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Short communication

Predictors of persistent smoking and quitting among women smokers

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Abstract

This study examined predictors of persistent tobacco smoking and smoking cessation in a longitudinal study of women's health. The sample consisted of 575 women, with an average age of 34 years at baseline. Follow-up occurred some 13 years later. Two models of smoking behavior were examined, the first identifying correlates of daily smoking at baseline and the second identifying predictors of subsequent quitting at follow-up among those smoking at baseline. Poor maternal education, being young at birth of first child, high level of anxiety, having a partner who smoked, and high tea/coffee consumption were all associated with smoking at baseline. Being a young mother and number of cigarettes smoked at baseline predicted subsequent persistent smoking while high levels of anxiety significantly predicted subsequent quitting.

Keywords: Tobacco smoking; Cessation; Predictors

1. Introduction

An understanding of factors predicting sustained tobacco use and cessation may be useful in developing public health actions to reduce smoking. Smoking cessation has been related to variables including higher socioeconomic status (Gilman, Abrams, & Buka, 2003); lower alcohol intake and antidepressant medication (Pomerlau, Zucker, & Stewart, 2003); partner support for quitting (Roski, Schmid, & Lando, 1996); and lower dependence (Ferguson et al., 2003). Much research on cessation has

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examined predictors of relatively short-term cessation after treatment for tobacco dependence. Here we examine smoking in a longitudinal study of NZ women in mid-life over a 13-year period, using a large amount of information enabling an investigation of socioeconomic, health and behavioral factors, which might be associated with persistence or cessation of tobacco smoking.

2. Methods

2.1. Participants

Participants were women whose children were enrolled in the Dunedin Multidisciplinary Health and Development Study (DMHDS), a longitudinal study of 1037 children born in 1972–1973 (Silva & Stanton, 1996). Extensive information about the women has been collected over the course of the DMHDS. Information about tobacco use was collected in 1981–1982 as part of a study of smoking among the children, and tobacco use was included at follow-up in 1994 (Williams, McGee, Olaman, & Knight, 1997). Information about smoking was available at baseline for 743 women (average age = 34.2 years) representing 76% of the potential sample.

2.2. Measures

Baseline assessments included self-report of smoking status (non-smoking, daily smoking, ex-smoker) and cigarettes smoked (<10, 10–19 and 20+ daily), smoking by other household members, smoking during pregnancy, and knowledge about the health effects of smoking. Smoking status was again assessed in 1994. Predictive measures were chosen in an exploratory way to investigate associations with later smoking persistence and cessation. Socio-demographic variables included age, and age at birth of first child (<21 years); solo parenting; maternal education (no education beyond high school—75% of such women had a qualification gained after only 3 years of high school); working 20+ h outside home; and maternal reading ability (Scottish Council for Research in Education, 1976). Mental health variables included a 10-item anxiety measure based on the Malaise Inventory, and depression measured by 18 items (Williams et al., 1997). Family social support was measured by the Family Relations Index from the Family Environment Scale (FES: Moos & Moos, 1981). Physical activity was assessed through self-rating of "fitness" and report of engaging in physical activity more than once a week, while family activity was assessed by the active-recreational scale of the FES. Physical health included reports of respiratory symptoms, worries about health, concerns about weight, and Body Mass Index (BMI). Finally, predictors relating to substance use included number of cigarettes smoked each day, partner's smoking status, knowledge about the health effects of smoking, weekly alcohol use (2 or more times per week), and daily tea and coffee consumption.

2.3. Data analyses

The analysis was based on Hosmer and Lemeshow (1989), whereby variables were analyzed in blocks. For example, the socio-demographic variables were considered as a block, and logistic regression used to determine the strength of univariate relationships between individual socio-demographic variables and daily smoking at baseline (Model 1) and quitting by follow-up (Model 2). Variables were included in

further multivariate modelling if $P<0.25$ for each particular univariate association within a block of variables.

3. Results

3.1. Model of smoking at baseline

Complete data on smoking at both ages were available for 575 women, representing 77.4% of those followed-up. Some 209 (36.3%) reported smoking cigarettes daily at baseline. The following variables were associated with daily smoking, at $P<0.25$: low maternal education; young at the birth of the first child; higher anxiety; lower family social support; having a partner who smoked; lower weekly physical activity; more respiratory problems; higher BMI; and higher consumption of tea and coffee. These nine variables were then entered into a bootstrap procedure to select the most important variables for further multivariate modelling. The final model with those variables remaining significant at $P<0.05$ is shown in Table 1. Among women with no education past high school, 43.1% were smoking daily compared with 25.2% among those with further education; and among those who were young at the birth of their first child, 46.1% were smoking daily compared with 32.0% among older first-time mothers. Higher self-reported anxiety was associated with smoking daily (50.7% vs. 34.3% among women reporting low anxiety), as was having a partner who smoked (55.6% vs. 24.0% among women with a non-smoking partner); and higher levels of tea and coffee consumption (55.7% vs. 29.9% among women with low beverage consumption).

3.2. Model of quitting at follow-up

Of the 209 women smoking cigarettes at baseline, 75 (35.9%) reported having quit smoking at follow-up. The final model for these 209 women is shown in Table 1. Being young at birth of first child

Table 1
Multivariate model of tobacco smoking at baseline and quitting at follow-up showing odds ratios (OR) and 95% confidence intervals (95% CI)

Variable	Unadjusted OR	Adjusted OR	95% CI
Smoking at baseline (Model 1)			
Low education	2.25	2.08	1.40–3.10
<21 birth first child	1.82	1.59	1.07–2.36
High anxiety	1.97	1.79	1.04–3.10
Partner smokes	3.96	3.97	2.73–5.77
High tea/coffee consumption	1.31	1.24	1.06–1.45
Quit at follow-up (Model 2)			
<21 birth first child	0.42	0.39	0.20–0.75
High anxiety	2.04	2.93	1.30–6.62
Amount smoked*			
10–19 cigarettes	0.29	0.21	0.10–0.44
20+ cigarettes	0.16	0.14	0.06–0.37

*Reference category is 1–10 cigarettes smoked daily at baseline. Adjusted ORs are adjusted for all other items in the model.

predicted less quitting at follow-up (24.4% vs. 43.3% had quit among older first-time mothers). Among those reporting higher anxiety, 50.0% had quit by follow-up compared with 32.9% among the remaining women smoking at baseline who reported low anxiety. Number of cigarettes smoked at baseline showed a dose–response relationship with quitting at follow-up, with prevalence of quitting being 59.0%, 29.5% and 18.6% among women smoking <10 daily, 10–19 daily and >19 daily, respectively.

4. Discussion

The aim of this study was to develop a model of daily cigarette smoking among women at mid-life, and a model of subsequent quitting. Socio-demographic disadvantage was significant in both models. Women who had their first child before the age of 21 years were 60% more likely to be current daily smokers at baseline, and two and one half times more likely to show persistent smoking at follow-up. Having no education past high school was also significantly associated with current smoking.

We found no association between self-reported depression and either smoking or subsequent quitting, but there were relatively strong associations between anxiety and both smoking and quitting. Women more anxious at baseline were about twice as likely to report current smoking than those with low anxiety, but more interestingly were about three times more likely to report quitting 13 years later. While frequency of alcohol use was not significant in either model, reported frequency of daily tea and coffee consumption was associated with current smoking. Other variables reflecting "lifestyle" such as physical activity, family active-recreational orientation and BMI were not significantly associated with smoking or quitting. The strongest predictors of smoking and quitting were variables relating to smoking context. Having a partner who smoked was associated with a four-fold increase in the likelihood of women smoking at baseline, while self-report of the number of cigarettes smoked at baseline was strongly related to subsequent reports of quitting.

While the research examined a large amount of prospectively collected data to identify early predictors of smoking cessation over a 13-year period, a limitation was the problem of missing data at follow-up. Nevertheless, a comparison of smoking rates among those women with all data available at both assessments (36.3%) with those having complete data at baseline (36.9%) suggested no differential dropout of those smoking at baseline over time. A second limitation was the reliance on self-report to assess smoking status, although this is a feature of much other research on this topic.

Our findings are consistent with previous research indicating associations between socioeconomic status and both tobacco smoking and quitting (Gilman et al., 2003). However, being a young first-time mother appears to be a relatively unexamined variable in the smoking literature and it may explain part of the association between "lone motherhood" and smoking (Siahpush, 2004). Both low educational qualifications and being a young mother were associated with persistent smoking in the 1958 British Birth Cohort (Jefferis, Power, Graham, & Manor, 2004). Williams et al. (1997) have shown that poor maternal education and being a young first-time mother have independent and additive effects on the subsequent lives of women, exposing them to an ongoing pattern of economic and social disadvantage extending into mid-life. Our findings also suggest that these two variables have independent and presumably additive effects on smoking uptake indicating multiple pathways to smoking.

Pomerlau et al. (2003) reported an association among women between smoking and depression, as well as somatic symptoms such as "being bothered by things" and "having restless sleep". These somatic symptoms might be expected to reflect anxiety as well, and this finding is consistent with those of our

study. A relationship between cigarette smoking and anxiety has been reported before (e.g. Johnson et al., 2000), although there is debate over the causal direction of the association. Our findings suggest that anxiety may be an important motivational factor in inducing some women to quit smoking. In New Zealand, a lot of cigarette smoking has traditionally taken place at workplace and home tea or coffee breaks; in the past these were often called "smokos", indicating their association with tobacco use. It is unclear whether increased tea and coffee consumption is a consequence of tobacco smoking or precedes it, but the association may well be worth further investigation particularly in terms of developing strategies for helping smokers quit.

Our findings regarding strength of the smoking habit are consistent with previous research indicating that lower tobacco dependence makes cessation more likely to succeed (Ferguson et al., 2003). Efforts to reduce the number of cigarettes smoked daily either at the individual level through education and help in quitting or at the community level through restrictions on smoking remain the best approach to reducing smoking in the long-term.

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