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Brief Report

# Dutch youth's smoking behaviour during a partial Covid-19 lockdown

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## Abstract

Previous research found that adult smokers increased their smoking in response to the Covid-19 lockdown in spring 2020. This study explored changes in youth's smoking during, compared to before, the partial lockdown in the Netherlands in a cross-sectional sample of 287 adolescents. Smoking prevalence increased from 4.5% to 5.2%. Cigarette consumption remained the same on school days and increased with +1.9 cigarettes per weekend day. The largest increase in cigarette consumption on weekend days was observed for adolescents who 1) did not consider smoking a risk factor for contracting Covid-19 (+4.5), 2) had smoking siblings (+4.1), and 3) had smoking friends (+2.4). Youth without smoking friends (-0.8) and who considered smoking a risk factor for Covid-19 (-0.2) decreased their cigarette consumption.

## Introduction

During the Covid-19 pandemic, the Netherlands was in a partial lockdown from March 15 to June 2<sup>nd</sup> 2020. Restaurants, bars, sports clubs, and schools closed for almost three months. Supermarkets and other shops however remained open. The lockdown was called 'intelligent'; people were allowed to go outside for any reason as long as they would practice social distancing (defined as 1.5 m), but were urged to stay at home if possible. Adolescents were also encouraged to stay at home and avoid social events.<sup>1</sup> Many parents were home as well, as a result of working from home due to closure of non-essential workplaces during these months.

Throughout the lockdown, tobacco consumption in the Netherlands increased among 27% of smokers aged 16 and older.<sup>2</sup> Other studies also found increased cigarette consumption among adolescents in Poland (45%),<sup>3</sup> Italy (38%),<sup>4</sup> and the USA (30%).<sup>5</sup> Less is however known about the effects of the lockdown on adolescents' smoking behaviour.

Given the results on adult smoking behaviour, it is possible that tobacco use among Dutch youth during the lockdown also increased because of i) more boredom,<sup>6,7</sup> due to restrictions on leisure time activities; ii) increased stress levels,<sup>7,8</sup> for instance due to job loss in positions where adolescents work; or iii) increased exposure to parental and sibling smoking.<sup>9,10</sup> However, a decrease of youth's smoking behaviour could also be possible, because of i) intensified parental control;<sup>9,10</sup> ii) less peer contact;<sup>3</sup>

and iii) threat of smoking as a risk factor for Covid-19.<sup>11</sup>

This study is a first exploration of changes in youth's smoking behaviour during the lockdown compared with before. We explored i) to what extent the smoking prevalence rate changed; ii) whether cigarette consumption changed among adolescent smokers; and iii) whether this change in consumption varied according to the smoking status of parents, siblings, and friends, and perception of smoking as a risk factor of contracting Covid-19.

## Methods

### Data and study population

Seven secondary schools in three cities in the Netherlands (Amsterdam, Haarlem and Eindhoven) invited all 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> year students to complete a questionnaire in an app on their mobile phone. An estimated 6.49% (n=287) answered the survey. Respondents were 12 to 18 years old. Questionnaires were answered between May 3<sup>rd</sup> and July 7<sup>th</sup> 2020; 89 concluded the survey before reopening of the school on June 2<sup>nd</sup> and 198 after this date. In practice, reopening meant going back to school for approximately two days a week. Students were not allowed to stay at the school premises before or after school hours.

In the app, all questions were multiple choice and were mandatory. The questionnaire could only be filled in once. Respondents received a €10 gift card upon completion of the questionnaire. Informed consent was provided by all respondents and, if younger than 16 years old, also by one of their parents. The Medical Ethics Committee of the Academic Medical Center (AMC) confirmed that the Medical Research Involving Human Subjects Act does not apply to this study and that official approval was not required (ref. W19\_305#19.363), and the AMC's Data Protection Officer supervised the data collection and processing procedure in light of the EU General Data Protection Regulation.

### Measurements

In the questionnaire, respondents reported whether they ever tried a cigarette. If yes, follow-up questions were 'How many cigarettes did you smoke in [February/the past 30 days] on a [school day/weekend day]?' Both for February and the past 30 days, respondents were grouped into never-smokers, ever-smokers, and current smokers. For those who were current smokers in

### Significance for public health

*This study reports on a unique period in history of which we have little understanding. Especially in light of the tobacco end game and tobacco control policies, it is important to understand the effects of a lockdown on smoking behaviour of youth.*

February, we calculated the average number of cigarettes smoked per day for before and during the lockdown.

*Smoking status of mother, father, and siblings* were each reported by the respondent, distinguishing whether they smoked, had quit smoking, or had never smoked. For siblings we asked whether at least one of the respondent's siblings was a smoker. There was also an answer category 'not applicable'. In the analysis, the answer categories were dichotomised into smokers (do smoke) and non-smokers (have quit, have never smoked, and not applicable). The smoking status of mother and father were combined into a new variable with categories 'yes' and 'no' for respectively respondents with at least one smoking parent or no smoking parents.

*Smoking status of friends* was assessed with one question: 'How many of your best friends smoke?'. Answer categories were 'none', 'a few', 'half', 'most', or 'all'. These answer options were dichotomised into 'no' (none) and 'yes' (a few, half, most, or all).

*Risk perception of smoking for contracting Covid-19* was examined with the following statement, 'People who smoke have a higher risk of contracting Covid-19 than non-smokers'. Answer options were 'totally agree', 'agree', 'neutral', 'disagree', and 'totally disagree'. This variable was also dichotomised. The first two options were combined into 'yes', smoking is a risk factor for Covid-19, and the other responses combined to 'no', smoking is not a risk factor.

### Analysis

Given the small smokers sample size, inferential statistical analyses were not appropriate. Instead, this paper is explorative in nature and presents descriptive data of youth's smoking behaviour during and before lockdown. More specifically, we present the smoking status before and during lockdown and the average number of cigarettes smoked per day among respondents who were current smokers before the lockdown. All smoking variables were specified by school day and weekend day. We furthermore stratified results on cigarette consumption by smoking status of parents, siblings, and friends, and smoking as a risk factor for contracting Covid-19.

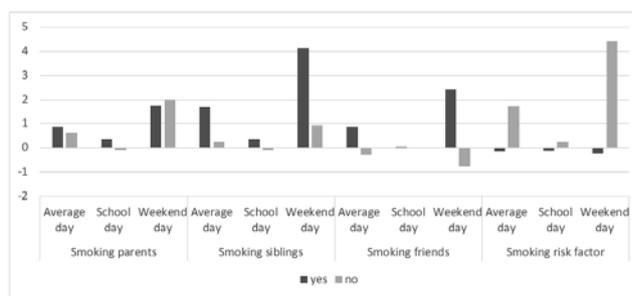
### Results

The sample characteristics are presented in Supplementary Table 1. The average age of the respondents was 15.03 (*SD* = 1.42). The sample included more girls (58.2%) than boys (41.8%). A majority of respondents reported to have non-smoking parents (86.4%) as well as non-smoking siblings (91.3%). Most of the respondents did not have smoking friends (59.9%). Smoking is considered to be a risk factor for contracting Covid-19 by 73.2%

of respondents.

Table 1 specifies respondents' smoking status. A majority of respondents had never smoked (85.7%). Thirteen respondents (4.5%) were current smokers before the lockdown and 15 (5.2%) were current smokers during lockdown. Four pre-lockdown smokers quit smoking during the lockdown. Six of the 28 adolescents who had ever smoked before lockdown became current smokers during lockdown. Among those who were current smokers before the lockdown, cigarette consumption during school days remained the same (4.0 cigarettes per day). Cigarette consumption on weekend days increased from 4.3 to 6.2 cigarettes per day (+1.9) (Supplementary Table 1).

Figure 1 shows these changes in numbers of cigarettes smoked stratified by smoking status of parents, siblings, and friends and the perception of smoking as a risk factor for Covid-19. On school days, adolescents with smoking parents (+0.3), siblings (+0.3), and friends (+0.1) increased their cigarette consumption, while smokers without smoking parents (-0.1) or siblings (-0.1) decreased their cigarette consumption. Smokers without smoking friends did not smoke on school days both before and during lockdown. On weekend days, smokers without smoking parents showed similar changes as those with smoking parents. Smokers with smoking siblings more strongly increased their cigarette consumption on weekend days (+4.1) than smokers without smoking siblings (+0.9). Smokers with smoking friends increased their cigarette consumption on weekend days (+2.4), while smokers without smoking friends decreased their cigarette consumption (-0.8). Smokers who did not consider smoking a risk factor for Covid-19 increased their cigarette consumption on weekend days (+4.5), while those who did consider it a risk factor decreased their cigarette consumption (-0.2).



**Figure 1. Average change in number of cigarettes per day during lockdown compared with before lockdown for current smokers before the lockdown (n=13).**

**Table 1. Cross-tabulation of smoking behaviour before (February 2020) and during lockdown (past 30 days, i.e., April, May or June 2020), in n (%).**

	During lockdown		Current	Total
	Never	Ever		
Before lockdown				
Never	246 (85.7)	-	-	246 (85.7)
Ever	-	22 (7.7)	6 (2.1)	28 (9.8)
Current	-	4 (1.4)	9 (3.1)	13 (4.5)
<b>Total</b>	<b>246 (85.7)</b>	<b>26 (9.1)</b>	<b>15 (5.2)</b>	<b>287 (100)</b>

Never, respondent never tried a cigarette; Ever, respondent has smoked, but not in the month in question (i.e., before or during lockdown); Current, respondent has smoked at least one cigarette in the month in question (i.e., before or during lockdown).

## Discussion

### Key findings

Thirteen respondents (4.5%) were current smokers before and 15 (5.2%) during lockdown. Among those who were current smokers before lockdown (n=13), cigarette consumption remained the same on school days and increased with +1.9 cigarettes per weekend day. The largest increase in cigarette consumption on weekend days was observed for adolescents who i) did not consider smoking a risk factor for contracting Covid-19; ii) had smoking siblings; and iii) had smoking friends.

### Limitations

The number of smokers in the sample is small and may not be representative of all adolescent smokers in the sampled cities, nor of all adolescents in the Netherlands. Due to the small sample, possibilities for stratification were limited. For example, we could not stratify by the smoking status of parents, siblings and friends simultaneously. Moreover, we had no longitudinal data on trends in smoking prevalence among adolescents during the lockdown. The retrospective survey questions that we used instead may be prone to recall bias. Results therefore require careful interpretation.

### Interpretation of the findings

In line with previous research on adults' smoking behaviour during the Covid-19 induced lockdown, our findings suggest that more adolescents started smoking than quit smoking, and that smoking adolescents increased their smoking behaviour. Possible explanations for the increase of smoking could be stress relief,<sup>7,8</sup> or boredom relief.<sup>6,7</sup> For adolescents, the amount of spare time increased, due to the closure of schools and job loss for adolescents working in closed down industries (e.g., hospitality sector), while leisure activities were limited due to the prohibition of social gatherings and the closure of sports clubs, hospitality venues, and the cultural sector (e.g., cinemas). We observed that cigarette consumption during weekends only increased among smokers with smoking friends. By the elimination of leisure activities, close friendships might have gained importance, as adolescents probably did not meet all their classmates or other acquaintances during lockdown. The influence of close friends on youth's smoking behaviour may therefore have increased during the lockdown. Such influences could also explain the larger increase in tobacco use on weekend days compared to school days. In a similar pattern, relations with siblings could have gained importance which may have increased the influence of siblings on smoking behaviour.

We expected the number of cigarettes smoked during school days to increase in particular among adolescents with smoking parents, e.g. due to an increase of tobacco use among their parents during the lockdown<sup>12,13</sup> and the opportunities that smoking parents provide at home to smoke and/or to get cigarettes. However, changes over time in smoking did not substantially differ according to parental smoking status, suggesting a greater influence of siblings and peers.

During the first months of lockdown, youth were considered a low-risk group for Covid-19.<sup>14,15</sup> Despite such messages, several adolescent smokers did perceive smoking a risk of Covid-19. We found a small decrease in cigarette consumption among these adolescents. In line with the theory of reasoned action,<sup>16</sup> which postulates that behaviour is shaped by expected results, one might reason that the perceived risk of Covid-19 contraction may have motivated these adolescents to cut down.

## Conclusions

In this small sample, we found that cigarette consumption among Dutch smoking youth increased on weekend days during the lockdown, especially among smokers with smoking siblings and friends, and smokers who did not consider smoking a risk factor for contracting Covid-19. Adolescents with and without smoking parents increased their cigarette consumption to a similar extent, while absence of smoking friends reduced tobacco use.

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**Contributions:** TRDvD, MAGK, BvdP and AEK designed the methodology for this paper; TRDvD performed the statistical analyses; TRDvD drafted the manuscript; TRDvD, MAGK, BvdP and AEK contributed to the interpretation of the findings and the writing of the final manuscript. All authors contributed to and have approved the final manuscript.

**Conflict of interest:** All authors declare that they have no conflict of interest.

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