EMPIRICAL RESEARCH - QUANTITATIVE

Transitions in smoking status in nursing students: A prospective longitudinal study

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Abstract

Aim: To describe transitions in smoking status and their determining factors among nursing students between baseline (2015–2016) and follow-up (2018–2019).

Design: Observational prospective longitudinal study of 4381 nursing students in Catalonia (Spain).

Methods: We examined transitions in smoking status from: (i) current smokers to recent quitters, (ii) never smokers to new smokers and (iii) former smokers to quitters who relapsed. We fitted logistic regression models to assess the predictors of quitting smoking.

Results: The proportion of current smokers decreased from 29.7% at baseline to 23.6% at follow-up, with a cumulative incidence rate of quitting of 28.3% during follow-up. Nondaily smokers were more likely to quit than daily smokers. Of those who

were never smokers at baseline, 4.6% were smokers at follow-up, and 23.2% of former smokers at baseline had relapsed at follow-up.

Conclusions: Nondaily smokers were more likely to have quit smoking at follow-up among this cohort of nursing students. The early implementation of a comprehensive tobacco control program that includes tobacco-free campus policies, tobacco prevention interventions and cessation support during college years may decrease tobacco use among nursing students.

Impact: Nursing students' tobacco use is concerning, as they are the future workforce of nurses who have a key role in tobacco product use prevention and cessation. During college years, nursing students have a greater likelihood of experimenting with several smoking status changes as well as to consolidate smoking behaviors. This is the first longitudinal study to highlight the factors associated with quitting smoking among a cohort of Spanish nursing students. Being a nondaily smoker at baseline predicted quitting at follow-up. Our findings support the early implementation of a comprehensive tobacco control program that includes tobacco-free campus policies, tobacco prevention interventions and tobacco cessation support during college years to decrease tobacco product use prevalence among nursing students.

Reporting Method: We have adhered to STROBE guidelines. No Patient or Public Contribution. This observational study has not been registered.

KEYWORDS

longitudinal studies, nursing students, smoking, smoking cessation, tobacco use, young adult

1 | BACKGROUND

Young college students (18–24 years-old) are susceptible to being exposed to high-risk behaviors, such as tobacco use, which can lead from experimentation to regular consumption, this time being a crucial period of consolidation of tobacco behaviors (Berg et al., 2020; Cooke et al., 2016; Sutfin et al., 2022). Furthermore, emerging tobacco and nicotine products have altered college students' tobacco behaviors, leading to an increased prevalence of alternative tobacco product and polytobacco use among this group (American College Health Association, 2022; Haardörfer et al., 2016).

According to recent data, nearly 33% of college students are current users of a tobacco or nicotine product, including cigarettes, cigar/cigarillo/little cigar, electronic nicotine systems (ENDS) such as electronic cigarettes (e-cigarettes), water pipes (also known as hookah or shisha), heated tobacco products (HTPs) and smokeless tobacco (American College Health Association, 2022). Tobacco initiation occurs frequently between the ages of 14 and 25 through combustible products such as manufactured (MF) and roll-your-own (RYO) cigarettes, which are still the most common gateway to tobacco addiction among young people (Reitsma et al., 2021). However, in recent years, increasing use of alternative tobacco products such as e-cigarettes and water pipes has been observed among college students (American College Health Association, 2022). Furthermore, concurrent use of multiple tobacco products (polytobacco use) is increasing, while single tobacco product use is decreasing (Haardörfer et al., 2016).

Several known factors influence tobacco use among college students, either by increasing the probability of initiating and maintaining consumption or by hindering tobacco cessation. In this regard, being male, older, having a peer and/or family smoker, being exposed to secondhand smoke (SHS) and having high scores of depression, anxiety and/or stress are all associated with a greater likelihood of being a tobacco user (Berg et al., 2020; Cooke et al., 2016; Creamer et al., 2018). Moreover, the use of alternative tobacco products predicts cigarette initiation, as well as the inverse associated exits (Creamer et al., 2018; Sutfin et al., 2022). Furthermore, high nicotine dependence, high perceived addiction and low self-efficacy to quit are significant barriers to stopping smoking (Pardavila-Belio et al., 2019).

The current evidence has widely demonstrated the prevalence and changes in tobacco use and its predictors among college students globally. Nevertheless, there is a scarcity of longitudinal studies that have focused on different college fields, such as health science degrees, even though they have a key role in tobacco control. This is especially true for nursing students, who in the future will be role models and will be expected to perform smoking prevention and cessation interventions. Although previous studies among Spanish nursing students have reported changes in tobacco use prevalence and smoking status (Ordás et al., 2015), the predictors of smoking status changes have not been addressed. Furthermore, cohort studies that encompass the use of different tobacco products, e-cigarettes and cannabis among this group are uncommon in Europe. Thus, we analyzed data from the "Study of Tobacco Consumption in Nursing Students of the Universities of Catalonia (ECTEC)," a cohort study initiated in the

academic year 2015–2016 (Martínez et al., 2019) to describe transitions in smoking status and their determining factors among nursing students between baseline (2015–2016) and follow-up (2018–2019).

2 | METHODS

2.1 | Design

We employed an observational prospective longitudinal study design to follow a cohort of nursing students from all nursing schools in Catalonia (Spain) between the academic years 2015–2016 and 2018–2019.

2.2 | Participants and recruitment

At baseline, we have instructed all nursing students from all nursing schools of Catalonia (Spain) to complete a paper-and-pencil questionnaire during class time at their nursing schools. All participants gave written informed consent to take part in the baseline study and, optionally, they provided their email account addresses and permission to be contacted in follow-up studies. Details of the cross-sectional baseline survey are available (Martínez et al., 2019).

Atfollow-up, we included all participants who answered the baseline questionnaire, provided informed consent to be followed up, and had valid contact information. In 2018, we invited the participants by email to fill in an online follow-up questionnaire. For this study, we included the participants that completed the baseline and follow-up questions regarding their smoking status.

2.3 | Instrument and outcome measures

At baseline, we used a self-administered questionnaire that explored: (i) the use of tobacco products, e-cigarettes and cannabis, (ii) knowledge, attitudes and formal training about tobacco control and (iii) compliance with tobacco-free policies. The baseline paper-and-pencil questionnaire was based on the Global Health Professional Survey (GHPS). At follow-up, we used an online survey based on the baseline questionnaire that was launched through the LimeSurvey platform. The follow-up questionnaire included 11 questions regarding sociodemographic characteristics and 19 about the use of tobacco products, e-cigarettes and cannabis (7 for all participants, 8 for those who were current smokers and 4 for former smokers). Prior to administration, the follow-up questionnaire was piloted, first with 20 collaborating researchers from different areas and then with 50 study participants (see details in Laroussy et al., 2022).

In the baseline and follow-up surveys, we asked about the participants' use of different tobacco products (MF and RYO cigarettes, cigars/cigarillos/little cigars and water pipes), e-cigarettes, HTPs and cannabis, through the question: Of the following statements, indicate which one best describes your behavior with respect to (name

of the product). A total of seven questions were formulated, one for each product. The possible answers were: *I currently smoke every day* (*at least once a day*), *I currently smoke nondaily* (*not every day*), *I don't smoke now, but I used to smoke every day* (*at least once a day*), *I don't smoke now, but I used to smoke nondaily* (*not every day*) and *I have never smoked*. Then, we classified participants into three categories according to the current Centers for Disease Control and Prevention and *Diagnostic and Statistical Manual of Mental Disorders Fifth Edition* definitions of smoking behaviors: (i) current smoker, a person who uses combustible tobacco products (MF and/or RYO cigarettes) at the moment of the survey or had quit less than 6 months ago; (ii) former smoker, a person who had smoked MF and/or RYO cigarettes and had remained abstinent for at least 6 months and (iii) never smoker, a person who has never smoked MF and/or RYO cigarettes. Among current smokers, we differentiate between a daily smoker (a person who smokes every day) and a nondaily smoker (a person who smokes regularly but not every day, whatever the quantity or the frequency).

Current smokers were asked about their age of initiation (classified into <17 or ≥17); the reason/s why they initiated smoking (*because my friends/classmates smoked*, *because one of my family members smoked*, *because my teachers smoked*, *to experiment with new experiences*, *because it is trendy*, *to feel older*, *to meet people or to flirt*, and other); the reason/s why they currently smoke (*for weight control*, *for reducing stress/relaxing*, *for socializing*, *because my friend/family smokes*, *because it is trendy*, *for pleasure*, *because I could not quit*, and other); the number of cigarettes smoked per day (CPD) or per week (classified into <10, 10–19, or ≥20); how long it takes to smoke their first cigarette from the moment they wake up (5 min or less, between 6 and 30 min, between 31 and 60 min or more than 60 min); if they have seriously tried to quit smoking in the last year (yes or no), the number of quit attempts of at least 24 h in the last year (1 or ≥2) and if they have the intention to quit or cut back their consumption in the following year (yes or no). We used the data of the number of CPD and time to first cigarette (TFC) to calculate the heaviness of smoking index (HSI) using the following scoring for CPD: <10 = 1 point (p), 10–19 = 2 p, or ≥20 = 3 p and TFC: 5 min or less = 3 p, between 6 and 30 min = 2 p, between 31 and 60 min = 1 p or more than 60 min = 0 p. We have summed the scores from both variables to obtain a score between 0 and 6; and considered an HSI from 0 to 2 as low nicotine dependence, 3–4 as medium and 5–6 as high (Chabrol et al., 2005).

Former smokers were asked about their age of initiation (classified into <17 or ≥17); their age of cessation (classified into <19 or ≥19); the reason/s why they quit smoking (*to protect my health*, *on the advice of a health professional*, *to set an example*, *under pressure from family or friends*, *to save money*, *because it is important for my role as a nurse*, or other reasons); and if they used any treatment during the quitting process (nicotine gum, lozenges, mouth spray or patches, prescription drugs [bupropion, varenicline or others], professional support [doctor, nurse, psychologist or others], acupuncture/homeopathy/hypnosis, others or they have not used any treatment).

The main dependent variable was transition in smoking status. Smoking transitions were defined according to the changes in tobacco use between baseline and follow-up: (i) participants who were

current smokers at baseline and transitioned to former smokers at follow-up were classified as *recent quitters*; (ii) participants who were never smokers at baseline and transitioned to current smokers at follow-up were classified as *new smokers*; (iii) participants who were former smokers at baseline and transitioned to current smokers at follow-up were classified as *quitters who relapsed*. Participants who had not changed their smoking status were defined as *continued as smokers*, *continued as never smokers* and *continued as former smokers*.

At baseline, we collected sociodemographic characteristics such as sex, age (classified into ≤19 years, 20–24 years or ≥25 years), year in nursing school (first, second, third or fourth year), place of birth (Catalonia or outside of Catalonia), location of nursing school (Barcelona or outside of Barcelona) and type of nursing school (public, private with public funding or private). At follow-up, we explored whether they had finished the nursing degree (yes or no); occupation at follow-up (nursing student, nurse or other); for those who were still in nursing school, their year in nursing school (second, third or fourth); for those who were working as nurses, we asked their work area (hospital, primary care or other) and the type of institution (public, private with public funding or private); if they were living with family or were independent, their monthly income (≤1500€, 1501€–3000€ or ≥3001€) and their marital status (single, married/cohabiting, divorced or widowed). In addition, we also used the characteristics related to the pattern of tobacco use among current and former smokers at baseline as independent variables.

2.4 | Validity, reliability and rigor of the instrument

The content validity of the instrument of measurement used in this study (questionnaire) was strengthened by different pilot tests conducted before the baseline study and before the follow-up study. All details about the procedure of data collection and the characteristics of the survey have been described earlier and are explained elsewhere (Laroussy et al., 2022).

To ensure reliability, a rigorous quality analysis of the data was conducted. In this step, we excluded invalid surveys as well as participants with incomplete information. The number of excluded invalid surveys is detailed in Section 3.

2.5 | Data analysis

For bivariate analysis, we used a Chi-square test for qualitative variables. In addition, to analyze the predictors of quitting, we performed logistic regression models to obtain both crude and adjusted odds ratios (aORs), and their 95% confidence interval (CI). The full-adjusted models only included the following independent variables: sex, baseline age and baseline smoking status. The variables smoking for reducing stress/relaxing, number of CPD, HSI and thinking about cutting back consumption were excluded from the model due to their association with the baseline smoking status (number of CPD and HSI) or their small sample size (smoking for reducing stress/relaxing and thinking about cutting back consumption). Predictors of initiating smoking or relapsing were not assessed due to the small sample sizes in both subgroups. Furthermore, we calculated the cumulative rates of quitting, starting and relapsing, stratified by occupation at follow-up, to compare the participants who were still nursing students with those who had graduated and were working as nurses at follow-up. Significance was set at $p < .05$. All statistical analyses were performed using IBM SPSS statistics version 25.

2.6 | Ethical considerations

The study protocol was approved by the Ethics Committee of the Hospital Universitari de Bellvitge (PR239/18). Written informed consent was obtained from all participants at both baseline and follow-up.

	Current smoker at follow-up	Former smoker at follow-up	Never smoker at follow-up
Current smoker at baseline	Continued as current smoker (n=198)	Recent quitter (n=78)	-
Former smoker at baseline	Quitter who relapsed (n=29)	Continued as former smoker (n=96)	-
Never smoker at baseline	New smoker (n=29)	New smoker and recent quitter* (n=58)	Continued as never smoker (n=597)

*These participants reported being never smokers at baseline and former smokers at follow-up. Thus, we concluded that they both started smoking and quit smoking between baseline and follow-up.

FIGURE 1 Smoking status transitions among the cohort of nursing students between baseline (2015–16) and follow-up (2018–19). *These participants reported being never smokers at baseline and former smokers at follow-up. Thus, we concluded that they both started smoking and quit smoking between baseline and follow-up.

TABLE 1 Tobacco use of the followed participants according to sociodemographic characteristics at baseline (2015–2016) and follow-up (2018–2019).

	Current smokers			Daily smokers			Nondaily smokers		
	All								
	n	%	95% CI	*n*	%	95% CI	*n*	%	95% CI
Overall	256	23.6	(21.1–26.2)	163	15.0	(13.0–17.2)	93	8.6	(7.0–10.3)
Characteristics at baseline									
Sex									
Male	30	26.1	(18.7–34.6)	17	14.8	(9.2–22.1)	13	11.3	(6.5–18.0)
Female	226	23.3	(20.7–26.0)	146	15.1	(12.9–17.4)	80	8.2	(6.6–10.1)
Age									
≤19 years	79	19.6	(15.9–23.6)	40	9.9	(7.3–13.1)	39	9.7	(7.1–12.8)
20–24 years	135	25.6	(22.0–29.5)	88	16.7	(13.7–20.1)	47	8.9	(6.7–11.6)
≥25 years	39	26.9	(20.2–34.5)	34	23.4	(17.1–30.8)	5	3.5	(1.3–7.4)
Year in nursing school									
First	90	23.4	(19.4–27.9)	55	14.3	(11.1–18.1)	35	9.1	(6.5–12.3)
Second	60	21.4	(16.9–26.5)	37	13.2	(9.6–17.6)	23	8.2	(5.4–11.9)
Third	57	27.2	(21.5–33.4)	39	18.6	(13.8–24.2)	18	8.6	(5.3–12.9)
Fourth	44	23.9	(18.2–30.5)	30	16.3	(11.5–22.1)	14	7.6	(4.4–12.1)
Place of birth									
Catalonia	218	25.3	(22.5–28.3)	142	16.5	(14.1–19.1)	76	8.8	(7.1–10.9)
Outside of Catalonia	33	16.5	(11.9–22.1)	19	9.5	(6.0–14.1)	14	7.0	(4.1–11.2)
Location of nursing school									
Barcelona	222	25.7	(22.9–28.7)	143	16.6	(14.2–19.1)	79	9.1	(7.4–11.2)
Outside of Barcelona	34	15.4	(11.1–20.6)	20	9.0	(5.8–13.4)	14	6.4	(3.7–10.1)
Type of nursing school									
Public	82	17.5	(14.3–21.1)	48	10.2	(7.7–13.2)	34	7.3	(5.2–9.9)
Private with public funding	66	32.6	(26.4–39.2)	47	23.2	(17.8–29.3)	19	9.4	(5.9–13.9)
Private	108	26.2	(22.1–30.5)	68	16.5	(13.1–20.3)	40	9.7	(7.1–12.8)
Characteristics at follow-up									
Has finished degree									
Yes	149	23.0	(19.9–26.4)	97	15.0	(12.4–17.9)	52	8.0	(6.1–10.3)
No	107	24.4	(20.6–28.6)	66	15.1	(12.0–18.6)	41	9.3	(6.9–12.4)
Occupation									
Nursing student	94	23.0	(19.2–27.3)	60	14.7	(11.5–18.4)	34	8.3	(5.9–11.3)
Nurse	149	23.0	(19.9–26.4)	97	15.0	(12.4–17.9)	52	8.0	(6.1–10.3)
Other	13	43.3	(26.9–61.0)	6	20.0	(8.8–36.7)	7	23.3	(11.1–40.4)
Year in nursing school (students)									
Second or third	22	21.8	(14.6–30.6)	12	11.9	(6.7–19.2)	10	9.9	(5.2–16.9)
Fourth	72	23.5	(19.0–28.4)	48	15.7	(11.9–20.0)	24	7.8	(5.2–11.2)
Work area (nurses)									
Hospital	111	24.2	(20.5–28.3)	77	16.8	(13.6–20.4)	34	7.4	(5.3–10.1)
Other	24	20.9	(14.2–29.0)	13	11.3	(6.5–18.0)	11	9.6	(5.2–15.9)
Type of institution they work in (nurses)									
Public	70	24.8	(20.1–30.1)	46	16.3	(12.4–21.0)	24	8.5	(5.7–12.2)
Other	65	22.3	(17.8–27.4)	44	15.1	(11.4–19.6)	21	7.2	(4.7–10.6)

| p-value[a] | Non smokers | | | | | | p-value[b] |
| | Never smokers | | | Former smokers | | | |
	n	%	95% CI	n	%	95% CI	
	619	57.0	(54.1–60.0)	210	19.4	(17.1–21.8)	
.396							.293
	58	50.4	(41.4–59.5)	27	23.5	(16.5–31.8)	
	561	57.8	(54.7–60.9)	183	18.9	(16.5–21.4)	
<.001							<.001
	260	64.3	(59.6–68.9)	65	16.1	(12.8–19.9)	
	298	56.5	(52.3–60.7)	94	17.9	(14.7–21.3)	
	57	39.3	(31.6–47.4)	49	33.8	(26.5–41.8)	
.733							.862
	220	57.3	(52.3–62.2)	74	19.3	(15.6–23.4)	
	165	58.9	(53.1–64.6)	55	19.7	(15.3–24.6)	
	116	55.2	(48.5–61.9)	37	17.6	(12.9–23.2)	
	102	55.4	(48.2–62.5)	38	20.7	(15.3–26.9)	
.399							.011
	487	56.6	(53.3–59.9)	155	18.1	(15.6–20.7)	
	118	59.0	(52.1–65.6)	49	24.5	(18.9–30.8)	
.528							.006
	479	55.4	(52.1–58.7)	163	18.9	(16.4–21.6)	
	140	63.3	(56.9–69.5)	47	21.3	(16.3–27.0)	
.275							<.001
	298	63.5	(59.1–67.8)	89	19.0	(15.6–22.7)	
	102	50.2	(43.4–57.1)	35	17.2	(12.5–22.9)	
	219	53.0	(48.2–57.8)	86	20.8	(17.1–24.9)	
.575							.853
	373	57.7	(53.8–61.4)	125	19.3	(16.4–22.5)	
	246	56.2	(51.5–60.8)	85	19.4	(15.9–23.3)	
.395							.078
	236	57.8	(53.0–62.6)	78	19.2	(15.5–23.1)	
	373	57.7	(53.8–61.4)	125	19.3	(16.4–22.5)	
	10	33.3	(18.6–51.1)	7	23.4	(11.1–40.4)	
.300							.925
	60	59.4	(49.7–68.6)	19	18.8	(12.1–27.3)	
	176	57.3	(51.7–62.8)	59	19.2	(15.1–23.9)	
.152							.501
	259	56.6	(52.0–61.0)	88	19.2	(15.8–23.0)	
	82	62.6	(53.5–71.1)	19	16.5	(10.6–24.1)	
.808							.645
	163	57.8	(52.0–63.5)	49	17.4	(13.3–22.1)	
	168	57.7	(52.0–63.3)	58	20.0	(15.7–24.8)	

TABLE 1 (Continued)

	Current smokers								
	All			Daily smokers			Nondaily smokers		
	n	%	95% CI	*n*	%	95% CI	*n*	%	95% CI
Living									
With family	148	21.4	(18.5–24.6)	83	12.0	(9.7–14.6)	65	9.4	(7.4–11.7)
Independent	92	27.7	(23.1–32.7)	70	21.1	(17.0–25.7)	22	6.6	(4.3–9.7)
Monthly income									
≤1500€	68	24.5	(19.7–29.8)	50	18.0	(13.8–22.8)	18	6.5	(4.0–9.8)
1501€–3000€	72	20.9	(16.8–25.4)	46	13.3	(10.1–17.2)	26	7.6	(5.1–10.7)
≥3001€	57	25.9	(20.5–32.0)	34	15.4	(11.1–20.7)	23	10.5	(6.9–15.0)
Does not know/Does not answer	59	24.4	(19.3–30.1)	33	13.7	(9.8–18.4)	26	10.7	(7.3–15.1)
Marital status									
Single	175	22.0	(19.2–25)	101	12.7	(10.5–15.1)	74	9.3	(7.4–11.5)
Other	63	28.1	(22.5–34.3)	50	22.3	(17.2–28.1)	13	5.8	(3.3–9.4)

Note: Significant values are highlighted in bold.

Abbreviation: CI, confidence interval.

[a]Chi-square test (daily vs. nondaily smokers).

[b]Chi-square test (current smokers vs. never smokers vs. former smokers).

3 | RESULTS

3.1 | Description of the sample

From the overall 4381 participants of the baseline study, we identified 3440 (78.5%) people who were eligible for follow-up (who agreed to participate in the follow-up and provided their email address). Of them, 1252 (28.6%) participated in the follow-up. For the current analysis, we excluded 103 participants who did not complete the key questions in the follow-up survey and 64 participants whose response could not be linked to their response for the baseline survey. Thus, we studied 1085 participants (24.8%) with complete information at baseline and follow-up.

Overall, 89.4% of the followed participants were female and 49.0% were aged 20–24. Comparing the three age groups, the proportion of women was higher among participants ≤19 years old, and the proportion of men was higher among those ≥25 years old (both *p* < .01). Regarding their occupation at follow-up, 408 were still nursing students and 647 had graduated. Among nursing students, we observed a higher proportion of females in the second or third year of school and a higher proportion of males in the fourth year (both *p* < .05) (Table S1).

3.2 | Changes in smoking status

Figure 1 presents the main smoking transitions that nursing students experienced during the follow-up period. The prevalence of current

smokers decreased significantly between baseline (29.7%, 95% CI 27.2–32.2) and follow-up (23.6%, 95% CI 21.1–26.2). Consequently, there was an increased prevalence of former smokers (from 13.1%, 95% CI 11.3–14.9, to 19.4%, 95% CI 17.1–21.8). Among smokers, the percentage of nondaily smokers was high at both baseline (38.0%) and follow-up (36.4%). The proportion of never smokers showed almost no change between baseline and follow-up (Table 1).

Current smoking (daily and nondaily together) and former smoking increased by age group at follow-up (*p* < .001) with no differences by year in nursing school. Current smoking at follow-up was more common among students who were born in Catalonia compared with those who born outside of Catalonia (25.3%, 16.5%, respectively, *p* < .05), those who were enrolled in universities in Barcelona compared with those from universities outside of Barcelona (25.7%, 15.4%, respectively, *p* < .05), in private nursing schools with public funding compared with those from public or private schools (32.6%, 17.5%, 26.2%, respectively, *p* < .001), those who were independent when compared with those living with their families (27.7%, 21.4%, *p* < .001) and those who had a marital status other than singles (28.1%, 22.0, *p* < .001). Former smoking at follow-up was more frequent among participants who were born outside of Catalonia than those who were born in Catalonia (24.5%, 18.1%, respectively *p* < .05), those who were independent, compared with those who were living with their family (24.7%, 17.2%, respectively, *p* < .001) and with another marital status, compared with those who were single (31.7%, 16.5%, respectively, *p* < .001).

Among current smokers, the proportion of nondaily smokers was higher among younger participants, whereas the proportion of daily smokers was higher among older ones (*p* < .001). Daily smoking was more common among independent students and among those

| | Non smokers | | | | | | |
| | Never smokers | | | Former smokers | | | |
p-value[a]	n	%	95% CI	n	%	95% CI	p-value[b]
.002							<.001
	425	61.4	(57.7–65.0)	119	17.2	(14.5–20.1)	
	158	47.6	(42.3–53.0)	82	24.7	(20.3–29.5)	
.188							.659
	157	56.4	(50.6–62.2)	53	19.1	(14.8–24.0)	
	198	57.4	(52.1–62.5)	75	21.7	(17.6–26.3)	
	121	55.0	(48.4–61.5)	42	19.1	(14.3–24.7)	
	143	59.1	(52.8–65.1)	40	16.5	(12.3–21.6)	
.002							<.001
	490	61.5	(58.1–64.9)	131	16.5	(14.0–19.2)	
	90	40.2	(33.9–46.7)	71	31.7	(25.9–38.0)	

with another marital status, compared with those who were living with their families and with those who were single (both $p < .002$). Nondaily smoking was more frequent among students who were living with their families and were single, compared with those who were independent and had another marital status (both $p < .002$).

In contrast to participants' tobacco use pattern at baseline, most male smokers at follow-up initiated smoking at ≥17 year-old, whereas most females initiated at <17 year-old ($p = .008$). Regarding the type of product, tobacco users mostly used combustible tobacco (MF cigarettes 66.4% and RYO cigarettes 47.0% at baseline, increasing to 79.7% and 57.1% at follow-up, respectively, Table 2). The proportion of RYO cigarette and water pipe users was higher among the youngest participants, whereas the proportion of MF cigarette users was higher among the oldest participants ($p < .05$). The use of alternative products increased: water pipes from 10.0% to 16.1%, e-cigarettes from 0.4% to 1.6% and cannabis from 11.5% to 15.0%. While the use of HTPs was negligible at baseline, it had increased at follow-up, and it was higher in men (6.7%) than in women (1.3%) ($p < .05$). At follow-up, the number of consumed CPD and nicotine dependence increased by age group at follow-up ($p ≤ .001$). A greater proportion of males than females reported quit attempts in the last year (48.1% vs. 27.6%, $p < .05$). Finally, the proportion of smokers who had the intention to quit at follow-up increased by age group (≤19 year-old: 71.4%, 20–24 year-old: 82.4% and ≥25 year-old: 100%, $p = .002$).

3.3 | Predictors of smoking transition

As shown in Table 3, the cumulative incidence of quitting was 28.3% at follow-up. The only predictor of quitting was being a nondaily

smoker compared to a daily smoker (aOR = 3.86, 95% CI 2.19–6.82). The proportion of recent quitters who reported smoking for reducing stress or relaxing at baseline was lower than those who continued smoking at follow-up ($p < .006$). As well, the proportion of recent quitters was higher among participants who, at baseline, had a low cigarette consumption (<10 CPD), compared with those who consumed ≥10 CPD ($p < .001$), those who had low nicotine dependence, compared with those who had medium and high dependence ($p = .036$) and those who had no intention to cut back consumption, compared with those who had this intention ($p = .026$). There were no differences in the factors linked to quitting at follow-up between participants who were still students and those who had graduated.

Among never smokers at baseline, the cumulative incidence of smoking initiation at follow-up was 4.6% (Table 4). There were no significant differences in baseline characteristics among new smokers. The small number of new smokers ($n = 29$) prevented further analysis through logistic regression modelling. Stratified analysis by occupation at follow-up showed no significant differences. Most new smokers used MF cigarettes exclusively (48.3%) or used both MF and RYO cigarettes (34.5%). The overall prevalence of water pipe and cannabis use among this group was 27.6% and 24.1%, respectively.

Among former smokers at baseline, the cumulative incidence of relapse was 23.2% at follow-up (Table 5). There were no differences regarding the baseline characteristics. Due to the small number of quitters who relapsed ($n = 29$), we could not perform logistic regression modelling. Most quitters who relapsed consumed MF (44.8%) or both MF and RYO cigarettes (37.9%). The overall prevalence of water pipe and cannabis use was 20.7% and 13.8%, respectively.

TABLE 2 Tobacco use pattern among current smokers at follow-up (2018–2019).

| | All | | | Sex | | | | | |
| | | | | Male | | | Female | | |
	n	%	95% CI	*n*	%	95% CI	*n*	%	95% CI
Overall	256	100		30	100		226	100	
Age of initiation									
<17 years	125	57.1	(50.5–63.5)	9	33.3	(17.9–52.1)	116	60.4	(53.4–67.1)
≥17 years	94	42.9	(36.5–49.5)	18	66.7	(47.9–82.1)	76	39.6	(32.9–46.6)
Pattern of smoking									
Daily	163	63.7	(57.7–69.4)	17	58.6	(40.6–75.0)	146	66.7	(60.2–72.7)
Nondaily	93	36.3	(30.6–42.3)	12	41.4	(25.0–59.4)	73	33.3	(27.3–39.8)
Type of tobacco product consumed									
Manufactured cigarettes	204	79.7	(74.4–84.3)	22	73.3	(55.9–86.5)	182	80.5	(75.0–85.3)
Roll-your-own cigarettes	145	57.1	(50.9–63.1)	18	60.0	(42.2–76.0)	127	56.7	(50.2–63.1)
Cigars, cigarillos, little cigars	5	2.0	(0.8–4.3)	1	3.3	(0.4–14.5)	4	1.8	(0.6–4.2)
Electronic cigarettes	4	1.6	(0.5–3.7)	1	3.3	(0.4–14.5)	3	1.3	(0.4–3.5)
Water pipes	41	16.1	(12.0–21.0)	8	26.7	(13.5–44.1)	33	14.7	(10.6–19.8)
IQOS	5	2.0	(0.8–4.3)	2	6.7	(1.4–19.7)	3	1.3	(0.4–3.5)
Cannabis	38	15.0	(11.0–19.7)	5	16.7	(6.7–32.7)	33	14.7	(10.6–19.8)
Number of cigarettes per day									
<10	170	68.5	(62.6–74.1)	21	72.4	(54.6–86.0)	149	68.0	(61.7–73.9)
10–19	59	23.8	(18.8–29.4)	7	24.1	(11.5–41.6)	52	23.7	(18.5–29.7)
≥20	19	7.7	(4.8–11.5)	1	3.4	(0.4–15.0)	18	8.2	(5.1–12.4)
Heaviness of smoking index									
Low (0–2)	182	83.9	(78.5–88.3)	23	88.5	(72.3–96.6)	159	83.2	(77.5–88.0)
Medium and high (3–6)	35	16.1	(11.7–21.5)	3	11.5	(3.4–27.7)	32	16.8	(12.0–22.5)
Quit attempts in the last year									
Yes	66	30.1	(24.4–36.4)	13	48.1	(30.3–66.4)	53	27.6	(21.6–34.2)
No	153	69.9	(63.6–75.6)	14	51.9	(33.6–69.7)	139	72.4	(65.8–78.4)
Number of quit attempts									
1	24	36.4	(25.5–48.4)	7	53.8	(28.3–77.9)	17	32.1	(20.7–45.3)
≥2	42	63.6	(51.6–74.5)	6	46.2	(22.1–71.7)	36	67.9	(54.7–79.3)
Are you seriously thinking about quitting now?									
Yes	179	81.7	(76.2–86.4)	23	85.2	(68.5–94.8)	156	81.3	(75.3–86.3)
No	40	18.3	(13.6–23.8)	4	14.8	(5.2–31.5)	36	18.8	(13.7–24.7)
Are you thinking about cutting back consumption?									
Yes	140	63.9	(57.4–70.1)	17	63.0	(44.2–79.1)	123	64.1	(57.1–70.6)
No	79	36.1	(29.9–42.6)	10	37.0	(20.9–55.8)	69	35.9	(29.4–42.9)

Note: Significant values are highlighted in bold.

Abbreviation: CI, confidence interval.

[a]Chi-square test (male vs. female).

[b]Chi-square test (≤19 vs. 20–24 vs. ≥25).

p-value[a]	Baseline age group (years)									p-value[b]
	≤19			20–24			≥ 25			
	n	%	95% CI	n	%	95% CI	n	%	95% CI	
	79	100		135	100		39	100		
.008										.820
	34	54.0	(41.7–65.9)	70	58.8	(49.9–67.4)	20	57.1	(40.7–72.4)	
	29	46.0	(34.1–58.3)	49	41.2	(32.6–50.1)	15	42.9	(27.6–59.3)	
.391										.001
	40	53.3	(42.1–64.3)	88	67.2	(58.8–74.8)	34	87.2	(74.2–94.9)	
	35	46.7	(35.7–57.9)	43	32.8	(25.2–41.2)	5	12.8	(5.1–25.8)	
.357	54	68.4	(57.6–77.8)	114	84.4	(77.6–89.8)	34	87.2	(74.2–94.9)	.008
.731	55	69.6	(58.9–78.9)	70	52.6	(44.2–61.0)	19	48.7	(33.6–64.0)	.026
.567	3	3.8	(1.1–9.8)	2	1.5	(0.3–4.7)	-	-	-	.321
.410	1	1.3	(0.1–5.8)	3	2.3	(0.6–5.9)	-	-	-	.589
.095	21	26.6	(17.8–37.0)	19	14.3	(9.1–21)	1	2.6	(0.3–11.4)	**.003**
.049	2	2.5	(0.5–7.9)	3	2.3	(0.6–5.9)	-	-	-	.619
.780	15	19.0	(11.5–28.7)	21	15.8	(10.4–22.7)	1	2.6	(0.3–11.4)	.054
.659										**<.001**
	61	81.3	(71.4–88.9)	90	68.7	(60.4–76.2)	16	41.0	(26.7–56.6)	
	9	12.0	(6.1–20.8)	33	25.2	(18.4–33.1)	17	43.6	(28.9–59.1)	
	5	6.7	(2.6–14.0)	8	6.1	(2.9–11.2)	6	15.4	(6.7–29)	
.776										**.001**
	56	90.3	(81.1–95.9)	102	86.4	(79.4–91.7)	22	62.9	(46.3–77.3)	
	6	9.7	(4.1–18.9)	16	13.6	(8.3–20.6)	13	37.1	(22.7–53.7)	
.029										.093
	13	20.6	(12.1–31.8)	43	36.1	(27.9–45.0)	10	28.6	(15.7–44.8)	
	50	79.4	(68.2–87.9)	76	63.9	(55.0–72.1)	25	71.4	(55.2–84.3)	
.144										.764
	4	30.8	(11.4–57.7)	17	39.5	(26.0–54.4)	3	30.0	(9.3–60.6)	
	9	69.2	(42.3–88.6)	26	60.5	(45.6–74.0)	7	70.0	(39.4–90.7)	
.620										**.002**
	45	71.4	(59.5–81.4)	98	82.4	(74.8–88.4)	35	100	-	
	18	28.6	(18.6–40.5)	21	17.6	(11.6–25.2)	-	-	-	
.911										.064
	34	54.0	(41.7–65.9)	78	65.5	(56.7–73.6)	27	77.1	(61.5–88.6)	
	29	46.0	(34.1–58.3)	41	34.5	(26.4–43.3)	8	22.9	(11.4–38.5)	

4 | DISCUSSION

In our longitudinal study among nursing students in Catalonia, several changes in tobacco use patterns occurred between the baseline and the 3-year follow-up. The overall prevalence of current smokers decreased, and the overall prevalence of former smokers increased. Among current smokers at baseline, more than a quarter of them were recent quitters at follow-up. Being a nondaily smoker at baseline was a predictor of quitting at follow-up. Among never smokers at baseline, 4.6% were new smokers at follow-up. Finally, among former smokers at baseline, 23.2% had relapsed at follow-up.

Our results regarding predictors of quitting smoking are consistent with previous findings in the literature among college students (Pardavila-Belio et al., 2019; Wetter et al., 2004). Being a nondaily smoker was the strongest predictor of quitting at follow-up, which is in line with what Wetter et al., have found in their study. The fact that nondaily smokers had a higher probability of quitting could be associated with their low nicotine dependence, a well-known predictor of quitting among college students (Pardavila-Belio et al., 2019). However, a lower level of addiction and frequency of use has also been linked to continuing smoking because of psychosocial factors rather than a physical addiction (Fernández et al., 2015). In fact, nondaily college smokers have an important heterogeneity regarding their behavioral and psychosocial factors, presenting relevant differences in their frequency and quantity of use, social smoking and perceived addiction (Romero et al., 2014). As such, analyzing these factors among subgroups of nondaily users could provide further information about the specific factors that influence them to quit smoking. Notwithstanding that nondaily use was more prevalent among the youngest participants, age and sex were not associated with quitting smoking in this cohort of nursing students. Accordingly, Pardavila-Belio et al. found age and sex had no influence on the probability of quitting among a cohort of Spanish college students. In contrast, in another longitudinal study among U.S. college students, Buu et al. found males more likely to be both continuing smoking and quitting recently than females; however, they compared both groups with those who continued being never smokers rather than compare both groups (continued as smokers vs. recent quitters) with each other as we have done. Also, the fact that Berg et al. (2020) included all tobacco products in the definition of smoker, including e-cigarettes, water pipes, chewing tobacco and more (in addition to cigarettes), may explain these differences. Likewise, those who have included the year of university as a potential predictor of tobacco use have described an increased probability of using tobacco among first year students, which points out that the first years of college may be a pivotal period in preventing tobacco initiation (Sutfin et al., 2022). Finally, it must be mentioned that a potential factor associated with quitting among nursing students could be having a higher tobacco-related knowledge since they might have received training about this topic during their university education. Nonetheless, it seems that higher tobacco-related knowledge received during academic years is not associated with lower tobacco use among health students (Han et al., 2011).

The 3-year quitting rate obtained was three times higher than the 4-year rate reported in longitudinal research conducted among Spanish college students (Gutiérrez-Bedmar et al., 2009) but was similar to the 6 and 27-month rate reported in college smokers enrolled in smoking cessation programs (Joo et al., 2020; Pardavila-Belio et al., 2019). Since no smoking cessation programs were carried out among the cohort of our study, the striking cessation rate may be related to the participants' role as nursing students. We hypothesize that this role might have influenced their awareness of social norms and of the acceptability (or rather lack of acceptability) of smoking and, consequently, it might have increased their odds of quitting (Alamar & Glantz, 2006). Furthermore, we have observed that a high proportion of participants lost to follow-up were current smokers at baseline, compared to never smokers, which could disguise the actual incidence of quitting (Laroussy et al., 2022).

Smoking initiation rates in our nursing student cohort are in concordance with a longitudinal study among Spanish college students (Gutiérrez-Bedmar et al., 2009). It is noteworthy to mention that this initiation rate may be underestimated because we only examined the initiation of MF and RYO cigarette consumption. Furthermore, there may be a response bias regarding lower rates of participation among new smokers. Perhaps nursing students who smoked anticipated being judged by the researchers and therefore were more reluctant to participate, a phenomenon that has been reported in studies conducted among health professionals (Zhang & Jose Duaso, 2021). In addition, we observed that MF cigarettes were the main type of product involved in tobacco initiation and relapse in this cohort, which is in line with other studies (Buu et al., 2020; Joo et al., 2020). Nevertheless, the overall prevalence of other products such as e-cigarettes, water pipes and cannabis increased between baseline and follow-up, although it was lower than that reported in other studies (Buu et al., 2020). This fact suggests that the decreasing trend of cigarette initiation and increasing use of alternative tobacco products among college students might have also been reflected among nursing students (American College Health Association, 2022).

Generally, rates and predictors of smoking status transitions among this cohort of nursing students were similar to those reported among other college students, despite being an important group regarding their role in tobacco control. This fact indicates that similar factors could be influencing their tobacco behaviors, at the same time highlighting the need to intervene massively among college students to reduce tobacco product consumption and their negative consequences. The university setting could be a perfect time to prevent tobacco use initiation and to reinforce the observed quitting trends through targeted strategies for college students. The current evidence recommends the use of comprehensive tobacco control programs to address multiple components, such as policy, education and cessation programs (Centers for Disease Control and Prevention, 2014). The implementation of these comprehensive

TABLE 3 Predictors of smoking cessation in a cohort of nursing students according to baseline characteristics and smoking status.

	Recent quitters[a]			
	n	%	*p*-value	Adjusted OR[b] and 95% CI
Overall	78	28.3		
Sex			.212	
Male	13	37.1		1.38 (0.63–3.05)
Female	65	27.0		1.00
Age group[c]			.191	1.01 (0.96–1.08)
≤19 years	30	34.1		
20–24 years	32	23.4		
≥25 years	15	31.3		
Year in nursing school			.906	
First	28	28.3		
Second	21	31.3		
Third	15	25.4		
Fourth	13	27.7		
Place of birth			.146	
Catalonia	61	26.3		
Outside of Catalonia	14	37.8		
Location of nursing school			.075	
Barcelona	62	26.3		
Outside of Barcelona	16	40.0		
Type of nursing school			.201	
Public	29	31.9		
Private with public funding	13	19.7		
Private	36	30.3		
Age of initiation			.614	
<17 years	49	26.8		
≥17 years	27	29.7		
Reason why they initiated smoking				
Having peer/family smoker	48	26.7	.421	
Other	53	27.5	.653	
Reason why they currently smoke				
For reducing stress/relaxing	32	21.5	**.006**	
For pleasure	51	26.6	.314	
Other	34	25.4	.301	
Baseline smoking status			**<.001**	
Nondaily smoker	48	45.3		3.86 (2.19–6.82)
Daily smoker	30	17.6		1.00
Type of product used			.222	
Only manufactured and/or roll-your-own cigarettes	59	30.4		
Manufactured and/or roll-your-own cigarettes+other/s	19	23.2		
Number of cigarettes per day			**<.001**	
<10	48	41.4		
10–19	16	18.2		

(Continues)

TABLE 3 (Continued)

	Recent quitters[a]			
	n	%	*p*-value	Adjusted OR[b] and 95% CI
≥20	14	19.4		
Heaviness of smoking index			**.036**	
Low (0–2)	62	32.0		
Medium and high (3–6)	16	19.5		
Number of quit attempts in the last year			.557	
0	57	27.8		
1	10	33.3		
≥2	7	21.2		
Are you seriously thinking about quitting now?			.823	
Yes	11	29.7		
No	64	27.9		
Are you thinking about cutting back consumption?			**.026**	
Yes	34	22.5		
No	41	34.7		

Note: Significant values are highlighted in bold.

Abbreviations: CI, confidence interval; OR, odds ratio.

[a]Compared with "continued as smokers" (*n* = 198).

[b]OR adjusted for sex, baseline age and baseline smoking status.

[c]Continuous variable.

tobacco control programs has proven successful in decreasing the prevalence of tobacco use and SHS exposure among U.S. young adults (Centers for Disease Control and Prevention, 2014). The American Nonsmokers' Rights Foundation developed a Comprehensive Tobacco Control Program (CTCP) model, designed for college students, that encompasses several factors that influence tobacco behaviors in this population. It includes (i) the implementation of tobacco-free campus policies, (ii) restriction of tobacco sales, advertising, and promotion, (iii) tobacco prevention interventions and (iv) tobacco cessation programs (American Nonsmokers' Rights Foundation, 2008). The implementation of this program in nursing universities may be effective in encouraging smoking cessation among nursing students and in reinforcing the already observed decrease in smoking. We consider that tobacco-free campus policies should also ban the use of alternative tobacco and nicotine products since they frequently contain nicotine. As well, tobacco prevention interventions should be offered to first year students, since first year' students are the most likely to use tobacco products. Moreover, the use of online methods, such as social media, university virtual campus platforms and text messages, in tobacco prevention and cessation programs may increase their effectiveness (Berg et al., 2014; Müssener et al., 2016). Finally, monitoring tobacco product use among nursing students could help to customize the last cited intervention for specific groups and products according to its predictors of initiation or cessation. More research is needed to evaluate the implementation of these strategies on nursing students in Spain.

4.1 | Limitations and strengths

The main limitation of this study is the potential bias due to attrition of the cohort of participants. In this regard, participants lost to follow-up were more likely to be male, aged >20 years, and current smokers at baseline (Laroussy et al., 2022). Furthermore, even with the large number of participants at baseline, the small number of participants at follow-up made it difficult to analyse predictors of all smoking status transitions. Despite the wide range of tobacco and nicotine products explored, we only included MF and RYO cigarettes in the definition of smoker, because these are the main products consumed in Spain. This decision may have reduced the number of participants identified as smokers. As previously explained, due to the voluntary nature of the participation in the follow-up, some selection bias is possible, as those agreeing to be followed up could be the participants with greater health awareness and greater likelihood of being nonsmokers. This fact might have accounted for the low prevalence of new smokers at follow-up. A notable limitation of this work is the fact that we were not able to assess all quitting predictors that have been described in the literature. The most relevant absences are: social environment, perceived addiction and self-efficacy to quitting smoking. However, we have included several individual and contextual variables that are important for studying transitions in smoking among college students such as sex, age and several characteristics that describe baseline smoking status (frequency of use, type of tobacco product, number of CPD, HSI and more). This study is, to

TABLE 4 Baseline characteristics of the participants who had started to smoke at follow-up.

	New smokers[a]		p-value
	n	%	
Overall	29	4.6	
Sex			.911
Male	3	4.9	
Female	26	4.6	
Age group[b]			.176
≤19 years	15	5.7	
20–24 years	13	4.3	
≥25 years	-	-	
Year in nursing school			.625
First	13	5.8	
Second	5	3.1	
Third	6	5.1	
Fourth	4	3.9	
Place of birth			.087
Catalonia	27	5.4	
Outside of Catalonia	2	1.7	
Location of nursing school			.523
Barcelona	24	4.9	
Outside of Barcelona	5	3.6	
Type of nursing school			.737
Public	12	4.0	
Private with public funding	5	4.8	
Private	12	5.4	

[a]Compared with "continued as never smokers" (*n* = 597).
[b]Continuous variable.

the best of our knowledge, the first longitudinal research in Europe that has addressed the transitions in smoking status and its predictors among nursing students. Finally, data were collected through a self-report questionnaire and, therefore, are vulnerable to recall bias regarding smoking status.

5 | CONCLUSIONS

Smoking nondaily (either MF or RYO cigarettes) was the main predictor of quitting in a cohort of Spanish nursing students in the Catalonia region. Less than 5% of participants had started smoking at follow-up and just under a quarter of former smokers had relapsed. Early implementation of a comprehensive tobacco control program that includes tobacco-free campus policies, restriction of tobacco sales, advertising, and promotion, tobacco prevention interventions

TABLE 5 Baseline characteristics of the participants who had relapsed at follow-up.

	Quitters who relapsed[a]		p-value
	n	%	
Overall	29	23.2	
Sex			.168
Male	5	38.5	
Female	24	21.4	
Age group[b]			.409
≤19 years	6	21.4	
20–24 years	17	28.3	
≥25 years	6	16.7	
Year in nursing school			.703
First	6	16.7	
Second	9	28.1	
Third	7	25.9	
Fourth	6	24.0	
Place of birth			.618
Catalonia	20	22.2	
Outside of Catalonia	8	26.7	
Location of nursing school			.523
Barcelona	24	24.5	
Outside of Barcelona	5	18.5	.515
Type of nursing school			
Public	8	16.7	
Private with public funding	8	33.3	
Private	13	24.5	
Age of initiation			.317
<17 years	22	26.8	
≥17 years	7	18.4	
Age of cessation			.561
<19 years	10	20.4	
≥19 years	17	25.0	
Reason why they quitted smoking			
To protect my health	23	23.0	.895
To save money	9	26.5	.687
Other	13	22.4	.701
Use of any treatment to quit smoking			1.000
Yes	1	20.0	
No	28	24.1	

[a]Compared with "continued as former smokers" (*n* = 96).
[b]Continuous variable.

and tobacco cessation programs may be effective in decreasing tobacco product use prevalence among nursing students. The use of online tools and monitoring tobacco product use may increase its effectiveness.

AUTHOR CONTRIBUTIONS

Kenza Laroussy, Esteve Fernández and Cristina Martinez: Conceptualization, Investigation, Methodology, Writing—Original Draft. **Yolanda Castellano:** Formal analysis and Data curation. **Marcela Fu:** Validation. **Antoni Baena** and **Jon Aldazabal:** Software. **Ariadna Feliu:** Writing—Review and Editing. **Mercè Margalef:** Project administration. **Olena Tigova:** Visualization and Writing—Review and Editing. **Jordi Galimany:** Supervision. **Montserrat Puig:** Supervision. **Carmen Moreno:** Resources and Funding acquisition. **Albert Bueno:** Supervision. **Antonio López:** Supervision. **Judith Roca:** Writing—Review and Editing. All authors have agreed on the final version and meet at least one of the following criteria (recommended by the ICMJE [http://www.icmje.org/recommendations/]): Substantial contributions to conception and design, acquisition of data or analysis and interpretation of data; Drafting the article or revising it critically for important intellectual content.

CONFLICT OF INTEREST STATEMENT

No conflict of interest has been declared by the author(s).

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DATA AVAILABILITY STATEMENT

Data available on request from the corresponding author. At this moment, we have decided not to do it since most of the analysis have not been performed by the research team. Nonetheless, if the editor or reviewers want to browse our database, we can provide an encrypted and protected access through an online file.

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