Correlates of smoking cessation in a nationally representative sample of U.S. adults

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Abstract

Persistent cigarette smoking is associated with significant morbidity and mortality. Correlates of difficulty quitting smoking include psychopathology, such as major depressive disorder, and problems with other substances, such as alcoholism. In addition, socio-demographic risk (e.g. poverty) and protective (e.g. living in a region with stringent tobacco laws) influences can modify risk for persistent cigarette smoking. Using data on 17,919 individuals with a lifetime history of smoking 100 or more cigarettes, from a nationally representative U.S. sample, we examine the constellation of risk and protective factors that correlate with smoking cessation (defined as remaining smoke-free in the past 12 months) across four cohorts: young (18–31 years), intermediate-aged (32–43 years), middle-aged (44–60 years) and older (61–99 years) adults. Using survival analyses, we demonstrate that in addition to a history of DSM-IV nicotine dependence, which is negatively associated with smoking cessation, living below the poverty line is also associated with persistent smoking across all age cohorts. Residents over the age of 31 years living on the U.S. West Coast are less likely to be persistent smokers as well. Major depressive disorder is associated with persistent smoking, but interestingly, only in middle-aged and older adults. Alcoholism and a family history of substance use problems are both correlated with persistent smoking but only in older adults. Here, we find evidence for psychopathology that may hinder successful quit attempts during the developmental period when a majority of quit attempts are made (early to mid-40's). However, our analyses also highlight the important benefits of effective tobacco legislation on the U.S. West Coast and urge policy makers to actively consider addressing issues surrounding tobacco taxation and the impact of poverty on tobacco use, in addition to the risks posed by co-occurring psychiatric problems and other substance use disorders.

Keywords

Smoking cessation; psychopathology; age differences; survival analysis

1. Introduction

Persistent cigarette smoking represents the most potent cause of premature death (Centers for Disease Control and Prevention, 2003). Given the addictive potential of nicotine, successful cessation is especially challenging once an individual proceeds to a more involved stage of tobacco use, such as nicotine dependence. However, most smokers wish to quit and a majority of serious quit attempts are made by individuals in their early 40's (for e.g., Shiffman et al., 2006). In addition to nicotine dependence, which is associated with difficulty quitting, inability to quit smoking may be associated with other psychopathology, including mood and anxiety disorders, and substance-use problems, including alcohol (Bachman et al., 1991) and illicit drug use (Golub and Johnson, 2001). Socio-demographic risk factors, such as poverty (Flint and Novotny, 1997) and ethnicity (King, Polednak, Bendel, Vilsaint, and Nahata (2004)) also appear to correlate with smoking cessation.

Building on a prior report (Grant, Hasin, Chou, Stinson, and Dawson, 2004), which examined the association between nicotine dependence and psychiatric problems, the goal of the current study was to examine, in the same sample, the correlates of smoking cessation (defined as not having smoked a cigarette in the past 12 months) in individuals aged 18 and older reporting a lifetime history of regular smoking (100+ cigarettes).

2. Materials and Methods

We used data from the National Epidemiological Study of Alcohol and Related Conditions (NESARC, Grant and others, 2004). Interviews were conducted by the U.S. Bureau of the Census, on behalf of the National Institute on Alcohol Abuse and Alcoholism, (Grant et al, 2003) on 43,093 individuals, including adult, non-institutionalized U.S. citizens and non-citizens (including Alaska and Hawaii) during the first wave (2001–2002) of this longitudinal survey. Complete details regarding the sampling strategy, study design and estimation of weights for generalizability are available at niaaa.census.gov/pdfs/source_and_accuracy_statement.pdf).

For the current analyses, we selected only those individuals who reported smoking 100 or more cigarettes during their lifetime (41.8%) and could recollect the last time that they had smoked a cigarette (N=17,919)(Grant and others, 2004). The main outcome examined was quitting cigarette smoking, defined as not having smoked even a single cigarette in the past 12 months. Age at last cigarette smoked was determined by converting a measure of "duration (hours) since last smoked cigarette" into years and subtracting from current age.

In addition to gender, age, poverty, census region and ethnicity, predictors of quitting included DSM-IV (American Psychiatric Association, 1994) diagnostic assessments of nicotine dependence, conduct disorder, alcohol abuse/dependence, major depressive disorder, mania, panic disorder with and/or without agoraphobia, social anxiety disorder and specific phobias. A measure of parental alcohol/substance-related problems (defined as participant's report that either parent had a history of alcohol or drug problem during their lifetime) was included.

A semi-parametric survival analysis was performed using Cox proportional hazards models in STATA (Stata Corp, 2003) to estimate the "hazards" of smoking cessation in individuals who had smoked 100+ cigarettes. All diagnostic measures were structured to be time-varying with respect to quitting. Data were weighted by sampling weights from NESARC. Given the possibility of heterogeneity in the impact of these correlates and quitting smoking in a sample of individuals aged 18–99 years, analyses were conducted separately in four age-groups – those aged 18–31 years, 32–43 years, 44–60 years and those aged 61 and older.

3. Results

Approximately, 45% reported quitting smoking, with a mean age of 40 years [range 7–89 years]. Men were almost as likely as women to report quitting while those endorsing Caucasian ethnicity were more likely than other ethnic groups to report quitting as were those participating from the West Coast census region. Those living below the poverty line at the time of interviews were less likely to quit. Sample characteristics are presented for the those with a lifetime history of smoking a 100+ cigarettes, stratified as those who quit/remained smoke-free for the past 12 months (N=7,750) and those who smoked in the past 12 months (N=10,167) in Table 1. Results from survival analyses conducted in the four age groups are shown in Table 2.

3.2.1 Young adults (18–31 years)

In these individuals, the prevalence of quitting smoking was 12% (median quitting age of 22 years). Those living on the West Coast were more likely to quit smoking as were those living above the poverty line. A prior history of nicotine dependence was associated with a lower likelihood of quitting smoking whereas those with specific phobias were at increased hazards for quitting. No violations of the proportional hazards assumptions were noted in this age group.

3.2.2 Intermediate-aged adults (32–43 years)

Approximately 29% of those in this age group had quit smoking (mean quitting age of 28 years). In this group, in addition to Caucasian ethnicity and poverty, both of which predicted a reduced hazard of quitting, a prior history of nicotine dependence, panic disorder and generalized anxiety disorder were associated with lower hazards of quitting. Social phobia was associated with an increased likelihood of smoking cessation. For panic disorder and Caucasian ethnicity, a violation of the proportional hazards assumption was noted. Introducing interactions between each of these measures and quitting smoking after 30 years of age satisfied the assumption, although only the interaction with panic disorder was significant [Hazard ratio 3.14]. This suggests a non-linear relationship such that individuals with panic disorder were more likely to quit smoking after 30 years of age, although this is likely associated with mean onset age of panic disorders being middle-adulthood.

3.2.3 Middle-aged adults (44–60 years)

Quitting was most common in this age group (47%, mean age 36 years). A number of risk factors were associated with a reduced likelihood of quitting, including poverty, Caucasian ethnicity, a family history of alcohol/drug problems, nicotine dependence, major depressive disorder, generalized anxiety disorder, social phobia and alcohol abuse/dependence. Living on the West Coast was associated with an increased likelihood of quitting. Significant (p < 0.01) violations of proportional hazards were noted for nicotine dependence, major depressive disorder, generalized anxiety disorder and alcohol abuse/dependence. Graphical tests of the violations demonstrated that for major depressive disorder, nicotine dependence and generalized anxiety disorder, occurrence of the psychiatric disorder was associated with delayed age of quitting (after 35 years of age). For alcohol abuse/dependence, however, there was a significant increase in failure to quit in early adulthood (18–20 years) and lower risk associated with quitting smoking between 35–60 years of age.

3.2.4 Older adults (61–99 years)

About 72% of those in this age-group had quit smoking (mean quitting age of 48 years). Factors associated with quitting in this age group were identical to those for individuals aged 44–60 years, with the exception of generalized anxiety disorder and social phobia which were unrelated to cessation in this age group. Violations of the proportional hazards assumption were noted for major depressive disorder and alcohol abuse/dependence. Major depressive

disorder was a significantly better predictor of inability to quit when the participants were under 50 years of age. As in the middle-aged adults, the risks associated with alcohol dependence were significantly greater in early adulthood and diminished dramatically after 35 years of age.

4. Discussion

Effective smoking cessation is a key public health priority (Healthy People 2010, 2000). In elucidating the constellation of risk and protective factors that influence an individual's ability to successfully quit smoking cigarettes, we find that that the patterns of factors vary across different development phases of adulthood. This is an important consideration for treatment providers – depending on the age of the individual, different aspects of psychopathology may be of greater significance. Such behavioral treatment to assist with smoking cessation, when available, is often comprehensive, however, Medicaid support for such services are few and far between. Given the recurring association between poverty and persistent smoking noted by us, and the compounding effect of mental health problems that complicate successful quit attempts, which are themselves more common in the economically disadvantaged (Fergusson, Boden, and Horwood, 2007; Patel and Kleinman, 2003; Saxena, Thornicroft, Knapp, and Whiteford, 2007; van, I, van, Droomers, and de, 2004; Wang et al., 2007), there is an even greater urgency for accessibility of cessation services in the poor. We also encourage policy makers to take into consideration the effects of tobacco legislation in California – our analyses suggest that quit rates in residents of the U.S. West Coast are considerably higher. Whether this reflects a general trend towards healthful living in individuals selecting to reside on the West Coast (Andrulis and Shaw-Taylor, 1996) or the effect of larger concentrations of immigrants who, prior to acculturation effects, tend to smoke less (Gordon-Larsen, Harris, Ward, and Popkin, 2003; Singh and Siahpush, 2002) or a true influence of non-tolerance towards public smoking is unknown in our study. This distinction, however, is largely inconsequential from a public health perspective – if implementation of stricter laws surrounding smoking encourages residents to quit smoking or attracts individuals who wish to remain smoke-free, then this can only improve the general quality of living of the state, including dramatic reduction in the economic burden imposed by tobacco-related illnesses (Centers for Disease Control (CDC), 2002).

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Table 1

Prevalence of socio-demographic and psychiatric correlates in those who smoked 100 or more cigarettes, lifetime, in the National Epidemiological Survey of Alcohol and Related Conditions (N=17,919), stratified by their current smoking status and their association with smoking cessation

	Quit smoking (N=7,750)	Persistent Smoking (N=10167)	Odds-ratio [95% confidence limits]
Gender (F)	47.7	51.1	0.87 [0.82–0.93]
Caucasian	82.7	78.2	1.33 [1.24–1.44]
West Coast resident	22.4	19.8	1.17 [1.09–1.26]
Poverty	10.6	18.6	0.52 [0.48–0.57]
Age 18–31	5.4	29.1	0.14 [0.13–0.16]
Age 32–43	15.1	28.3	0.45 [0.42–0.48]
Age 44–60	32.8	28.6	1.21 [1.11–1.29]
Age 61–99	42.7	14.0	5.41 [5.04–5.81]
Nicotine Dependence	17.4	52.9	0.17 [0.15–0.18]
Major Depressive Disorder	18.6	25.6	0.35 [0.32–0.38]
Mania	3.1	6.5	0.25 [0.21–0.30]
Panic Disorder	6.0	8.9	0.34 [0.29–0.40]
GAD	4.8	6.7	0.32 [0.27–0.38]
Social Phobia	5.4	6.1	0.78 [0.67–0.88]
Specific Phobia	9.9	12.6	0.64 [0.58–0.71]
Conduct Disorder	4.1	9.1	0.40 [0.25–0.45]
Alcohol abuse/dependence	46.0	37.0	0.51 [0.48–0.55]
Parental History of Alcohol/Drug Problems	22.6	32.1	0.62 [0.58–0.66]

TABLE 2

Hazards ratios with their 95% upper and lower confidence limits, in each of the 4 age-groups, showing association between socio-demographic and psychiatric correlates and quitting cigarette smoking (last cigarette smoked prior to the past 12 months).

	Hazard Ratio [95% confidence limits]			
	18–31 years	32–43 years	44–60 years	61–99 years
Gender (F)	1.20 [0.94–1.54]	1.18 [1.03–1.37][*]	1.09 [0.98–1.20]	0.79 [0.73–0.86][*]
Caucasian	1.36 [0.97–1.88]	1.38 [1.04–1.82][*]	1.42 [1.26–1.61][*]	1.19 [1.07–1.32][*]
West Coast resident	1.39 [1.08–1.80][*]	1.16 [0.98–1.37]	1.13 [1.00–1.26][*]	1.12 [1.02–1.22][*]
Poverty	0.66 [0.45–0.89][*]	0.60 [0.46–0.78][*]	0.60 [0.50–0.73][*]	0.75 [0.66–0.84][*]
Nicotine Dependence	0.19 [0.13–0.29][*]	0.27 [0.23–0.33][*]	0.32 [0.28–0.36][*]	0.35 [0.31–0.40][*]
Major Depressive Disorder	0.98 [0.72–1.35]	0.91 [0.74–1.11]	0.61 [0.53–0.71][*]	0.71 [0.61–0.82][*]
Mania	0.61 [0.31–1.21]	0.95 [0.63–1.44]	0.76 [0.55–1.07]	0.79 [0.53–1.12]
Panic Disorder	0.63 [0.35–1.14]	0.32 [0.19–0.57][*]	0.80 [0.65–1.00]	0.82 [0.67–1.02]
Generalized Anxiety Disorder	0.84 [0.42–1.70]	0.51 [0.31–0.85][*]	0.75 [0.56–1.00]	0.95 [0.72–1.26]
Social Phobia	1.52 [0.94–2.46]	1.78 [1.36–2.32][*]	1.33 [1.06–1.68][*]	1.22 [0.98–1.51]
Specific Phobia	1.83 [1.30–2.57][*]	0.95 [0.74–1.22]	1.03 [0.87–1.24]	1.10 [0.96–1.27]
Conduct disorder	1.13 [0.73–1.75]	0.97 [0.72–1.29]	0.90 [0.70–1.16]	0.92 [0.68–1.25]
Alcohol abuse-dependence	0.85 [0.67–1.08]	1.00 [0.86–1.16]	0.98 [0.89–1.09]	0.87 [0.80–0.96][*]
Parental History of Alcohol/Drug Problems	0.90 [0.70–1.16]	1.03 [0.88–1.20]	1.18 [1.05–1.31][*]	1.18 [1.06–1.30][*]

[*] significant pvalue ≤ 0.05 in multivariate model