religious beliefs) and geographic (i.e., social isolation) characteristics which results in differences from more urban communities^{24,25}. These unique features of rural Appalachia make understanding and interpreting information as well as targeting the region and individuals who live within it, an interesting yet important challenge.

Findings from the current study suggest gender differences in lifetime and past 30 day substance use as well as age of first use among drug users in rural Appalachian Kentucky. Significantly more males reported lifetime and past 30 day use of alcohol as well as using at a younger age (13.6 years) when compared with females (15.1 years). These findings are congruent with data from large scale national surveys (i.e., 2005 NSDUH¹, 2008 NSDUH²) and other previous studies^{9,10}. While some literature suggests diminishing differences at the national level in age of first use for alcohol⁶, these differences hold true for this rural Appalachian drug-using population. Some evidence suggests individuals in rural Appalachia experience a lack of access to basic services and have a pervasive feeling of powerlessness over changing individual situations; both are mentioned as contributing factors to alcohol abuse²⁵. It is also noteworthy that alcohol abuse exists despite the fact that the predominant religious belief among the Appalachian culture prohibits alcohol use²⁵. Gender differences in substance use have been attributed to traditional gender stereotypes, differing social stigma, as well as disparate opportunities to use¹². It is likely that some of these social characteristics are still present and influential in rural Appalachia, where women are often viewed differently. Rural environments are noted for unique attitudes, beliefs, social isolation²⁶, and poverty²⁷. More specifically, women in rural Appalachia are often expected to follow traditional gender stereotypes^{25,28} (i.e., staying at home with children) and may be treated more as objects, rather than active participants in society²⁹. Disparate opportunities to use may be particularly influential for alcohol use in rural Appalachia; some of the counties are still “dry,” that is they do not sell alcohol in the county lines³⁰. Thus, transportation and access may influence ability to use.

Findings also suggest gender differences in lifetime, past 30 day, and age of first use for illegal/illicit drugs. More males report lifetime drug use including: heroin, crack cocaine, methamphetamine, marijuana, and hallucinogens. Gender differences were also present for heroin and marijuana use in the past 30 days. These findings are consistent with data collected as part of the 1996 NHSDA³ and 2008 NSDUH² suggesting higher rates of lifetime drug use among men. It is noteworthy that even among a sample of individuals identified for study participation because of drug use, males still report the use of more illegal substances.

While more women reported lifetime use of hydrocodone, overall there were few gender and/or age differences in illicit prescription drug use. The lack of gender differences related to illicit sedative and opioid use is surprising considering past research has illuminated an

increased risk for women abusing drugs designed to treat anxiety and sleeplessness^{5,7,8}. As mentioned previously, rural Appalachian Kentucky has recently received focused national attention for high rates of misuse and nonmedical use of prescription opiates and sedative/benzodiazepines^{15,16,31,32}. Recent data from the 2007–2008 NSDUH shows that Kentucky ranked in the top fifth of States for individuals reporting the use of pain relievers for non-medical purposes in the past year in each of three age groups (i.e., 12 to 17; 18 to 25; 26 and older) as well as for the total population aged 12 and older³². Previous research has suggested elevated rates of non-medical use of prescription drugs may be related to the high rates of disability present within this region^{16,33}, which may be a risk factor for high levels of chronic pain. Further, other research has suggested that prescription drug use may not be perceived as high risk in comparison with other forms of drug use by individuals living in Appalachia³⁴. More specifically, Logan and colleagues³⁴ presented evidence from a random community survey that suggested the use of “nerve pills” (i.e., sedatives) was perceived as less risky than other types of illegal drug using behaviors (i.e., smoking marijuana, using cocaine/crack)³⁴. While this study did not examine perceptions of prescription drug use/abuse, these views/attitudes could have a profound impact on the lack of differences in this study. Further, gender and age of initiation differences may not be statistically significant because use of these substances is so widespread among this sample.

This study has several noteworthy limitations. First, while self-report data has been identified as a valid method for assessing historical patterns of substance use³⁵, it is also a concern that in interview settings participants may under-report behaviors. Second, while RDS helps recruit hidden populations, it is a non-probability purposive sample which limits the generalizability of findings. Third, this study includes individuals who have been enrolled because of reported use of prescription opioids, cocaine, heroin or methamphetamine to get high in the past 30 days. Findings should not be generalized to all rural Appalachian individuals. Finally, this paper offers only a preliminary understanding of gender and age of first use differences among drug users in rural Appalachian Kentucky. More in-depth study focusing on socio-cultural factors to better understand why these differences exist is still needed. The larger study from which this data is derived primarily focuses on understanding social networks particularly to examine risk factors for HIV and other infectious complications associated with drug use. Due to time limitations with participants, many questions/variables of importance for understanding gender differences (i.e., influences on initiation) were not included in the interview.

Limitations notwithstanding, findings from this study have implications for substance abuse early intervention, prevention and treatment efforts, especially among rural drug users. Results suggest that preventing initiation of alcohol and marijuana likely needs to start before age 13. Therefore, early intervention efforts should likely begin in elementary and middle school. And, while initiation of other substance use generally did not begin until late adolescence, studies suggest that early intervention is much more effective in preventing substance use than interventions that begin in later adolescence^{36,37}. Prevention and intervention efforts targeting substance use in rural areas, particularly in Appalachia, must also take into account unique beliefs about the harmful nature of substance use³⁴, values associated with the health care system as well as perceptions of the need for services^{24,25,30}. Past research has suggested a general reluctance of individuals in Appalachia to engage in health-related services related to the gap between the culture and values present in rural Appalachia and those present in service providing settings²⁴. Additionally, individuals in rural Appalachia often emphasize the importance of informal measures to cope with physical and mental health problems^{24,25}. Further, given the importance of family in Appalachian cultures^{25,30}, it may be important to take into account individuals in close proximity who may be highly influential on intervention/treatment. Understanding and incorporating techniques to address unique cultural issues is integral to successful

prevention and intervention. A primary issue for early intervention, prevention and treatment in rural Appalachia and other resource deprived areas is the lack of resources. Numerous studies indicate that substance abuse and other mental health resources are lacking in rural areas such as Appalachian Kentucky^{38,39} and rural men in particular are the least likely group to seek treatment⁴⁰.

In conclusion, longitudinal study is warranted to determine whether there are gender differences in use trajectories over time, especially among those using prescription drugs non-medically. Longitudinal data will be available at the conclusion of the current study to further explore this area. Further, this topic warrants qualitative exploration to better understand the influence of gender on substance use among rural, Appalachian individuals. In addition to increasing substance abuse early intervention, prevention, and treatment, given the different use patterns between men and women in rural Appalachia, development of gender-specific resources may be beneficial in reducing the burden of substance use in this already resource-deprived area.

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Table 1

Demographic Characteristics by Gender

Variable	Male n = 235		Female n = 135	
	<i>X</i>	<i>SD</i>	<i>X</i>	<i>SD</i>
Age	32.64	8.02	31.88	8.9
	<i>n</i>	%	<i>n</i>	%
Race				
White	216	91.9%	159	96.4%
Non-White	19	8.1%	6	3.6%
Employment *				
Full-time	91	38.7%	48	29.1%
Part-time	59	25.1%	37	22.4%
Unemployed	47	20.0%	54	32.7%
Education **				
Less than HS grad	100	42.6%	70	42.4%
HS graduation/GED	108	46.0%	58	35.2%
Some college/more	27	11.5%	37	22.4%
Health Insurance ***				
Uninsured	177	75.3%	91	55.2%
Private insurance	9	3.8%	7	4.2%
Medicaid/Medicare	49	20.9%	67	40.6%

*
p<.05,**
p<.01,***
p<.001

Table 2

Lifetime and Past 30 Day Substance Use Characteristics of Rural Drug Users by Gender

Variable	Male n = 235		Female n = 135	
Lifetime Substance Use				
	n	%	n	%
Alcohol*	235	100%	162	98.2%
Illicit Methadone	222	94.5%	157	95.2%
OxyContin®	223	94.9%	154	93.3%
Other Oxycodone	223	94.9%	156	94.6%
Hydrocodone*	226	96.2%	164	99.4%
Benzodiazepines	225	95.7%	157	95.2%
Heroin*	93	39.6%	45	27.3%
Cocaine	223	94.9%	152	92.1%
Crack**	187	79.6%	107	64.9%
Methamphetamine**	118	50.2%	56	33.9%
Marijuana*	232	98.7%	157	95.2%
Hallucinogens***	155	65.9%	76	46.1%
Past 30 Day Substance Use (Yes/No)				
	n	%	n	%
Alcohol***	145	61.7%	71	43.0%
Illicit Methadone	143	60.9%	100	60.6%
OxyContin®	166	70.6%	107	64.9%
Other Oxycodone	162	68.9%	117	70.9%
Hydrocodone	188	80.3%	137	83.0%
Benzodiazepines	199	84.7%	137	83.0%
Any Illegal Use**	173	73.6%	100	60.6%
Heroin**	18	7.7%	2	1.2%
Cocaine	63	26.8%	33	20.0%
Crack	30	12.8%	19	11.5%
Methamphetamine	7	2.9%	4	2.4%
Marijuana**	161	68.5%	87	52.7%
Hallucinogens	7	2.9%	2	1.2%

* p<.05,

** p<.01,

*** p<.001

Table 3

Adjusted Means for Age of First Substance Use for Rural Drug Users by Gender

Variable	Male n = 235		Female n = 135	
	$\bar{X}$	95% CI	$\bar{X}$	95% CI
Age of First Use				
Alcohol***	13.6	13.2 – 14.1	15.1	14.6 – 15.7
Illicit Methadone	25.5	24.4 – 26.6	25.2	23.9 – 26.5
OxyContin®	25.2	24.1 – 26.3	25.2	23.9 – 26.5
Other Oxycodone	21.9	20.9 – 22.9	21.7	20.6 – 22.9
Hydrocodone	19.6	18.7 – 20.4	20.6	19.6 – 21.6
Benzodiazepines	19.5	18.5 – 20.4	20.3	19.2 – 21.4
Heroin	24.6	23.3 – 25.9	22.8	20.9 – 24.6
Cocaine	21.2	20.4 – 22.0	21.9	20.9 – 23.0
Crack	23.3	22.2 – 24.4	23.6	22.1 – 25.0
Methamphetamine	24.9	23.6 – 26.4	26.3	24.3 – 28.4
Marijuana**	14.2	13.6 – 14.8	15.5	14.7 – 16.2
Hallucinogens**	18.1	17.5 – 18.8	19.7	18.8 – 20.6

*
p<.05,**
p<.01,***
p<.001