Cigarette Smoking and the Onset and Persistence of Panic Attacks During Mid-Adulthood in the United States: 1994–2005

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ABSTRACT

Objective: The current study examined the relationship between cigarette smoking (daily) and risk of onset and persistence of panic attacks over a 10-year period among adults in mid-adulthood in the United States and whether quitting smoking reduced the risk for panic attacks.

Method: Data were drawn from the Midlife Development in the United States Survey (N = 2,101), a nationally representative sample of adults aged 25 to 74 years at baseline (wave 1, 1994–1995) who were followed up 10 years later at wave 2 (2004–2006). Psychiatric diagnoses were based on the Composite International Diagnostic Interview Short-Form (CIDI-SF [based on *DSM-III-R* criteria]) scales. Logistic regressions were used to evaluate the associations between smoking status and the onset and persistence of panic attack after controlling for demographic characteristics and substance use problems.

Results: Daily smoking in 1994 (OR = 1.9 [95% CI, 1.1–3.3]) and persistent daily smoking in 1994 and 2005 (OR = 2.6 [95% CI, 1.4–4.8]) were associated with a significantly increased likelihood of panic attacks in 2005. Moreover, smoking abstinence significantly reduced the risk of new-onset panic attacks (OR = 0.6 [95% CI, 0.4–0.97]) and persistence of panic attacks (OR = 0.2 [95% CI, 0.1–0.5]).

Conclusions: The present data provide novel evidence that smoking is associated with an increased risk of panic attacks and that quitting smoking helps reduce such risk.

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Smoking and panic attacks frequently co-occur.[1–3] For instance, smokers have significantly higher rates of panic attacks compared to nonsmokers.[4] Empirical work suggests that the smoking-panic relationship is dynamic and bidirectional. For instance, panic attacks may influence the developmental progression to smoking, presumably via coping or self-medication processes.[4,5] Indeed, young adults with a history of panic attacks compared to those without such a history are significantly more likely to begin smoking.[6,7] Additionally, smoking appears to influence the onset and course of panic attacks.[6,7] This process has been theorized to occur, in part, as a result of neurophysiologic processes altered by smoking,[8,9] insults to the respiratory system due to smoking,[6] or the misinterpretation of physical symptoms induced by smoking deprivation (eg, nicotine withdrawal).[6,9] Finally, panic attacks are related to lower odds of quit success.[10–12]

At present, there are at least 4 notable limitations of existing work. First, previous studies[1,6] have spanned up to only 5 years, and longer-term outcomes have not yet been modeled. Thus, there is a need to use longer observational periods, especially for middle-aged adults, to understand the smoking-panic relationship over time. Second, there is a need to evaluate the role of persistent smoking (ie, "stable" smoking measured between at least 2 time points) in relation to panic attacks. Such knowledge is practically and theoretically helpful in providing insight into the role of stable smoking, perhaps an indicator of more severe smoking processes, in regard to panic attack risk. Third, past work has not investigated the role of quitting in terms of reduction in the risk of panic attacks. As a result, the clinical significance of smoking as a "target behavior" for panic attack prevention and intervention remains unclear. Finally, despite the large body of literature documenting the relationship between smoking and panic in adolescents and young adults,[6,7] there is relatively little knowledge about the smoking-panic relationship among older adults. This drawback is clinically important because smoking is the leading cause of premature death among adults in mid-to-late adulthood,[13,14] and panic attacks regularly occur through 50 years of age.[15]

To address each of the aforementioned gaps in past work, the current study investigated the relationship between smoking and panic attacks over a 10-year period. It was hypothesized that, after controlling for gender[16,17] and substance use problems,[18,19] daily smoking and persistent smoking would be associated with an increased likelihood of panic attacks. Additionally, it was hypothesized that quitting smoking would be associated with a decreased risk of panic attacks.

METHOD

Participants

Data were drawn from the 2 waves of the National Survey of Midlife Development in the United States (MIDUS),[20,21] a collaborative investigation of patterns and predictors of midlife (25 to 74 years) development in the areas of physical and mental health. Wave 1 was conducted from 1994 to

Clinical Points

- Despite existing knowledge on the role of smoking in the development of panic attacks among young adults, there is relatively little knowledge about the aforementioned relationship among older adults and for durations as long as a decade.
- The present results suggest there may be merit in targeting smoking to reduce the risk of panic attacks. Moreover, the mental health benefits of quitting smoking in the form of reduced risk of panic attacks could usefully be added to common information listed as reasons to quit.

1995 with a sample of 3,032 community-dwelling English speakers in the continental United States (a nationally representative, multistage, probability sample). Participants who completed the telephone interview were mailed a self-administered questionnaire. The response rate from the mailed questionnaire was 86.6%, yielding an overall response rate of 61% ($0.70 \times 0.87 = 0.61$).

Approximately 70% of wave 1 participants took part in the wave 2 survey collected by the Institute on Aging at the University of Wisconsin, Madison, and supported by the National Institute on Aging (2004–2006). Wave 2 participants completed a 30-minute telephone interview, and a self-administered questionnaire was mailed to them. Of the 3,032 participants from wave 1, 2,101 completed the wave 2 telephone surveys (response rate, 69.5%). For this study, we analyzed data only from respondents who completed both the phone and mail-in surveys at wave 1, participated in the wave 2 survey, and had complete information for wave 2 outcome variables.

Measures

Demographic characteristics. At wave 1, basic sociodemographic characteristics were obtained using a self-report questionnaire. These included age, race, gender, marital status, and level of formal education.

Smoking. At each wave, participants who reported ever smoking at least 1 cigarette were asked whether they had ever smoked regularly ("regularly—meaning at least a few cigarettes every day"), the age they were when they last smoked regularly, and whether they currently smoke regularly ("Do you smoke cigarettes regularly now?"). Those who reported no lifetime smoking were considered lifetime nonsmokers. Those who reported lifetime daily smoking and were not current daily smokers at wave 1 or 2 were considered former daily smokers. Those who reported current daily smoking at waves 1 and 2 were considered persistent smokers.

Panic attacks. Psychiatric diagnoses of MIDUS were based on the Composite International Diagnostic Interview Short-Form (CIDI-SF) scales,[22] which evaluate 6 *DSM-III-R* mental disorders. The CIDI-SF is a series of diagnostic-specific scales that were developed from item-level analyses of the Composite International Diagnostic Interview questions during the National Comorbidity Survey.[22] The CIDI-SF scales were designed to reproduce the full composite of international diagnoses as exactly as possible, with only a small subset of the original questions. Validity data[23] suggest a strong relationship between CIDI-SF–based and the full CIDI–based diagnoses. These measures were used in waves 1 and 2 for the presence of the disorders during the past 12 months. Recent incidence of panic attacks by 2005 was defined as having a 12-month disorder at wave 2, but not at wave 1. Persistent panic attacks were defined as having a 12-month disorder at both wave 1 and wave 2.

Statistical Analysis

We utilized χ^2 analyses to identify differences in demographic characteristics between lifetime nonsmokers, former daily smokers (those who were abstinent for less than 10 years and those abstinent for 10 or more years after a history of daily smoking), and persistent smokers. Logistic regression analyses were utilized to evaluate the relationships between (1) daily smokers (1994) versus lifetime nonsmokers, (2) persistent smokers versus lifetime nonsmokers, and (3) former daily smokers (successful quitters) versus persistent smokers and the odds of past 12-month panic attack by 2005 and of persistent or recurring panic attacks in 1994 and 2005. Odd ratios were adjusted for demographic characteristics and substance use problems.

RESULTS

Demographic Characteristics and Smoking

Persistent smokers compared with nonsmokers were more likely to be male, have a younger age, have fewer years of education, and be separated and divorced (Table 1). Moreover, compared to nonsmokers, former smokers were more likely to be male, have less education, and be divorced and older (see Table 1).

Daily Smoking and Panic Attacks

Smoking in 1994 was associated with an increased risk of panic attacks in 2005 and persistence of panic attacks (Table 2). After the results were controlled for age and gender at wave 1, these associations remained significant for both panic attack onset and persistence (see Table 2). After adding substance use problems to the models, the effect of persistence of panic attacks remained, but not for onset of panic attacks (see Table 2).

Persistent Smoking and Panic Attack

Persistent smoking compared to nonsmoking was associated with an increased risk of panic attack onset and persistence (see Table 2). These effects were still evident after the results were adjusted for the covariates (see Table 2).

Former Daily Smoking (sustained abstinence for less than 10 years or for 10 or more years) and Panic Attack

In comparison with persistent daily smokers, former daily smokers who were less than 10 years abstinent, had less risk for panic attack onset and persistence (Table 3). Former daily smokers who were 10 or more years abstinent had less panic attack risk than persistent daily smokers (see Table 3).

Table 1. Demographic Characteristics Associated With Remitted/Former Smoking (ie, abstinence for less than 10 years or for 10 or more years) and Persistent Smoking Among Adults in the Community[a]

Characteristic	Lifetime Nonsmokers (n = 518)	Former Daily Smokers (< 10 years abstinent) (n = 230)	Former Daily Smokers (≥10 years abstinent) (n = 550)	*P*	Persistent Smokers (n = 356)	*P*
Age, mean (SD), y	43.7 (12.7)	41.9 (11.9)	49.8 (12.4)	< .0001	41.3 (10.5)	.003
Gender, % (n)						
Male	23.1 (177)	14.6 (112)	39.1 (299)	< .0001	23.0 (176)	< .0001
Female	38.3 (341)	13.2 (118)	28.2 (251)		20.2 (180)	
Race, % (n)						
White	31.6 (424)	12.8 (172)	34.5 (463)	.1	21.1 (283)	.4
Black	33.0 (33)	16.0 (16)	30.0 (30)		21.0 (21)	
Native American	33.3 (3)	11.1 (1)	44.4 (4)		11.1 (1)	
Asian or Pacific Islander	50.0 (5)	10.0 (1)	30.0 (3)		10.0 (1)	
Other	27.3 (6)	9.1 (2)	31.8 (7)		31.8 (7)	
Multiracial	30.0 (3)	10.0 (1)	50.0 (5)		10.0 (1)	
Education, % (n)						
Some school	20.5 (52)	16.9 (43)	32.3 (82)	< .0001	30.3 (77)	< .0001
High school graduate	25.7 (142)	15.6 (86)	31.7 (175)		27.0 (149)	
Some college	31.7 (147)	13.2 (61)	33.9 (157)		21.2 (98)	
Bachelor's degree	40.3 (91)	12.4 (28)	38.5 (87)		8.8 (20)	
Some graduate school or beyond	51.9 (81)	8.3 (13)	32.1 (50)		7.7 (12)	
Marital status, % (n)						
Married	32.3 (363)	12.0 (135)	35.5 (399)	.026	20.2 (227)	< .0001
Separated	23.3 (7)	16.6 (5)	26.6 (8)		33.3 (10)	
Divorced	25.4 (67)	18.9 (50)	27.3 (72)		28.4 (75)	
Widowed	29.7 (33)	13.5 (15)	41.4 (46)		15.3 (17)	
Never married	33.9 (40)	21.2 (25)	21.2 (25)		23.7 (28)	

[a]Demographic characteristics reported at wave 1.

Table 2. Daily Smoking in 1994 and Persistent Smoking (in 1994 and 2005) and Risk of Panic Attack Onset and Persistence Compared to Lifetime Nonsmoking

Panic Attack	Lifetime Nonsmokers (n = 518), n (%)	Current Daily Smokers, 1994 (n = 525), n (%)	Odds Ratio (95% CI)[a]	Adjusted Odds Ratio (95% CI)[a,b]	Adjusted Odds Ratio (95% CI)[a,c]	Persistent Daily Smokers (n = 356), n (%)[d]	Odds Ratio (95% CI)[a]	Adjusted Odds Ratio (95% CI)[a,b]	Adjusted Odds Ratio (95% CI)[a,c]
2005 only	20 (3.8)	37 (7.0)	**2.0 (1.1–3.4)**	**1.9 (1.1–3.3)**	1.5 (0.8–2.8)	28 (7.0)	**2.3 (1.3–4.2)**	**2.6 (1.4–4.8)**	**2.5 (1.2–5.0)**
1994 and 2005	9 (1.7)	24 (4.7)	**3.3 (1.5–7.5)**	**3.2 (1.4–7.3)**	**2.9 (1.2–6.9)**	18 (5.0)	**3.3 (1.5–7.4)**	**3.6 (1.6–8.1)**	**2.7 (1.1–6.5)**

[a]Significant values ($P < .05$) are indicated in bold.
[b]Adjusted odds ratio for age and gender at wave 1 (1994).
[c]Adjusted odds ratio for age, gender, and alcohol/drug use problems at wave 1 (1994).
[d]Being a daily smoker at both waves (1994 and 2005).

Table 3. Former Daily Smoking and Risk of Panic Attack Onset and Persistence Compared to Persistent Daily Smoking

Panic Attack	Persistent Daily Smokers (n = 356), n (%)	Former Daily Smokers (< 10 years abstinent) (n = 230), n (%)	Odds Ratio (95% CI)[a]	Former Daily Smokers (≥ 10 years abstinent) (n = 550), n (%)	Odds Ratio (95% CI)[a]
2005 only	28 (7.9)	39 (16.9)	**0.6 (0.4–0.97)**	30 (5.7)	**0.6 (0.4–1.0)**
1994 and 2005	18 (5.0)	10 (4.3)	**0.2 (0.1–0.5)**	5 (1.0)	**0.2 (0.1–0.4)**

[a]Significant values ($P < .05$) are indicated in bold.

DISCUSSION

Smoking was significantly associated with an increased risk for the onset and persistence of panic attacks after the results were controlled for demographic characteristics and substance use problems over a 10-year period among a nationally representative sample of middle-aged adults. Notably, previous studies[6,7] have found somewhat higher odds of panic attack risk relative to those reported in the current investigation. This comparatively lower risk observed here may be partially influenced by the greater assessment window (ie, 10 years vs a maximum of 5 years in past work) employed in the current study. Additionally, because some of the daily smokers in 1994 quit smoking by 2005, the strength of the smoking-panic association would naturally be expected to be somewhat attenuated. Moreover, the present study involved participants with a minimum age of 25 years, an age cutoff following the period with the highest rate of panic attack onset.[24]

The present study also found that smokers who successfully remained abstinent had a lower risk of panic attacks. This finding indicates that quitting smoking indeed lowers the risk of panic attacks, and, therefore, suggests that there is merit to employing smoking cessation interventions

to reduce the risk of panic attacks. This inference can be strengthened in future research by testing in a randomized clinical trial whether smoking cessation reduces the risk for the onset or persistence of panic attacks.

In light of the evidence on the anxiogenic effects of nicotine,[25] it is possible that the increased risk of panic attacks among the smokers is due to the nicotine component of the cigarettes. If confirmed through prospective designs, this finding has an important public health policy implication considering the growing awareness and usage of alternative formats of nicotine-containing products (eg, electronic cigarettes) among former smokers.[26,27] These data could inform the regulation and monitoring of such products.

The present study has a number of limitations. First, we could not discern the exact chronology of some theoretically and clinically relevant events (eg, dates of onset of panic attacks and quitting or relapse dates). Second, as a retrospective study covering a large timeframe (ie, 10 years), the self-report data are possibly influenced by recall biases. Third, MIDUS is a survey among individuals aged 25–74 years and, consequently, it is not advisable to generalize these findings to younger or older adults. Fourth, this study did not have data on the severity of nicotine dependence. This lack of information is unfortunate, as there is a differential impact of smoking severity on panic attacks.[28,29] Fifth, we were limited to the predefined categorization system of smoking status within MIDUS data. Future studies could benefit from examining the same relationships by using alternative smoking assessments (eg, smoking rate, degree of dependence on nicotine). Sixth, the current data did not include the complete clinical profile of participants, including all possible Axis I and Axis II diagnoses. Finally, the observed associations could be due to the effects of other panic-relevant lifestyle factors, such as sleep, exercise, or diet.[30]

Overall, the current data highlight the clinically important role of smoking in terms of panic attack risk. According to these findings, it may be advisable to target smoking to reduce the risk of panic attacks. Moreover, from a public health and policy perspective, the mental health benefits of quitting smoking in the form of reduced risk of panic attacks could usefully be added to common information listed as reasons to quit.

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Additional information: Data from the Midlife Development in the United States (MIDUS) survey are owned by the University of Wisconsin-Madison, Institute on Aging (http://aging.wisc.edu/midus/data/index.php). Access to the data can be obtained at http://www.icpsr.umich.edu/icpsrweb/ICPSR/series/00203.

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