Research Report

How much improvement in mental health can be expected when people stop smoking? Findings from a national survey

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Abstract

Background and aims: There is evidence that mental health improves when smokers stop. This study aimed to assess in a nationally representative sample how far anxiety and depression in long-term ex-smokers can be expected eventually to reach levels found in those who have never smoked.

Methods: Data from the Smoking Toolkit Study (STS) were used. The STS involves monthly household surveys of representative samples of the adult population of England. Anxiety and depression were compared using an item from the EQ5-D in respondents aged 40+ years where were either current smokers, never smokers, or had stopped for at least a year, adjusting statistically for age, gender and social grade.

Results: The prevalence of anxiety or depression was 10.0% (95% CI 9.1-10.9) in never smokers, 18.3% (95% CI 16.0-20.6) in current smokers, and 11.3% (95% CI 9.6-13.0) in long-term ex-smokers. After adjusting for age, sex and social grade, long-term ex-smokers were similar to never smokers (OR=1.15, 95% CI=0.94-1.41). Current smokers had higher prevalence than never smokers (OR=1.69, 95% CI=1.39-2.04) and ex-smokers (OR=1.47, 95% CI=1.15-1.86).

Conclusions: Prevalence of anxiety and depression in long-term ex-smokers appears to be similar to what is found in never smokers.

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Data access: The data file used for this analysis and the SPSS syntax are available as supplementary files. On www.smokinginbritain.co.uk.

Commentaries: Readers are invited to comment on this article including presenting results of additional data analyses by going to: www.smokinginbritain.co.uk.

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Introduction

If stopping smoking improves mental health this provides an important additional reason for smokers to stop. It is useful to know whether ex-smokers can expect eventually to have similar mental health to never smokers. This study aimed to assess in a nationally representative sample the prevalence of anxiety and depression in long-term ex-smokers, never-smokers and current smokers.

Smokers have worse mental health than either never smokers or ex-smokers (1-3). A recent study in England found that heavy smokers (those who smoke 20 or more cigarettes a day) were 86% more likely to report, at a given point in time, anxiety or depression compared with never-smokers, with other characteristics controlled for (4). Several studies have found that the mental health of smokers improves when they stop (1, 5, 6), although not all studies have found this (7), and at least part of the change may reflect an effect of poor mental health in causing relapse to smoking (8). From the smoker's point of view, and for economic analyses of the benefits of smoking cessation, it is useful to be able to estimate the degree of improvement that can be expected in the population as a whole arising from cessation. In particular, it is useful to assess whether prevalence of mental health problems in long-term ex-smokers becomes similar to that of never smokers.

Longitudinal data, following smokers up over time, in theory provide the best way of addressing the issue. However, they are potentially subject to bias arising from self-selection into studies that are demanding in terms of requiring commitment to follow up over many years. Longitudinal studies also suffer from differential loss to follow up which may bias the results, especially over a period of years or decades.

Cross sectional surveys are less demanding on respondents and could be expected to be more likely to recruit representative samples. However they leave open the question as to whether the difference between ex-smokers and smokers arises because smokers with better mental health found it easier to stop smoking or remain abstinent. If the prevalence of mental health problems in ex-smokers turns out to be similar to that of never smokers, rather than intermediate between the two, it makes it somewhat more likely that this reflected a return to what would have been the case if they had not smoked. In fact, prevalence of mental health problems could be somewhat higher in ex-smokers than never smokers because people with a propensity to mental health problems may be more likely to take up smoking in the first place (9).

In the light of the above, this study aimed to assess in a cross sectional survey whether the prevalence of anxiety/depression in long-term ex-smokers in England was similar to never smokers, and lower than current smokers.

Methods

Design: This article used data from the Smoking Toolkit Study. This is an ongoing study involving monthly household surveys of representative samples of the adult population in England. Full details are provided in (10). See www.smokinginengland.info for further details.

Sample: The sample consisted of 6,471 respondents aged 40+ years who were surveyed between April and September 2012. The sample was limited to those aged 40+ because most

of the deterioration in health-related quality of life due to smoking would not be expected to occur until after that age. This may not apply to anxiety/depression but was one of a number of quality of life domains explored (for which the findings will be reported elsewhere).

Measures: Cigarette smoking status was assessed by the question: Which of the following best applies to you? 1. I smoke cigarettes (including hand-rolled) every day, 2. I smoke cigarettes (including hand-rolled), but not every day, 3. I do not smoke cigarettes at all, but I do smoke tobacco of some kind (e.g. pipe or cigar), 4. I have stopped smoking completely in the last year, 5. I stopped smoking completely more than a year ago, 6. I have never been a smoker (i.e. smoked for a year or more), 7. Don't know. Those who responded either 1. or 2. were classed as current cigarette smokers. Those who responded 5. were classed as long-term ex-smokers and those who responded 6. were classed as never smokers. Those who responded 3. or 4. were excluded as they were either not cigarette smokers or had only stopped smoking for a short period of time. Data were also collected on age, gender and social grade: AB professional/managerial, C1 skilled non-manual, C2 skilled manual, D semi-skilled manual, E unskilled manual, low paid or long-term unemployed. Ex-smokers were asked at what age they had stopped, and this was used to calculate how many years it was since they stopped. Anxiety/depression was assessed using an item from the EQ5-D. This is an established measure of quality of life covering 5 domains, including mental health. The mental health item asks respondents to choose one of the following options: 1. I am not anxious or depressed, 2. I am moderately anxious or depressed, 3. I am extremely anxious or depressed (4).

Analyses: Data were weighted using the standard formula for the Smoking Toolkit Study (11). The prevalence of anxiety/depression was calculated, for smokers, ex-smokers and never smokers, together with 95% confidence intervals. To take account of age, gender and social grade (all of which could influence anxiety and depression) a logistic regression was carried out in which the odds of reporting being moderately or extremely anxious or depressed were regressed on to smoking status (never smoker, smoker, and long-term ex-smoker) adjusting for age, sex, and social grade. Planned comparisons were between never smokers and smokers, never smokers and long-term ex-smokers, and smokers and long-term ex-smokers. The logistic regressions were repeated with unweighted data as a sensitivity analysis.

Results

Table 1 shows the distributions of the variables used in the study. A total of 11.7% reported moderate or extreme anxiety or depression. Figures are based on an N after weighting of 6,326. The prevalence of anxiety or depression in never smokers was 10.0% (N=393/3920, 95% CI 9.1-10.9) in never smokers, 18.3% (N=205/1117, 95% CI 16.0-20.6) in current smokers, and 11.3% (145/1288, 95% CI 9.6-13.0) in long-term ex-smokers.

Table 2 shows the results of the logistic regression analyses. It is clear that in both the adjusted and unadjusted analyses, long-term ex-smokers have similar prevalence of anxiety or depression to that of never smokers and lower than current smokers. Prevalence of anxiety/depression in smokers was higher for smokers than long-term ex-smokers (OR=1.47, 95% CI=1.15-1.86). It is also noteworthy, that prevalence of anxiety/depression was greater in women than men and greater with increasing social disadvantage. The results were similar when the logistic regressions were run with unweighted data.

Table 1: Distributions of variables

Variable	N (%) (weighted)
Smoking status	
Never smoker	3,920 (62.0)
Smoker	1,117 (17.7)
Long-term ex-smoker	1,288 (20.4)
Years since quit (ex-smokers)	
1-10	367 (28.5)
11-20	275 (21.4)
21-30	264 (20.5)
31+	381 (29.6)
Age (yrs)	
40-44	977 (15.4)
45-54	1,777 (28.1)
55-64	1,492 (23.6)
65+	2,080 (32.9)
Sex	
Male	3,007 (47.1)
Female	3,318 (52.5)
Social grade	
AB	1,955 (30.9)
C1	1,692 (26.7)
C2	1,290 (20.4)
D	839 (13.3)
E	55 (8.7)
Anxiety/depression	
None	5,583 (88.3)
Moderate	633 (10.0)
Extreme	110 (1.7)

Table 2: Results of logistic regression of anxiety/depression on to smoking status and socio-demographic variables

	Unadjusted Odds ratio (95% Confidence Interval)	**Fully adjusted Odds ratio (95% Confidence Interval)**
Smoking status		
Never smoker (Ref)	1	1
Smoker	2.01 (1.68-2.42)	1.69 (1.39-2.04)
Long-term ex-smoker	1.14 (0.93-1.39)	1.15 (0.94-1.42)
Sex (Ref: Male)	1.34 (1.15-1.56)	1.35 (1.15-1.58)
Age (Ref: 40-44)	1.00 (0.93-1.07)	1.00 (0.92-1.07)
Social grade (Ref: AB)	1.47 (1.39-1.56)	1.43 (1.35-1.52)

'Ref' refers to reference category. For age the odds ratio refers to each additional year of age. For Social grade the odds ratio refers to each category change treating this as an ordinal variable.

Discussion

In the English population aged 40+, the prevalence of reported anxiety/depression in long-term ex-smokers is similar to never smokers. The prevalence in smokers is substantially higher than both never- and long-term ex-smokers. These findings add to the body of evidence which suggests that smoking may be responsible for an increase in anxiety/depression in the population.

The pattern of results found in the present paper could also arise if anxiety and depression led to relapse to smoking over time. It would have to be an implausibly strong association to account for prevalence reaching a value similar to that of never smokers (12), but it remains a possibility.

The idea that, in the general population of a country such as England, smoking increases tendency towards anxiety and depression, and cessation reverses this, raises some important theoretical and policy issues. From a theoretical point of view, the question arises as to what it is about smoking that underpins this effect. One possibility is that it is a result of chronic ingestion of nicotine. Nicotine has been claimed to have mood enhancing properties, but this is only apparent in smokers who have been abstinent for at least a few hours, which suggests that it is not an enhancement effect but reversal of an adverse withdrawal state (13). After only a few hours of abstinence, smokers experience a worsening of mood. This is reversed by nicotine replacement therapy and if abstinence continues for several weeks. Thus, one explanation for smoking causing a general worsening of mood may be that smokers are daily going through a cycle of adverse nicotine withdrawal effects and reversal of those effects, with the net effect being worse mood than if they had not smoked.

Another possibility, is that the anxiety and depression is secondary to physical ill health caused by smoking. If this were the case, one would expect there to be an interaction with age since smoking-related ill health should become worse with age. In fact no suggestion of such an interaction was found (OR=0.94, 95% CI=0.77-1.15 for the smoker versus never smoker by age interaction) so this seems unlikely. However, it was not possible to control for co-morbidities so this cannot be ruled out.

It is also possible that a psychoactive compound other than nicotine in cigarettes lead to impairment of mental health. There are no obvious candidates for this, however.

An important policy implication of the findings of this study is that improvement in mental health should be factored into health economic evaluations of smoking cessation interventions more directly. Although use of the overall EQ-5D score in some economic analyses captures this effect to some degree, cost savings from lower use of mental health services arising from lower smoking prevalence should probably also be considered.

The study had a number of limitations. First, the measure of anxiety/depression was very crude. However, it was sufficiently sensitive to detect an increase in prevalence among smokers and in respondents with greater socioeconomic disadvantage, and among women. The strength of the associations was similar to that found with more fine grain measures. Secondly, the sample involved adults aged 40+ and the results may not generalise to younger smokers. In addition, it is possible that the benefits of cessation may depend on the age at which it occurs. This study did not have a sufficient sample size to be able to assess this. Thirdly, the analysis did not allow for existing co-morbidities due to the absence of such data.

In conclusion, among the English population aged 40+, smokers who have stopped for at least a year have similar prevalence of reported anxiety and depression to never smokers, and smokers have a prevalence that is much higher than both of these groups. This adds to the growing body of evidence that smoking increases propensity to anxiety and depression and that stopping reverses this effect.

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