Smoking cessation among daily smokers, aged 45–69 years: a longitudinal study in Malmö, Sweden

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ABSTRACT

Objective To investigate differences in snuff consumption, socio-demographic and psychosocial characteristics between baseline daily smokers who had remained daily smokers, become intermittent smokers or stopped smoking at the 1-year follow-up.

Design, setting, participants and measurements A population of 12 507 individuals aged 45–69 years, interviewed at baseline in 1992–94 and at a 1-year follow-up, was investigated in this longitudinal study. The three groups of baseline daily smokers were compared to the total population according to socio-demographic, psychosocial and snuff consumption characteristics. A multivariate logistic regression model was used to assess differences in psychosocial conditions, adjusting for age, sex, country of origin, marital status, education and snuff consumption.

Findings Eighty-six per cent of all baseline daily smokers remained daily smokers, 6.5% had become intermittent smokers and 7.3% had stopped smoking at the 1-year follow-up. The daily smokers who remained daily smokers were more likely to be born in other countries than Sweden, not married, have a lower educational level and poorer psychosocial conditions than the total population, while the socio-demographic characteristics and psychosocial resources of those daily smokers who had become intermittent smokers or had stopped smoking were much more similar to the general population, with the exception of a higher snuff consumption, especially for intermittent smokers.

Conclusions Daily smokers who remained daily smokers at the 1-year follow-up had poorer psychosocial assets, especially social participation, than baseline daily smokers who had become intermittent smokers or had stopped smoking, and the general population. The results suggest that low levels of social participation are a potent barrier against smoking cessation. Snuff consumption may explain a part of the increase in smoking cessation among men as opposed to women in Sweden.

KEYWORDS Daily smoking, longitudinal study, psychosocial, social participation.

INTRODUCTION

Cigarette smoking has been identified as the single most important cause of premature death in developed countries and is now emerging as a major public health concern in developing countries (Peto *et al.* 1992; Collishaw & Lopez 1995). The prevalence of smoking has declined in most developed countries in recent decades (Molarius *et al.* 2001). In Sweden, there has been a significant and continuous decrease in the prevalence of

smoking among men between the 1960s and the 1990s. During this time period, the proportion of ex-smokers among men increased from 20% to 41% (Wersäll & Eklund 1998). The decrease in smoking prevalence has been smaller among women (WHO 1997). Furthermore, the decrease in the prevalence of smoking has not been distributed evenly in all segments of the population. In the 1950s and the 1960s there were no socio-economic differences in smoking, while smoking is now associated strongly with low socio-economic status (Jarvis 1994; WHO 1997). The investigation of factors that facilitate the process of smoking cessation thus seems to be of high importance and priority.

Smoking cessation is a dynamic process that begins with a decision to stop smoking and ends with abstinence maintained over a long period of time (US Department of Health and Human Services 1990). Smoking cessation is thus not a single event, but rather a process influenced by social, psychological and biological factors (Pomerleau & Pomerleau 1991; Sanders *et al.* 1993; Gulliver *et al.* 1995; Hajek *et al.* 1995). A strong biological mechanism can account for the fact that smokers experience stress in connection with acute nicotine withdrawal, and that nicotine reinstatement leads to an immediate improvement in the depleted mood state of the smoker (Warburton & Lader 1988; Pomerleau & Pomerleau 1991; Warburton *et al.* 1991; West 1992; Warburton 1992). However, these biological characteristics of smokers are most probably affected by other factors in the social environment of the individual. Health-related behaviours such as daily smoking are a result of the interaction between a person and the environment. The relationship with the environment can be viewed as a dynamic process, since environmental changes require continuous adaptation by the individual. Successful adaptation to changes in the environment requires both individual resources and social relations, e.g. social network and social support. According to the element of the psychosocial stress theory tested in this study, resources are individual ones, but also resources that the individual has access to through their social network (Selye 1946; Syme *et al.* 1989).

Intermittent or occasional smoking seems to be a transitional stage for many smokers. Some intermittent smokers seem to be in the uptake phase of smoking. Others appear to be preparing for smoking cessation. Intermittent smoking is also related to a stronger intention to quit and a greater likelihood of having attempted to quit recently (Owen *et al.* 1995; Hennrikus *et al.* 1996).

The aim of this longitudinal study is to assess the proportion of all baseline daily smokers who remain daily smokers at a 1-year follow-up, the proportion who have become intermittent smokers and the proportion who have stopped smoking. The aim is also to compare these three groups of baseline daily smokers according to socio-demographic, psychosocial and snuff consumption characteristics with the total population.

MATERIALS AND METHODS

Study population

This study is based on the Malmö Shoulder–Neck Study (MSNS), which is a subcohort of the Malmö Diet and Cancer Study (MDCS). Malmö is a city in southern Sweden with about 250 000 inhabitants. In 1990, all subjects born in 1926–45, aged 45–69 years, living in Malmö were defined as a cohort, $N = 53,325$, for the MDCS. The recruitment to the MDCS took place from March 1991 until September 1996. The Malmö Shoulder–Neck Study (MSNS) took place between February 1992 and December 1994 and included 14 555 subjects, 6489 men and 8066 women from this cohort. Detailed information concerning the Malmö Shoulder–Neck Study, and the Malmö Diet and Cancer Study is given in two other studies (Berglund *et al.* 1993; Ektor-Andersen *et al.* 1999). The study cohort was approached in two ways, by postal invitation or, to a much lesser extent, by direct contact taken by the people to be examined after a media campaign. The focus of the information given in the invitation was on the relation between diet and cancer and not on smoking or musculosceletal problems.

All who participated in the MSNS baseline study were also invited to participate in a second examination 1 year later (median 12.6 months, interquartiles 12.3–13.3 months). A questionnaire was sent to all participants in the baseline study still registered in the municipality of Malmö. Information letters introduced the questionnaire and two written reminders and finally a telephone call followed, if needed. In total 12 507 participated in the second examination giving a response rate of 86%. On their return, the questionnaires were immediately checked for missing values and completed by telephone, if necessary.

Definitions

Outcome variable

The *smoking* item in both the baseline and the 1-year follow-up questionnaires contained four alternatives: daily smoker, intermittent (non-daily) smoker, stopped smoking and never smoked. The baseline daily smokers had, at the 1-year follow-up, either remained daily smokers (daily/daily), become intermittent smokers (daily/intermittent) or had stopped smoking (daily/stopped).

The smoking item includes cigarette, cigar and pipe smoking, but the vast majority (80.9% of all men and 97.3% of all women) were cigarette smokers.

The reliability of the smoking item was assessed by investigating the test–retest stability of 200 respondents within 2 weeks after the baseline examination. The test–retest stability was very high. The kappa coefficient was 0.96 for all 200 respondents, 0.99 for the men and 0.94 for the women. No age differences in reliability were observed, since the kappa coefficients for the smoking item was 0.97 for the <58.1 years group and 0.96 for the >58.1 years group.

Independent variables

The *age* of the participants was computed from birth to the first visit to the Malmö Diet and Cancer Study Center and categorized into five groups. In the final analyses, the 45–54-year group was compared to the 55–69-year group.

Country of origin

All participants born in countries other than Sweden were merged into a single category.

Marital status

Four categories were used: married (including people cohabitating), never married, divorced and widow/widower. In the final analyses, the married/cohabitating category was compared to the other three groups.

Education

Education was categorized by length of education. The respondents were classified into three groups: university degree, medium level (university studies without degree or less than 3 years of university studies, senior high school) and basal level (primary school, 9 years or less).

Social participation

Social participation (during the past year) describes how actively the person takes part in the activities of formal and informal groups in society. Respondents were asked whether in the previous 12 months they had been involved in any of the following activities: study circle/course at work-place, other study circle/course, union meeting, meeting of other organizations, theatre/cinema, arts exhibition, church, sports event, letter to the editor of a newspaper/journal, demonstration, night club/entertainment, large gathering of relatives, private party. It was measured as an index consisting of 13 items and dichotomized. If three alternatives or less were indicated, the social participation of that individual was classified as low.

Social anchorage

Social anchorage (five items) described belonging to formal and informal groups and the feeling of membership in these groups (familiarity with neighbourhood, sense of belonging to friends and relatives, membership in organizations or clubs, feeling of belonging at the place of work and feelings of importance to other people). If three or more items denoted low social anchorage, the whole index variable was regarded as low.

Emotional support

Emotional support (three items) reflected the opportunity for care, encouragement of personal value and feelings of confidence and trust. Each item had the same four alternatives as the instrumental support item. If two or three items were low, emotional support was considered low.

Instrumental support

Instrumental support (one item) reflected the individual's access to advice, information, practical services and material resources from other people. This item was measured by a four-alternative question: 'Yes, I am absolutely sure to get such support', 'Yes, possibly', 'Not certain' and 'No'. The three latter alternatives were classified as low instrumental support.

The reliability and validity of the four psychosocial variables have been assessed in several other studies (Östergren *et al.* 1995; Hanson *et al.* 1997). The different items showed a good or acceptable validity and reliability. The test–retest stability was high. The kappa coefficients for the social support variables social participation and social anchorage were 0.70 and 0.66, respectively. The kappa coefficients for the emotional and instrumental support variables were 0.57 and 0.47, respectively. The construct validity analysed by Cronbach's alpha was highest for emotional support (0.63) and social participation (0.61), while social anchorage scored the lowest (0.40). The analysis of construct validity indicated that the different indices measure different aspects of the psychosocial environment.

Oral snuff

Nicotine consumption in the form of oral snuff is a common habit in Sweden (Schildt *et al.* 1998). The prevalence of snuff intake (yes/no) was assessed.

Statistics

Three groups of baseline daily smokers who either had remained daily smokers, had become intermittent smokers or had stopped smoking at the 1-year follow-up were compared to the total population in a logistic regression model according to socio-demographic, psychosocial and snuff consumption characteristics. A multivariate logistic regression model was used to assess differences in psychosocial conditions, adjusting for age, sex, country of origin, marital status, education and snuff consumption. The proportions of male as opposed to female baseline daily smokers that had remained daily smokers, had become intermittent smokers or had stopped smoking at the 1-year follow-up were compared (χ^2 tests). Sex differences in snuff consumption within these groups were also compared (χ^2 tests). Statistical analysis was performed using the SPSS software package (Norusis 1993).

RESULTS

Table 1 shows that the proportions of daily and intermittent smokers at baseline were very similar among men and women. The proportion of never-smokers was much higher among women (44.6%) than among men (28.1%). On the other hand, the proportion of individuals who had stopped smoking was much higher among men (42.0%) than among women (26.8%). Distribution according to age, country of origin, social participation and social anchorage did not differ between men and women. Men were married/cohabitating to a somewhat higher extent than women, and women were divorced and widows to a higher extent than men. A higher proportion of women had high emotional support and high instrumental support. On the other hand, a higher proportion of women also had only a basal level of education. Only 0.4% of all women were snuff consumers, compared to 7.0% of all men.

The prevalence of daily smoking decreased from 23.8% to 21.7% ($p < 0.001$) at the 1-year follow-up among the 86% who participated at both the baseline and the 1-year follow-up, while the prevalence of intermittent smoking increased from 4.8% to 5.4% ($p < 0.001$). The proportion that had stopped smoking increased from 33.7% to 35.1% ($p < 0.001$). The proportion of never-smokers remained unaltered (37.7%) (not shown in tables).

Table 2 shows that a 86.2% majority of all baseline daily smokers remained daily smokers at the 1-year follow-up, while 6.5% had become intermittent smokers and 7.2% had stopped smoking. A small (< 0.1%) proportion (two individuals) of all baseline daily smokers stated that they had never smoked at the 1-year follow-up. This group (two individuals) was regarded in the following analyses as baseline intermittent smokers that had stopped smoking.

Tables 3 and 4 show that the baseline daily smokers who remained daily smokers at the 1-year follow-up to a significantly higher extent than the total population were relatively young, born in other countries than Sweden, not married, had a lower educational level and had low social participation, low social anchorage and low emotional support. They were also snuff consumers to a lower extent than the total population. The daily smokers who had become intermittent smokers (daily/intermittent) were not married/cohabitating, odds ratio 1.65 (1.24–2.20) and were snuff consumers to a much higher extent, odds ratio 1.94 (1.07–3.51) than the total population. The baseline daily smokers who had stopped smoking (daily/stopped) did not differ from the total population, with the exception that they were younger. The daily/intermittent and daily/stopped groups did not differ in any respect from the total population in psychosocial resources.

Table 5 shows that the baseline daily smokers who remained daily smokers at the 1-year follow-up still had significantly higher odds ratios of low social participation and to a much more limited extent low social anchorage compared to the total population after adjustment for age, sex, country of origin, marital status, education and snuff consumption in the multivariate logistic regression analysis. In contrast, the odds ratio of having low social participation and low social anchorage among daily smokers who had become intermittent smokers and daily smokers who had stopped smoking did not significantly differ from the total population in the multivariate analysis.

Table 6 shows that an 85.1% fraction of the male baseline daily smokers were still daily smokers at the 1-year follow-up, compared to 87.2% of the baseline female daily smokers (sex diffference $p < 0.001$). This finding corresponds well to the fraction of baseline daily smokers who had stopped smoking at the 1-year follow-up: 8.4% among men and 6.4% among women (sex difference $p < 0.001$). In contrast, no sex differences were observed between male and female baseline daily smokers who had become intermittent smokers at the 1-year follow-up, 6.5% and 6.4%, respectively (not significant).

The sex differences in the proportion of snuff users are larger between male and female baseline daily smokers who had become intermittent smokers, 15.3% compared to 0.1%, and who had stopped smoking, 12.7% compared to 0.1%, at the 1-year follow-up, than between male and female baseline daily smokers who were still daily smokers at the 1-year follow-up, 5.6% compared to 0.3% ($p < 0.001$ for all comparisons) (not shown in tables).

Table 1 Prevalence (%) of smoking, socio-demographic and psychosocial variables: the Malmö Shoulder–Neck Study.

	Men		*Women*		*Total*	
	N	%	N	%	N	%
Smoking status						
Regular/daily smoker	1606	24.8	1944	24.1	3550	24.4
Intermittent smoker	334	5.1	365	4.5	699	4.8
Stopped smoking	2725	42.0	2160	26.8	4885	33.6
Never smoked	1821	28.1	3593	44.6	5414	37.2
(Missing)	(3)		(4)		(7)	
Age						
45–49 years	826	12.7	1024	12.7	1850	12.7
50–54 years	1608	24.8	2027	25.1	3635	25.0
55–59 years	1501	23.1	1809	22.4	3310	22.7
60–64 years	1566	24.1	2004	24.8	3570	24.5
65–69 years	988	15.2	1202	14.9	2190	15.0
(Missing)	(0)		(0)		(0)	
Country of origin						
Sweden	5615	86.6	7047	87.4	12662	87.0
Other country	871	13.4	1014	12.6	1885	13.0
(Missing)	(3)		(5)		(8)	
Marital status						
Married	4674	72.1	5053	62.7	9727	66.9
Never married	696	10.7	646	8.0	1342	9.2
Divorced	942	14.5	1587	19.7	2529	17.4
Widow/widower	173	2.7	769	9.5	942	6.5
(Missing)	(4)		(11)		(15)	
Education						
University degree	841	13.0	974	12.1	1815	12.5
Medium	1370	21.1	1128	14.0	2498	17.2
Basal level	4268	65.9	5941	73.9	10209	70.3
(Missing)	(10)		(23)		(33)	
Social participation						
High	4492	69.2	5537	68.6	10029	68.9
Low	1997	30.8	2529	31.4	4526	31.1
(Missing)	(0)		(0)		(0)	
Social anchorage						
High	4687	73.4	5910	75.9	10597	74.7
Low	1702	26.6	1878	24.1	3580	25.3
(Missing)	(100)		(278)		(378)	
Emotional support						
High	4243	65.7	5804	72.4	10047	69.4
Low	2211	34.3	2213	27.6	4424	30.6
(Missing)	(35)		(49)		(84)	
Instrumental support						
High	4162	64.3	5857	72.9	10019	69.0
Low	2313	35.7	2182	27.1	4495	31.0
(Missing)	(14)		(27)		(41)	
Snuff consumption						
Yes	451	7.0	36	0.4	487	3.4
No	6031	93.0	8007	99.6	14038	96.6
(Missing)	(7)		(23)		(30)	
Total	6489		8066		14555	

Table 2 Smoking status at baseline compared to smoking status at 1-year follow-up (number and percentage): the Malmö Shoulder–Neck Study.

	Daily smokers at baseline	
	N	%
Smoking status at 1-year follow-up		
Daily	2569	86.2
Intermittent	193	6.5
Stopped smoking	215	7.2
Never smoked	2	0.1
Total*	2979	100.0

*2048 individuals missing at 1-year follow-up due to 86% participation in 1-year follow-up (total N = 12507 at the 1-year follow-up).

The exclusion of the baseline daily smokers who reported that they had never smoked at the 1-year follow-up from the daily/stopped group yielded the same results as the results presented in Tables 5 and 6 for the daily/stopped group.

DISCUSSION

An 86.2% majority of all baseline daily smokers had remained daily smokers, 6.5% had become intermittent smokers and 7.3% had stopped smoking at the 1-year follow-up. The daily smokers who remained daily smokers were born in other countries than Sweden, not married, had a lower educational level and poorer psychosocial conditions to a higher extent than the total population, while the socio-demographic characteristics and psychosocial resources of those who had become intermittent smokers or had stopped smoking were much more similar to the general population.

Comparison with another investigation conducted in the city of Malmö during the same time period with a higher participation rate showed a good correspondence in the same age groups concerning socio-economic status, smoking and social participation (Lindström *et al.* 2000). Some studies have shown that non-participants differ from study participants in smoking habits (Criqui *et al.* 1978; Boström *et al.* 1993). The smoking prevalence in these studies have been somewhat higher among non-participants. This is confirmed in our study by the finding that the prevalence of daily smoking at baseline was 24.4% among all baseline participants, but only 23.8% among those 86% of the baseline participants who participated both at baseline and at the 1-year follow-up. The corresponding prevalences for 'low' social participation is 31.1% and 29.7%, respectively, and for 'low 'social anchorage 25.3% and 24.7%, respectively. However, this is probably of less importance for the findings and conclusions of this study.

The validity of items assessing smoking has been analysed several times. The results have shown consistently that self-reported tobacco-smoking is a valid and reliable way to measure smoking habits in a population (USDHHS 1990; Murray *et al.* 1993; Tate *et al.* 1994; Verkerk *et al.* 1994; Steffensen *et al.* 1995; Wells *et al.* 1998). The test–retest stability of the smoking item within 2 weeks was very high, the kappa coefficient indicating an extremely high reliability. Differential misclassification is not likely to have been present. Non-differential misclassification seems to be a problem of less importance in this study, since non-differential misclassification tends to attenuate true differences, and the main results of this study show clear differences between the daily smoker group and the total population. The reliability and validity of the psychosocial variables showed a good or acceptable validity and reliability. The kappa coefficients for the two social network items social participation and social anchorage were 0.70 and 0.66, respectively. The kappa coefficients for the social support variables were 0.57 for emotional support and 0.47 for instrumental support. The construct validity analysed by Cronbach's α was highest for emotional support (0.63) and social participation (0.61), while social anchorage scored lowest (0.40). The analysis of construct validity indicated that the different indices measure different aspects of the psychosocial environment (Hanson *et al.* 1997).

Age, sex, country of origin, marital status, education and snuff consumption could be confounders of the associations between the psychosocial variables and baseline daily smoking. Adjusting for these variables, however, only marginally affected the estimates.

The 7% prevalence of snuff consumption among men may be regarded as low compared to the prevalence sometimes reported for Sweden (WHO 1997). However, other unpublished data from Scania in southern Sweden reveal the same prevalence of snuff use as the one reported in this study.

The longitudinal study design may be considered the most important strength of this study, because it makes it possible to follow the smoking history of the individual daily smokers for at least a year.

Despite the very high reliability of the smoking item, two baseline daily smokers reported at the 1-year follow-up that they had never smoked. We have no certain explanation for this recall bias. However, it seems to be of less importance for the results of this study, because they represent less than 1% of the baseline daily smokers who had stopped smoking (217 people) at the 1-year follow-up. The exclusion of the two baseline daily

Table 3 Distribution of socio-demographic and psychosocial characteristics according to smoking status of baseline daily smokers at 1-year follow-up: the Malmö Shoulder–Neck Study.

	Daily/daily (N = 2569) %	*Daily/intermittent (N = 193)* %	*Daily/stopped (N = 215)* %	*Total (N = 12507)* %
Age				
45–49 years	15.0	17.1	16.1	12.5
50–54 years	27.9	28.4	28.1	24.5
55–59 years	22.7	22.8	22.6	22.8
60–64 years	21.7	19.2	21.2	24.8
65–69 years	12.7	12.4	12.0	15.4
(Missing)	(*N* = 0)	(*N* = 0)	(*N* = 0)	(*N* = 0)
Sex				
Men	43.9	45.1	50.7	44.2
Women	56.1	54.9	49.3	55.8
(Missing)	(*N* = 0)	(*N* = 0)	(*N* = 0)	(*N* = 0)
Country of origin				
Sweden	86.7	91.2	88.0	88.3
Other country	13.3	8.8	12.0	11.7
(Missing)	(*N* = 0)	(*N* = 0)	(*N* = 0)	(*N* = 7)
Marital status				
Married	57.4	56.0	61.8	67.5
Never married	10.7	10.9	12.9	9.1
Divorced	25.0	27.5	19.4	16.9
Widow/widower	6.9	5.7	6.0	6.5
(Missing)	(*N* = 1)	(*N* = 0)	(*N* = 0)	(*N* = 7)
Education				
University degree	9.7	12.0	13.8	12.7
Medium	16.3	15.1	15.2	17.5
Basal level	74.0	72.9	71.0	69.8
(Missing)	(*N* = 4)	(*N* = 1)	(*N* = 0)	(*N* = 23)
Social participation				
High	60.3	66.8	68.2	70.3
Low	39.7	33.2	31.8	29.7
(Missing)	(*N* = 0)	(*N* = 0)	(*N* = 0)	(*N* = 0)
Social anchorage				
High	72.6	79.8	74.9	75.4
Low	27.4	20.2	25.1	24.6
(Missing)	(*N* = 54)	(*N* = 5)	(*N* = 2)	(*N* = 288)
Emotional support				
High	67.1	71.4	66.8	69.9
Low	32.9	28.6	33.2	30.1
(Missing)	(*N* = 14)	(*N* = 1)	(*N* = 0)	(*N* = 58)
Instrumental support				
High	67.6	66.3	65.4	69.1
Low	32.3	33.7	34.8	30.9
(Missing)	(*N* = 4)	(*N* = 0)	(*N* = 0)	(*N* = 27)
Snuff consumption				
Yes	2.4	6.2	3.7	3.3
No	97.6	93.8	96.3	96.7
(Missing)	(*N* = 2)	(*N* = 0)	(*N* = 0)	(*N* = 22)
Total	100.0	100.0	100.0	100.0

Table 4 Odds ratios and 95% confidence intervals (OR, 95% CI) of socio-demographic, psychosocial and snuff consumption characteristics among the three groups of daily smokers at baseline compared to the total population at baseline: the Malmö Shoulder–Neck Study.

	Daily/daily OR, 95% CI	*Daily/intermittent OR, 95% CI*	*Daily/stopped OR, 95% CI*
Age 55–69/45–54 years	0.73 (0.67–0.80)	0.70 (0.52–0.92)	0.73 (0.56–0.96)
Sex Men/women	0.98 (0.90–1.07)	1.04 (0.78–1.38)	1.30 (1.00–1.71)
Country of origin Other/Sweden	1.20 (1.06–1.37)	0.73 (0.44–1.20)	1.03 (0.68–1.56)
Marital status Not married/married	1.74 (1.59–1.90)	1.65 (1.24–2.20)	1.29 (0.98–1.70)
Education Basal level/medium + university	1.29 (1.17–1.43)	1.17 (0.85–1.61)	1.06 (0.79–1.42)
Social participation Low/high	1.78 (1.62–1.94)	1.18 (0.87–1.60)	1.11 (0.83–1.48)
Social anchorage Low/high	1.20 (1.09–1.33)	0.77 (0.54–1.11)	1.03 (0.75–1.40)
Emotional support Low/high	1.18 (1.08–1.30)	0.93 (0.68–1.28)	1.16 (0.87–1.54)
Instrumental support Low/high	1.09 (0.99–1.20)	1.14 (0.84–1.54)	1.19 (0.89–1.57)
Snuff consumption Yes/no	0.67 (0.51–0.87)	1.94 (1.07–3.51)	1.11 (0.54–2.26)

Table 5 Odds ratios and 95% confidence intervals (OR, 95% CI) of psychosocial characteristics among the three groups of daily smokers at baseline compared to the total population at baseline: the Malmö Shoulder–Neck Study.

	*Daily/daily OR, 95% CI**	*Daily/intermittent OR, 95% CI**	*Daily/stopped OR, 95% CI**
Social participation Low/high	1.80 (1.63–1.98)	1.23 (0.89–1.68)	1.14 (0.85–1.54)
Social anchorage Low/high	1.12 (1.01–1.24)	0.71 (0.50–1.03)	0.97 (0.71–1.33)
Emotional support Low/high	1.07 (0.98–1.18)	0.86 (0.63–1.19)	1.08 (0.81–1.44)
Instrumental support Low/high	1.05 (0.96–1.16)	1.10 (0.81–1.49)	1.14 (0.86–1.51)

* Adjusted for age, sex, country of origin, marital status, education and snuff consumption.

smokers who reported that they had never smoked at the 1-year follow-up yielded the same results in the statistical analyses.

This study has shown that the level of social participation differs between the baseline daily smokers who remained daily smokers at the 1-year follow-up (daily/daily), and the baseline daily smokers who became intermittent smokers or stopped smoking. The group of baseline daily smokers who remained daily smokers seem to contain a higher proportion of individuals with low social participation compared to the total population. In contrast, the groups of baseline daily smokers that had become intermittent smokers and the baseline daily smokers who had stopped smoking had proportions of individuals with low social participation that were equal to the proportion of persons with low social participation in the total population of the study. Previous studies have suggested that intermittent smoking could be a transitional stage from daily smoking to smoking cessation or from non-smoking to daily smoking (Hennrikus *et al.* 1996). Both baseline daily smokers who became intermittent smokers and baseline daily smokers who had

Table 6 Smoking status of the baseline intermittent smokers at 1-year follow-up, men and women; the Malmö Shoulder–Neck Study.

	Men		*Women*		p
	N	%	N	%	*(sex difference)*
Daily/daily	1117	85.1	1432	87.2	< 0.001
Daily/intermittent	85	6.5	105	6.4	Not significant*
Daily/stopped	110	8.4	105	6.4	< 0.001
Missing	12		13		
Total	1324	100.0	1655	100.0	

*Not significant at 95% confidence interval level.

stopped smoking at the 1-year follow-up thus could be in the process of smoking cessation. Furthermore, social participation seems to be a factor that facilitates the process of smoking cessation among daily smokers. There are at least two plausible causal mechanisms that can explain this statistical pattern. First, social participation, i.e. many different contact surfaces to different forms of social life, may be a psychosocial asset for the individual daily smoker that removes the barriers against smoking cessation. The process of smoking cessation might otherwise be hindered by, e.g. psychological, social or economic stress. The finding that low social anchorage and, prior to adjustments, low emotional support also are more prevalent among the daily smokers that remained daily smokers supports this psychosocial interpretation. Secondly, high levels of social participation may also be viewed as a source of knowledge, innovation and transmission of certain values that affect smoking behaviour. The values transmitted may, of course, theoretically either be such values that affect the daily smoker to remain a daily smoker or to initiate the process of smoking cessation. However, the generally declining trends in smoking in Sweden and other western countries during the past decades would imply that high levels of social participation generally would serve to facilitate the development into intermittent smoking or smoking cessation, rather than the continuation of daily smoking. The theory of diffusions of innovations suggests that some segments of the population adapt to changes in society earlier than others (Rogers 1983). One non-material resource that could explain the decision of a daily smoker to initiate the process of smoking cessation by becoming an intermittent smoker or by stopping may be a high level of social participation as defined in this study. In fact, it is conceivable that higher levels of social participation as measured in this study serve as psychosocial assets and sources of information concerning the health effects of smoking.

The finding that the group of baseline daily smokers that have become intermittent smokers at the 1-year follow-up contains a much higher proportion of individuals with snuff consumption partly contradicts the notion that intermittent smokers may be less nicotine addicted than daily smokers (Shiffman 1989). In contrast, this finding suggests that the snuff consumption of the intermittent smokers is increased in order to compensate for their reduced cigarette consumption. There is a significant and substantial sex difference in the proportion of daily smokers who had stopped smoking at the 1-year follow-up, 8.4% among men compared to 6.4% among women. This finding corresponds to the sex diffences in snuff consumption among the baseline daily smokers who had stopped smoking at the 1-year follow-up, 12.7% among men as opposed to 0.1% among women. This could correspond to a substantial, although not major, fraction of the explanation of why there has been an increase in smoking cessation in recent years among men but not among women, although we believe that other social and work-related factors may be even more important.

It would be of interest to know the extent to which those daily smokers that became non-smokers had any assistance/treatment to facilitate the cessation process, since low social participation may be seen as not only a direct barrier to smoking but, if it hinders access to smoking cessation services, also an indirect barrier. Unfortunately, the MSNS does not contain any such data.

CONCLUSION

Daily smokers who remained daily smokers at the 1-year follow-up have poorer psychosocial assets, especially social participation, than baseline daily smokers who had become intermittent smokers or had stopped smoking and the total population. The results suggest that low social participation is a potent barrier against smoking cessation. Snuff consumption may explain a part of the increase in smoking cessation among men as opposed to women in Sweden.

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