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Tobacco use habits among Swedish female youth athletes and the influence of the social environment

Abstract: *Aim:* This study examined the prevalence of tobacco habits and the influence of the social environment among Swedish female athletes representing both individual and team sports in Sweden. *Material and method:* A self-reported cross-sectional survey was performed with 791 female athletes 15–24 years old representing ten of the most common sports in Sweden. The questions related to the participants' involvement in sports and their tobacco habits. *Results:* Findings revealed that a large proportion of the female athletes had never smoked (65%) or used snus (74%). However, a considerable portion of the participants had tried smoking (27%) or using snus (20%), especially those involved in team sports. Results also showed statistically significant associations between female athletes' smoking habits and those of both their mothers and their peers, but not with the tobacco habits of their coaches, indicating that coaches do not influence the female athletes' use of tobacco. *Conclusion:* In conclusion, this study indicated that the vast majority of female athletes did not use tobacco. A significant portion had sometimes tried tobacco, especially members of team sports, but this behaviour did not seem to be influenced by the tobacco habits of their coaches.

Key words: athletes; gender; smokeless tobacco; smoking; snuff; snus; sports

Introduction

According to the World Health Organization (WHO), tobacco use is one of the main threats to sustained good health. This has been confirmed in countless studies, where the medical effects, mainly of smoking, have been studied (1). In some countries, the tobacco trends are worrisome as the widespread use of tobacco among women is increasing. The theme for the World No Tobacco Day 2010 highlighted gender and tobacco with an emphasis on marketing to women and initiated a global action to protect women against the harmful effects of tobacco use (2).

Numerous studies have shown that cigarette smoking has harmful effects, causes various types of cancer and increases the risk of cardiovascular disease (1, 3–5). There are relatively few studies on the use of smokeless tobacco/snus in Sweden and elsewhere. Moreover, the results are not always clear and in some cases even contradictory (6–8). However, changes in the oral mucous membrane following smokeless tobacco/snus use are well documented (9, 10).

Because of the potential harmful effects of tobacco use, it has been of great interest to find arguments for oral health promotion as well as

strategies to prevent young people from starting to use it. In their daily interactions with socialization agents, symbols and objects in their immediate and more remote environmental contexts, adolescents incorporate the shared norms, customs, values and traditions of their own societies (11, 12). This socialization process may not always lead to desirable outcomes. Socialization agents including parents, grandparents and above all peers have a major impact on young people's decisions concerning whether to start or not using tobacco (13–15). Chassin *et al.* (13), for example, found significant relationships between both parents' and peers' smoking behaviour and adolescents' smoking habits.

Organized sport is highly valued in most Western societies, partially owing to the public notion that sporting activities foster qualities that children and adolescents need to be successful, well-adjusted and healthy members of society (16, 17). The majority of young people in Europe participate in organized sports, and in Sweden, almost two-thirds of all children and youth are members of a sports club, which makes this a salient arena in which socialization processes occur (18).

In two studies regarding tobacco habits and their development among Swedish youths, Rolandsson and Hugoson (19, 20) showed that tobacco use, especially snus use, was highly prevalent among male ice hockey players (12–22 years). Over a three-year period, snus use increased by 16%, and in the age group 17–22, there was a combination of snus and cigarette use. In a qualitative study, including male ice hockey players, Rolandsson *et al.* (21) identified the following five categories of enhancing factors for commencing snus use: 'having a role model, residing in a consenting environment, experiencing performance demands, experiencing a sense of community and creating an image'.

Earlier researches have shown that frequency of smoking is related to different types of sports, for example team sports versus individual sports (22). Martinsen & Sundgot-Borgen (23) showed that use of snus was more common among athletes in team sports than in individual sports. A study among young men (18–29 years) showed that team sports were associated with increased use of snus compared with men who did not participated in team sports (24). Most of the studies in this field have focused on male youth athletes, consequently ignoring the gender perspective. For this reason, a study of tobacco use among female youth athletes is important to obtain a more comprehensive picture of tobacco use among this group. Interesting is also, if the tobacco use among female athletes are more common in team sports versus individual sports. This study is also important from the point of view that several studies have pointed out adolescence as a critical period in life with regard to commencing a tobacco habit (25). The aim of this investigation was therefore to study the prevalence of tobacco habits and the influence of the social environment, with focus on female athletes representing both individual and team sports from ten of the most common sports in Sweden. The hypothesis was that there is no difference regarding tobacco use in the different types of sports.

Material and methods

Participants and procedures

This cross-sectional survey, carried out in 2008, represented Swedish female athletes (15–24 years old) in the following sports: athletics, cross-country skiing, equestrian sports, floorball, soccer, handball, ice hockey, orienteering, swimming and tennis. To achieve representation from all those sports, the Swedish Sport Federation (RF) was contacted to establish a random sample of 50 sports clubs from each of the different sports. The authors then contacted the heads of each club by telephone, informed them about the purpose of the study, and requested the names and addresses on the female athletes. Forty-nine clubs responded. A covering letter together with a questionnaire was sent out to the female athletes on the lists obtained. Each athlete was thus informed of the purpose of the study and asked to complete the questionnaire and return it in a stamped, self-addressed envelope. The response rate was low from sports clubs representing individual sports, which made it necessary to contact RF again and ask them to draw up a new sample of 50 sports clubs representing individual sports. Of these, 44 clubs responded. A new set of covering letters/questionnaires was sent out to the people whose names were supplied by the head of each club. A totally, 1166 letters were sent to female athletes participating in ten different sports. The response rate was 68% (n = 791). No reminders were sent out. The study was approved by Karlstad University research ethics committee (dnr C 2005/803).

Questionnaire

The questionnaire was divided into three sections. First, the athletes were asked about their involvement in sports (i.e. 'What is your main sports activity?', 'How many years have you been active in this sport?'). In the second section, participants were asked to report on their tobacco habits, cigarette smoking or snus use (i.e. 'Do you smoke?', 'Do you use snus?') followed by six response alternatives (1 = 'No, I have never smoked/used snus', 2 = 'No, I have only tried', 3 = 'No, I have quit', 4 = 'Yes, but only occasionally', 5 = 'Yes, almost every day' and 6 = 'Yes, every day').To compare groups between those who never have smoked/used snus and those who had tried smoking/using snus or smoked/used snus regularly, the response alternatives were categorized into two separate variables for each tobacco form: 0 = never smoked (65%, n = 509); 0 = never used snus (74%, n = 582) (based on response alternative 1 above) and 1 = past or current smoker (35%, n = 272); 1 = past or current snus user (26%, n = 202) (based on response alternative 2–6 above). In the third section, the athletes were asked to respond to questions concerning the tobacco habits of some important socialization agents (i.e. parents, siblings, friends and coaches) along with questions concerning consenting attitudes of those socialization agents. Participants could respond to more than one alternative. These questions have been used earlier in studies by Rolandsson and

Hugoson (19, 20) and by Rolandsson *et al.* (10), indicating good face and content validity. Missing values, that is, unanswered questions or incomplete answers, were limited.

Non-response analysis

In studies of this kind, it is inevitable that there will be a certain number of non-respondents. Other similar studies (26) have shown a relatively high frequency of non-respondents when member lists from the Swedish Sport Confederation (RF) were used. In an analysis of the reasons for not taking part in a study, Patriksson and Wagnsson (26) showed that 48% of the non-responses were attributable to the fact that the sports clubs chosen did not have any activities for the targeted group (i.e. children of age 8–12). Moreover, 19% of the non-responses were the result of difficulties in reaching the people who were responsible for the list of members and 15% were because the club heads did not get permission to reveal the names of club members. Additionally, 13% were the result of the sports association forgetting to send the list of members. In this study, the non-response rate among the female athletes was 32%.

Data analysis

Analyses were conducted using the SPSS statistical software package v. 18.0 (SPSS, Inc., Chicago, IL, USA). While the data were mainly analysed using dichotomized variables, Chi-square tests were used to examine whether potential group differences and relations were statistically significant ($P < 0.05$). Logistic regression analyses were also used to predict the influence of significant socialization agents. Odds ratio (OR), 95% confidence intervals and regression coefficients of determination (R^2) were presented.

Results

Participants ($n = 791$; $M = 17.24$ years; SD = 2.34) were involved in handball (24%), ice hockey (16%), equestrian sports (15%), soccer (14%), swimming (8%), floorball (7%), orienteering (5%), tennis (4%), athletics (3%) and cross-country skiing (3%). Almost one-third (31%) were active in two or more sports, and 83% of the participants had been active for more than 6 years.

Tobacco habits

Of the 791 female, 781 answered the questions about smoking habits and 784 about snus habits. Most of the female athletes reported that they had never smoked, 509 (65%), or used snus, 582 (74%). In line with these results only a small proportion, 13 (2%), of the female athletes reported that they smoked every day/almost every day and 16 (2%) that they used snus every day/almost every day. Six (1%) of the females were former smokers, and 8 (1%) others were former snus users and had thus quit their tobacco use. Two hundred eleven (27%) had tried smoking and 155 (20%) had tried snus, 42 (5%) smoked and 23 (3%) used snus occasionally.

The proportion of daily smokers and occasional smokers were almost the same in individual as in team sports (Table 1), while the proportion of daily snus users were slightly more common in team sports. When comparing females who participated in team sports (soccer, handball, ice hockey and floorball) and individual sports (swimming, athletics, cross-country skiing, tennis, orienteering and equestrian sports) (team sports = 0; individual sports = 1) in relation to their current and previous tobacco habits (0 = never smoked/never used snus; 1 = past or current smoker/past or current snus user), the results showed that the female athletes, who mainly participate in team sports, smoke or have tried smoking more frequently ($\chi^2 = 12.06$; $P < 0.001$) and/or use or have used snus more frequently ($\chi^2 = 22.48$; $P < 0.001$) than individual athletes.

Smoking and snus habits among female athletes representing different sports are shown in Tables 2 and 3. Daily smokers were only found among females active in equestrian sports (5%), handball (3%) and ice hockey (2%), while occasional smokers were found in several sports, especially floorball (11%) and handball (10%). Female athletes who have tried smoking were found in all sports, but most in floorball (39%) and soccer (36%). The female athletes who never smoked were mainly found in sports with high demands in terms of aerobic capacity to perform well, for example, cross-country skiing (74%), swimming (75%) and orienteering (88%).

The highest proportion of daily snus users was found among ice hockey players (5%) and floorball players (4%). Occasional snus users were found among ice hockey (6%) and soccer players (5%). The highest percentage of the female athletes who had tried snus were found in floorball (28%), soccer (24%), handball (22%) and in cross-country skiing (22%), while the lowest percentage of those who had tried snus were found in tennis (9%), swimming (15%) and orienteering (17%). Female athletes who had never used snus were found in sports such as equestrian sports (85%), swimming (85%) and tennis (91%).

Table 1. **Participants' ($n = 781/784$) tobacco habits by team versus individual sports**

	Smoking		Snus	
Frequency	Team *n* (%)	Individual *n* (%)	Team *n* (%)	Individual *n* (%)
Daily/almost every day	7 (1)	6 (2)	13 (3)	3 (1)
Occasionally	31 (7)	11 (4)	20 (4)	3 (1)
Quit	5 (1)	1 (0)	7 (2)	1 (0)
Tried	145 (31)	66 (22)	111 (23)	44 (14)
Never	287 (60)	222 (72)	325 (68)	257 (84)
Total	475 (100)	306 (100)	476 (100)	308 (100)

Table 2. **Participants' (n = 781) smoking habits by sport**

	Smoking habits				
Sports	Never *n* (%)	Tried *n* (%)	Quit *n* (%)	Occasion *n* (%)	Daily *n* (%)
Handball	110 (59)	50 (27)	2 (1)	18 (10)	5 (3)
Ice hockey	84 (68)	33 (27)	1 (1)	3 (2)	2 (2)
Equestrian	77 (66)	27 (23)	1 (1)	6 (5)	6 (5)
Soccer	66 (58)	41 (36)	2 (2)	4 (4)	–
Swimming	49 (75)	13 (20)	–	3 (5)	–
Floorball	27 (50)	21 (39)	–	6 (11)	–
Orienteering	37 (88)	4 (10)	–	1 (2)	–
Tennis	25 (74)	9 (26)	–	–	–
Athletics	17 (68)	7 (28)	–	1 (4)	–
Cross-country skiing	17 (74)	6 (26)	–	–	–
Total	509 (100)	211 (100)	6 (100)	42 (100)	13 (100)

The category 'Daily' includes participants who smoke on a daily or almost everyday basis.

Table 3. **Participants' (n = 784) snus habits by sport**

	Snus habits				
Sports	Never *n* (%)	Tried *n* (%)	Quit *n* (%)	Occasion *n* (%)	Daily *n* (%)
Handball	130 (71)	42 (22)	1 (1)	6 (3)	5 (3)
Ice hockey	80 (64)	27 (21)	5 (4)	7 (6)	6 (5)
Equestrian	99 (85)	14 (12)	–	3 (3)	1 (1)
Soccer	80 (71)	27 (24)	–	6 (5)	–
Swimming	55 (85)	10 (15)	–	–	–
Floorball	35 (66)	15 (28)	1 (2)	1 (2)	2 (4)
Orienteering	35 (83)	7 (17)	–	–	–
Tennis	30 (91)	3 (9)	1 (1)	–	
Athletics	20 (74)	5 (19)	–	–	2 (7)
Cross-country skiing	18 (78)	5 (22)	–		–
Total	582 (100)	155 (100)	8 (100)	23 (100)	16 (100)

The category 'Daily' includes participants who use snus on a daily or almost everyday basis.

Socialization and tobacco use

To grasp the presumptive effects on tobacco habits related to different socialization agents, female athletes who had smoked or used snus at some time were asked to mark on a list of predetermined causes what had influenced them the most to start smoking or using snus (Table 4). The results showed that the smoking/snus habits of their peers and the calming effects of tobacco were among the most frequently listed causes.

The percentages of potential socialization agents, including parents, peers and coaches, reported by the female athletes as smoker or users of snus are shown in Table 5. The participants reported that their peers were the most common smoking and snus use socialization agents (32% and 41%, respectively). Few coaches were perceived as smokers (1%), although a larger proportion of the coaches were reported as using snus (11%).

Table 4. **Perception of factors that mainly influenced tobacco-using athletes to start smoking or/and using snus**

Perceived causes	Smoking *n* (%)	Snus *n* (%)
Peers smoking/snus	56 (64)	20 (38)
Parents smoking/snus	3 (4)	5 (9)
Parental permission	–	2 (4)
Siblings smoking/snus	2 (2)	8 (15)
Coach smoking/snus	3 (4)	1 (2)
Coach permission	–	2 (4)
Idol/role model	–	1 (2)
Performance enhancing	–	–
Cool image	7 (8)	1 (2)
Calming	16 (18)	13 (24)
Total	87 (100)	53 (100)

The number of participants is based on those who answered that they smoked (n = 55) or used snus.
(n = 39) daily or almost every day.

To investigate the presumptive influence of important socialization agents, participants' tobacco habits (0 = never smoked/used snus; 1 = sometimes/regular) were compared with tobacco habits of different socialization agents (0 = non-smoking/using snus; 1 = smoking/using snus). The results of a logistic regression analysis showed that smoking habits of the female athletes' mothers, other closely related adults and peers were related to the smoking behaviour of the female athletes, but no statistically significant relationship was found to the smoking habits of fathers, siblings or coaches (Table 6). The odds rate for female athletes to smoke when their mothers smoked was almost twice as high and it was three times as high if they had peers who smoked.

As regards snus use, and after controlling for other important socialization agents, it was shown that the tobacco behaviour of the coaches did not seem to encourage the female athletes to use snus (Table 6). Female athletes who had peers, who used snus daily, were five times more prone to using snus than those with non-snus-using peers. Moreover, the odds of using snus were doubled when the female athletes had other adults around them or siblings who used snus. Snus-using mothers or fathers seemed to have no effect on the female athletes' decision to try or use snus.

Table 5. **The number of daily smoking and daily snus-using socialization agents reported by participants (n = 791)**

	Athletes with smoking agents *n* (%)	Athletes with snus-using agents *n* (%)
Mothers	84 (11)	20 (3)
Fathers	52 (7)	167 (21)
Close adults	90 (11)	117 (15)
Siblings	17 (2)	60 (8)
Peers	249 (32)	321 (41)
Coach	9 (1)	87 (11)
Total	501 (64)	772 (99)

Participants were able to respond to more than one alternative.

Table 6. **The odds ratio [Exp (β)] for smoking or using snus related to daily smoking and snus-using socialization agents (*n* = 791)**

	Smoking			
			95% CI for Exp (β)	
Included	B(SE)	Exp (β)	Lower	Upper
Constant	−0.74 (0.50)	0.48		
Mothers smoking	0.66 (0.26)**	1.94	1.18	3.20
Fathers smoking	0.02 (0.32)	1.02	0.53	1.92
Other adults smoking	0.64 (0.24)**	1.89	1.17	3.03
Peers smoking	1.15 (0.16)***	3.16	2.29	4.36
Siblings smoking	−0.37 (0.54)	0.69	0.24	2.00
Coach smoking	−1.24 (0.84)	0.29	0.06	1.50
Nagelkerke R^2	0.12			
	Snus			
			95% CI for Exp (β)	
Included	B(SE)	Exp (β)	Lower	Upper
Constant	−0.38 (0.30)	0.69		
Mothers snus	0.16 (0.56)	1.17	0.39	3.49
Fathers snus	0.10 (0.22)	1.11	0.71	1.73
Other adults snus	0.67 (0.23)**	1.96	1.24	3.09
Peers snus	1.65 (0.18)***	5.19	3.62	7.45
Siblings snus	0.71 (0.32)*	2.04	1.10	3.78
Coach snus	0.21 (0.27)	1.24	0.73	2.10
Nagelkerke R^2	0.21			

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$. Nagelkerke R^2 = regression coefficient of determination.

Discussion

The main purpose of the present study was to examine the prevalence of tobacco habits in different types of sports, with the focus on female athletes. In addition, analyses tested whether daily tobacco use among important socialization agents was associated with the female athletes' tobacco habits.

The reasons for non-responses have not been analysed in depth. However, in line with Patriksson and Wagnsson (26), it was shown that some questionnaires posted to clubs were not forwarded to the athletes. Another reason for non-response may be that too many questionnaires were distributed to a club in relation to the actual number of female athletes, with unused questionnaires not always being returned.

The findings indicated that the majority of the female athletes had never used tobacco and that 2% were daily smokers or/and used snus on a daily basis. When these results are compared with Swedish national data from 2008 (27) for the age group 16–29 it was shown that in this group 12% of young Swedish women were daily smokers and 4% used snus. This makes it clear that female athletes use tobacco to a lesser extent than the general population. This is further strengthened by the findings from a Norwegian study (24) that showed that 2.8% of the female athletes studied were daily snus users and the corresponding figure for males was 7.6%. Cigarette smoking was less common among athletes than controls.

Reinforced by other findings (28–32), ours imply that socialization experiences in the sporting environment may have preventive effects on youth athletes' interest in using tobacco. However, one must be cautious in drawing conclusions in terms of causal relationships between sporting activities and tobacco use. Differences in tobacco use between people active and not active in sports may be a result of selection bias regarding the sporting activities, reflecting differences in aspects of tobacco habits established before beginning these sporting activities. Future research would benefit from using longitudinal designs to clarify these relationships.

In line with studies by Brettschneider (22), Mattila *et al.* (23) and Martinsen & Sundgot-Borgen (24), the present study showed that it is more common for people participating in team sports than individual sports to use tobacco. The proposed hypothesis that there is no difference regarding tobacco use in different types of sports was thus rejected. A possible explanation for these differences might be that team athletes can 'hide' their performance more easily, while an individual athlete has to rely to a greater extent on him or herself. Another explanation could be that athletes in team sports spend a lot of time together, creating a sense of community, which could cause the teammates who use tobacco influence non-users to start using tobacco. This would mean that the tobacco users have some type of pressure on non-users to create a team spirit (21). Moreover, most of the individual sports listed in this study demand a quite high cardiovascular standard to perform well, which may prevent these athletes from using tobacco. Because of the imbalance between the numbers of participants in different sports studied, it was not possible to make comparisons on an individual level.

When studying the relationship between tobacco habits of important socialization agents and tobacco habits of the female athletes, statistically significant associations were found between the athletes' smoking habits and those of their mothers, as well as of their peers, which is consistent with other studies involving adolescents (33–35). It is worth noting that no significant relationships were found between the tobacco habits of coaches and the tobacco habits of the athletes, indicating that coaches in general do not seem to influence female athletes' use of tobacco to any great extent. This assumption was strengthened by the fact that only four participants indicated that their coach influenced them in starting to use tobacco.

This descriptive cross-sectional study can only provide a snapshot of the lifestyle of athletes, which is a limitation in terms of a lack of information about the length of time the different individuals have used tobacco and the age at which they started their tobacco habits. Moreover, as elements of retrospective data have been used, reports related to the presumable influence of different socialization agents may have been subject to recall bias. The present study is also based on self-reported questionnaires covering issues that may not have been answered completely truthfully. Sensitive issues such as

the use of tobacco among adolescents can result in both under-reporting and over-reporting. An important element in obtaining truthful answers is the fact that the questionnaire was answered anonymously. In addition, it is generally agreed for instance that self-rated health reports are valid (36). The present questionnaire, used in an earlier publication (10) where it was also validated, remained unchanged compared with the original questions. This was done to facilitate the comparison with earlier data.

Despite the limitations concerning generalizing the results to a wider population, the results of the current study mainly contribute to this research area when results from our study are compared with results from other investigations and statistics from national databases.

In conclusion, the present study showed that a large proportion of the female athletes had never used tobacco. However, a significant portion of the participants had sometimes tried tobacco, especially members of team sports. The community provides, in different ways, information on the negative effects of tobacco use, for example at school, in the media and in information campaigns as well as from sports club/organization. As there is a risk to start using tobacco permanently when you have tried tobacco as a teenager, an important objective must therefore be to create health promotion programmes for targeted groups such as youth female athletes to encourage them to completely refrain from tobacco use in the future.

No statistically significant associations were found between the female athletes' tobacco habits and those of their coaches, indicating that coaches in general do not influence female athletes' use of tobacco. Consequently, targeting promotion programmes to encourage coaches to stop using tobacco seems pointless. Instead, it would be more appropriate to involve members of the female athlete's families in particular their mothers and their siblings, in health promotion programmes, to prevent the female athletes from future tobacco use.

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