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Abstract:
The protective effect of marriage on smoking has been extensively established in the literature. However, less is known about the dynamics of how smoking behaviour is connected to various marital life course events, and whether there are any gender discrepancies in this respect. In this article the connection between the marital life course and smoking is analysed from a stress-related perspective controlling for other socio-economic characteristics. We use information on 81.000 individuals from the Swedish longitudinal micro-level ULF (Survey of Living Conditions) data-base 1980-2000, which is randomly drawn from the sample population of all Swedes aged 16-84. Logistic regressions on current smoking status and changes in smoking behaviour of participants in the panel part of the data are estimated. The marital life course is strongly linked to smoking behaviour, being or getting married indicating low smoking risks, marital disruption indicating high. The divorced smoke to a higher extent than widowed and there are signs that getting divorced implies higher risks than becoming widowed, both of taking up / relapsing and, for women, not being able to quit. Further, the results indicate that the connection between smoking cessation and living with a partner is stronger for men, whereas women are more affected by the propensity to start smoking after marital disruption. The protective effect of being married on smoking decreases with the age difference between spouses in households where the wife is older than the husband. Taken together, the results yield a rather complex pattern of smoking behaviour over the marital life course. Further, perceived financial stress is strongly connected to smoking and not being able to quit. Controlling for this effect still leaves a socio-economic status gradient in smoking.

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Introduction

In recent decades increased medical knowledge concerning the health consequences of smoking and considerable public efforts in the form of health campaigns, legislation and heavy taxation have been accompanied by decreasing smoking rates in most parts of the western world (Molarius, Parsons, Dobson, Evans, Fortmann, Jamrozik et al. 2001). However, the decrease has not been uniformly distributed among the considered nations or within the considered populations. From being a mainly male habit, smoking has become more gender neutral (Graham 1996), a development that is particularly evident in Sweden where a dramatic decrease in male smoking has reversed the traditional gender pattern, women currently smoke to a greater extent than men (Wersäll & Eklund 1998; CAN 2002). To be married is one of the most empirically well-established predictors of being a non-smoker and successful smoking cessation (e.g. Hanson, Isacsson, Janzon & Lindell 1990; Sanders, Peveler, Mant & Fowler 1993; Tillgren, Haglund, Lundberg & Romelsjö 1996; Khuder, Dayal & Mutgi 1999; Broms, Silventoinen, Lahelma, Koskenvuo & Kaprio 2004). However, less is known about differences among the single statuses (i.e. never married, divorcees and the widowed), and above all about the dynamics, i.e. how actual *changes* in marital status affect smoking behaviour and whether any such effects are gender-dependent.

The purpose of this study is to analyse how marital status influences smoking in general, and particularly how marital life course events (getting married, divorced, widowed) are connected to the inclination to start or stop smoking, and whether such connections are gender-dependant. The empirical data consists of 81.209 individuals aged 20-76, from the representative Swedish longitudinal micro-level ULF (Survey of Living Conditions) database for 1980-2000, of which 19715 were re-interviewed 8 years after the initial survey. The importance of socio-economic living conditions, mainly captured by socio-economic status,

perceived financial stress, and ethnicity, is controlled for and briefly discussed. But firstly, as a background, the general development of smoking in Sweden is briefly described below.

Smoking in Sweden

In 1946 approximately every second man and tenth woman were regular smokers and total cigarette consumption in Sweden was fairly low (500 cigarettes per adult). Consumption increased rapidly peaking at about 2000 cigarettes in the period 1976-1980 (42% of men and 34% of women smoked regularly). Since then consumption decreased steadily to about 1100 cigarettes in the year 2000 (WHO 1997; CAN 2002). The gender dependency is apparent. Between 1980 and 2000 smoking decreased almost linearly for both men and women but at a faster pace for men, and in the year 2002 16% and 19% of adult men and women, respectively, were smokers (CAN 2002).[1] Hence, Sweden was the first to attain WHO:s goal of reducing overall smoking rates among adults to 20% (in 1998). Rates are higher for immigrants and somewhat less for native Swedes (Lindström and Sundquist 2002).[2]

Stress and smoking

The reasons people give for being smokers have been thoroughly investigated and there are undoubtedly some immediate positive effects, in contrast to the obviously adverse, long-term health risks. Apart from abstinence avoidance, it has been suggested that the almost instant influx of nicotine to the brain results in increased pleasure, decreased anxiety, and a state of alert relaxation counteracting boredom and reducing the perceived level of tension, anxiety, helplessness and loneliness (Pomerleau & Pomerleau 1987; Perkins, Grobe, Fonte & Breus

[1] The strong gender dependency of the decrease has been linked to the common use of moist snuff (or "snus") among Swedish men (Rodu, Stegmayr, Nasics, Cole & Asplund 2003; Foulds, Ramström, Burke & Fagerström 2003). Sweden has more than one million snuff users (of a total population of about nine million) of whom approximately 80-90% are men. The general opinion is that snuff use is much less dangerous from a personal health perspective than smoking (see Asplund 2001 for overview).

[2] There are striking similarities between different categories of immigrants with some exceptions, e.g. women of Arabic speaking origin, who have low smoking rates.

1992). In particular, smoking has been identified as a mechanism for coping with stress and ”mood control”, which is emphasized by current smokers, though the evidence of clinical tests on actual stress reduction and mood effects are mixed (Russell, Peto & Patel 1974; Perkins et al. 1992; Brandon 1994; Parrot and Kaye 1999; Herbert, Foulds & Fife-Schaw 2001). However, the empirical connection between stress and drug habits in general, and smoking habits in particular, is evident (Marlatt & Gordon 1985; Weaver, Turner & O'Dell 2000; Colby, Linsky & Straus 1994).

The slower decline in smoking rates among women has been attributed to both biological as well as psychological factors e.g. a greater fear of gaining weight and that they, to a higher degree than men, miss the “control feeling” associated with smoking, emphasize relaxation and mood control as the effects of and reasons for smoking, and smoke in response to stress (Lando, Pirie, Hellerstedt & McGovern 1991; Waldron 1991; Clarke, White, Beckwith, Borland & Hill 1993; Pomerleau, Ehrlich, Tate, Marks, Flessland & Pomerleau 1993; Perkins, Donny & Caggiula 1999; Livson & Leino 1988; Pomerleau, Berman, Gritz, Marks & Goeters 1994). Women seem to be as likely as men to make attempts to give up smoking but less likely to succeed (Royce, Corbett, Sorensen & Ockene 1997). Though the perception of smoking as a stress control device differs between men and women, studies revealing gender differences in smoking behaviour in response to stressful life events are rare. One exception is McKee, Maciejewski, Falba & Mazure (2003) who showed that negative financial events had an excessive impact on women’s smoking behaviour, female smokers failing to quit and ex-smokers relapsing to a higher extent than men.

The marital life course, stress and smoking

The personal social network extends the resource pool beyond the individuals´ own inherent capabilities. The network may provide informational, material and emotional support as well as exercising social regulation and control over health related behaviours, and the empirical connection between social networks and health and mortality has been extensively established (House, Landis & Umberson 1988; Shye, Mullooly, Freeborn & Pope 1995; Litwin 1998; Berkman 2000). A spouse is probably the most important person in a married individuals network. After all, spouses generally interact, monitor each other's behaviour and support each other on a daily basis, sharing emotions, experiences, information, and probably also network to a certain extent. They may further exploit economies of scale and obtain specialisation gains within the household. Indeed, married people generally score higher on psychological well-being scales (Waite & Gallagher 2000; Umberson, Wortman & Kessler 1992). From this perspective it seems natural that a stable marriage prohibits smoking and that smoking propensities for people getting married decreases. Obviously, the loss of a spouse by widowhood or divorce constitutes a major stressor releasing emotional distress as well as affecting the more practical aspects of daily life. There is also a strong positive empirical connection between the presence of a spouse and general health behaviour, in particular for men (Macintyre 1992; Joung 1996). Though psycho-social stress, or rather lack hereof, may be one explanatory factor for the empirically well-established protective effect of being married on smoking, less is known about smoking differences among the categories of single individuals (never-married, widowed and divorced), in particular how the transition between marital states affects smoking behaviour and whether any such effects are gender dependent.

In order to indicate whether men and women from a general stress-related perspective, are affected differently by experiencing divorce or widowhood, we briefly turn to findings from

other fields of research. Results of research on gender differences in psychological distress brought on by widowhood are somewhat mixed though the most common result is that men overall are more adversely affected (Lee, DeMaris, Bavin & Sullivan 2001). Taking relative mortality risk as an ultimate sign of stress, there is ample evidence that the penalty of experiencing widowhood is greater for men, i.e. the mortality elevation is higher among newly bereaved men than women. (e.g Young, Benjamin & Wallis 1963; Mellstrom, Nilsson, Oden, Rundgren & Svanborg 1982; Martikainen and Valkonen 1996). This gender discrepancy seems to have been prevailing in Sweden for at least 200 years (Nystedt 2002). The elevation of suicide risks after marital disruption follows a similar pattern, especially widowed men being affected (Gove 1972; Smith, Mercy & Conn 1988; Li 1995). That widowhood may be more stressful for men than for women has been suggested many times in the literature (see Stroebe, Stroebe & Schut 2001 for overview). A potential explanation for such a gender dependency of stress levels is based on expectations (Nystedt 2002). Husbands are generally older than their wives in addition to having shorter life expectancies, which implies that more marriages end with the death of the husband than the wife. Hence, women in general face a greater risk of becoming widowed, and also of remaining in that state. In this context, spousal bereavement ought to be a more expected event for women, which may trigger less stress *per se*, but also implies that married women, from a traditional rational choice perspective, have greater incentives to make sure that they stand prepared for a potential future in widowhood. By the same token, the expectation of divorce ought to be equally distributed between men and women, as there are equally many men and women experiencing divorce.

On the other hand, financial negative outcomes are more common among widows and female divorcees, triggering financial-related stress in case of marital disruption (Duncan and

Hoffman 1985; Zick and Smith 1991; Umberson et al. 1992). Combining this with the finding of McKee et al. (2003) (that financial related stress had a greater effect on women's inclination to relapse into smoking), suggests that any marital disruption effect on smoking could generally be stronger for females.[3] Whereas common property is divided between two separating spouses, inheritance laws commonly protect a widow, who also may be eligible for benefits from a deceased husband's private life assurance or public widow's pension.[4] From this material perspective the adversity of divorce may be greater than that of widowhood, especially for females. Simon (2002), analysing emotional distress as a consequence of marital disruption in the US, finds that depressive symptoms are elevated overall, divorce being more adverse than widowhood and divorced women being affected to a higher extent than divorced men.

Though the arguments referred to above are by no means exhaustive or conclusive, we allow ourselves to suggest that they at least indicate that, in relation to experiencing divorce, widowhood may be a relatively more adverse experience, inducing more stress for men than women in western cultures. To what extent this may translate into gender variations in smoking behaviour following marital disruption is unclear. On a speculative basis we hypothesize that a main effect would be that marital disruption affects smoking behaviour in general, men being relatively more influenced by widowhood than divorce compared with women.

Studying different behavioural outcomes for varying marital statuses on a micro-level, it is obvious that marriages differ in their characteristics and functioning, which is hard to capture

[3] Note that McKee et al. did not find any smoking relapse effect of "interpersonal loss", which was a mixed variable indicating death of close friend or relative, or divorce.
[4] In Sweden all women born in 1944 or earlier and married before 1990 are covered by a public widow's pension in case of death of husband.

quantitatively. One particular aspect that has raised some, but far from extensive, interest in the literature is the age difference between spouses. Large age differences have been found to increase tensions by adversely affecting the quality of spousal relations and degree of value consensus (Presser 1975), and to correlate with adverse marital outcomes such as gender inequality, divorce risks and even spousal homicide (Veevers 1984; Mercy and Saltzman 1989; Tzeng 1992). From a stress-related perspective it does not seem farfetched to suggest that the age difference between spouses also may be connected to smoking propensities. The norm throughout the world seems to be that the husband is 2-4 years older than his wife (United Nations 1990). In the empirical part of this study we estimate to what extent intra-spousal age differences affect the smoking prevalence for men and women. To our knowledge, there are no previous studies analysing a similar connection.

Information, socio-economic status and health behaviour

Marital status is naturally not the only factor associated with smoking. The decrease in smoking rates in the western world has tended to turn smoking into a prominent marker of low education and socio-economic status (Jarvis 1994; Wilkinson 1996; Escobedo & Peddicord 1996; WHO 1997; Osler, Prescott, Gottschau, Bjerg, Hein, Sjol & Schnohr 1998; Bartley, Martikainen, Shipley & Marmot 2004; Barbeau, Krieger & Soobader 2004). From an economic perspective, individual changes in health-related behaviours are commonly viewed as conscious investments (or disinvestments) in future health (Grossman 1972). From this line of reasoning the decision to start/stop or continue being a smoker/non-smoker ought to be based on relevant information concerning potential direct and indirect benefits (relaxation, taste, abstinence avoidance, stress and mood control etc.) and immediate as well as long-term costs (e.g. price of cigarettes, adverse future health effects). Accordingly, individuals who are more inclined to apprehend, perceive, interpret, evaluate and trust such information should be

more susceptible to adjusting their behaviour in line with new medical findings mediated to the general public (e.g. concerning adverse health effects of smoking). This approach opens up several possible paths for explaining social differences in the adjustment of health behaviours. For instance, such differences have been attributed to people of lower social positions being more inclined to rely on their habits (Lindbladh and Lyttkens 2002). To (inactively) rely on habits instead of (actively) striving to obtain, process and evaluate new information, and change behaviour accordingly, may be highly rational and effective the more burdensome and costly, in relation to available resources, such an "active" process is. Compared with general unskilled manual work tasks, more disparate stimulating tasks in daily working life could make information evaluation and decision making a more common and natural process for people in higher social positions. Further, it has been suggested that relying on habits in daily life, "a natural adjustment to lack of resources – makes it more costly to bother about new information" (Lindbladh and Lyttkens 2003). Current trends of diverging smoking behaviour among people of different social status could be a result of such a process, reflecting the differences in resources and work environment that affects opportunity, capability and the will to take in and process new information concerning appropriate changes in behaviour and investments in health. Several studies have also linked low cessation rates to low education and socio-economic status (Helmert, Shea & Bammann 1999; Lindström, Hanson, Östergren & Berglund 2000; Chandola, Head & Bartley 2004). Socio-economic conditions are controlled for in the empirical section below. Though of subordinate importance in this work, the results are also briefly discussed.

Data and Statistical Method

Study Population

The data analysed is from the survey on living conditions ULF (Undersökningar om Levnadsförhållanden) 1980-2000, conducted annually via interviews by Statistics Sweden.[5] The annual sample population consists of all adults aged 16-84 currently permanently living in Sweden. Interview subjects are randomly chosen and 6.000-7.000 interviews are conducted annually. Since 1986, about 40% are re-interviews, eight years after, constituting the panel part of the data.[6] The response rate is about 80% but there is an indication that this is decreasing (Statistics Sweden 2001).[7] The total number of interviews for the period 1980-2000 is 132867. In order to ensure that observations used are randomly drawn and statistically independent, only initial interviews are used to estimate smoking prevalence, leaving a total of 81209 for the age group studied here (aged 20-76 the first interview). By the same independency argument, only observations of an individual from the first and second interviews for the period 1980-2000 are included to estimate smoking cessation and initiation/relapse between interviews, leaving in total 19715 pairs of observations.

Endogenous variables:

Three separate endogenous variables are under study, all based on the simple interview question: Do you smoke every day? In the smoking prevalence estimation a positive response defines a smoker and a negative one a non-smoker. For the longitudinal analysis changes in smoking behaviour are captured via variation in response between the two interviews, which indicates having ceased or started. Hence, the three outcomes are binary:

1) to be a smoker

[5] The survey started in 1975 and is still ongoing. From 1980 onwards, information on smoking habits is included.
[6] Panel participants were originally randomly drawn from the previous 8-year-old initial sample selection.
[7] In total the 20% of non-participants consist of about 15% who chooses not to participate and 5% that are not reached.

2) to have ceased between interviews (initial smokers)

3) to have started/relapsed between interviews (initial non-smokers)

Exogenous variables:

Marital status and changes hereof are our main interest. Current *Marital status* (five class categorical variable; never-married, cohabiting, married, divorced and widowed) as reported in the interviews is used directly in the smoking prevalence estimation. The comparison of marital status in initial and follow-up interviews, in combination with information on the length of cohabitation with current partner for, at follow-up, married and cohabiting individuals, yields the *Marital life course* variable for the longitudinal analysis categorised into eight classes according to the listing below:

Continuously *Married*, i.e. married at the time of both interviews, and where length of cohabitation at the second interview is greater than 7 years.[8] Since our main interest is marital life course events, entering into and exiting out of marriage, *Married* is our reference category in the statistical estimations below.

Continuously *Cohabiting* , i.e. cohabiting at both interviews, and where length of cohabitation at the second interview is greater than 7 years.

Continuously *Never Married*, both interviews.

Continuously *Divorced/Widowed*, divorced or widowed both interviews.

Got Divorced, cohabiting/married at first interview and never married/divorced at the second.

Got Widowed, cohabiting/married at first interview and widowed at the second.

[8] There is no information on "length of cohabitation" for 1990/1991. People married both in 1982/83 and 1990/91 are classified as continuously *Married* between interviews though some of them may be living with a new spouse. However, the number of cases wrongly classified due to the missing information ought to be miniscule. Calculations based on the vast majority of cases for which we have full information suggest that a minor fraction of far less than 1% of the total set of individuals classified as continuously married are miss-classified. The problem is somewhat more pronounced for the category of continuously *Cohabiting* of whom, by the same principle, slightly less than 5% may be regarded as being misclassified.

Got Married, initially never married/divorced/widowed, married or cohabitants at second interview.

Multiple Changes i.e. those whose survey answers indicate that they may have experienced at least two marital status changes e.g. initially married but cohabiting at the second interview, initially never-married but divorced or widowed at second interview etc.. Further, including individuals married or cohabiting in both periods where length of cohabitation is less than time between interviews, indicating change of partner.

In the prevalence estimation the age difference between spouses is included. *AgediffOlder* measures how much older (in years) a married or cohabiting individual is in relation to the partner. This variable is set to 0 for younger spouses and individuals living alone. Correspondingly, *AgediffYounger* is how much younger an individual is in relation to the partner.

Socio-economic living conditions are controlled for in the form of socioeconomic status (*SES*) and *financial stress. SES* is ten class categorical variable, stemming from standardisation by statistics Sweden, of which the first five range from non-skilled manual workers to non-manual high level employees. Altogether these constitute about 80% of the data set (see table 1) and the limited part of our discussion treating *SES* focuses on these. *Financial stress* is a dummy variable based on the interview item: Have you experienced difficulties in managing daily living expenditures during the last year? A positive reply is defined as having experienced *financial stress*. In the longitudinal analysis, information on SES and financial stress is from the first interviews. *Ethnicity* is a three class categorical variable; 1) native born,

2) born abroad (immigrant), 3) born in Sweden with at least one immigrant parent, included in the prevalence estimations.[9]

The estimations are stratified by gender and performed separately for men and women. Further, in all estimations we control for age and period effects by the continuous variables *Age* (in years) and its square *AgeSquare*, and *Year* (normalised from 0 to 1, 1980-2000) describing in which year the interview was conducted.[10]

Statistical Method:

All three outcomes under study are binary and we employ the binary logistic (logit) model specification stratified by gender.[11] Hence we estimate 6 separate main regressions, three for each gender, on the risk of 1) being a smoker, 2) giving up smoking and 3) starting to smoke between interviews. In the result tables, odds ratios (OR) are reported with 95% confidence intervals. Since the major variables under study (marital status and life course event) are of a categorical type including several classes, we also include the joint significance of such variables, indicating whether the variable is of significant statistical importance. In order to assess whether the estimated effects differ between the sexes, we have also performed the regressions with both sexes included, adding gender and gender interaction effects for all variables.[12] The statistical significance of the gender interactions is reported in a separate column of the result tables.

[9] The variable proved insignificant as regards starting/stopping smoking and was not included in these estimations. It could be noted that this did not affect the resulting marital life course estimates in any noticeable way.

[10] Though the estimates of these controls are not shown in the result tables, it could be noted that they follow the pattern to be expected from national aggregate statistics (CAN 2002). Hence, they reflect the ∩-shape in age of smoking prevalence, and that cessation rates have increased, and prevalence and starting to smoke risks decreased over time, both developments being more rapid for men

[11] All estimations are done in SAS v8.

[12] It should be noted that from a statistical point of view this corresponds exactly to estimating the regressions separately for men and women, yielding exactly the same parameter estimates and standard errors as above with the addition of gender and its interactions.

Results

In table 1 descriptive statistics of the cross-sectional data are given. In all 29% of men and 27% of women were daily smokers at the first interview (table 1). Table 2 presents descriptive statistics of smoking behaviour and the marital life course variable for the dynamic sample. Of 3024 men and 2910 women who smoked at the time of the initial interview, 926 (31%) and 760 (26%), respectively, had stopped by the second. Correspondingly 321 (4.9%) out of 6540 initial male non-smokers were daily smokers at the second interview, as were 311 (4.4%) out of 7100 women. Turning to the logistic regressions, we first present the results connected to marital status and life course events for all three issues under study (prevalence, stopping, starting), after which the impact of socio-economic factors is summarised.

There is a strong gender-neutral effect of being divorced (OR=2.48, 2.39 for men and women respectively) in the prevalence estimation (table 3).[13] The effect of being widowed is smaller, and similar to the influence of cohabiting, also in strikingly gender-neutral fashion (OR=1.58, 1.56 for the widowed and 1.44, 1.50 for cohabitants). The only marked gender variation in marital status effect is found for the never married, of whom men smoke only slightly more (OR=1.19) but women smoke to an extent similar to widowed and cohabiting women (OR=1.57).[14] Overall, the marital status variable effect differs between men and women (p-value <0.0001) but this is largely due to considerable variation in the impact of being never married. The age difference between partners is connected to smoking. For individuals of both sexes living in a partnership where the woman is older than the man, the probability of being

[13] Henceforth, if not otherwise indicated, the first of two odds ratios given in parenthesis concerns men and the second women.

[14] Note that the gender neutrality implied for widowed, divorced and cohabitants is related to the married reference. If, for instance, never married were to be treated as a reference, the protective effect of being married is stronger for women and the negative effect of being widowed, divorced or cohabiting stronger for men.

a smoker increases with the age gap (OR=1.03, 1.04). This effect is much less pronounced in couples where the man is older than the woman (OR=1.00, 1.01)

The *Marital life course* predicts smoking cessation (significant at the 0.01% level) for both men and women, but there is no statistical difference between the sexes overall (p-value 0.17) (see table 4). For males, a partner is essential for quitting probabilities; the most likely quitters are married or continuously live in a stable marriage (OR=1.14, 1.00 ref category). The continuously cohabiting and "multiple changes" males, of whom a fraction have ended up with a partner, also face relatively high cessation propensities (OR=0.79, 0.73), whereas all single categories, i.e. those who have become widowed or divorced, or continuously live as never married or widowed/divorced, face low and strikingly similar odds ratios (0.52, 0.49, 0.48, 0.59) respectively. The pattern is somewhat different for women. The effect of getting married is significantly stronger (OR 1.68). The second most likely to quit are the continuously cohabiting (OR 1.04), followed by the continuously married and those who have become widowed (OR=1.00 reference, 0.97). Never married and multiple changes imply cessation probabilities rather similar to that of married women (OR=0.87, 0.76). Women who divorce are the only category significantly less inclined to stop smoking than married women (OR=0.64).

The corresponding estimated effects on the probability of starting to smoke are presented in table 5. As odds and probabilities tend to coincide for small probabilities, and overall risks are rather low (about 5%), the odds ratios may be interpreted as approximate relative risks. The effects mirror the picture given for cessation above to a high degree, but differ in some respects. Again the marital life course is associated with change behaviour (overall p-value<0.0001 for women and =0.0022 for men) but neither in this case does the general

impact statistically significantly differ between the sexes (p-value=0.07). Experiencing divorce predicts an extremely high risk of starting to smoke for women (OR=4.43). Risk-wise they are followed by the categories of multiple changes and the newly widowed (OR=3.15, 2.31). The corresponding effects are overall less strong for men, the most probable to take up smoking are the multiple changes, newly divorced and widowed individuals (OR=2.66, 2.19, 1.47), the last effect being insignificant.

To our knowledge, previous research on changes in smoking behaviour have mainly dealt with coarser marital life history descriptions, often the binary variable to live with a partner or not. In order to facilitate comparison we have momentarily taken a step back from our detailed approach and merged the single statuses (the newly divorced, widowed and continuously divorced/widowed and never married) into one category (singles) and re-estimated the regressions on cessation presented in table 4, again with continuously married as reference. The resulting ORs for the single category of men and women are 0.51 (p-value <0.001) and 0.78 (p-value= 0.01) respectively, and the difference in effect between single men and women is statistically significant at the 1% level. When it comes to smoking initiation (table 5) there are larger differences between the single categories, which make the approach taken above less attractive. Nevertheless, the result for the merged single category is that the ORs of initiation amount to 1.17 (non-significant) and 2.39 (p-value <0.001) for men and women, respectively, and in this case the gender discrepancy is also significant at the 1% level.

Summarising the estimates of the socio-economic variables, it is evident that socio-economic conditions are crucially linked to smoking behaviour. *Financial stress* is connected to smoking prevalence and not having stopped for both men and women over the studied 8-year

period (cessation OR = 0.62, 0.64; prevalence OR = 2.05, 1.78) and though similar in magnitude, the latter effect is statistically significantly greater for men. Controlling for financial stress still leaves *socio-economic status* (SES) as a marker of smoking. Focussing on the five main SES categories, it is found that when it comes to smoking prevalence, the variation in influence is continuously decreasing with SES ranging from unskilled manual workers (OR=1.00 reference) to high level non-manual employees (OR= 0.53, 0.43). Similarly, unskilled manual workers are the least and non-manual employees the most likely quitters, whereas unskilled workers are also the most likely to have taken up smoking between interviews. Finally, smoking is much more common among male but not female immigrants (OR = 1.63, 1.02). For second-generation immigrants this gender discrepancy is levelled, both men and women smoking more than natives, but men smoking less and women to a higher degree than their immigrant fathers/mothers (OR = 1.22, 1.21).

Discussion

From an epidemiological database we have estimated smoking risks connected to a quite detailed marital life course. Before deeper elaboration and analysis of the results presented above, some comments on the shortcomings and virtues of the approach taken are warranted. The main advantages of this study concern the prospective nature of the data,[15] and that the data is representative (sample population: all adult Swedes). Few previous studies explicitly deal with the impact of marital life course events on a detailed level. To the best of our knowledge, the work by Broms et al. (2004) on cessation among a large sample of Finnish twins over a 9-year period, where marital life courses were separated into four categories (corresponding to: married, unmarried, got married, and got widowed/divorced) is the closest to the approach taken here.

[15] With the exception of the “length of cohabitation”-item used to identify marital life courses, which is retrospective.

There are naturally several intrinsic limitations concerning the information used, given the nature of the epidemiological data at hand. All information is self-reported and it should therefore be noted that the reliability of self-reported smoking habits have generally been found to be good (Wagenknecht, Burke, Perkins, Haley & Friedman 1992). The studied age span is wide, but estimations based on, age-wise, truncated sub-samples of the data have yielded strikingly similar results.[16] The starting to smoke estimations are performed on all individuals who were stated non-smokers at the initial interview, and adult ex-smokers are generally more prone than never-smokers to take up smoking. This phenomenon calls for careful interpretation and constitutes a general problem if the proportion of former smokers varies among different classes of the categorical variables.[17] However, the marital life course odds ratios obtained from estimations on starting to smoke for the sub-sample of first-interview non-smoking individuals, where there is retrospective information whether they were previous daily smokers or not, are qualitatively harmonious to our original results (presented in table 5).[18] Information on spousal relations is sparse. This implies that the categories of *never married* and continuously *widowed/divorced* may have cohabited with several partners between interviews. Focussing on our marital life course events (getting married, widowed, divorced) it seems plausible to argue that most people have only

[16] For instance, studying the sub-sample of individuals aged 32-57 the first interview and 40-65 at follow up gives the following results (ORs): Smoking prevalence; (cohabiting, never-married, divorced widowed), (1.60, 1.64, 2.36, 1.64) and (1.54, 1.35, 2.42, 1.53) for women and men respectively. When it comes to smoking cessation, the ORs of the four single categories ranges from 0.49 to 0.52 for men, newly divorced women are still the only female category with significantly lower cessation rates (0.60) than continuously married. The most likely starters are still the newly divorced, widowed and multiple changes categories with ORs ranging from 2.80-4.40 (women) and 2.33-2.76 (men). It should be noted that the smaller number of observations implies that the confidence intervals are widened overall.

[17] Focussing on marital life course events, the problem only arises if previous smoking habits among non-smokers affect their, getting married, divorce and widowhood risk. The immediate reaction may be that such connections ought to be of limited importance, but they cannot be completely ruled out.

[18] Of 2222 and 2181 male and female self-reported ex-smokers at first interview 123 (5.5%) and 140 (6.4%) were daily smokers at the follow-up interview. Among this sub-sample, it is still the newly divorced (OR=4.24, 4.90) and the ones experience multiple changes (OR=3.24, 4.09) followed by the newly widowed (OR=2.92, 2.12, both being non-significant) that are the most likely to relapse into the previous habit.

experienced one such event between interviews.[19] Further, it has been shown that smoking cessation is influenced by the smoking habits, and also the socio-economic status and education, of a partner (Osler & Prescott 1998; Monden, de Graaf, & Kraaykamp 2003; Monden, van Lenthe, de Graaf, & Kraaykamp 2003; Bartley et al. 2004), information lacking in the present study. Even though every detail of factors associated with smoking behaviour and alterations hereof are not captured, we argue that the quality and scope of the data overall, and the marital life course variable in particular, enabling the detailed approach taken, well merits this study. Turning to the crucial issue of causality, it is implicitly assumed in this study that the causality goes from the marital life course to smoking, mainly via stress and support related mechanisms. We acknowledge that in some cases the direction may be reversed; e.g. smoking cessation among single individuals to increase their prospects of getting married, whereas for other marital life courses this seems more unlikely (e.g. for initially non-smoking married individuals that have both got widowed and started to smoke). Most marital life course changes are not instant and totally unexpected since a marriage generally creaks some time before it breaks, and widowhood is often preceded by a period of spousal illness, which may imply heavy care-giving chores and trigger psychosocial stress adversely affecting the surviving partner (Schulz & Beach 1999; Morimoto, Schreiner & Asano 2003). From this point of view the marital life course consists of processes and not just discrete events. Hence, the 8-year time span between interviews may be preferable to shorter ones, as a larger fraction of individuals will have completed such marital transitions.

That said, this study provides some firm and intriguing results. First and foremost: The marital life course has significant effects on smoking risks for both men and women, when it comes to prevalence as well as changes in behaviour (stopping/starting). Marriage is

[19] It should also be noted that even for the presumably rather few individuals, that have been e.g. married and divorced or widowed several times between interviews, our marital life course categorisation captures the last and, hence, from a smoking influence perspective, presumably the most influential event.

doubtlessly protective against smoking whereas marital disruption and especially divorce is connected to adverse smoke risks in general terms. Some researchers have found that being married/cohabiting is important for men's cessation success but not for women's (e.g. Khuder et al. 1999; Lindström and Sundquist 2002; Broms et al. 2004 Tillgren et al. 1996).[20] Generally, such statements are based on intra-gender comparisons, i.e. that there is a significant effect of being married / living with a partner for men but not for women, and it should be noticed that this is not the same as saying that the effects statistically differ *between* the sexes, an issue seldom explicitly addressed.

When we do not separate between the single categories, living in stable marriage predicts smoking cessation for both men and women, and the effect is significantly stronger for men. From this respect, spousal support is beneficial for both sexes and more crucial for men. In line with this result there are signs in the literature that wives tend to make greater efforts than husbands to exercise control over their spouse's general health behaviour (Umberson 1992). In addition, Westmaas, Wild & Ferrence (2002) find that increases in partner influence have more moderating effects on men's smoking than on women's. For our finer division of the marital life course, there are virtually no differences among the four types of single categories for men. For women, the newly divorced distinguish themselves by being the only category with significantly lower cessation rates than continuously married. Hence, for men it seems to be a lack of partner support *per se* that is associated with low cessation, whereas for women, there are signs that it is the experience of losing one's partner by divorce that most strongly predicts continuation of smoking.

[20] Tillgren et al. 1996 analysed a limited sub-sample of the data studied here from 1980/81 and 1988/89.

The starting to smoke estimates reveal a different pattern. For our merged single category regressions, the effect is significantly greater for women. On the more detailed level of marital life courses, there is greater variation among the different categories of singles than for smoking cessation, marital disruption implying high risks and continuously never-married and divorced/widowed facing risks that corresponds more to the married reference. Especially newly divorced and those experiencing multiple marital life course events are susceptible and the former effect seems to be stronger for women. Previous research indicates that the category of divorced women in particular is subject to increases of depressive symptoms following marital disruption (Simon 2002) and that women are more prone to state that they use cigarette smoking as a stress and mood-control device (e.g. Livson & Leino 1988). From this perspective, a stronger connection between smoking initiation and experiencing divorce for women does not seem surprising.

Support for the hypothesis that, in relation to experiencing divorce, widowhood is more adverse for men, or by the same token, divorce is more adverse than widowhood for women, is weak. Except for the never married, the marital status effects, though strong and varying, are strikingly gender neutral in the prevalence estimations. For cessation, starting and relapse, the estimated effect of divorce, in relation to widowhood, is stronger for women. Hence, experiencing divorce or widowhood has somewhat more similar effects on men than on women, which is in line with the hypothesis, but separate statistical tests have failed to significantly confirm this.

As noted above, research on the influence of partner characteristics has grown in the last few years (Monden, de Graaf, & Kraaykamp 2003; Monden, van Lenthe, de Graaf, & Kraaykamp 2003; Bartley et al. 2004). In this article we have shown that smoking prevalence increases for

both partners with the age gap of couples, where the woman is older than the man but not vice versa. Hence, living in a relationship with a non-normative age structure implies being a daily smoker and the effect is somewhat stronger for women. This also adds to the rather sparse literature on the effects of age differences on intra-spousal relations and marital living conditions. The nature of the data does not allow us to assess whether this effect is mostly due to selection mechanisms or specific internal relations within such partnerships, or perhaps to psychosocial stress emanating from perceived normative societal pressure.

Results from previous research on gender discrepancies in the effects of socio-economic indicators on cessation propensities are somewhat mixed. For Britain, Chandola et al. (2004) sggest that occupational social class does matter for both sexes. Godtfredsen, Prescott, Osler & Vestbo (2001) studying Denmark, and Tillgren et al. (1996), Sweden, found that education level was connected to cessation for women but not for men. In our study financial stress is a stark predictor of being a smoker, suggesting that people coping and adapting to such stress are less likely to bother with burdensome adaptation and abstinence following cessation attempts, in spite of the fact that the cessation of smoking positively affects the financial situation due to the high prices of cigarettes. Naturally, there may be reversed causal mechanisms, smokers being financially strained due to the proportion of their budget devoted to cigarette purchases. However, current financial stress is also a predictor of still being a smoker 8 years later. Controlling for financial stress, there is still a socio-economic occupational status gradient for smoking for both men and women. This may partly be explained by a greater propensity for the better off to continuously take in, evaluate and process information concerning health-related behaviours (Lindbladh & Lyttkens 2003). Nourjah, Wagener, Eberhardt & Horowitz (1994), found that male blue-collar workers had less knowledge about the adverse health consequences of smoking than white-collar workers.

There is also a considerable ethnic factor in smoking prevalence. Overall, male immigrants smoke to a much higher degree and females similar to native Swedes, but it should be remembered that smoking prevalence vary substantially among different groups of immigrant women *(*Lindström and Sundquist 2002). For second-generation immigrants this pattern is modified, both men and women smoking more than natives but far less than immigrant men. Hence, there seems to be cultural adaptation of smoking behaviour for males lasting for at least two generations. The female ethnic pattern is more intriguing. On a speculative basis the fact that female smoking is considered culturally adverse and unusual in some parts of the world may make smoking a way of expressing independence for second-generation immigrant females. Indeed, it has been suggested that among adolescent women smoking "serves as a buffer against feelings of alienation from the dominant culture of feminity" (Wearing, Wearing & Kelly 1994), a mechanism that may be particularly strong for females whose parents originally come from cultures where female smoking is considered more adverse than in Sweden.

Summary and Conclusion

Marriage is overall protective against smoking for both men and women. Married individuals are the least, and divorced individuals the most likely smokers. The detailed division of marital status and marital life courses used in this study yields a rather complex pattern of changes in smoking behaviour. For men, the process of smoking cessation is strongly connected to the presence of a partner, and the cessation rates do not vary among the single categories. For women, the presence of a partner, though of overall importance, has less impact, and newly divorced women have the lowest cessation rates. For the risk of taking up smoking, it is the actual loss of a partner that is crucial, divorce having a greater effect than

spousal bereavement, and there are signs that the effects are stronger for women. Hence, whereas long-term presence of a partner, implying spousal influence and support, generally predicts successful cessation, it is the stressful event of marital disruption that is linked to relapsing / starting to smoke. From a methodological point of view, the similarity, especially for men, in cessation rates for all four single categories, indicates that merging these may serve as a fair approximation of an overall impact of living alone. When it comes to prevalence and starting to smoke estimations, the marked difference between the marital statuses / life courses makes such an approach more questionable. Further, the large impact of socio-economic conditions on smoking cessation and starting implies that the socio-economic gradient in smoking is widening. Sweden has experienced a very successful aggregate development of declining smoking rates in recent decades. In order to facilitate the continuation of this process and prevent the widening of the socio-economic gap, public health policy measures ought to be directed towards the general population, but also specifically target vulnerable groups in low socio-economic position and those experiencing marital disruption, especially divorce, who are the least likely to cease and the most likely to start/relapse.

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Table 1. Descriptive statistics of cross-sectional sample.

		Women N=40831	percent	Men N=40378	percent
DAILY SMOKER:	NO	29475	72.8	28332	71.0
	YES	11007	27.2	11533	29.0
	MISSING	*349*		*493*	
MARITAL STATUS					
Married		21837	53.48	21149	52.38
Cohabiting		6408	15.69	6287	15.57
Never married		6522	15.97	10017	24.81
Divorced		2954	7.23	2138	5.30
Widowed		3110	7.62	786	1.95
	MISSING	*0*		*1*	
SOCIO-ECONOMIC STATUS					
Non-skilled manual workers		13350	33.60	9463	24.09
Skilled manual workers		3712	9.34	8591	21.87
Non manual low level employees		7156	18.01	3727	9.49
Non manual mid level employees		5550	13.97	6030	15.35
Non manual high level employees		2408	6.06	4727	12.04
Small scale entrepreneurs		1205	3.03	3025	7.70
Large scale entrepreneurs		132	0.33	452	1.15
Home workers / housewives		2974	7.49	156	0.40
Employed in farm sector		1026	2.58	1331	3.39
Students		2218	5.58	1773	4.51
MISSING		*1100*		*1103*	
Financial stress	NO	33454	82.99	34777	87.41
	YES	6858	17.01	5007	12.59
	MISSING	*519*		*594*	
Ethnicity:					
Native born		34656	85.04	34663	85.98
Immigrant		4500	11.04	3969	9.84
Immigrant parent		1598	3.92	1683	4.17
	MISSING	77		63	
Continuous Variables:		Mean	Std. Dev.	Mean	Std. Dev.
Year		1988.2	6.1	1988.1	6.1
Age		45.0	16.5	44.2	16.3
AgediffOlder[a]		3.2	3.3	4.5	3.7
AgediffYounger[b]		4.6	3.7	3.4	3.5

[a] based on 19700 men and 4645 women who were older than their partner
[b] based on 4850 men and 20675 women who were younger than their partner

Table 2. Descriptive statistics of smoking behaviour, marital life course, socio-economic status and financial stress at baseline for the dynamic sample.

		Women N=10061	percent	Men N=9654	percent
CURRENT SMOKER:					
At initial interview	NO	7100	70.93	6540	68.38
	YES	2910	29.07	3024	31.62
	MISSING	*51*		*90*	
At follow-up interview	NO	7495	75.36	7133	74.86
	YES	2451	24.64	2396	25.14
	MISSING	*115*		*125*	
STARTING TO SMOKE		311	4.3	321	4.9
SMOKING CESSATION		760	26.1	926	30.6
MARITAL LIFE COURSE					
Married		4977	49.47	5059	52.41
Cohabiting		516	5.13	518	5.37
Got married		1117	11.10	1403	14.53
Got divorced		535	5.32	462	4.79
Got widowed		583	5.80	201	2.08
Never married		763	7.58	1257	13.02
Widowed/divorced		1186	11.79	377	3.91
Multiple change		383	3.81	376	3.90
	MISSING	*1*		*1*	
SOCIO-ECONOMIC STATUS					
Non-skilled manual workers		3408	34.71	2345	24.88
Skilled manual workers		777	7.91	2148	22.79
Non manual low level employees		1815	18.49	891	9.45
Non manual mid level employees		1297	13.21	1437	15.25
Non manual high level employees		508	5.17	1065	11.30
Small scale entrepreneurs		295	3.00	697	7.40
Large scale entrepreneurs		25	0.25	99	1.05
Home workers / housewives		971	9.89	25	0.27
Employed in farm sector		275	2.80	362	3.84
Students		447	4.55	356	3.78
	MISSING	*243*		*229*	
Financial stress	NO	8510	85.25	8489	88.96
	YES	1472	14.75	1053	11.04
	MISSING	*79*		*112*	

Table 3. Odds ratios from logistic regression of smoking prevalence on marital status, age-difference between partners, perceived financial stress and socio-economic status (controlled for age, age-square and period effects).

Exogenous Variables		Women			Men			Gender difference in effect (P-value)
		OR	95% conf interval		OR	95% conf interval		
			lower	Upper		lower	lower	
MARITAL STATUS			p-value <0.0001			p-value <0.0001		<0.0001
Married (reference)		1			1			
Cohabiting		1.50	1.39	1.61	1.44	1.35	1.55	0.49
Never married		1.57	1.45	1.70	1.19	1.11	1.28	<0.0001
Divorced		2.48	2.26	2.71	2.39	2.16	2.64	0.60
Widowed		1.56	1.38	1.75	1.58	1.34	1.87	0.86
Age difference among partners:								
AgediffOlder		1.04	1.03	1.06	1.00	0.99	1.01	<0.0001
AgediffYounger		1.01	1.00	1.02	1.03	1.01	1.04	0.06
SOCIO-ECONOMIC STATUS			p-value <0.0001			p-value <0.0001		0.001
Non-skilled manual workers (reference)		1			1			
Skilled manual workers		0.96	0.89	1.04	0.92	0.86	0.98	0.41
Non manual low level employees		0.84	0.79	0.90	0.89	0.81	0.97	0.33
Non manual mid level employees		0.53	0.49	0.57	0.61	0.57	0.66	0.01
Non manual high level employees		0.43	0.39	0.48	0.53	0.49	0.58	0.01
Small scale entrepreneurs		1.00	0.87	1.14	0.93	0.85	1.02	0.40
Large scale entrepreneurs		0.58	0.36	0.93	0.63	0.50	0.80	0.73
Home workers / housewives		0.66	0.60	0.72	0.68	0.46	1.02	0.83
Employed in farm sector		0.28	0.22	0.36	0.43	0.37	0.50	0.01
Students		0.56	0.50	0.62	0.64	0.56	0.73	0.83
Financial stress	NO (reference)	1			1			
	YES	1.78	1.67	1.89	2.05	1.92	2.19	0.002
Ethnicity			p-value = 0.004			p-value <0.0001		<0.0001
Native born (reference)		1			1			
Immigrant		1.02	0.95	1.10	1.63	1.51	1.75	<0.0001
Immigrant parent		1.21	1.08	1.36	1.22	1.08	1.36	0.98

Table 4. Odds ratios from logistic regression of smoking cessation on marital life course, perceived financial stress and socio-economic status (controlled for age, age-square and period effects).

Exogenous Variables	Women			Men			Gender difference in effect (P-value)
	OR	95% conf interval		OR	95% conf interval		
		lower	upper		lower	lower	
MARITAL LIFE COURSE	p-value <0.0001			p-value <0.0001			0.17
Married (reference)	1			1			
Cohabiting	1.04	0.73	1.46	0.79	0.58	1.10	0.27
Got married	1.68	1.29	2.20	1.14	0.88	1.48	0.04
Got divorce	0.64	0.44	0.93	0.49	0.34	0.70	0.31
Got widowed	0.97	0.60	1.57	0.52	0.26	1.04	0.15
Never married	0.87	0.61	1.23	0.48	0.35	0.65	0.01
Widowed/divorced	0.76	0.55	1.05	0.59	0.40	0.89	0.35
Multiple change	0.81	0.53	1.22	0.73	0.50	1.06	0.73
SOCIO-ECONOMIC STATUS	p-value 0.01			p-value 0.13			0.76
Non-skilled manual workers (reference)	1			1			
Skilled manual workers	1.14	0.84	1.56	1.14	0.92	1.43	0.99
Non manual low level employees	1.30	1.03	1.63	1.18	0.88	1.59	0.64
Non manual mid level employees	1.38	1.04	1.84	1.45	1.11	1.90	0.79
Non manual high level employees	1.59	1.03	2.46	1.27	0.93	1.74	0.41
Small scale entrepreneurs	1.23	0.78	1.94	1.10	0.80	1.52	0.71
Large scale entrepreneurs	0.40	0.05	3.43	1.42	0.66	3.09	0.28
Home workers / housewives	0.68	0.47	0.99	0.39	0.05	3.13	0.60
Employed in farm sector	0.39	0.09	1.74	0.76	0.43	1.34	0.41
Students	1.30	0.84	2.00	0.74	0.43	1.29	0.12
Financial stress: NO (reference)	1			1			
YES	0.64	0.51	0.81	0.62	0.49	0.79	0.84

Table 5. Odds ratios from logistic regression of starting to smoke on marital life course, perceived financial stress and socio-economic status (controlled for age, age-square and period effects).

Exogenous Variables	Women			Men			Gender difference in effect (P-value)
	OR	95% conf interval		OR	95% conf interval		
		lower	Upper		lower	lower	
MARITAL LIFE COURSE	p-value <0.0001			p-value <0.0001			0.07
Married (reference)	1			1			
Cohabiting	1.73	1.07	2.78	0.71	0.38	1.34	0.03
Got married	1.11	0.72	1.70	1.18	0.81	1.72	0.82
Got divorce	4.43	3.10	6.35	2.19	1.40	3.43	0.02
Got widowed	2.31	1.13	4.70	1.47	0.52	4.18	0.48
Never married	1.54	0.96	2.48	0.88	0.59	1.32	0.08
Widowed/divorced	1.09	0.57	2.10	0.78	0.31	1.94	0.55
Multiple change	3.15	1.97	5.02	2.66	1.69	4.17	0.61
SOCIO-ECONOMIC STATUS	p-value 0.005			p-value 0.017			0.57
Non-skilled manual workers (reference)	1			1			
Skilled manual workers	0.56	0.33	0.94	0.88	0.64	1.21	0.15
Non manual low level employees	0.91	0.66	1.26	0.93	0.61	1.41	0.94
Non manual mid level employees	0.47	0.30	0.71	0.70	0.48	1.03	0.16
Non manual high level employees	0.58	0.33	1.02	0.54	0.34	0.86	0.86
Small scale entrepreneurs	0.93	0.44	1.98	0.86	0.53	1.41	0.87
Large scale entrepreneurs	2.72	0.34	21.61	1.47	0.56	3.82	0.60
Home workers / housewives	1.00	0.67	1.49	3.37	0.91	12.58	0.08
Employed in farm sector	0.16	0.02	1.18	0.26	0.08	0.85	0.68
Students	0.62	0.37	1.05	0.57	0.30	1.10	0.85
Financial stress: NO (reference)	1			1			
YES	1.20	0.86	1.67	1.21	0.83	1.76	0.97