

# A Review of Life-Course Familial and Lifestyle Factors of Smoking Initiation and Cessation

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**Abstract** Smoking raises the risk of cardiovascular diseases in active and passive smokers throughout life. Taking a life-course approach, we reviewed current literature on the familial and lifestyle factors of smoking initiation and cessation. Single-parent and parental smoking are risk factors of smoking in young people, while smoking cessation of parents and family support predict quitting in both young and adult smokers. Results on the familial influences on relapses are limited and mixed in adolescents and adults. Regarding behavioral factors, poor eating habits and alcohol drinking would increase, and a high physical activity level would decrease, the likelihood of smoking in both adolescents and adults. Nutritional status of children improves with parental smoking cessation. In addition, disordered eating may hinder smoking cessation in women. Familial and behavioral factors interplay in their associations with smoking initiation and cessation in the life-course, which warranted further investigations for formulating better smoking prevention and cessation programs.

**Keywords** Life-course · Familial · Lifestyle · Smoking · Cessation

## Introduction

The Framingham studies have well established the epidemiologic relation between smoking and cardiovascular diseases [1, 2]. In the United States, about 20 % of adults [3], and 17 %

and 13 % of adolescent boys and girls are smokers [4]. Children lack the autonomy in avoiding smokers, rendering them more susceptible to secondhand smoke. To young children, their home is the usual place for exposure to passive smoking. More than 1 in 6 youths with asthma were exposed to tobacco smoke at home in 2005–2010, defined by the presence of family members who smoked inside the house [3]. For newborns, parental awareness of the harm of secondhand smoke declined after birth [5], and about 40 %–50 % of female smokers relapsed within 6 months postpartum [6–8]. These recent figures suggest that smoking still poses major cardiovascular risks to different age groups in various ways.

Social and physical factors of smoking interplay within families, and are complicated by the family compositions and culture. Familial factors are no less important than personal lifestyle preference in determining exposure to tobacco from young to old age. Most family members are not indifferent to the smoking behaviors of other family members, even when the smokers are adults [9]. Quitting not only benefits smokers but also their family members. Clinical data suggest that family-based counseling involving both adolescent smokers and their parents may be more effective than individual cessation services [10]. Approaching the smoking issue from both familial and lifestyle perspectives may therefore be more promising. No comprehensive review has evaluated current evidence concerning the associations of familial factors and personal lifestyles. We systematically reviewed the roles of these factors in the onset and discontinuation of smoking in children, adolescents, and adults.

## Familial Factors Related to Smoking

Parents are an important source of social support to adolescent development and growth. Paternal smoking may promote or deter tobacco use of adolescents, depending on the stages of

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smoking of their children [11]. Similarly, longitudinal results show that maternal smoking can increase tobacco dependence, forming a smoking habit in adolescents [12]. Not only parents' actual smoking behaviors, but also their norms of smoking, may influence the perceptions of adolescents toward the image of smokers presented in the media [13]. Moreover, family backgrounds such as ethnicity may affect adolescents' perceptions toward smoking and thus the rates of smoking [14]. Among adolescents from single-parent families, current smoking was 41 % more common for those coming from paternal than maternal families [15]. On the other hand, parents' awareness of the use of free-time of children [16], parental care, and good parent–child relationships [17] seem to help prevent children from smoking. Furthermore, having a smoking friend is associated with ever-smoking in adolescents; together with a smoking parent, an odds ratio of 8.3 was observed for ever-smoking, and 12.0 if both parents smoked [18]. Parental smoking is associated with an earlier onset of smoking among youth and subsequently, heavier smoking [19••]. Studies of the familial factors of smoking are mostly conducted among children or adolescents.

Investigations about the familial factors of smoking among adults mainly focus on cessation as most smokers started smoking before adulthood, and adults have greater autonomy over their own behaviors. The presence of a smoking mother is related to smoking in nurses [20]. In South America, mothers who have fewer children may be more likely to initiate smoking than mothers with more children with an odds ratio of 1.3 [21]. The available literature suggests that family backgrounds and structures, as well as the smoking status, attitudes, and parenting style, are related to smoking of children of all ages.

### Familial Factors Related to Quitting Smoking

A large UK study has found smokers who tried to quit smoking tended to cluster within the same households [22], so understanding the smoking-related interactions between family members is important for planning family-based interventions. In adolescents, tolerance of parents toward smoking behaviors would delay quitting of established smokers [23]. Adolescent ever-smokers whose parents quit smoking were twice as likely to quit as those who had a parent who still smoked [24]. Smokers would be 80 % significantly more likely to quit earlier in their young adulthood if their parents had quit smoking before the children reached grade 11 [25]. Regarding relapses, the available literature did not show the influence of parental smoking and parenting on the relapse of smoking in adolescents [26, 27].

For adults, smokers from lower household income families may be less likely to be invited for evidence-based quitting programs [28], although children's exposure to secondhand

smoke at home is relatively more intensive in low-income families [29]. Lower income young adult smokers may also be less likely to quit if they are non-daily smokers [30]. Parents' quitting smoking also affects the chance of their children to initiate quitting, even when the children are adults. For example, nurses living with their families are more likely to quit smoking than those who lived alone [20]. Continued smoking during pregnancy predicted a 69 % higher likelihood of smoking after 3 years in the mothers than those who stopped smoking during pregnancy [31]. Partners are the most intimate relationships for adults, and passive smoking is a serious hazard for nonsmoking partners [32]. However, marriage or cohabitation is positively associated with successful quitting [33]; this also seems to be true for living with an ex-smoker [34]. Furthermore, partners' support was reported to be important to the preparation of quitting in US adults living in rural areas [35].

Support from husbands and children are also crucial among women who quit during pregnancy [36, 37]. Nevertheless, the results relating pregnancy of wives and quitting of husbands are mixed. Results from a 6-month educational trial suggest that the prevalence of self-reported quitting in the intervention and control groups were 16.5 % and 9.3 %, with the number needed to treat (NNT) for smoking husbands during the pregnancy of their wives being 13 to 14 [38]. In another study without interventions, smoking prevalence of husbands did not change from pregnancy to postnatal periods [39]. However, these studies are not clear about whether the husband's actual smoking behaviors changed, eg, smoking outside the home during the wife's pregnancy.

In addition to partners, children could also encourage quitting smoking in adults. Smokers with children who have asthma have a higher intention to stay in cessation programs [40]. Female smokers are more likely to quit smoking than male smokers with an OR of 1.85, mostly because they wish to protect their children [41]. Among male adults who have ever attempted to quit, one-third of them attribute family pressure as the drive for quitting smoking [42]. Educational interventions for smoking cessation in fathers of sick children are found to be effective in a Chinese community [43]. Among female smokers with relatives diagnosed with lung cancer, 28 % were at the precontemplation stage, 65 % at the contemplation stage; and 7 % at the preparation stage of quitting, according to the transtheoretical model of health behavior change [44]. The barrier to quitting smoking is the temptation component of the transtheoretical model. Moreover, Australian young women perceive lack of family support as a barrier to quitting smoking [45]. In fact, quitting smoking is never come too late in the life-course [46, 47]. Old age smokers in the US with substance use in their family history were less willing to quit smoking than those without such a family history [48]. These findings have highlighted that the influence of children and parents on quitting smoke

may be bidirectional. At the same time, support from family members may have synergetic influence on the smoking behaviors of the smoking members. Motivating of partners and children to participate into smoking cessation programs may increase the effectiveness of the services in the community.

Similarly to adolescents, the effects of familial factors on relapse in smoking among adults have yet to be concluded. Longitudinal results of a cohort of 2431 smokers from United States, United Kingdom, Canada, France, and Spain have shown that family support is not significantly associated with relapse of smoking [49]. The physical environment in addition to the social environment may also modify the interactions between family members regarding smoking. For instance, promoting a smoke-free physical environment at home, such as displaying “no smoking” signs, refusing smoking among visitors, or removing ashtrays were valued as good support to quitting smoking by the rural smokers in the United States [50]. Likewise, smoking restriction at home is associated with quitting of working women who smoke [51]. These are however, beyond our scope in this review for more detailed discussion.

### Behavioral Factors Related to Smoking

Smoking shares similar loci of control with other behaviors such as eating and drinking alcohol [52]. Attitudes toward health behaviors differ across age, gender, and ethnic groups [53]. In infants, the effects of smoking habits of mothers on birth weight appeared to be mediated through differences in nutrient intakes [54]. In children, consumption of snacks and soft drinks are also related to smoking [55]. Meals with the family could lower the risks of both smoking and alcohol use in adolescents [56]. In adolescents, smoking clustered with alcohol consumption [57], and was more common in those adolescents from non-intact families [58]. A well-designed family-directed program was found to be useful in preventing both smoking and alcohol use of adolescents at the same time [59]. In US adolescent girls, among the nonsmokers, 6 % showed onset of experimental smoking and 5 % showed onset of daily smoking after 1 year. Body dissatisfaction has been associated with onset of smoking with an odds ratio of 4.33 in adolescent girls [60]. Male adult smokers usually have a less healthy diet than nonsmokers [61], which may not be the results of compensatory health beliefs of smokers as expected [62]. Clustering of unhealthy behaviors such as alcohol use, unhealthy diet and sedentary lifestyles with smoking was observed in college students [63].

Smoking and alcohol consumption may alter adults' dietary patterns [64]. At the same time, the association of smoking with nutritional behaviors is not unidirectional. It is well established that smokers have higher intakes of fat [65, 66], but lower intakes of antioxidant nutrients [67, 68] than

nonsmokers. These differences in the balance of foods are claimed to explain the higher stress levels in smokers [69]. Adults living with smokers are also prone to poorer nutrition than those living with nonsmokers [70]. Whether smoking leads to acute anorectic behaviors in smokers may be arguable [71]. Bulimia nervosa patients seem more likely to smoke occasionally than anorexia nervosa patients [72]. Female smokers commonly use smoking as means of weight-control and this could lead to eating disorders [73]. Women with binge or purge subtypes of eating disorders reported the highest rates of smoking of all of the subtypes, perhaps due to their impulsive personality traits [74]. Both binge eating and smoking may modulate negative affect or anxiety in women [75]. In the elderly, correlations of underweight status with smoking and alcohol drinking are also found from the limited literature available [76].

Physical activity is another major health behavior closely related to smoking from the perspective of harm reduction [77]. A longitudinal study suggests that decreasing physical activity is a risk factor for being a smoker in adolescents [78]. Higher physical activity levels may lead, however, to a higher chance of alcohol consumption, but a lower chance of smoking in college students [79]. Another cross-sectional study suggests that higher physical activity levels are related to a lower chance of smoking in adults [80]. The above research may suggest that many health-related behaviors, including smoking, are mutually affecting one another across gender and age groups.

### Behavioral Factors Relating to Quitting Smoking

When compared with that in adult smokers, information about the behavioral factors for quitting in children and adolescents is relatively limited, probably owing to their unstable smoking status [81]. Quitting smoking could improve the nutritional status of children, owing to the shift of expenditure from tobacco to foods, even in rural places [82]. However, the successful rate of smoking quit attempts among adolescents is low (about 10 %), according to the 2003 national school-based Youth Risk Behavior Survey [83]. Other risky behaviors such as alcohol drinking would decrease the chance of successful smoking cessation with an odds ratio of 0.42 [84], and even increase the possibility of relapse in adolescents [85].

Nutritional behaviors are also closely related to quitting smoking in adults, particularly in women. In overweight men and women, the binge eating group has a higher average weight gain (11.2 kg) than the non-binge eating group (5.0 kg) 1 year after cessation of smoking [86]. In women, longitudinal studies reported that binge eating is a barrier to successful cessation [87]. Moreover, dieting moderates the impact of mood states on cessation in women [88]. A

randomized controlled trial also showed the success of cognitive-behavioral weight control program in increasing the self-efficacy of quitting among women [89]. Currently, there is insufficient information to have better understanding of the behavioral factors relating to quitting across ages.

## Discussion

This systematic review suggests that familial factors, especially parents, are the key factors for children and adolescent smoking and quitting behaviors. For adult smokers, consideration of the health of family members, mainly of partners and children may be the major factors for quitting. Association of nutritional problems with smoking is found in adolescents and adults, probably because of the expenditure on tobacco affects the family nutrition, in particularly the lower income families. Moreover, using smoking for weight control may help explain the unhealthy eating behaviors observed in women [90].

There are other factors we have to consider in delineating the relation between familial and behavioral risk factors of smoking. In children and adolescents, smoking of significant people other than family members also contribute to smoking. For instance, smoking of teachers is associated with smoking among adolescents in China [23]. Adolescent boys and girls also have very different preferences toward methods of smoking cessation in Norway [91]. Aboriginal Canadian adolescents, although having a higher smoking prevalence than the general adolescent population, may have a higher intention to quit smoking [92]. In adults, successful quitting is related to a smoking continuum (nonsmoker, quitter, light smoker, heavy smoker), the relationship varies further between men and women [93]. Specifically, weekend smokers seem to need a longer cessation period than daily smokers in the UK [94]. Social factors relating to quitting such as social exclusion in an aboriginal society [95] and military services [96] are also worth further investigation.

The major difficulty to conduct a review on the topic of familial and behavioral factors of smoking is the idiosyncratic findings from fragmentary data. Most results cannot be directly generalized to other populations. Similarly to the Doll and Peto's seminal findings on smoking harm among doctors [97, 98], yet this pioneer study led to more extensive and groundbreaking research after the 1950s. It is perhaps high time to launch research to organize all these piecemeal attempts to investigate the risk and protective factors related to smoking onset and cessation. A well-designed longitudinal study investigating the effects of coexistence of familial and lifestyle factors on smoking status (initiation, continuation, quitting, and relapse) is desirable to systematically record the dominant factors of smoking at different stages. Practically, diet is one of the highly related behavioral factors of smoking. Public health efforts to combat cardiovascular risks including smoking and

obesity should align in health promotion [99]. Nutritional interventions, if well formulated, could be a good introduction point for smoking cessation [100]. Furthermore, gynecologists [101] and pediatricians [102] should not miss the opportunities of providing smoking cessation advice and programs to pregnant and postpartum women who have enhanced motivation at that stage of life, to quit smoking. Referring smoking parents of child patients suffering from respiratory or cardiovascular problems for smoking cessation services by pediatricians is also encouraged [103]. Only by creating a smoke-free social network will the denormalization of smoking be established in a society [104] and effectively protect people from escalating cardiovascular risks. In conclusion, smoking prevention and cessation programs should adopt a behavioral and family-based approach with tailor-made components to suit the needs of family members at different stages of the life course.

## Compliance with Ethics Guidelines

**Conflict of Interest** Kwok-Kei Mak declares that he has no conflict of interest. Jeffrey R Day declares that he has no conflict of interest. Sai-Yin Ho declares that he has no conflict of interest.

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.

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- Of importance
- Of major importance

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