



# Prevalence and Determinants of Non-daily Smoking Among Iranian University Students: A Web-based Survey

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## Abstract

**Background and aims:** Usually non-daily smokers do not consider themselves smokers, and they are at a higher level of health risks due to smoking compared to non-smokers. This study aimed to identify the prevalence of non-daily smoking (NDS) and its associated factors among university students.

**Methods:** This cross-sectional web-based study was performed in Tabriz, Iran. A proportional random sample of 3666 students from all universities of Tabriz were recruited from July to August, 2019, and an online questionnaire was used to collect data. Predictors of NDS were investigated using a multiple logistic regression model.

**Results:** A total of 15.7% and 7.8% of the students were daily and NDSs, respectively. Compared to the non-smokers, the NDSs were more likely to exhibit high-risk behaviors such as substance abuse (odd ratio [OR]=2.96; 95% CI: 2.12-4.13), alcohol drinking (OR=2.54; 95% CI: 1.78-3.62), hookah smoking experience (OR=9.30; 95% CI: 6.06-14.25), and regular hookah use (OR=24.22; 95% CI: 14.86-39.46). Compared to daily smokers, NDSs were more likely to be female gender (OR=0.16; 95% CI: 0.10-0.24), denial of being a smoker (OR=11.69; 95% CI: 6.86-19.91), not addicted to nicotine (OR=10.02; 95% CI: 4.21-23.85), and less likely to have an intention for quitting in recent months (OR=2.27; 95% CI: 1.28-4.04).

**Conclusion:** Non-daily smokers do not consider themselves smokers and have no intention to quit smoking. They are more prone to present high-risk health behaviors. Health policymakers should pay more attention to NDSs while planning smoking cessation programs.

**Keywords:** Health risk behaviors, Smoking, Smoking water pipes, Substance-related disorders, Smoking cessation

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## Introduction

No clear definition is proposed for non-daily smoking (NDS).<sup>1</sup> Non-daily smokers are typically called social, occasional, intermittent, and recreational smokers.<sup>2</sup> NDS is often considered to be either a transition to daily smoking (DS) or a step towards a gradual reduction in DS.<sup>3</sup> Non-daily smokers are usually younger and more educated and have a higher income than daily smokers.<sup>4</sup> Studies have shown that non-daily smokers often consider themselves as a non-smoker<sup>5,6</sup>; a belief that might be negatively associated with a person's recent/future attempts to quit smoking.<sup>7</sup> A significant number of non-daily smokers become daily smokers over time. Results

of a study conducted in the United States indicated that 18.4% of non-daily smokers became daily smokers after 12 months.<sup>8</sup>

Although non-daily smokers have lower levels of health risk perception of their smoking habits,<sup>9</sup> it is reported that NDS may increase the risk of morbidity and mortality associated with several diseases, including cardiovascular diseases, various types of cancer, respiratory diseases, and reproductive health problems.<sup>10</sup> Results of a study conducted among the United States adult population showed that non-daily smokers have 72% higher levels of mortality risk for the diseases such as cancers and cardiovascular and respiratory diseases.<sup>11</sup> Compared

to non-smokers, non-daily smokers were twice more likely to develop pulmonary diseases,<sup>12</sup> be more prone to depression and suicide attempts,<sup>13</sup> and have higher levels of anxiety.<sup>14</sup>

Although the prevalence rate of DS has recently declined in many countries,<sup>15</sup> previous studies have demonstrated an increasing trend in the number of non-daily smokers.<sup>16,17</sup> The results of a study in Mexico indicated that the prevalence of DS decreased by about 50% from 2002 to 2016, while the prevalence of NDS increased by 35% from 2009 to 2016.<sup>18</sup> In Iran as a developing country, few studies have examined the prevalence of NDS. A study among a sample of the Iranian (15-75 years old) population showed the prevalence of NDS to be 1.7%, with 2.9% and 0.8% prevalence among men and women, respectively.<sup>19</sup>

Research on the smoking behaviors of students is particularly important because this behavior among students could indicate smoking among young people in society. Any change in smoking behaviors of students can significantly contribute to the increasing and/or decreasing prevalence rate of smoking within society.<sup>20</sup> The majority of the students who smoke cigarettes do not smoke on a daily basis.<sup>21</sup> NDS is common among students and accounts for more than two-thirds of smoking modes among students.<sup>22</sup> Previous studies on American students have displayed that the prevalence rates of DS and NDS were 7%-13% and 16.6%-22%, respectively.<sup>23-25</sup> Another study among Irish students reported the prevalence rates of DS and NDS to be 7% and 12%, respectively.<sup>26</sup> All these findings indicate the high prevalence rate of NDS compared to daily consumption among students.

The prevalence rate of NDS among Iranian students is unknown as no study was found with reports on NDS among this population. However, there are studies that display 4%-5% of occasional smoking among Iranian students.<sup>27,28</sup> Accordingly, the present study aimed to investigate the prevalence rate and determinants of NDS among university students in Tabriz, Iran.

## Materials and Methods

### Study Design and Participants

This cross-sectional web-based study was conducted on the students of nine universities in Tabriz, Iran, from July to August 2019. All students of these universities who consented to participate in the study were eligible to be included. Stratified-random sampling was employed to recruit the subjects, proportional to the size of students in each university. Subsequently, 3775 students completed the online questionnaire, and 109 of them were excluded due to delivering incomplete or unanswered questionnaires. Hence, the statistical analysis was performed for 3666 students.

### Measure

A questionnaire was designed based on a literature review and using the experts' opinions. To ensure content validity, the questionnaire with a response form was sent

to three groups of knowledgeable persons (five smoking researchers, six research methodology and instrumentation experts, and five knowledgeable students) to comment quantitatively on the questionnaire's relevance and transparency. To assess reliability, the questionnaire was completed by 30 students as a pilot test. The Spearman correlation coefficient in two consecutive measurements of the questionnaire variables exceeded 80%.

The final questionnaire included the following four categories:

1. *Demographic characteristics*: This included age, gender, level of education, marital status, and field of education.
2. *High-risk health behaviors*: Alcohol drinking during the past month (Yes/No), hookah smoking (never smoked hookah/ only tried or experienced hookah/ regular hookah smoker/ smoked at least one time for a month), and a history of substance abuse, including opium, heroin, cannabis, methamphetamine, ecstasy, Ritalin, crystal, weed, and marijuana. The response format for all items was Yes/No.
3. *Smoking status*: Smoking status was assessed using the following single self-declared item<sup>29</sup>: "Which item may best describe your smoking status?" The items included (1) never smoked a cigarette, (2) not smoked regularly, (3) smoked regularly, but now I have quit it, (4) I smoke, but not on a daily basis, and (5) I smoke daily. The participants who chose items 1, 2, and 3 were classified as non-smokers, those who chose item 4 were considered as non-daily smokers, and those who chose item 5 were classified as daily smokers.
4. *Psychological factors*: Psychological factors were investigated by applying the following five items: (1) Do you consider yourself as a smoker? Response format: Yes/No.<sup>7</sup> (2) How soon do you smoke your first cigarette after you wake up? Answer choices: Within 30 minutes/after 30 minutes. This item was selected from the Fagerström test for nicotine dependence,<sup>30</sup> which was shown to be the strongest item in determining nicotine dependence.<sup>31</sup> (3) Do you think that it is difficult for you to quit smoking? Response format: Yes/No. (4) In the last 12 months, how many times you have stopped cigarette smoking (with the intention to quit) for a day or longer?<sup>32</sup> Answer choices: I have made attempts to quit smoking at least once in the last 12 months/I made no attempt. (5) Which of the following items may best describe your intention to quit smoking?<sup>33</sup> (a) I never intend to quit, (b) I will probably quit in the future, but not in the next six months, (c) I may quit in the next 6 months, and (d) I will quit smoking next month. The answer choices to this question were grouped into two categories while analyzing the data: I never intend to quit and I will quit in the coming months.

### Data Collection

Revising the items based on the students' feedback, we

designed the online questionnaire in Google Drive online platform. All participants were asked to complete the online questionnaire which was provided as a shortened Uniform Resource Locator (URL). To motivate the students to participate in the study, social media platforms (Telegram and Instagram) were used. For this purpose, we asked the admins of the identified channels and groups, where the students of Tabriz universities were joined as members, to share the link of the questionnaire in their channels and/or groups so that the students can easily complete the online questionnaire anonymously. Participation in the study was voluntary. The process of sampling was monitored to ensure that the students were recruited from all universities in proportion to the sample size.

### Data Analysis

In univariate analysis, chi-square and one-way analysis of

variance tests were used to assess the associations between qualitative and quantitative independent variables and smoking status, respectively.

To determine the determinants of NDS, two separate multiple logistic regression models were used, and non-smokers and daily smokers were considered as the reference group in the first and second models, respectively. To choose the best fitting model, all variables were entered into the univariate logistic regression model, then the significant variables at the level of 0.2 were entered into the multiple models, and eventually, the final model was developed using the backward stepwise method involving gender, the field of education, alcohol consumption in the past 30 days, lifetime substance abuse, and hookah use. All analyses were performed using SPSS-22 software.

### Results

The mean age of study participants was  $22.85 \pm 3.6$  years

**Table 1.** Smoking Status by Demographic and High-risk Behavior Variables

Characteristics	Non-smokers	Daily Smokers	Non-daily Smokers	P Value
	n (%)	n (%)	n (%)	
Age (mean $\pm$ SD)	22.90 $\pm$ 3.86	22.80 $\pm$ 2.85	22.28 $\pm$ 3.13	0.032
Gender				
Male	1284 (63.6)	536 (26.6)	198 (9.8)	<0.001
Female	1478 (92.4)	35 (2.2)	86 (5.4)	
Marital status				
Single	2461 (75.8)	523 (16.1)	262 (8.1)	0.003
Married	287 (83.7)	42 (12.2)	14 (4.1)	
Field of education				
Technical and engineering	675 (67.1)	239 (23.8)	92 (9.1)	
Medical of sciences	711 (85.9)	78 (9.4)	39 (4.7)	
Humanities	440 (76.7)	84 (14.7)	49 (8.6)	0.001
Agriculture	92 (84.4)	10 (9.2)	7 (6.4)	
Fundamental sciences	197 (80.7)	27 (11.1)	20 (8.2)	
Art	116 (61.1)	49 (25.8)	25 (13.2)	
Not responded	548 (80.1)	84 (12.3)	52 (7.6)	
Education level				
Associate	42 (62.7)	15 (22.4)	10 (14.9)	
Undergraduate	1888 (75.1)	421 (16.7)	206 (8.2)	0.002
Postgraduate	424 (81.1)	63 (12.0)	36 (6.9)	
Doctorate (Ph.D and MD)	404 (80.2)	70 (13.8)	30 (6.0)	
Alcohol consumption (in the past 30 days)				
No	2652 (82.9)	334 (10.4)	213 (6.7)	<0.001
Yes	108 (26.3)	234 (57.1)	68 (16.6)	
Hookah smoking				
Never	1644 (97.6)	16 (0.9)	26 (1.5)	<0.001
Experimenter	996 (65.6)	351 (23.1)	172 (11.3)	
Regular (at least once per month)	130 (31.1)	202 (48.3)	86 (20.6)	
Substance abuse				
No	2483 (83.8)	283 (9.5)	198 (6.7)	<0.001
Yes	131 (29.6)	247 (55.9)	64 (14.5)	

Note. SD: Standard deviation; Ph.D: Doctor of philosophy; MD: Doctor of medicine.

(Range: 18–37), 55.5% of them were male, and 10.0% were married. The prevalence rates of NDS and DS were 7.8% (95% confidence interval [CI]: 7.0- 8.7) and 15.7% (95% CI: 14.6-16.9), respectively.

The smoking status by demographic factors and high-risk behaviors are presented in Table 1. Significant associations were found in smoking status by all demographic characteristics and high-risk health behaviors ( $P < 0.05$ ).

The comparison of non-daily smokers with non-smokers and daily smokers by demographic and risky behavior variables is illustrated in Table 2. The results of logistic regression analysis showed that being a male increases the chance of NDS in comparison to non-smoking by 1.98 times and decreases the probability of NDS in comparison to DS by 84%. Further, medical students in comparison to technical and engineering students had a 39% lower chance of being non-daily smokers compared to non-smokers. In

**Table 2.** The Comparison of Non-daily Smokers With Non-smokers and Daily Smokers by Demographic and Risky Behavior Variables

Characteristics	Nondaily Smokers vs. Non-smokers <sup>a</sup>			Nondaily Smokers vs. Daily smokers <sup>b</sup>		
	OR	95% CI	P Value	OR	95% CI	P Value
<b>Gender</b>						
Male (vs. Female)	1.98	(1.48-2.66)	<0.001	0.16	(0.10-0.24)	<0.001
<b>Field of education</b>						
Technical and Engineering (referent)	-	-	-	-	-	-
Medical sciences	0.61	(0.41-0.90)	0.038	1.68	(1.08-2.60)	0.052
Humanities	0.90	(0.61-1.33)	0.669	0.99	(0.65-1.53)	0.984
Agriculture	1.13	(0.54-2.37)	0.787	1.28	(0.52-3.16)	0.648
Fundamental sciences	1.30	(0.79-2.14)	0.393	1.85	(1.02-3.38)	0.090
Art	1.69	(1.02-2.80)	0.085	1.55	(0.91-2.66)	0.176
Not responded	0.75	(0.51-1.13)	0.249	1.58	(1.01-2.49)	0.095
<b>Alcohol consumption (in the past 30 days)</b>						
Yes (vs. No)	2.54	(1.78-3.62)	<0.001	0.51	(0.36-0.71)	0.001
<b>Substance abuse</b>						
Yes (vs. No)	2.96	(2.12-4.13)	<0.001	0.42	(0.30-0.58)	<0.001
<b>Hookah smoking</b>						
Never (referent)	-	-	-	-	-	-
Experimenter	9.30	(6.06-14.25)	<0.001	0.54	(0.29-1.02)	0.109
Regular (at least once per month)	24.22	(14.86-39.46)	<0.001	0.73	(0.37-1.42)	0.436

Note: CI: Confidence interval; OR: Odds ratio.

<sup>a</sup> Reference group = non-smokers; <sup>b</sup> Reference group = Daily smokers.

**Table 3.** The Comparison of Daily and Non-daily Smokers by Psychological Factors

Characteristics	Daily Smokers n (%)	Non-daily Smokers n (%)	P-value	OR (95% CI)	P Value
<b>Considering oneself as a smoker</b>					
Yes	480 (88.6)	62 (11.4)	<0.001	1	
No	76 (26.6)	210 (73.4)		11.69 (6.86 - 19.91)	<0.001
<b>Quit attempts (past 12 months)</b>					
Yes	280 (72.9)	104 (27.1)	0.010		
No	269 (64.5)	148 (35.5)		0.68 (0.40 - 1.18)	0.170
<b>Intention to quit in future months</b>					
Yes	371 (74.5)	127 (25.5)	<0.001	1	
No	174 (61.1)	111 (38.9)		2.27 (1.28 - 4.04)	0.005
<b>Think that quit of smoking is difficult</b>					
Yes	257 (86.0)	42 (14.0)	<0.001	1	
No	297 (57.8)	217 (42.2)		1.16 (0.63 - 2.11)	0.637
<b>Smoke within 30 minutes of waking up</b>					
Yes	254 (96.6)	9 (3.4)	<0.001	1	
No	300 (56.3)	233 (43.7)		10.02 (4.21 - 23.85)	<0.001

Note. OR: Adjusted odds ratio; 95% CI = 95% Confidence interval for OR.

addition, medical students in comparison to technical and engineering students had a 68% higher chance of being non-daily smokers compared to being daily smokers. Moreover, the association between substance abuse and alcohol consumption with being a non-daily smoker in the past 30 days was statistically significant in comparison to non-smokers and daily smokers.

Table 3 presents a comparison between daily and non-daily smokers by psychological factors. Non-daily smokers were significantly less prone to consider themselves as a smoker, quit attempts during the last 12 months, have the intention to quit smoking, be nicotine dependence, and think that quit of smoking is not difficult in univariate analysis ( $P < 0.05$ ). After adjustment of estimates in the multiple models, we found that non-daily smokers were almost 11.5 times less likely to consider themselves a smoker and 2.27 times less likely to have the intention to quit smoking in the coming months (Table 3). Moreover, non-daily smokers were 10 times less likely to be addicted to nicotine (those who lit their first cigarette 30 minutes after waking up), as depicted in Table 3.

### Discussion

The results of the present study showed that among the smoking students, 15.7% and 7.8% were daily smokers and non-daily smokers, respectively. In a study conducted in North Carolina, the United States, about 20% of the students were non-daily smokers and only 9% smoked daily.<sup>23</sup> Another study in Minnesota found that 22% and 13% of the students were non-daily and daily smokers, respectively.<sup>24</sup> An Irish study also showed the prevalence rates of NDS and DS to be 12% and 7%, respectively.<sup>26</sup> These findings are in contrast to those found in the current study, which could be due to the use of different definitions for non-daily smokers. The above-mentioned studies have used “the number of days that an individual smoked in the last month” to define NDS. According to this definition, if a person does not smoke even for one day out of the past 30 days, he/she is defined as a non-daily smoker. However, based on the definition used in our study, a non-daily smoker was a person who smokes but not on a daily basis.<sup>29</sup> Another reason for the dissimilarities could be associated with the claim that NDS is more prevalent in developed countries due to having more preventive policies on DS.<sup>34</sup> A study conducted among the Iranian adult population indicated that DS and NDS prevalence rates were 8.3% and 1.7%, respectively.<sup>19</sup> These results were in line with those found in the present study. However, the differences in the prevalence rates of NDS between these two studies may be due to the difference in the mean age of study participants (23 years in the present study versus 32 years in the associated study). Furthermore, the prevalence rate of NDS among students and young individuals is reported to be higher than that among the general population.<sup>35</sup>

Moving further, male students in our study were more likely to be daily smokers, while female students were more likely to be non-daily smokers. Several studies, particularly

those conducted in developing countries, have suggested that being male increases the chance of performing many high-risk health behaviors, such as smoking.<sup>28,36</sup> The results of previous studies among university students in North Carolina,<sup>23</sup> Minnesota,<sup>24</sup> and Ireland<sup>26</sup> indicated no gender difference in the mode of smoking (being a non-smoker, daily smoker, and non-daily smoker). Such discrepancies between the results found in our study and those found in the previous studies may be due to cultural differences. Compared to women in developed countries, Iranian women have a lower level of social acceptance when smoking cigarettes and are faced with a higher level of smoking obscenity.<sup>37</sup>

Our results also indicated that medical students were less likely to be daily and/or non-daily smokers than those who studied in the field of engineering, which was consistent with the results reported in other studies.<sup>38</sup> Compared to the students in other fields, the students in medical and health sciences have higher levels of health literacy and may have a better understanding of the adverse effects of smoking, which may result in less possibility to smoke.<sup>39</sup> Similar to what was found in previous studies,<sup>28,36,40</sup> the students who had at least one smoker among their family members were more likely to smoke, particularly on a daily basis, and having a history of self-harm increased the students' chance to be a daily smoker.

In line with previous studies, our study showed that both daily and non-daily smokers have more probability to engage in high-risk behaviors such as alcohol use in the past 30 days, substance abuse, and regular hookah use compared to non-smokers. This can be justified based on problem behavior theory (PBT). According to PBT, problematic behaviors co-occur in individuals, and engaging in one high-risk behavior increases the likelihood of experiencing other high-risk behaviors.<sup>41</sup> In the present study, two high-risk behaviors, alcohol use in the past 30 days and substance abuse, were less common among non-daily smokers than among daily smokers. These findings confirm the theoretical basis of PBT and are similar to those reported in previous studies.<sup>23,24,32</sup>

We also found that the non-daily smokers, unlike daily smokers, did not regard themselves as smokers. Many studies conducted on students and the general population have confirmed this finding and suggested that non-daily smokers, despite acknowledging their smoking, consider themselves non-smokers.<sup>5,7</sup> Consistent with other studies, our results indicated that non-daily smokers, unlike daily smokers, have slight nicotine dependence, so they were very unlikely to smoke their first cigarette soon after waking up.<sup>42,43</sup> It was also found that the non-daily smokers, unlike daily smokers, did not intend to quit smoking in the coming months. A high proportion of daily smokers (73%) had attempted to quit smoking at least once during the past year; however, only 27% of non-daily smokers had such attempts. Evidence suggested that a majority of non-daily smokers underestimate the health risks of NDS<sup>9</sup> and do not regard themselves as smokers, so they

pay less attention to the advice of health professionals and do not feel the need for smoking cessation counseling.<sup>44</sup> Therefore, they may not have the intention to quit their occasional smoking.<sup>7,4,45</sup> On the other hand, there is a claim that non-daily smokers are more prone to quit smoking in the coming months compared with daily smokers.<sup>32</sup> There is a group of non-daily smokers called “converted nondaily smokers”. They used to be daily smokers and, then, became non-daily smokers. These individuals are more likely to decide to quit smoking in the coming months and attempt to quit.<sup>46</sup> Therefore, in the studies that used the definition of “the number of days people smoked in the last month”, there is a higher possibility for “converted non-daily smokers” in their sample. Among participants of the present study, the non-daily smokers were much less nicotine dependent than daily smokers. Given the close association between nicotine dependence and the decision to quit,<sup>32,47</sup> the non-daily smokers were less likely to quit smoking in the coming months due to less nicotine dependence.

### Limitations

The present study had some limitations. A major concern of web-based studies is the low response rate,<sup>48</sup> and our study may have such a limitation as well. However, as we did not know the number of students who received the questionnaire link, we were not able to calculate the response rate. Another possible limitation of the study is participation bias similar to other web-based surveys,<sup>49</sup> which may affect our results. In other words, only certain individuals who had access to the Internet, a social media account, and a desire to participate in the study may have answered the questionnaire. Moreover, the results of the present study are based on self-reported data, so the accuracy of the collected data depends on the honesty of the respondents. Another limitation is the cross-sectional nature of the study, so any cause-effect inferences from the results are warranted.

### Conclusion

Among Iranian university students who participated in our study, DS was more prevalent than NDS. However, the non-daily smokers, just similar to daily smokers, were involved in high-risk health behaviors such as hookah use, alcohol consumption, and substance abuse, which can pose a greater threat to their health. The non-daily smokers did not consider themselves smokers, were less nicotine dependent, and were less likely to decide to quit. These behavioral characteristics might put them at a greater risk of health damage and may even turn them into DS in the future. These characteristics should be considered as core categories while designing smoking cessation interventions among young non-daily smokers. Therefore, besides paying attention to daily smokers, health policymakers and health professionals should consider the educational needs of non-daily smokers while planning for smoking cessation programs among

young populations.

### Authors' Contribution

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### Competing Interests

The authors declare that they have no competing interests.

### Consent for Publication

Not applicable.

### Data Availability Statement

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

### Ethical Approval

The study protocol and designed questionnaire were approved by the Ethics Committee of Tabriz University of Medical Sciences with reference code IR.TBZMED.REC.1398.190, and the necessary permissions were obtained to conduct the study (Webpage of the Ethical Approval code is <http://ethics.research.ac.ir/IR.TBZMED.REC.1398.190>).

### References

- Husten CG. How should we define light or intermittent smoking? Does it matter? *Nicotine Tob Res.* 2009;11(2):111-21. doi: [10.1093/ntr/ntp010](https://doi.org/10.1093/ntr/ntp010).
- Schane RE, Glantz SA, Ling PM. Nondaily and social smoking: an increasingly prevalent pattern. *Arch Intern Med.* 2009;169(19):1742-4. doi: [10.1001/archinternmed.2009.315](https://doi.org/10.1001/archinternmed.2009.315).
- Shiffman S. Light and intermittent smokers: background and perspective. *Nicotine Tob Res.* 2009;11(2):122-5. doi: [10.1093/ntr/ntn020](https://doi.org/10.1093/ntr/ntn020).
- Ayo-Yusuf OA, Szymanski B. Epidemiological profile of non-daily smokers in South Africa: implications for practice. *S Afr Fam Pract.* 2009;51(3):244-8. doi: [10.1080/20786204.2009.10873855](https://doi.org/10.1080/20786204.2009.10873855).
- Leas EC, Zablocki RW, Edland SD, Al-Delaimy WK. Smokers who report smoking but do not consider themselves smokers: a phenomenon in need of further attention. *Tob Control.* 2015;24(4):400-3. doi: [10.1136/tobaccocontrol-2013-051400](https://doi.org/10.1136/tobaccocontrol-2013-051400).
- Lee JK, Boyle RG, D'Silva J, St Claire AW, Whittet MN, Kinney AM. Smoker identity among occasional smokers: findings from Minnesota. *Am J Health Behav.* 2013;37(4):525-30. doi: [10.5993/ajhb.37.4.10](https://doi.org/10.5993/ajhb.37.4.10).
- Berg CJ, Lust KA, Sanem JR, Kirch MA, Rudie M, Ehlinger E, et al. Smoker self-identification versus recent smoking among

- college students. *Am J Prev Med.* 2009;36(4):333-6. doi: [10.1016/j.amepre.2008.11.010](https://doi.org/10.1016/j.amepre.2008.11.010).
8. Wang Y, Sung HY, Yao T, Lightwood J, Max W. Factors associated with short-term transitions of non-daily smokers: socio-demographic characteristics and other tobacco product use. *Addiction.* 2017;112(5):864-72. doi: [10.1111/add.13700](https://doi.org/10.1111/add.13700).
  9. Savoy E, Reitzel LR, Scheuermann TS, Agarwal M, Mathur C, Choi WS, et al. Risk perception and intention to quit among a tri-ethnic sample of nondaily, light daily, and moderate/heavy daily smokers. *Addict Behav.* 2014;39(10):1398-403. doi: [10.1016/j.addbeh.2014.05.002](https://doi.org/10.1016/j.addbeh.2014.05.002).
  10. Schane RE, Ling PM, Glantz SA. Health effects of light and intermittentsmoking:areview.*Circulation.*2010;121(13):1518-22. doi: [10.1161/circulationaha.109.904235](https://doi.org/10.1161/circulationaha.109.904235).
  11. Inoue-Choi M, McNeel TS, Hartge P, Caporaso NE, Graubard BI, Freedman ND. Non-daily cigarette smokers: mortality risks in the US. *Am J Prev Med.* 2019;56(1):27-37. doi: [10.1016/j.amepre.2018.06.025](https://doi.org/10.1016/j.amepre.2018.06.025).
  12. Formagini TDB, Gomide HP, Perales J, Colugnati FAB. Prevalence and correlates of light and non-daily smoking in Brazil: results from a nationwide representative survey. *Drug Alcohol Depend.* 2017;178:15-9. doi: [10.1016/j.drugalcdep.2017.04.018](https://doi.org/10.1016/j.drugalcdep.2017.04.018).
  13. Lee J, Kim TH, Min S, Kim MH, Park KC, Moon JS, et al. Depressive symptoms and suicidal behaviours in adolescent non-daily smokers compared to daily smokers and never-smokers in Korea: national cross-sectional study. *PLoS One.* 2018;13(11):e0207182. doi: [10.1371/journal.pone.0207182](https://doi.org/10.1371/journal.pone.0207182).
  14. Weinberger AH, Gbedemah M, Wall MM, Hasin DS, Zvolensky MJ, Chaiton M, et al. Depression among non-daily smokers compared to daily smokers and never-smokers in the United States: an emerging problem. *Nicotine Tob Res.* 2017;19(9):1062-72. doi: [10.1093/ntr/ntx009](https://doi.org/10.1093/ntr/ntx009).
  15. GBD 2015 Tobacco Collaborators. Smoking prevalence and attributable disease burden in 195 countries and territories, 1990-2015: a systematic analysis from the Global Burden of Disease Study 2015. *Lancet.* 2017;389(10082):1885-906. doi: [10.1016/s0140-6736\(17\)30819-x](https://doi.org/10.1016/s0140-6736(17)30819-x).
  16. Kwan Y, Kim HS, Kang DR, Kim ATH. Trend in the prevalence of non-daily smoking and their relationship with mental health using the Korea Health and Nutrition Examination Survey. *Int J Environ Res Public Health.* 2020;17(10):3396. doi: [10.3390/ijerph17103396](https://doi.org/10.3390/ijerph17103396).
  17. Jamal A, King BA, Neff LJ, Whitmill J, Babb SD, Graffunder CM. Current cigarette smoking among adults - United States, 2005-2015. *MMWR Morb Mortal Wkly Rep.* 2016;65(44):1205-11. doi: [10.15585/mmwr.mm6544a2](https://doi.org/10.15585/mmwr.mm6544a2).
  18. Zavala-Arciniega L, Reynales-Shigematsu LM, Levy DT, Lau YK, Meza R, Gutiérrez-Torres DS, et al. Smoking trends in Mexico, 2002-2016: before and after the ratification of the WHO's Framework Convention on Tobacco Control. *Tob Control.* 2020;29(6):687-91. doi: [10.1136/tobaccocontrol-2019-055153](https://doi.org/10.1136/tobaccocontrol-2019-055153).
  19. Salimzadeh H, Najafipour H, Mirzaiepour F, Navadeh S, Shadkam-Farrokh M, Mirzazadeh A. Prevalence of active and passive smoking among adult population: findings of a population-based survey in Kerman (KERCADRS), Iran. *Addict Health.* 2016;8(1):16-24.
  20. Aziz K, Sharghi A. Norms of behavior factors affecting smoking in students. *Journal of Faculty of Nursing and Midwifery.* 2009;11:1-7.
  21. Berg CJ, Lessard L, Parelkar PP, Thrasher J, Kegler MC, Escoffery C, et al. College student reactions to smoking bans in public, on campus and at home. *Health Educ Res.* 2011;26(1):106-18. doi: [10.1093/her/cyq076](https://doi.org/10.1093/her/cyq076).
  22. Halperin AC, Smith SS, Heiligenstein E, Brown D, Fleming MF. Cigarette smoking and associated health risks among students at five universities. *Nicotine Tob Res.* 2010;12(2):96-104. doi: [10.1093/ntr/ntp182](https://doi.org/10.1093/ntr/ntp182).
  23. Sutfin EL, McCoy TP, Berg CJ, Champion H, Helme DW, O'Brien MC, et al. Tobacco use by college students: a comparison of daily and nondaily smokers. *Am J Health Behav.* 2012;36(2):218-29. doi: [10.5993/ajhb.36.2.7](https://doi.org/10.5993/ajhb.36.2.7).
  24. Berg CJ, Ling PM, Hayes RB, Berg E, Nollen N, Nehl E, et al. Smoking frequency among current college student smokers: distinguishing characteristics and factors related to readiness to quit smoking. *Health Educ Res.* 2012;27(1):141-50. doi: [10.1093/her/cyr106](https://doi.org/10.1093/her/cyr106).
  25. Ames S, Stevens S, Schroeder D, Werch C, Carlson J, Kirov G-E, et al. Nondaily tobacco use among Black and White college undergraduates: a comparison of nondaily versus daily tobacco users. *Addict Res Theory.* 2009;17(2):191-204. doi: [10.1080/16066350802318366](https://doi.org/10.1080/16066350802318366).
  26. McKee G, Barry J, Mullin M, Allwright S, Hayes C. Predictors of daily and occasional smoking and quitting in Irish university students. *Health.* 2017;9(3):435-50. doi: [10.4236/health.2017.93031](https://doi.org/10.4236/health.2017.93031).
  27. Taheri E, Ghorbani A, Salehi M, Sadeghnia HR. Cigarette smoking behavior and the related factors among the students of Mashhad University of Medical Sciences in Iran. *Iran Red Crescent Med J.* 2015;17(1):e16769. doi: [10.5812/ircmj.16769](https://doi.org/10.5812/ircmj.16769).
  28. Kabir K, Mohammadpoorasl A, Esmaeelpour R, Aghazamani F, Rostami F. Tobacco use and substance abuse in students of Karaj Universities. *Int J Prev Med.* 2016;7:105. doi: [10.4103/2008-7802.190091](https://doi.org/10.4103/2008-7802.190091).
  29. Kvaavik E, von Soest T, Pedersen W. Nondaily smoking: a population-based, longitudinal study of stability and predictors. *BMC Public Health.* 2014;14:123. doi: [10.1186/1471-2458-14-123](https://doi.org/10.1186/1471-2458-14-123).
  30. Heatherton TF, Kozlowski LT, Frecker RC, Fagerström KO. The Fagerström test for nicotine dependence: a revision of the Fagerström Tolerance Questionnaire. *Br J Addict.* 1991;86(9):1119-27. doi: [10.1111/j.1360-0443.1991.tb01879.x](https://doi.org/10.1111/j.1360-0443.1991.tb01879.x).
  31. Heatherton TF, Kozlowski LT, Frecker RC, Rickert W, Robinson J. Measuring the heaviness of smoking: using self-reported time to the first cigarette of the day and number of cigarettes smoked per day. *Br J Addict.* 1989;84(7):791-9. doi: [10.1111/j.1360-0443.1989.tb03059.x](https://doi.org/10.1111/j.1360-0443.1989.tb03059.x).
  32. Pinsker EA, Berg CJ, Nehl EJ, Prokhorov AV, Buchanan TS, Ahluwalia JS. Intent to quit among daily and non-daily college student smokers. *Health Educ Res.* 2013;28(2):313-25. doi: [10.1093/her/cys116](https://doi.org/10.1093/her/cys116).
  33. Prochaska JO, DiClemente CC. Self change processes, self efficacy and decisional balance across five stages of smoking cessation. *Prog Clin Biol Res.* 1984;156:131-40.
  34. Pierce JP, White MM, Messer K. Changing age-specific patterns of cigarette consumption in the United States, 1992-2002: association with smoke-free homes and state-level tobacco control activity. *Nicotine Tob Res.* 2009;11(2):171-7. doi: [10.1093/ntr/ntp014](https://doi.org/10.1093/ntr/ntp014).
  35. Brown AE, Carpenter MJ, Sutfin EL. Occasional smoking in college: who, what, when and why? *Addict Behav.* 2011;36(12):1199-204. doi: [10.1016/j.addbeh.2011.07.024](https://doi.org/10.1016/j.addbeh.2011.07.024).
  36. Alotaibi SA, Durgampudi PK. Factors associated with tobacco smoking among Saudi college students: a systematic review. *Tob Prev Cessat.* 2020;6:36. doi: [10.18332/tpc/122444](https://doi.org/10.18332/tpc/122444).
  37. Mohammadpoorasl A, Bahari A, Marin S, Hajizadeh M. Obscenity of cigarette and hookah smoking in Iranian

- adolescents: a longitudinal school-based study. *Int J Prev Med.* 2019;10:47. doi: [10.4103/ijpvm.IJPVM\\_342\\_17](https://doi.org/10.4103/ijpvm.IJPVM_342_17).
38. Chatterjee T, Haldar D, Mallik S, Sarkar GN, Das S, Lahiri SK. A study on habits of tobacco use among medical and non-medical students of Kolkata. *Lung India.* 2011;28(1):5-10. doi: [10.4103/0970-2113.76293](https://doi.org/10.4103/0970-2113.76293).
  39. Evans AY, Anthony E, Gabriel G. Comprehensive health literacy among undergraduates: a Ghanaian university-based cross-sectional study. *Health Lit Res Pract.* 2019;3(4):e227-e37. doi: [10.3928/24748307-20190903-01](https://doi.org/10.3928/24748307-20190903-01).
  40. Wu J, Liu H. Features of nonsuicidal self-injury and relationships with coping methods among college students. *Iran J Public Health.* 2019;48(2):270-7.
  41. Jessor R, Donovan JE, Costa FM. *Beyond Adolescence: Problem Behaviour and Young Adult Development.* Cambridge: Cambridge University Press; 1994.
  42. Berg CJ, Schauer GL, Buchanan TS, Sterling K, DeSisto C, Pinsky EA, et al. Perceptions of addiction, attempts to quit, and successful quitting in nondaily and daily smokers. *Psychol Addict Behav.* 2013;27(4):1059-67. doi: [10.1037/a0033790](https://doi.org/10.1037/a0033790).
  43. Shiffman S, Ferguson SG, Dunbar MS, Scholl SM. Tobacco dependence among intermittent smokers. *Nicotine Tob Res.* 2012;14(11):1372-81. doi: [10.1093/ntr/nts097](https://doi.org/10.1093/ntr/nts097).
  44. Tong EK, Ong MK, Vittinghoff E, Pérez-Stable EJ. Nondaily smokers should be asked and advised to quit. *Am J Prev Med.* 2006;30(1):23-30. doi: [10.1016/j.amepre.2005.08.048](https://doi.org/10.1016/j.amepre.2005.08.048).
  45. Butler KM, Ickes MJ, Rayens MK, Wiggins AT, Ashford K, Hahn EJ. Intention to quit smoking and polytobacco use among college student smokers. *Prev Med Rep.* 2018;10:72-5. doi: [10.1016/j.pmedr.2018.02.006](https://doi.org/10.1016/j.pmedr.2018.02.006).
  46. Schauer GL, Malarcher AM, Berg CJ. Differences in smoking and cessation characteristics among adult nondaily smokers in the United States: findings from the 2009-2010 National Adult Tobacco Survey. *Nicotine Tob Res.* 2014;16(1):58-68. doi: [10.1093/ntr/ntt113](https://doi.org/10.1093/ntr/ntt113).
  47. Fagan P, Augustson E, Backinger CL, O'Connell ME, Vollinger RE, Jr., Kaufman A, et al. Quit attempts and intention to quit cigarette smoking among young adults in the United States. *Am J Public Health.* 2007;97(8):1412-20. doi: [10.2105/ajph.2006.103697](https://doi.org/10.2105/ajph.2006.103697).
  48. Ebert JF, Huibers L, Christensen B, Christensen MB. Paper- or web-based questionnaire invitations as a method for data collection: cross-sectional comparative study of differences in response rate, completeness of data, and financial cost. *J Med Internet Res.* 2018;20(1):e24. doi: [10.2196/jmir.8353](https://doi.org/10.2196/jmir.8353).
  49. van Gelder MM, Bretveld RW, Roeleveld N. Web-based questionnaires: the future in epidemiology? *Am J Epidemiol.* 2010;172(11):1292-8. doi: [10.1093/aje/kwq291](https://doi.org/10.1093/aje/kwq291).