Addictive Behaviors 64 (2017) 223–228

Contents lists available at ScienceDirect

Addictive Behaviors

journal homepage: www.elsevier.com/locate/addictbeh

Trends in cigarette use, by serious psychological distress status in the United States, 1998–2013

Valerie L. Forman-Hoffman [a,*], Sarra L. Hedden [b], Greta Kilmer Miller [a,1], Kristen Brown [a], Judith Teich [b], Joseph Gfroerer [b,2]

[a] RTI International, 3040 East Cornwallis Road, Research Triangle Park, NC 27709, USA
[b] Substance Abuse and Mental Health Services Administration (SAMHSA), Center for Behavioral Health Statistics and Quality (CBHSQ), 5600 Fishers Lane, Room 2-1090, Rockville, MD 20857, USA

HIGHLIGHTS

- Current smoking is not declining among U.S. adults with SPD.
- Heavy smoking is not declining as quickly among adults with versus without SPD.
- Smoking prevention and cessation programs may need to target those with SPD.

ARTICLE INFO

Article history:
Received 1 May 2016
Received in revised form 20 September 2016
Accepted 21 September 2016
Available online 23 September 2016

Keywords:
Cigarette use trends
Serious psychological distress

ABSTRACT

Objectives: The study compared trends in current and heavy cigarette smoking between adults with and without serious psychological distress (SPD).
Methods: This study examined data from 480,024 adults aged 18 years or older in the 1998–2013 National Health Interview Survey (NHIS) public use files. SPD is defined as having a Kessler-6 score of 13 or higher in the past month. Trends in the prevalence of current smoking and heavy smoking for 2-year time periods were assessed among those with versus those without SPD using logistic regression; tests of interaction terms determined whether smoking trends differed by SPD status.
Results: The prevalence of current smoking decreased over time among adults without SPD (adjusted odds ratio [AOR] = 0.97, 95% CI = 0.97–0.98), but remained stable among adults with SPD (AOR = 1.01, 95% CI = 0.99–1.03). Both groups had significant declines in heavy smoking over time; however, the rates of decline were greater among adults without versus with SPD (AOR = 0.87, 95% CI = 0.86–0.88 and AOR = 0.91, 95% CI = 0.88–0.94, respectively).
Conclusions: The prevalence of current smoking is not declining among adults with SPD, and the prevalence of heavy smoking is not declining as quickly among adults with SPD as compared with those without SPD. Smoking cessation efforts may need to target these populations and tailor programs accordingly.

1. Introduction

The prevalence of current cigarette smoking has declined in the United States since 1965 (Centers for Disease Control and Prevention [CDC], 2011), and heavy smoking (usually defined as smoking more than one pack of cigarettes or 20 cigarettes per day, on average) among current smokers has also declined (CDC, 2012; Pierce, Messer, White, Cowling, & Thomas, 2011). Although various national data sources have determined that rates of cigarette use have decreased over time, smoking trends among some demographic subpopulations do not appear to be significantly declining or are not decreasing as rapidly as in the general population. Identifying these subpopulations provides important information about smoking cessation targets. Prior studies have determined that female adults (American Lung Association, 2011), adults aged 45 or older (CDC, 2012), adults with lower levels of education (American Lung Association, 2011), adults with income below the poverty line (U.S. Department of Health and Human Services [HHS], 2012), adults living in the West or South regions of the United States (CDC, 2012), and adults with one or more chronic health conditions (Stanton et al., 2016) appear to have no rate of decline or slower rates of decline than comparison populations.

* Corresponding author at: RTI International, 3040 East Cornwallis Road, Post Office Box 12194, Research Triangle Park, NC 27709-2194, USA.
E-mail address: vhoffman@rti.org (V.L. Forman-Hoffman).
[1] Formerly of RTI, International and has subsequently moved to the Center for Disease Control and Prevention.
[2] Formerly of SAMHSA and has subsequently retired.

http://dx.doi.org/10.1016/j.addbeh.2016.09.003
0306-4603/

Although it has been well established that adults with mental health issues are more likely to smoke (CDC, 2014; Dube et al., 2009; Hagman, Delnevo, Hrywna, & Williams, 2008; Lasser et al., 2000), little is known about differences in smoking *trends* between those with and without mental health issues. Two recent nationally representative studies have investigated trends in tobacco use for individuals with and without measured indicators of mental illness in the United States: one using the National Longitudinal Alcohol Epidemiologic Survey (NLAES) and the second wave of its successor, the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) (Secades-Villa et al., 2013); and the other using Medical Expenditure Panel Survey (MEPS) data (Le Cook et al., 2014). The NESARC study found that the prevalence of past year daily use of any tobacco product decreased significantly between the 1991–1992 wave and the 2004–2005 wave surveys; however, this trend was not seen among some groups of the population. For example, there was only a slight decrease in daily tobacco use among individuals with a lifetime alcohol use disorder or lifetime major depressive disorder as assessed by a fully structured diagnostic interview (the Alcohol Use Disorder and Associated Disabilities Interview Schedule–IV [Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) version] [AUDADIS-IV]), in contrast to significantly decreasing rates among those without these disorders (Secades-Villa et al., 2013). In the MEPS study, the trends in smoking as assessed by a "yes" response to the question, "Do you currently smoke?" across the years 2004–2011 were different between those with and without mental illness, defined as having one or more of the following: (a) during the survey year, the respondent made an outpatient visit to a primary care professional or specialist, linked to the behavioral health International Classification of Diseases, Ninth Revision (ICD-9) codes 291, 292, and 295–314, or psychotherapy or mental health counseling, or a prescription drug fill for a behavioral health disorder; (b) the respondent had serious psychological distress (SPD), a nonspecific indicator of mental health issues associated with severe impairment, as indicated by a score of 13 or greater on the Kessler psychological distress scale (K6); or (c) the respondent scored >2 (possible scores, 0–6) on the Patient Health Questionnaire 2 (PHQ-2) depression symptom checklist (Kroenke, Spitzer, & Williams, 2003). A significant decrease in smoking was found for those without this indicator of mental illness but not for those with mental illness.

Due to limitations of prior studies, there continues to be a need for further investigation on differences in cigarette smoking trends between those with and without mental health issues. First, neither of the two aforementioned nationally representative studies specifically examined cigarette smoking. Second, the NESARC study does not enable examination of more than two estimates over time. In addition, because the MEPS sample is selected from the previous year's sample of National Health Interview Survey (NHIS) households, it has lower response rates than the parent NHIS study (ranging from 58.6% to 68.2% for the years 2004–2011 included in the analyses) (Hedden et al., 2012), which may compromise the generalizability of the findings.

The data source used in the current study, the NHIS, is the primary source of information on the health of the civilian, noninstitutionalized household population of the United States, so its estimates are considered the principal indicator for tracking cigarette smoking (HHS, 2012). The NHIS interview also includes the dimensional K6 measure to determine SPD status, which is a good indicator of those who require mental health services because it incorporates severity of illness into its assessment rather than relying solely on individual diagnoses of mental disorders that may vary widely in severity. This study compares trends in current cigarette smoking and heavy smoking for those with and without SPD (Kessler et al., 2002).

2. Methods

This study used data from the NHIS public use files for the years 1998–2013 (http://www.cdc.gov/nchs/nhis.htm) (Botman, Moore, Moriarity, & Parsons, 2000). The total sample of adult respondents aged 18 years or older was 480,024.

The analyses involved two primary dependent variables of interest: current cigarette smoking and current heavy cigarette smoking. Current cigarette smoking was defined as responding "yes" to the question, "Have you smoked at least 100 cigarettes in your entire life?" and responding "every day" or "some days" to the question, "Do you now smoke cigarettes every day, some days, or not at all?" Current heavy cigarette smoking was defined as being categorized as a current smoker and answering "20 or greater" to the question, "On the average, how many cigarettes per day do you typically smoke?"

Using the NHIS data, average annual trends in current and heavy smoking were examined by combining 2 years of data (1997–1998, 1999–2000, etc.) to increase sample size and precision of estimates made across subgroups of interest. The time trend variable created and used in the analyses was a continuous variable that ranged from 1 (survey years: 1998–1999) to 8 (survey years: 2012–2013). The main correlates of interest were both time and a measure of psychological distress, the K6 scale. The K6 asks how frequently the respondent has experienced each of six indicators of mental illness: "During the PAST 30 DAYS, how often did you feel... 1. So sad that nothing could cheer you up; 2. Nervous; 3. Restless or fidgety; 4. Hopeless; 5. That everything was an effort; and 6. Worthless." The response options included: "1. ALL of the time; 2. MOST of the time; 3. SOME of the time; 4. A LITTLE of the time; and 5. NONE of the time," with each option assigned a number of "4 (ALL of the time)" to "0 (NONE of the time)" and summed to get an overall score ranging from 0 to 24. SPD was defined as having a past month K6 psychological distress scale score of 13 or higher (range 0–24) in accordance with prior studies that have determined concordance with serious mental illness (SMI) designations made based on DSM-IV criteria (Kessler et al., 2002; Kessler et al., 2003; Kessler et al., 2010).

Covariates used as control variables in regression models included standard classifications of age group (18 to 34, 35 to 54, and 55 or older); education (less than high school, general equivalency diploma, high school graduate, some college, and college graduate); race/ethnicity (not Hispanic or Latino white, not Hispanic or Latino black or African American, Hispanic or Latino, and other); gender (male and female); and region of residence (Northeast, Midwest, South, West).

Descriptive statistics were used to estimate the average annual prevalence of current smoking and heavy smoking for each 2-year period between 1998 and 2013 (e.g., 1998–1999, and 2000–2001). Significant differences in proportions of cigarette smoking by SPD status were tested for each 2-year time period using *t*-tests (rather than chi-square), which better reflect the test statistic under finite sample sizes in complex survey data (Aldworth, Chromy, & Davis, 2012). Estimates with relative standard errors of >0.3 were suppressed in accordance with NHIS suppression criteria (http://www.cdc.gov/nchs/nhis.htm).

Logistic regression models adjusted for the aforementioned correlates were fit separately for the dependent variables of current smoking and heavy smoking, with the focus on the mental health indicator of interest, SPD, and trends over time. Trend lines for each smoking outcome over time were confirmed to be linear, after which a time by SPD interaction term was added to each of the two models to determine whether trends in current smoking or in heavy smoking differed by SPD status over time (i.e., 1998–2013). Significant interaction terms ($p < 0.05$) based on Wald chi-square testing were investigated further via contrasts to determine differences in trends (i.e., the direction and magnitude of each smoking outcome by SPD status).

Adjusted odds ratios (AORs) and 95% confidence intervals (CIs) were reported for nonreference levels of each variable in the logistic regression models. The OR for the time trend indicates the percentage increase or decrease in average annual current or heavy smoking prevalence across each 2 adjacent interview years. For example, an OR of 1.03 would indicate that the odds of smoking increased by an average of 3% for each 2-year time period between 1998 and 2013.