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## Prevalence and factors associated with use of smokeless tobacco in young Swiss men

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**Background:** Smokeless tobacco is of increasing interest to public health researchers and policy makers. This study aims to measure prevalence of smokeless tobacco use (nasal dry snuff, *snus* and chewing tobacco) among young Swiss men, and to describe its correlates. **Methods:** We invited 13 245 young men to participate in this survey on socio-economic and substance use data. Response rate was 45.2%. We included 5720 participants. Descriptive statistics and multivariable-adjusted logistic regression were performed. **Results:** Mean age of participants was 19.5 years. Self-reported use once a month or more often was 8% for nasal dry snuff, 3% for *snus* and negligible for chewing tobacco. In multivariable-adjusted logistic regression, the odds for nasal dry snuff use increased in non daily smokers [odds ratio (OR) 2.41, 95% confidence interval (CI) 1.90–3.05], compared with non smokers, participants reporting risky weekly drinking volume (OR 3.93, 95% CI 1.86–8.32), compared with abstinent, and binge drinking once a month or more often (OR 7.41, 95% CI 4.11–13.38), compared with never binge drinking. Nasal dry snuff use was positively associated with higher BMI, average or above family income and German language, compared with French, and negatively associated with academic higher education, compared with non higher education, and occasional cannabis use, compared with no cannabis use. Correlates of *snus* were similar to those of nasal dry snuff. **Conclusion:** One in 12 young Swiss men use nasal dry snuff and 3% use *snus*. Consumption of smokeless tobacco is associated with a cluster of other risky behaviours, especially binge drinking.  
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### Introduction

Smokeless tobacco refers to a variety of products made of tobacco that are not consumed by combustion. Types of smokeless tobacco include oral wet snuff, such as *snus* used in Sweden and other Scandinavian countries, or, for example, chewing tobacco known as *dip* in the United States. Nasal dry snuff, historically the most prevalent form of smokeless tobacco in continental Europe and United Kingdom, is another form of smokeless tobacco.<sup>1</sup> Dry snuff is a flavoured tobacco powder that is inhaled through the nose. Only few studies examined the health impact of smokeless tobacco. One recent study suggested increased odds of newly diagnosed type 2 diabetes mellitus in middle-aged male heavy *snus* users in Sweden.<sup>2</sup> *Snus* use has also been associated with increased risk of preterm delivery and preeclampsia in Swedish women.<sup>3</sup> Bolinder *et al.*<sup>4</sup> found a higher risk for cardiovascular mortality in smokeless tobacco users compared with non users. A more recent meta-analysis of eight Swedish cohort studies found a modestly increased case fatality among *snus* users with acute myocardial infarction, compared with non *snus* users with acute myocardial infarction.<sup>5</sup> However, the findings of this study did not support any relationship between the use of *snus* and the development of acute myocardial infarction.<sup>5</sup> Although the association between smokeless tobacco and the risk of cancer, such as cancer of the mouth, seems to be inconsistent throughout the literature,<sup>6,7</sup> one study suggests that smokeless tobacco use is associated with an increased risk of pancreatic cancer.<sup>7</sup>

Smokeless tobacco has a high addictive potential and is an increasing concern to health care professionals, public health researchers and policy makers. Tobacco companies use new marketing strategies to promote smokeless tobacco as an

alternative to smoking because of smoke free regulations.<sup>8–10</sup> Prevalence of smokeless tobacco is known to be highest in young male populations. A survey of 5471 male US college students aged 18 to 24 years found a prevalence of 8.7% for current use and 13.9% for past year use.<sup>11</sup> In Sweden, 29% of the male population aged 16–29 used *snus* in 2012.<sup>12</sup> Chewing tobacco initiation has been associated with smoking- and alcohol-related problems in the United States,<sup>13</sup> and prevalence of binge drinking is elevated among young Swedish males who use *snus*.<sup>14</sup> Selling of *snus* is restricted in the European Union and in Switzerland but not in Sweden.<sup>15,16</sup> However, the importation of *snus* for personal use is allowed in Switzerland, and it can be ordered online, without effective age control. According to the Swiss customs, the quantity of oral tobacco imported from Sweden was multiplied by 56 between 2004 and 2011 from 282 to 27 410 metric tons.<sup>17</sup> This selling restriction does not touch other forms of smokeless tobacco. In Switzerland, prevalence of smokeless tobacco use between 2008 and 2010 was estimated to be 2.3% in the general population (both men and women aged 14 to 65 years old). Nasal dry snuff was used by 7.8% of men aged 14 to 19 years, but only 0.2% of them indicated using *snus* and 0.4% using chewing tobacco.<sup>18</sup> To our knowledge, the characteristics of nasal dry snuff users have not been studied previously, and it is not clear whether findings concerning other types of smokeless tobacco can be directly applied to nasal dry snuff.

The aims of this study were to describe the prevalence of nasal dry snuff use and other forms of smokeless tobacco among young men in Switzerland, and to assess its association with the use of other substances such as cigarettes, alcohol and cannabis, and with socio-economic factors.

## Methods

### Study design

All young men presenting to three out of six Swiss army recruitment centres in Lausanne, Windisch and Mels between 23 August 2010 and 15 November 2011 were invited to participate in a survey. In Switzerland, conscription is mandatory, and almost all men have to present to a recruitment centre after their 18th birthday, where their aptitude for military or civil service is assessed. To account for regional differences, two of the chosen recruitment centres were situated in the German-speaking part of Switzerland and one in the French-speaking part. The study protocol was approved by the Ethics Committee for Clinical Research of the Lausanne University Medical School (Protocol No. 15/07). A few days after written consent and enrolment at these recruitment centres, participants were invited by email to complete an anonymous online questionnaire containing questions about their socio-economic background, and their consumption of alcohol, tobacco, cannabis and other drugs (questionnaire available online: [www.c-surf.ch](http://www.c-surf.ch)). The questionnaire, in German or French, was used according to the language spoken by participants in each region and was available in paper form on request. To increase response rate, reminders were sent twice by email to participants who consented but failed to fill out the questionnaire, and encouraging telephone interviews were performed if email reminders failed. Participants who completed the questionnaire were rewarded with a voucher of a value of 30 Swiss Francs. Data were collected until January 2012.

### Participants

A total of 13 245 men were invited to participate in this study. Of these, 7563 accepted to participate and signed the informed consent form (consent rate: 57.1%), and 5987 filled out the questionnaire (response rate: 45.2%). To test for potential non-consent or non-response bias, a very short questionnaire on demographics, alcohol, cannabis and tobacco consumption was handed out to all of the 6384 invitees in Lausanne and 6180 in Windisch and filled out by 6099 (95.5%) and 5720 (92.5%) of them (overall 94.0% response rate), respectively. Compared with non responders and non consenters, a lower proportion of alcohol abstainers, heavy drinkers, daily smokers, and heavy cannabis users, and a higher proportion of non smokers and non cannabis users were found among responders.<sup>19</sup> We excluded 267 (4.5%) participants with incomplete data for the main variables of interest. Compared with included participants, these were slightly older (19.8 vs. 19.5 years,  $P=0.001$ ), had a lower proportion of below average self-estimated socio-economic status (38% vs. 44%,  $P=0.04$ ), a higher proportion of French speakers than German speakers (67% vs. 54%,  $P<0.001$ ), a higher proportion of low education level (72% vs. 57%,  $P=0.001$ ), but a similar proportion of smokeless tobacco users (27.8% vs. 26.7%,  $P=0.7$ ).

### Measurements

The questionnaire assessed self-reported smokeless tobacco use, cigarette smoking, alcohol and cannabis use over the past 12 months. Participants who used one or more of these substances were further questioned on the frequency and quantity of use. We measured the prevalence of participants having used nasal dry snuff, *snus* or chewing tobacco using three different definitions based on frequency of smokeless tobacco use: at least once during the past 12 months, more than once a month and daily use. Smokers were categorized into daily smokers, defined as at least one cigarette every day, and non daily smokers, at least one cigarette in the past 12 months, but not every day. Participants who indicated alcohol consumption answered an open-ended question on the number of units of alcohol they drink in average per occasion, i.e. during a

normal day on which they consumed alcohol, as well as questions on the number of drinking days per week and the frequency of binge drinking, defined as drinking six or more units of alcohol on an occasion. Pictures of drinks containing one unit of alcohol (10 g of pure ethanol) were shown indicating the volume of each container, e.g. 100 ml of wine or 250 ml of beer. To obtain the weekly drinking volume, we multiplied the number of drinks per drinking day by the number of drinking days. We categorized alcohol use into a high risk group, 21 or more units of alcohol per week, and a moderate to low risk group, less than 21 units per week, using a compromise between the 14 drinks limit for brief interventions recommended by the National Institute on Alcohol Abuse and Alcoholism,<sup>20</sup> and the 28 drinks definition for harmful use of the World Health Organization.<sup>21</sup> We categorized participants according to the frequency of binge drinking into three categories—frequent binge drinkers (once a month or more often), occasional binge drinkers (less than once a month) and never binge drinkers. We categorized cannabis use as frequent if consumed twice a week or more and occasional if consumed less than twice a week. These definitions have been used in a previous report.<sup>22</sup> Body mass index (BMI) was calculated based on reported weight and height. No direct measurements were made. Participants were categorized as underweight (BMI  $<18.5$  kg/m<sup>2</sup>), normal weight (BMI 18.5–24.9 kg/m<sup>2</sup>), overweight (BMI 25–29.9 kg/m<sup>2</sup>) and obese (BMI  $\geq 30$  kg/m<sup>2</sup>), according to the definition by the World Health Organization.<sup>23</sup> As an indicator of socio-economic status, participants were asked whether they estimated the income of their family above average, on average or below average, according to the 2011 questionnaire of the European School Survey on Alcohol and Other Drugs.<sup>24</sup> In addition, participants were questioned on their current education level and were categorized, according to the International Standard Classification of Education (ISCED),<sup>25</sup> into a higher education track, defined as participant in training for or in possession of a diploma that gives access to academic—i.e. a universities or federal institutes of technology, corresponding to ISCED level 5B and C—or professional higher education—i.e. universities of applied science and professional colleges, corresponding to ISCED level 4 and 5A—and a non higher education track. Based on our literature review, we selected socio-economic variables and other factors known to be associated to smokeless tobacco use for our analysis.

### Data analysis

We built two multivariable-adjusted logistic regression models, one using nasal dry snuff use once a month or more often and the other one using *snus* use once a month or more often as dependent variables, and variables suspected to be associated with smokeless tobacco use based on previous knowledge as independent variables. The test for linear trend in the BMI categories was calculated by modelling the BMI ordinal category as a continuous variable. We considered  $P<0.05$  as statistically significant for all statistical analyses and used STATA software (version 12.1, Stata Corp., College Station, Texas).

## Results

### Sample characteristics

Characteristics of participants are shown in Table 1. Mean age of participants was 19.5 years [standard deviation (SD) 1.26] ranging from 17 to 31; 55% were French speaking, 45% German speaking, 44% estimated their family income below average and 43% were in a higher education track. There were 21% of daily smokers and 26% of non daily smokers; 6% drank  $>21$  units of alcohol on average per week; 46% drank  $\geq 6$  units of alcohol on at least one occasion per

**Table 1** Characteristics of participants (N=5720)

Age		
mean, SD	19.5	1.26
<b>BMI</b>		
<18.5 kg/m <sup>2</sup> (n, %)	186	3%
18.5–24.99 kg/m <sup>2</sup> (n, %)	4351	76%
25–29.99 kg/m <sup>2</sup> (n, %)	959	17%
≥30 kg/m <sup>2</sup> (n, %)	224	4%
<b>Language</b>		
German (n, %)	2591	45%
French (n, %)	3129	55%
<b>Family income</b>		
Below average (n, %)	2536	44%
Average or above (n, %)	3184	56%
<b>Education</b>		
Non higher education track (n, %)	3275	57%
Academic higher education track (n, %)	1558	27%
Professional higher education track (n, %)	887	16%
<b>Cigarette smoking</b>		
Non smoker (n, %)	3028	53%
Non daily smoker (n, %)	1491	26%
Daily smoker (n, %)	1201	21%
<b>Number of cigarettes per day (n = 2692)</b>		
Mean, SD	8.2	7.43
<b>Average weekly alcohol volume</b>		
None (n, %)	713	13%
<21 units of alcohol (n, %)	4650	81%
≥21 units of alcohol (n, %)	357	6%
<b>Frequency of binge drinking<sup>a</sup></b>		
Never (n, %)	1188	21%
Less than once a month (n, %)	1887	33%
Once a month or more often (n, %)	2645	46%
<b>Cannabis use</b>		
No (n, %)	3969	69%
Less than twice a week (n, %)	1207	21%
Twice a week or more (n, %)	544	10%

a: Defined as drinking six or more units of alcohol on an occasion.

**Table 2** Smokeless tobacco use (N=5720)

Smokeless tobacco use, at least once in the past 12 months		
None (n, %)	4191	73%
Yes, any (n, %)	1529	27%
-Dry snuff (n, %)	1347	24%
- <i>Snus</i> (n, %)	527	9%
-Chewing tobacco (n, %)	26	0.5%
Smokeless tobacco use, more than once a month during the past 12 months		
None (n, %)	5216	90%
Yes, any (n, %)	594	10%
-Dry snuff (n, %)	482	8%
- <i>Snus</i> (n, %)	182	3%
-Chewing tobacco (n, %)	9	0.2%
Smokeless tobacco use, daily		
None (n, %)	5636	98.5%
Yes, any (n, %)	84	1.5%
-Dry snuff (n, %)	29	0.5%
- <i>Snus</i> (n, %)	58	1%
-Chewing tobacco (n, %)	1	0.02%

month; 10% used cannabis twice a week or more; and 21% used cannabis less than twice a week.

### Prevalence of smokeless tobacco use

Table 2 shows the prevalence of smokeless tobacco use. Self-reported use of nasal dry snuff at least once in the past 12 months was 24%, whereas consumption of *snus* at least once in the past 12 months was

**Table 3** Factors associated with smokeless tobacco use in multivariable-adjusted logistical regression (N=5720)<sup>a</sup>

Variable	Nasal dry snuff <sup>b</sup> (n = 482) OR (95% CI)	Swedish type oral <i>snus</i> <sup>b</sup> (n = 182) OR (95% CI)
Age (per 1 more year)	0.79 (0.71–0.81)	0.88 (0.76–1.02)
<b>BMI</b>		
<18.5 kg/m <sup>2</sup>	0.99 (0.52–1.87)	(omitted)
18.5–24.9 kg/m <sup>2</sup> (reference)	1	1
25–29.9 kg/m <sup>2</sup>	1.37 (1.07–1.75)	1.28 (0.88–1.86)
>30 kg/m <sup>2</sup>	1.56 (0.99–2.47)	1.40 (0.94–12.39)
<b>Language</b>		
French (reference)	1	1
German	2.01 (1.62–2.49)	1.72 (1.24–2.39)
<b>Family income</b>		
Below average (reference)	1	1
Average or above	1.38 (1.12–1.69)	0.90 (0.66–1.23)
<b>Education</b>		
Non higher education track (reference)	1	1
Professional higher education track	0.84 (0.63–1.13)	0.84 (0.53–1.31)
Academic higher education track	0.60 (0.46–0.77)	0.58 (0.39–0.87)
<b>Cigarette smoking</b>		
Non smoker (reference)	1	1
Non daily smoker	2.41 (1.90–3.05)	1.82 (1.26–2.62)
Daily smoker	1.20 (0.89–1.61)	1.04 (0.66–1.63)
<b>Weekly alcohol volume</b>		
None (reference)	1	1
<21 units	2.12 (1.06–4.23)	0.80 (0.36–1.76)
≥21 units	3.93 (1.86–8.32)	1.36 (0.56–3.33)
<b>Binge drinking<sup>c</sup></b>		
Never (reference)	1	1
Less than once a month	3.03 (1.66–5.54)	2.42 (1.02–5.77)
Once a month or more often	7.41 (4.11–13.38)	6.76 (2.91–15.75)
<b>Cannabis use</b>		
No use (reference)	1	1
Less than twice a week	0.92 (0.73–1.17)	1.02 (0.71–1.47)
Twice a week or more	0.38 (0.25–0.58)	0.75 (0.43–1.31)

a: Adjusted for age, BMI, language, income, education track, cigarette smoking, weekly alcohol volume, frequency and cannabis use.

b: Once a month or more often in the past 12 months.

c: Defined as drinking six or more units of alcohol on an occasion.

reported by only 9% of participants. Eight percent of participants reported using nasal dry snuff once a month or more often during the past 12 months, and 3% used *snus* once a month or more often. Only 0.5% and 1% of participants reported daily use of nasal dry snuff and *snus*, respectively. Use of chewing tobacco was negligible.

### Multivariable-adjusted logistic regressions

The results of the multivariable-adjusted logistic regressions are shown in table 3. Non daily cigarette smokers had two times increased odds of nasal dry snuff use compared with non smokers [odds ratio (OR) 2.41, 95% confidence interval (CI) 1.90–3.05], but no association was found with daily smoking. Participants drinking 1–20 units of alcohol per week had two times increased odds (OR 2.12, 95% CI 1.06–4.23), and participants drinking >20 units of alcohol per week had almost four times increased odds of nasal dry snuff use (OR 3.93, 95% CI 1.86–8.32) compared with those who did not drink alcohol. The odds of nasal dry snuff use in participants reporting binge drinking less than once a month were three times higher (OR 3.03, 95% CI 1.66–5.54), and seven times higher in those with binge drinking once a month or more often (OR 7.41,

95% CI 4.11–13.38), compared with those never binge drinking. Cannabis use twice a week or more was negatively associated with smokeless tobacco use (OR 0.38, 95% CI 0.25–0.58), whereas no association was found with cannabis use less than twice a week. The odds of nasal dry snuff use once a month or more often decreased by 21% with each increase in one year of age (OR 0.79, 95% CI 0.71–0.81 per one more year of age). Compared with participants with normal weight, overweight participants had 37% increased odds for nasal dry snuff use (OR 1.37, 95% CI 1.07–1.75). The point estimate increased throughout the BMI categories, and there was a significant trend ( $P=0.002$ ), suggesting that the odds for nasal dry snuff use increased linearly with BMI, although results were not significant for obese and underweight participants. Nasal dry snuff use was also associated to German language (OR 2.01, 1.62–2.49) and average or above self estimated family income (OR 1.38, 95% CI 1.12–1.69). Participants in the academic tertiary education track had 40% decreased odds for nasal dry snuff use (OR 0.60, 95% CI 0.46–0.77).

The multivariable-adjusted logistic regression using *snus* use once a month or more often as dependent variable showed similar results (table 3). However, the associations with BMI, family income, education and cannabis use were not significant, probably because of loss of power due to a lower prevalence of *snus* use. Nevertheless,  $P$  for trend throughout the BMI categories was significant ( $P=0.02$ ).

## Discussion

We found a high prevalence of nasal dry snuff use among young Swiss men. One in four (24%) used nasal dry snuff at least once in the past 12 months and one-third of them (8%) used nasal dry snuff more than once a month. In comparison, 9% used *snus* at least once in the past 12 months, one-third (3%) of them more than once a month. Daily use of any form of smokeless tobacco was rare, and the use of chewing tobacco negligible. In a telephone survey performed in the Swiss population in 2010, the prevalence of nasal dry snuff use was estimated at 7.8% among young men aged 14 to 19 years old, but only 0.2% of them indicated using *snus* and 0.4% using chewing tobacco.<sup>18</sup> We found similar prevalence rates for nasal dry snuff and chewing tobacco, but higher prevalence of *snus* in our survey. This might be due to the slightly older age distribution in our sample. Also, participants might have been more reluctant to report *snus* use in a telephone survey. A non negligible proportion of young Swiss men use *snus* despite of the restrictions. This may be due to new marketing strategies of the tobacco industry.<sup>8</sup> Also, sports such as ice hockey might be a vector of *snus* use, as previously hypothesized.<sup>26</sup>

About one in two participants reported smoking, and one in five (21%) daily smoking. This rate of daily smoking is comparable with that found in the Swiss Survey of Tobacco Consumption (23%).<sup>18</sup> However, we found a much higher rate of non daily smoking compared with this survey (26% vs. 13%), probably because we chose a less restrictive definition—at least one cigarette in the past 12 months. Almost half of the participants reported at least monthly binge drinking (46%). Gmel *et al.* (2010)<sup>22</sup> found a comparable prevalence of binge drinking (58%) in a similar population of 3537 young men enrolled at the Swiss army recruitment centre (mean age 19.9 years; SD 0.025).

We found a strong association between dry snuff use and binge drinking. The association was especially strong in young men reporting binge drinking on at least one occasion per month who had more than seven times higher odds of use of nasal dry snuff compared with young men who did not report binge drinking in the past 12 months, after adjustment with potential confounders. Nasal dry snuff use was also associated with non daily smoking, and weekly alcohol volume, but it was not associated with daily smoking and occasional cannabis use, and negatively associated with cannabis use. Age, BMI, average or above self-estimated family income, and lower

education level were other correlates of nasal dry snuff use. We found similar results for *snus* use.

The association with lower age is consistent with previous reports on Swedish *snus* and smokeless tobacco in the US.<sup>13,27</sup> Smokeless tobacco use has also been associated with at risk alcohol consumption and smoking. In a prospective cohort study among US military, Hermes *et al.*<sup>13</sup> found three to four times increased odds for smokeless tobacco use initiation among smokers, and 21% increased odds among participants with alcohol-related problems. In a survey on 43 093 individuals in the US in 2001–2002, Agrawal *et al.*<sup>28</sup> found 5.4 times increased odds for smokeless tobacco use among participant with alcohol abuse or dependence, and 10.8 times increased odds for concomitant smokeless tobacco use and smoking. The same study found an association of concomitant smokeless tobacco use and smoking, and lifetime cannabis use (OR 2.12, 95% CI 1.76–2.55), but not of smokeless tobacco use alone, after adjustment for age, sex, race, origin and alcohol and nicotine dependence. In contrast to our results, smokeless tobacco use was negatively associated with self-reported poverty, whereas concomitant smokeless tobacco use and smoking was negatively associated with college education. On the other hand, a cross-sectional survey in Sweden showed that the current use of *snus* was positively associated with mid-level and basic education, lower income and rural place of residence in men.<sup>27</sup> Hamari *et al.*<sup>29</sup> found lower rates of *snus* use among high school graduates, in a population of male military recruits (mean age 19.4 years). Among 16–20-year-old male Norwegians, however, no association between socio-educational status and *snus* use was found.<sup>30</sup> In our study, we found an association of dry snuff use with lower education level, and, surprisingly, higher family income. We might hypothesize that smokeless tobacco (despite its affordability) is more used among young people with higher socio-economic status because it is a rather newer form of tobacco. As for smoking, people of higher SES adopt this new compartment first. The differences in the results of these three studies might also be explained by the different age distribution [40, 50 and 60 years for the Swedish study<sup>27</sup>; mean age of 46.4 years (SD 18.2) for the US study<sup>28</sup>; and 19.5 years (SD 1.27) in the current survey] and different racial distribution, diverse in the US study<sup>28</sup>; not surveyed but presumably rather uniformly Caucasian in the Swedish study<sup>27</sup> and in the current survey. In addition, the variables education and income are not directly comparable, as both studies measured completed education and individual income, whereas we measured ongoing education and family income. With regards to the Finnish<sup>29</sup> and the Norwegian<sup>30</sup> study, although educational systems may not be directly comparable, the classification of education level as well as the study populations seem to be rather similar to ours. Both studies did not test for family income. The results of one previous study associating smokeless tobacco use with overweight and weight gain is consistent with our finding.<sup>31</sup> To our knowledge, no study has ever assessed regional differences of smokeless tobacco use in Switzerland.

Our study has some limitations. First, the cross-sectional design does not allow for drawing causal conclusions. Associations might be due to confounding with other variables which were not included in the analysis. Second, smokeless tobacco use and consumption of other psychoactive drugs such as cigarettes, cannabis and alcohol were self-reported and there was no validation. This might have conducted to underestimation of the real prevalence as participants tend to underreport their consumption.<sup>32</sup> Also, substance use might be underestimated by non-response bias. Therefore, the reported prevalence rates should be interpreted with caution. Third, our sample is restricted to men and our results are therefore not applicable to women. Furthermore, the study excludes Swiss residents with foreign nationality. The sample was drawn at three out of six recruitment centres only: one in the French-speaking part, draining all of the French-speaking cantons, but two out of four centres in the German-speaking part, draining 14 out of 19

German-speaking cantons, and none in the Italian-speaking part of the country. Therefore, the sample is not representative with regards to language, even though we feel comfortable to claim that the sample of each recruitment centre is representative of the young male population in the area that it drains. Family income, as a proxy of parents' socio-economic status, was estimated by the participants themselves and might not be comparable with measures of socio-economic status in other studies. Because participants were too young to have completed higher education, we considered individuals training for a diploma allowing later access to higher education. This proxy of higher education might not be comparable with variables of higher education in other studies, as persons in the non higher education track may still switch to a higher education track later on, and has to be interpreted with caution. We did not adjust our results for rural origin of the participants, which has been found to be associated to smokeless tobacco use in Sweden.<sup>27</sup>

In conclusion, nasal dry snuff is used once a month or more often by about one in 12 young Swiss men. About one in 11 young Swiss men have tried *snus*, a form of smokeless tobacco previously unknown in Switzerland and 3% use it on a monthly basis, despite of restrictions. Daily use of smokeless tobacco is rare. Use of nasal dry snuff is associated with risky alcohol consumption and non daily smoking. This association is strongest in young men with frequent binge drinking, pointing to a cluster of substance use risk behaviour in this population of young men. Nasal dry snuff has been largely neglected by researchers and policy makers, and its potential health hazards, including its role in inducing nicotine dependence, should be assessed in longitudinal studies. *Snus* is a form of smokeless tobacco newly present in Switzerland, and *snus* users seem to have a similar profile as nasal dry snuff users with regards to the use of cigarettes, alcohol and cannabis, and socio-economic factors.

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### Key points

- About one in 12 young Swiss men use nasal dry snuff, the traditional type of smokeless tobacco in this country.
- About 3% of young Swiss men use *snus*, a type of smokeless tobacco imported from Sweden.
- Nasal dry snuff and *snus* are associated with a cluster of risk behaviours, including binge drinking.

## References

- 1 Sapundzhiev N, Werner JA. Nasal snuff: historical review and health related aspects. *J Laryngol Otol* 2003;117:686–91.
- 2 Östenson CG, Hilding V, Grill V, Efendic S. High consumption of smokeless tobacco (“snus”) predicts increased risk of type 2 diabetes in a 10-year prospective study of middle aged Swedish men. *Scand J Public Health* 2012;40:730–7.
- 3 England LJ, Levine RJ, Mills JL, et al. Adverse pregnancy outcomes in snuff users. *Am J Obstet Gynecol* 2003;189:939–43.
- 4 Bolinder G, Alfredsson L, Englund A, de Faire U. Smokeless tobacco use and increased cardiovascular mortality among Swedish construction workers. *Am J Public Health* 1994;84:399–404.
- 5 Hansson J, Galanti MR, Hergens MP, et al. Use of *snus* and acute myocardial infarction: pooled analysis of eight prospective observational studies. *Eur J Epidemiol* 2012;27:771–9.
- 6 Roosaar A, Johansson ALV, Sandborgh-Englund G, et al. Cancer and mortality among users and nonusers of snus. *Int J Cancer* 2008;123:168–73.
- 7 Luo J, Ye W, Zendehele K, et al. Oral use of Swedish moist snuff (snus) and risk for cancer of the mouth, lung, and pancreas in male construction workers: a retrospective cohort study. *Lancet* 2007;369:2015–20.
- 8 Bromberg JE, Augustson EM, Backinger CL. Portrayal of smokeless tobacco in YouTube Videos. *Nicotine Tob Res* 2012;14:455–62.
- 9 Regan AK, Dube SR, Arrazola R. Smokeless and flavored tobacco products in the U.S.: 2009 styles survey results. *Am J Prev Med* 2012;42:29–36.
- 10 Underner M, Perriot J. Tabac non fumé [Smokeless tobacco]. *Rev Mal Respir* 2011;28:978–94.
- 11 Rigotti NA, Lee JE, Wechsler H. US college students' use of tobacco products: results of a national survey. *JAMA* 2000;284:699–705.
- 12 Swedish National Institute of Public Health. National Survey of Public Health. 2010. Available at: <http://www.fhi.se/en/Highlights/National-Survey-of-Public-Health/Living-habits/Tobacco-habits/> (20 March 2012, date last accessed).
- 13 Hermes E, Wells T, Smith B, Boyko E. Smokeless tobacco use related to military deployment, cigarettes and mental health symptoms in a large, prospective cohort study among US service members. *Addiction* 2012;107:983–94.
- 14 Wickholm S, Galanti MR, Söder B, Gilljam H. Cigarette smoking, snuff use and alcohol drinking: coexisting risk behaviours for oral health in young males. *Community Dent Oral Epidemiol* 2003;31:269–74.
- 15 Council Directive 92/41/EEC of 15 May 1992 amending Directive 89/622/EEC on the approximation of the laws, regulations and administrative provisions of the Member States concerning the labelling of tobacco products. Available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0041:EN:HTML> (9 January 2012, date last accessed).
- 16 The Federal Authorities of the Swiss Confederation. Classified Compilation of Federal Legislation. Available at: [http://www.admin.ch/ch/f/rs/c817\\_06.html](http://www.admin.ch/ch/f/rs/c817_06.html) (12 December 2011, date last accessed).
- 17 Swiss customs. Importation of snus from Sweden to Switzerland between 2004 and 2011. Available at: <https://www.swiss-impex.admin.ch> (1 July 2012, date last accessed).
- 18 Keller R, Radtke T, Krebs H, Hornung R. *Der Tabakkonsum der Schweizer Wohnbevölkerung in den Jahren 2001 bis 2010. Tabak Monitoring – Schweizerische Umfrage zum Tabakkonsum. [Tobacco consumption of the Swiss population between 2001 – 2010 - Tobacco Monitoring Switzerland - Swiss Survey of Tobacco Consumption]*. Zurich, Switzerland: Psychologisches Institut der Universität Zürich, 2011.
- 19 Studer J, Baggio S, Mohler-Kuo M, et al. Examining non-response bias in substance use research – Are late respondents proxies for non-respondents? *Drug Alcohol Depend* 2013, doi:10.1016/j.drugalcdep.2013.02.029 [Epub ahead of print, 24 March 2013].
- 20 US Department of Health and Human Services. *The Physicians' Guide to Helping Patients With Alcohol Problems*. Rockville, MD: US Department of Health and Human Services, Public Health Service, National Institute of Health (NIH), National Institute on Alcohol Abuse and Alcoholism (NIAAA), 1995.
- 21 *International Guide for Monitoring Alcohol Consumption and Related Harm*. Geneva, Switzerland: World Health Organization, Department of Mental Health and Substance Dependence, Noncommunicable Diseases and Mental Health Cluster, 2000.
- 22 Gmel G, Gaume J, Willi C, et al. Challenging the “inoffensiveness” of regular cannabis use by its associations with other current risky substance use—a census of 20-year-old Swiss men. *Int J Environ Res Public Health* 2010;7:46–59.
- 23 World Health Organization. Obesity and overweight. Fact sheet No 311. Available at: <http://www.who.int/mediacentre/factsheets/fs311/en/index.html> (20 March 2012, date last accessed).
- 24 Hibell B, Guttormsson U, Ahlström S, et al. *The 2011 ESPAD Report*. Stockholm, Sweden: The Swedish Council for Information on Alcohol and other Drugs (CAN), 2012.
- 25 United Nations Educational Scientific and Cultural Organisations Institute for Statistics (UIS). *International Standard Classification of Education: ISCED 1997*. Re-edition. Montreal, Canada: UIS, 2006.
- 26 Marclay F, Saugy M. Determination of nicotine and nicotine metabolites in urine by hydrophilic interaction chromatography-tandem mass spectrometry: Potential use of smokeless tobacco products by ice hockey players. *J Chromatogr A* 2010;1217:7528–38.

- 27 Norberg M, Malmberg G, Ng N, Broström G. Who is using snus? - Time trends, socioeconomic and geographic characteristics of snus users in the ageing Swedish population. *BMC Public Health* 2011;11:929.
- 28 Agrawal A, Lynskey MT. Tobacco and cannabis co-occurrence: does route of administration matter? *Drug Alcohol Depend* 2009;99:240–7.
- 29 Hamari AK, Toljamo TI, Kinnula VL, Nieminen PA. Dual use of cigarettes and Swedish snuff (snus) among young adults in Northern Finland. *Eur J Public Health* 2013;23:768–71.
- 30 Øverland S, Tjora T, Hetland J, Aaro LE. Associations between adolescent socioeducational status and use of snus and smoking. *Tob Control* 2010; 19:291–6.
- 31 Hansson J, Galanti MR, Magnusson C, Hergens MP. Weight gain and incident obesity among male snus users. *BMC Public Health* 2011;11:371.
- 32 Harrison L, Hughes A. Introduction—the validity of self-reported drug use: improving the accuracy of survey estimates. *NIDA Res Monogr* 1997;167: 1–16.

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## Adolescent perceptions of cigarette appearance

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**Background:** To reduce the possibility of cigarette appearance misleading consumers about harm caused by the product, the European Commission's draft Tobacco Products Directive proposed banning cigarettes <7.5 mm in diameter. It appears however, following a plenary vote in the European Parliament, that this will not be part of the final Tobacco Products Directive. To reduce the appeal of cigarettes, the Australian Government banned the use of branding on cigarettes and stipulated a maximum cigarette length as part of the Tobacco Plain Packaging Act. We explored the role, if any, of cigarette appearance on perceptions of appeal and harm among adolescents. **Methods:** Focus group research with 15-year-olds ( $N=48$ ) was conducted in Glasgow (Scotland) to explore young people's perceptions of eight cigarettes differing in length, diameter, colour and decorative design. **Results:** Slim and superslim cigarettes with white filter tips and decorative features were viewed most favourably and rated most attractive across gender and socio-economic groups. The slimmer diameters of these cigarettes communicated weaker tasting and less harmful looking cigarettes. This was closely linked to appeal as thinness implied a more pleasant and palatable smoke for young smokers. A long brown cigarette was viewed as particularly unattractive and communicated a stronger and more harmful product. **Conclusion:** This exploratory study provides some support that standardising cigarette appearance could reduce the appeal of cigarettes in adolescents and reduce the opportunity for stick design to mislead young smokers in terms of harm.

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## Introduction

The guidelines on Article 13 of the Framework Convention on Tobacco Control recommend that 'individual cigarettes or other tobacco products should carry no advertising or promotion, including design features that make products attractive'.<sup>1</sup> To reduce the appeal of cigarettes, the Australian Government stipulated partial product standardisation as part of the Tobacco Plain Packaging Act, which was fully implemented in December 2012. The use of branding (including colour, brand name and decorative elements) on cigarettes is now prohibited, a maximum length for cigarettes has been specified and cigarettes must be white or white with an imitation cork filter. The legislation does not, however, place any parameters on cigarette diameter.<sup>2</sup>

The European Commission proposed a different approach from Australia with the draft Tobacco Products Directive (TPD) announced in December 2012. The draft TPD did not propose a ban on branding on cigarettes but instead a ban on cigarettes less than 7.5 mm in diameter, on the basis that 'cigarettes with a diameter of less than 7.5 mm shall be deemed misleading'.<sup>3</sup> This recommendation would have prohibited the sale of very slim cigarettes, called 'superslims', in the European Union. However, no research to date has examined the impact of slimmer cigarettes

on product attributes such as the perceived attractiveness or level of harm among adolescents.

Tobacco companies increasingly offer brand variants that feature alternative cigarette diameters, decorative designs and lengths.<sup>4,5</sup> Analyses of tobacco industry documents show that modifications to the appearance of cigarettes can make them more appealing to specific target groups, notably 'starter' and female smokers and can help to boost sales and market share.<sup>6–8</sup> Exemplifying the potential for product design to influence growth, sales of slim cigarettes grew by 50% from 23 855 million sticks in 2000 to 35 673 million sticks in 2010 in Europe, despite a general decline in factory manufactured cigarette sales.<sup>9</sup> This is consistent with global trends where the superslims segment is reported to have grown 10 times faster than the overall market in the past 5 years.<sup>10</sup>

It has been suggested that younger people are often the target of novel product design<sup>11</sup> and most vulnerable to the impact of tobacco marketing as they are especially susceptible to tobacco brand imagery and particularly concerned with their identity.<sup>12,13</sup> Recently, the public health focus on cues which influence brand imagery and product beliefs has lain with cigarette packaging.<sup>14–17</sup> However, marketing literature suggests that cigarette characteristics, such as length, diameter, colour and decorative elements, are intrinsic product cues that are not only consumed along with the