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Prevalence and Factors Associated with Smoking Tobacco among Men Recently Released from Prison in California: A Cross-Sectional Study

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Abstract

Background—Over 1.5 million people are incarcerated in state and federal correctional facilities in the United States. Formerly incarcerated men have significantly higher rates of mortality and morbidity than the general population, disparities that have been partially attributed to higher rates of tobacco smoking-related illnesses such as cardiovascular disease, pulmonary disease and cancer.

Methods—We compared the prevalence of smoking tobacco in a sample of 172 men who were released from California state prisons to Oakland and San Francisco between 2009 and 2011 to sub-populations of respondents to the 2009 California Health Interview Survey (CHIS). Using logistic regression, we analyzed the association among lifetime history of incarceration and self-reported smoking status.

Results—Seventy-four percent of men recently released from prison reported being current tobacco smokers. The prevalence of smoking in a demographically similar group of men in the CHIS was twenty-four percent. We found in bivariate analysis that each additional five years of history of incarceration were associated with 1.32 times greater odds of smoking (95% CI 1.02 to 1.71). Illicit substance use was associated with a 2.47 higher adjusted odds of smoking (95% CI 1.29 to 5.39). In the multivariate model adjusting for age, income, substance use and mental health, every five years of incarceration was associated with 1.23 greater odds of smoking (95% CI 0.94 to 1.63) which was not statistically significant.

Conclusions—Given the high prevalence of smoking tobacco among former prisoners and the underlying high tobacco-related mortality rates, these findings suggest that a history of incarceration may be an important determinant of smoking. Prison and parole systems may be important potential settings for smoking-cessation interventions.

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Keywords/MeSH terms

Adult; Male; California/epidemiology; Smoking/epidemiology; Prisoners/statistics & numerical data; Prevalence; Smoking/prevention & control; Risk Factors; Tobacco

Background

More than 1.5 million people are incarcerated in state and federal correctional facilities in the United States (Pew Charitable Trusts, 2008; U.S. Department of Justice, 2003; U.S. Department of Justice, 2012), and 700,000 are released annually (Travis 2005). People with a history of incarceration often have compromised health (Wang et al., 2009; Binswanger et al., 2011; Massoglia 2008) and post-incarceration mortality rates are higher than population mortality (Binswanger et al., 2007; Kariminia et al. 2007; Stewart et al., 2004, Bird et al., 2003; Krinsky et al., 2009; Binswanger et al 2011; Merrall et al., 2010).

The prevalence of smoking among incarcerated individuals is over 70% (Colsher et al., 1992; Cropsey, Eldridge & Ladner, 1992), and incarceration is associated with smoking-related disease (Massoglia 2008; Binswanger et al., 2007; Binswanger et al., 2011). Starting in 1993, states began prohibiting tobacco to reduce prison healthcare costs and California prisons banned tobacco in 2005 (Lucas 1993; California Department of Corrections 2012). By 2007, most U.S. correctional facilities had indoor or complete smoking bans (Kauffman et al., 2007). While prison bans may reduce smoking (Buter et al., 2007), one study found an 81% smoking prevalence in the presence of indoor smoking bans (Cropsey et al., 2005), and another found that smokers continued to smoke in the presence of a complete smoking ban (Kauffman et al., 2011).

Risk factors associated with higher prevalence of smoking in the general population such as substance use, psychiatric disorders, lower education, and lower income levels, are also associated with high prevalence of smoking in prisons (Papadodima et al., 2009). However, incarceration may have an independent effect on smoking. Chronic stress may contribute to smoking (Niaura et al., 2002), and community norms (Ahern et al., 2009), particularly in highly structured environments, are related to smoking (Haddock et al., 2009; Green et al., 2008). Longer exposure to the chronic stress of incarceration within an environment with a high prevalence of licit or illicit smoking may affect the likelihood of continuing or initiating smoking during incarceration and continuing to smoke post-incarceration. We could find no previous study of this possible temporal relationship. A longer period of incarceration may also increase stress during reentry if previous social and resource ties have been broken (Travis 2005), perhaps resulting in an increased risk of smoking. In addition, prisoners are often released into social environments where smoking is prevalent, which may potentiate a return to smoking (Centers for Disease Control and Prevention 2012; Centers for Disease Control and Prevention 2009).

This paper examines length of incarceration as a predictor of smoking among men released from prison after enactment of the California prison smoking ban. We hypothesize that smoking prevalence among formerly incarcerated men is higher than that in a comparison population, and that length of incarceration is associated with smoking prevalence. We also

hypothesize that substance use and mental health disorders are important associated risk factors in predicting smoking behaviors in this population.

Methods

Study procedures for the Relate Project

The Relate Project was a cross-sectional quantitative interview conducted with 172 male-female couples (N = 344 participants) in which the male partner was released from prison in the past 12 months but not in the past 3 months. It was designed to measure effects of imprisonment on HIV-related risk behavior, however the survey included current smoking status. Data were collected between January 2009 and February 2011 in Oakland and San Francisco, California. Recruitment, eligibility, screening, and data collection procedure, and institutional review board approvals are reported elsewhere (Turney et al., 2013). This paper analyzed data from the 172 male respondents.

Smoking status was measured using the item, “Do you currently smoke cigarettes?” Total years of incarceration was assessed by the item, “Altogether, how many years and months of your life have you spent incarcerated in juvenile detention, jail and state and federal prison combined?” Participants reported total income in the past 3 months from all sources. Lifetime mental health diagnosis reflected whether the participant had ever been diagnosed with depression, anxiety, or post-traumatic stress disorder. Questions about psychotic disorders were beyond the scope of the study and not queried in the survey. Lifetime substance use was measured by asking if the participant 1) ever used any drugs that are downers (e.g., valium, heroin, “or any other drug that calms you down”), and 2) ever used any drugs that are uppers (e.g., amphetamines, cocaine, “or any other drug that gives you a boost of energy.”) Lifetime mental health and substance use variables were binary, affirmative if the participants endorsed a single mental health or substance use item.

Study procedures for the 2009 California Health Interview Survey (CHIS)

The CHIS is a bi-annual population-based health survey (UCLA Center for Health Policy Research 2011). The 2009 CHIS includes data from 47,614 California adults. In addition to demographic variables, smoking was measured using the item “Do you now smoke cigarettes every day, some days, or not at all?”

Analysis

We used CHIS data to estimate smoking prevalence for the California population and for a group demographically similar to the Relate sample. As the Relate sample in our analyses was male, 76% African-American, with monthly income less than $3000, and an age range between 21 and 62 years, we estimated smoking for the 261 CHIS participants meeting these criteria.

Using Relate Project data, we conducted bivariate and multivariate analyses of the length of incarceration between smokers and non-smokers, adjusting for income, age, lifetime mental health diagnosis, and lifetime substance use. In the multivariate analysis we treated length of

incarceration as a continuous variable and described differences in increments of five years for ease interpretation.

The functional form of the relationship between continuous variables and the log odds of smoking was considered. A quadratic relationship between length of incarceration was also modeled and a Wald likelihood ratio test used to determine goodness-of-fit. We also tested potential effect modification between incarceration history and age, substance use and income. Tests for interaction were performed using the Wald likelihood ratio test with a p-value cut-off of < 0.10 for significant interaction (Selvin 2004). Normality of the distribution of continuous variables was tested using the Shapiro-Wilk test. The two-sided t-test for unequal variances was used to test the difference of means. We used a p-value cut-off of $p < 0.05$ to test for statistical significance of the main exposure of interest. All analyses were performed using Stata Version 12 (StataCorp, College Station, TX).

Results

For 172 men in the Relate Project sample, mean age was 39.5 years (interquartile range (IQR): 32–46), and mean years of incarceration was 12.1 (IQR: 6–17). Most (76%) were African American, reported at least a high school education (55%), and a total monthly income under $2000 (94%) (Table 1). Most (68%) had a lifetime history of substance use and 41% had lifetime history of mental health disorders.

Seventy-four percent reported being current tobacco smokers. The mean years of incarceration was 10.5 (IQR: 5–15) among non-smokers and 12.1 (IQR: 7–17.5) among smokers ($p = 0.03$). In the unadjusted analysis, every additional five years of incarceration was associated with 1.32 greater odds of smoking (95% CI 1.02 to 1.71). In the multivariate model adjusting for age, income, substance use and mental health, every five years of incarceration was associated with 1.23 greater odds of smoking (95% CI 0.94 to 1.63) which was not statistically significant. Substance use was the only variable independently associated with smoking (Table 2).

Prevalence of current smoking among all adult Californians was 13.6% in the CHIS. The prevalence of smoking was higher among African-American men (17.9%), and among men reporting income below $3000 per month (22.9%). For African American men ages 21 to 62 and with monthly income below $3000, smoking prevalence was 24.4%.

Discussion

In this sample of men recently released from prison, smoking prevalence was 74%, much higher than the 13.6% among California adults and the 24.4% for a demographically similar group. In bivariate analyses the odds of smoking increased with years of incarceration, possibly due to socialization or increased levels of stress in prison environments or during reentry (Niaura et al., 2002; Ahern et al., 2009; Haddock et al. 2009). This association was not significant in the multivariate model, suggesting that other factors, notably substance use, may be more salient than length of incarceration.

The high smoking prevalence in the Relate sample is remarkable, as these men served time in prison after the adoption of the California prison smoking ban (Colsher et al., 1992; Cropsey et al., 2009; Conklin et al., 2000). Our study is limited by the fact that we did not have data regarding when study participants started smoking. The absence of a developed tobacco control literature on the population of people with a history of incarceration may invite speculation, and points to potential areas for further research and intervention. There is some evidence that prison smoking bans suppress but do not eliminate smoking (Kauffmann et al., 2011). Further, persons who reduce or abstain from smoking while in prison may view this change as environmentally imposed, rather than an internally mediated health behavior change (Thibodeau et al., 2012). When the environment changes post-release, smoking behavior would also be expected to change (Thibadeau et al., 2010). Also the environment and conditions in which persons are released into may also increase the risk of initiating or continuing smoking (Centers for Disease Control and Prevention 2012; Centers for Disease Control and Prevention 2009). This would be consistent with literature showing high relapse rates for drug use post-release (Binswanger et al., 2007; Kariminia et al., 2007; Binswanger et al., 2012). If so, smoking cessation interventions offered in prison and post-release programs could help to support smoking behavior change prompted by the prison environment, and extend positive smoking changes over the long term. However, few such interventions are available at this time (California Department of Corrections 2012; Dembosky 2010).

Limitations include potential bias associated with self-report measures, particularly for questions related to substance use and mental health. However, no one refused to answer these questions, and many reported lifetime substance use (68%) or mental health symptoms (41%). The prevalence of psychiatric and substance use disorders was not measured directly, and was represented by proxy variables. The previously established association between smoking and substance use appeared in the results (Guydish et al. 2011), suggesting that the substance use variable was effective in the analysis. This cross-sectional study does not permit causal attribution, and the Relate Project survey included limited information on smoking behavior. The limited data we had regarding when our participants started smoking, whether they continued smoking while incarcerated, and the timing of when they (re)started smoking following release, constrains our ability to pinpoint the best time to intervene on these behaviors. Furthermore, our relatively small study sample was drawn from a restricted geographical area, limiting the generalizability of our conclusions to other regions.

Nevertheless, to our knowledge, this is the first effort to assess the relationship between smoking prevalence and length of incarceration in a post-release population and many of the conditions effecting our study population are common among persons with a history of incarceration.

Conclusion

Given the high prevalence of smoking among formerly incarcerated men, and the high rates of mortality from diseases that are exacerbated by tobacco smoking among the formerly incarcerated, our findings highlight the importance of addressing smoking cessation among

current and former prisoners. Rather than merely imposing smoking bans in prisons, correctional and public health authorities should consider the benefits of providing people exiting prison with evidence-based smoking cessation therapies to prepare them for the transition to community supervision (Schroeder 2007). In addition, more smoking interventions need to be designed and tested for use by prisoners and former prisoners (Clarke et al. 2011; Cropsey et al. 2011). Community supervision may provide opportunities to supplement smoking cessation interventions, targeting the stressors of reentry and social norms in communities where prisoners are released. Prisons provide a window of opportunity for reducing the prevalence of smoking and mitigating the health effects of smoking among disadvantaged men, with the potential for a lifelong positive impact on health (Eldridge & Cropsey, 2009).

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Table 1

Demographics of Recently Incarcerated Men Participating in Relate Project (N=172)

	N	%
Educational attainment		
less than High School	45	26%
High School or GED	73	43%
Some College	18	10%
College Graduate	4	2%
Graduate Work	0	0%
Did not report	31	18%
Race/ethnicity		
African-American	130	76%
Non-Hispanic White	18	10%
Hispanic	15	9%
Asian	0	0%
Native American	7	4%
Other	2	1%
Age (years)		
21–30	34	20%
31–40	53	31%
41–50	68	39%
51–60	15	9%
60+	2	1%
Monthly Household Income		
<$500	94	55%
$501 – $1,000	43	25%
$1,001 – $1,500	12	7%
$1,501 – $2,000	12	7%
>$2,000	6	4%
Did not report	5	3%
Have children in home		
Yes	25	14%
No	147	86%
Substance use		
Any	160	68%
Uppers	107	62%
Downers	78	45%
Total Years of Incarceration		
< 7 years	48	28%
7 – 10 years	44	26%
11 – 17 years	41	24%
> 17 years	39	23%

	N	%
Current Smoker		
No	44	26%
Yes	128	74%

Table 2

Odds of Smoking by Total Years of Incarceration and Substance Use

	Unadjusted Odds Ratio	95% CI	Adjusted Odds Ratio[£]	95% CI
Total Years of Incarceration				
For every additional 5 years[§]	1.32	(1.02,1.71)	1.23	(0.94, 1.63)
Substance Use	2.63	(1.29, 5.39)	2.47	(1.15, 5.33)

[£]Controlled for age, income, substance use, and mental health

[§]Total years of incarceration measured continuously