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Predictors of persistent nicotine dependence among adults in the United States

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ABSTRACT

Background: Evidence suggests that nicotine dependence is the key barrier to successful smoking cessation. No previous study has documented predictors of persistent nicotine dependence among adults in the community. The goal of this study is to prospectively identify predictors of continued nicotine dependence over a 3-year period among adults.
Methods: Data were drawn from Waves I and II of the National Epidemiologic Survey of Alcohol and Related Conditions (NESARC), a nationally representative sample of 34,653 adults in the United States. Logistic regression analyses were used to estimate the odds of persistent nicotine dependence at Wave 2 given the presence of various sociodemographic and psychiatric predictors at Wave 1.
Results: Mood, anxiety, personality and illicit substance use disorders were associated with significantly increased risk of persistent nicotine dependence. The strength of these relationships was attenuated slightly after adjusting for demographic differences, but remained statistically significant. Persistent nicotine dependence was more common among unmarried, younger females with lower income levels and lower educational attainment.
Conclusions: To our knowledge, this study is the first to prospectively identify predictors of persistent nicotine dependence among adults. Our results suggest that the incorporation of mental health treatment into alternative smoking cessation approaches may help to increase the effectiveness of these programs and that a greater focus of these services on vulnerable segments of the population is needed in order to reduce continued disparities in smoking in the general population.

1. Introduction

Cigarette smoking is the leading preventable cause of morbidity and premature mortality (Breslau et al., 1993; Bartal, 2001). Smoking has been causally linked with cancer, heart disease and nearly every chronic disease. Every year, 3% of those who smoke stop successfully, while 70% of smokers say they want to quit (Benowitz, 2010). It remains unclear why some people quit smoking and others do not.

Along with psychological constructs such as anxiety sensitivity and distress tolerance, (Brown et al., 2005; Bernstein et al., 2008; Gonzalez et al., 2008; Gregor et al., 2008; Cosci et al., 2009) evidence increasingly suggests that nicotine dependence is a key barrier to successful smoking cessation (Prokhorov et al., 2001; Baker et al., 2007; Tan et al., 2009). Nicotine dependence is defined as addiction to nicotine and is considered a mental disorder by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (American Psychiatric Association, 1994). As such, improving our understanding of the factors that are associated with persistence of nicotine dependence, compared with those among whom nicotine dependence remits, are essential to identifying those most vulnerable to persistent, dependent cigarette smoking. This is also critical in identifying potentially modifiable risk factors for persistent nicotine dependence in order to develop more effective treatment and prevention strategies.

Several previous studies have examined predictors of persistent cigarette smoking (Johnson and Novak, 2009). Evidence suggests that early age of onset, parental smoking, peer smoking and lower education predict persistent smoking (Pierce et al., 1989; Escobedo and Peddicord, 1996; Gilman et al., 2003; Hu et al., 2006; Lawrence et al., 2007). Previous research has also documented significant associations between psychiatric disorders and persistent smoking (Breslau et al., 1993; Alvarado and Breslau, 2005; Kollins et al., 2005; Hu et al., 2006). Specific psychiatric disorders (e.g., panic, disruptive behavior disorder) have also been associated with increased risk of onset of nicotine dependence in adolescents and the prevalence of nicotine dependence among adults (Isensee et al., 2003; Griesler et al., 2008). Yet, no previous study has documented predic-

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tors of persistent nicotine dependence among adults in the general population.

Against this background, our study begins to fill these gaps by addressing three main goals. First, the study investigated the prevalence of persistent nicotine dependence over a 3-year period among adults in the United States. Second, the study investigated demographic predictors of persistent, compared with remitted, nicotine dependence among adults in the United States. Third, the study examined mental health predictors of persistent nicotine dependence.

2. Method

2.1. Participants

The NESARC (Grant et al., 2004b; Grant et al., 2009) is a nationally representative longitudinal survey of the adult non-institutionalized, civilian population of the United States conducted by the United States Census Bureau under the direction of the National Institute on Alcohol Abuse and Alcoholism (NIAAA). Wave 1 was conducted in 2001–2002 with a sample of 43,093 respondents 18 years of age and over (Grant et al., 2003b). Wave 2 was a 3-year prospective follow-up comprising 34,653 of the Wave 1 respondents, representing a response rate of 86.7% of eligible respondents (Grant and Kaplan, 2005). In combination with the Wave 1 response rate of 81%, the cumulative response rate for Wave 2 is 70.2%. Trained lay interviewers with at least five years experience conducted face-to-face assessments using computer-assisted software. Informed consent was obtained from all participants before beginning the interviews. Interviewers retested a random sample of both the Wave 1 and Wave 2 samples in order to assess the reliability of the survey (Grant et al., 2003a; Ruan et al., 2008). Detailed descriptions of methodology, sampling, and weighting procedures have been reported elsewhere (Grant et al., 2003b; Grant and Kaplan, 2005).

2.2. Interviewers, training, and field quality control

Interviewing was conducted by 1,800 professional interviewers from the Census Bureau using computer-assisted software with built-in skip, logic, and consistency checks. All interviewers had experience with other national health-related surveys with an average of five years of experience, and were further trained for 10 days under the direction of NIAAA. Verification of the interviewer was conducted by regional supervisors who re-contacted a random 10% of all respondents for quality control purposes. In addition, a randomly selected subset of respondents was re-interviewed with 1–3 complete sections of the Alcohol Use Disorder and Associated Disabilities Interview Schedule – DSM-IV (AUDADIS-IV). This evaluation served as a test-retest reliability study of NESARC measures (Grant et al., 2003a). In the few cases when accuracy was uncertain, the data were discarded and a supervising interviewer repeated the interview.

2.3. Measures

Diagnoses were assessed with the AUDADIS-IV. This instrument was specifically designed for experienced lay interviewers and was developed to advance measurement of substance use and mental disorders in large-scale surveys. Nicotine dependence was assessed in a unique module separate from the assessment of other substance use. Respondents were considered to have ever used cigarettes if they have smoked 100 or more cigarettes during their lifetime. Four other modes of nicotine use were assessed as well: pipe, cigar, snuff, and chewing tobacco use. The test-retest reliability of the nicotine use variables as well as other AUDADIS-IV nicotine use measures (e.g., frequency and duration of use), were excellent, with interclass correlation coefficients of 0.83–0.84 (Grant et al., 2003a; Ruan et al., 2008).

Assessment of cigarette use and nicotine dependence was based on the unique characteristics of nicotine dependence as distinct from other substances. To that end, the AUDADIS-IV used an extensive list of over 40 questions to assess nicotine dependence, and obtained extensive information on time frames of nicotine use and dependence. Diagnoses were made according to the DSM-IV criteria (Schmitz et al., 2003). Criteria for nicotine dependence include 3/7 of the following: (1) the need for more nicotine to achieve desired effect; (2) the subject meets the criteria for nicotine withdrawal syndromes; (3) use of tobacco by the subject more than the subject intended; (4) the persistent desire or unsuccessful efforts to cut down on nicotine use; (5) a great deal of time spent using tobacco (e.g., chain smoking); (6) the necessity to give up activities in favor of nicotine use; (7) and continued use despite recurrent physical or psychological problems likely to have been caused by nicotine use. Nicotine withdrawal was assessed as a syndrome as described by the DSM-IV based on four symptoms: (1) the use of nicotine upon waking; (2) the use of nicotine after being in a situation in which nicotine was restricted; (3) the use of nicotine to relieve or avoid withdrawal symptoms; and (4) the need to wake up in the middle of the night to use nicotine. Nicotine dependence was assessed in the lifetime time period at Wave 1 and then in the previous 12-month period at Wave 2 (to determine whether the nicotine dependence was persistent or remitted).

Table 1
Characteristics of respondents in the NESARC with Wave 1 nicotine dependence.

	N	Prevalence, % (95% CI)
Wave 1 nicotine dependence	5696	17.5 (16.5–18.4)
Characteristics		
Gender		
Male	2731	53.9 (52.4–55.5)
Female	2965	46.1 (44.5–47.6)
Age		
18–29 years	1217	23.8 (22.3–25.4)
30–44 years	1938	34.4 (32.7–36.1)
45–64 years	2059	34.0 (32.5–35.5)
65+ years	482	7.8 (7.0–8.7)
Education		
Less than high school	960	16.3 (15.1–17.6)
High school	1776	32.4 (30.7–34.0)
Some college or higher	2958	51.4 (49.5–53.2)
Race		
White	3993	80.5 (78.6–82.2)
Black	842	7.8 (6.7–9.0)
American Indian/Alaska Native	172	3.8 (3.1–4.7)
Asian/Native Hawaiian/Pacific Islander	89	2.0 (1.4–2.7)
Hispanic/Latino	600	6.0 (5.0–7.2)
Marital status		
Married/cohabiting	2784	59.7 (58.0–61.5)
Separated/widowed/divorced	1620	19.7 (18.6–20.9)
Never married	1292	20.5 (19.0–22.1)
Household income		
$0–19,999	1512	20.7 (19.3–22.0)
$20,000–34,999	1297	21.4 (20.0–22.9)
$35,000–59,999	1494	28.7 (27.1–30.3)
$60,000+	1393	29.3 (27.2–31.4)
Remitted nicotine dependence (Wave 2)	2793	48.9 (47.2–50.6)
Persistent nicotine dependence (Wave 2)	2903	51.1 (49.4–52.8)
Wave 1 psychiatric disorders		
Major depression	1836	30.8 (29.2–32.4)
Dysthymia	580	9.3 (8.4–10.3)
Bipolar disorder	643	10.9 (9.8–12.1)
Any mood disorder	2057	34.2 (32.5–36.0)
Panic disorder with or without agoraphobia	660	11.2 (10.2–12.3)
Agoraphobia	21	0.4 (0.2–0.6)
Social phobia	547	9.6 (8.6–10.6)
Specific phobia	1023	18.0 (16.6–19.4)
Generalized anxiety disorder	516	8.4 (7.6–9.4)
Posttraumatic stress disorder	896	14.2 (13.2–15.3)
Any anxiety disorder	2238	37.8 (36.3–39.3)
Any mood or anxiety disorder	3049	51.4 (49.6–53.1)
Alcohol abuse or dependence	3393	61.5 (59.8–63.2)
Drug abuse or dependence	1620	29.9 (28.2–31.7)
Any substance disorder	3651	65.9 (64.2–67.6)
Any mood, anxiety or substance disorder	4614	81.0 (79.6–82.3)
Any personality disorder	2226	38.02 (36.3–39.8)

The reliability and validity of the nicotine dependence diagnosis was assessed via random subsample of 347 respondents who were re-interviewed with the nicotine dependence module up to 10-weeks after initial appraisal (Grant et al., 2003b). The reliability of the previous 12-month (i.e., current) diagnosis was good ($k = 0.63$). Further, a series of linear regression analyses were used to validate the diagnoses by examining the association between nicotine dependence and Short-Form-12v2 physical disability scores (an often-used measure of generic quality of life which generates 10 component and profile scores assessing various dimensions of physical and mental disability) (Grant et al., 2003a; Ruan et al., 2008). Analyses were controlled for age, personality disorders, current comorbid alcohol and drug use, and mood and anxiety disorders.

In this study any mood disorder was comprised of one or more of the following disorders: major depression, dysthymia, mania, and hypomania. Any anxiety disorder encompassed one or more of the following disorders: panic with agoraphobia, panic without agoraphobia, social phobia, specific phobia, posttraumatic stress disorder and generalized anxiety disorder. We also examined personality disorders which consisted of any one or more of the following 10 personality disorders: paranoid, schizoid, schizotypal, antisocial, histrionic, borderline, narcissistic, avoidant, dependent, and obsessive-compulsive disorders.