

# Family, lifestyles and new and old type of smoking in young adults: insights from an Italian multiple-center study

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*Parole chiave: Tabacco, sigaretta elettronica, fumo, famiglia, giovani adulti, stile di vita*

## Abstract

**Background.** Tobacco smoke is the epidemic of modern times due to its tremendous burden of diseases and deaths, greater than that produced by alcohol, AIDS, drugs, road accidents, murders and suicides combined. In Italy, 26% of the population smokes and the high prevalence of smoking even among young people is crucial for the Tobacco Industry, because young people are the reservoir which replaces smokers who quit or die. The aim of this study is to investigate smoking habits and determinants of smoking among young adults.

**Methods.** This cross-sectional study enrolled young people from three Italian regions: Latium (central Italy) Calabria (southern Italy) and Sicily (the largest Italian island). An anonymous, multiple-choice online questionnaire was distributed through social networks. Questions investigated individual habits and lifestyles (smoking, alcohol and coffee consumption, physical activity), the presence of smokers in the family and the use of electronic cigarettes. Descriptive and multivariate analyses were used to describe the characteristics of the sample and to evaluate factors associated with smoking status. All statistical analyses were conducted in SAS software version 9.4 (SAS Institute Inc., Cary, NC, USA). All hypothesis tests were 2-tailed and  $p$  values  $<0.05$  were considered statistically significant.

**Results.** In a sample of 382 subjects between 18 and 34 years, the prevalence of smoking was 25%. A statistically significant higher percentage of smokers is observed among those who drink coffee and those who drink alcohol. Only 48% of smokers usually smoke classic cigarettes, while 45% roll their own cigarettes and 7% use electronic cigarettes. More than half of the smokers, smoke 1 to 5 cigarettes a day, while 17% smoke over 10 cigarettes a day. In families where there was at least 1 smoker, the percentage of smokers was 34% versus only 15% in families where nobody else smokes. The presence of at least 1 smoker in the family was strongly associated with young adults' smoking behavior: subjects with family members who smoke were more than three times as likely to be current smokers, compared to those with no family smokers (Odds Ratio [OR] = 3.14, 95% confidence interval [CI] 1.8-5.5,  $p=0.0001$ ). Alcohol, coffee consumption, unemployment and being a student were also found to be independently and significantly associated with smoking of young adults (alcohol OR=2.96, 95%CI 1.64-5.34; coffee OR= 4.33, 95%CI 1.81-10.39; unemployment OR = 4.76, 95%CI 1.26-17.96; being a student OR = 3.21, 95%CI 1.25-8.27).

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**Conclusions.** *Preventing young people from smoking is crucial in order to stop the Tobacco Epidemic. The Tobacco Industry is selling new products and is using new marketing tactics (i.e. the “influencers” in social media) which are hooking young people to addictive products and behaviors, thus threatening to wipe out decades of progress in curbing tobacco use. Effective action to drastically reduce new and old types of smoking or to pursue the “Tobacco Endgame” requires an increasing commitment not only towards young people, but also towards families, that play an important role in influencing young people.*

## Introduction

Tobacco causes more deaths than alcohol, AIDS, drugs, road accidents, murders and suicides combined. It is a known or probable cause of at least 25 diseases, including chronic obstructive pulmonary disease and other chronic lung diseases, lung cancer and other forms of cancer, heart disease and vasculopathies. The World Health Organization (1) estimates that tobacco consumption currently kills nearly 6 million people each year. This figure could reach 8 million by 2030 in absence of measures to reverse this trend. In Europe, 94% of smokers start before the age of 25, about 50% of smokers die from the addiction, on average 14 years before non-smokers, and smokers suffer for several years of precarious health conditions. According to the data from the 2017 Eurobarometer survey, 26% of Europeans smoke (30% men and 22% women) and, although this prevalence was the same in 2014, smokers in the 15-24 age group are on the rise (from 24% to 29%). Italy is at the 10th place, with a prevalence of 24%, lower than the European average.

In Italy, the majority of adults between 18 and 69 years do not smoke (56.4%) or have quit smoking (17.6%), but one Italian in four is an active smoker (26%) (2-4). The prevalence is highest (34%) between 15 and 24 years of age (5). 70% of smokers start before the age of 18 and 94% before the age of 25 (6).

Adolescence and the period

immediately following are crucial phases in individual development, with important biological (i.e. puberty), psychosocial and cultural changes; it is in this age group that the population starts to try with new experiences, including the use of substances such as alcohol, cigarettes and drugs of various kinds (7, 8).

It is therefore clear that interventions aimed at preventing the creation of new smokers should focus on these delicate phases of life, also considering the high mortality that smoking brings in the long term (9). The factors that influence, and are associated with, smoking are many and range from socio-economic to environmental stimuli, from the family context to the circle of friends and acquaintances (10-13).

In Italy, people who want to quit smoking generally try directly by themselves, without using any support (medications, programs delivered by smoking cessation services, etc.) but success rate is very low (9%). Recently, electronic cigarettes have been used in order to aid quitting by one in ten Italian adult smokers, but the probability of success is very low (8%) and similar to that of quitting without any help (4). Often, electronic cigarettes have been used because they are considered less dangerous (14). However, the long-term effects of electronic cigarettes are still unclear, both as regards the health of the smoker and the effects of secondhand smoke, and as regards the pollution that the electronic cigarette produces (15). Despite this, in Italy more than 45 million Italians

know e-cigs, 3.5 million people tried them, and more than 600,000 subjects regularly used them in 2013 (16-17).

The aim of this study is to investigate the influence of lifestyle and of the presence of smokers in the family on smoking habits of young adults. The presence of smokers in the family constitutes an environmental risk factor for the young non-smokers; in fact, those who are exposed to the smoke of their parents from an early age tend to imitate the parental model and therefore will start smoking more easily than those living in families of non-smokers (18).

## Materials and methods

The study was conducted between March and December 2018 through the administration of an anonymous questionnaire elaborated ad hoc, distributed online through social networks and based on multiple-choice questions. An individual consent was obtained from each user.

This cross-sectional study enrolled young adults (18-34 years) coming from 3 Italian regions: Latium (center Italy), Calabria (southern Italy) and Sicily (the largest Italian island). The sample was selected based on age and on the Region of origin, all those who did not fall within these characteristics were discarded. Questions were asked regarding habits and lifestyles, such as physical activity (yes/no), consumption of alcohol and coffee (yes/no), smoking habits including the presence of a smoker in the family, the use of novel products such as electronic cigarettes and their adoption as a help to quit smoking.

Descriptive statistics with frequencies and proportions were used to describe the data. Chi-squared test followed by post hoc analysis was used for testing relationships between categorical variables. Multinomial

logistic regression models were used in order to evaluate the independent effects of factors as predictors of smoking status considered with three outcome categories: 'never smoker' (reference group), 'former smoker' and 'current smoker'. Separate models were used for each predictor due to collinearity between factors. Model selection was based on 2 test for goodness of fit. All analyses were conducted using SAS software version 9.4 (SAS Institute Inc., Cary, NC, USA). All hypothesis tests were 2-tailed and p values <0.05 were considered for statistical significance.

## Results

382 subjects filled the questionnaire; 147 (38%) were males and 235 (62%) females; 238 (62%) lived in Sicily, 77 (20%) in Latium and 67 (18%) in Calabria; 66% (251/382) were aged between 18 and 24 years, while 34% (131/382) 25-34 years. Of the total, 25% were smokers, 24% former smokers and 51% never smokers.

Demographic, socio-economic and behavioral factors are shown in Table 1 according to smoking status.

Age was found associated with smoking prevalence ( $p=0.01$ ). Post hoc analysis demonstrated that former smokers were significantly older than current and never smokers ( $p=0.02$  and  $p=0.004$ , respectively), while there was no difference between these latter groups ( $p>0.05$ ).

Higher percentages of smokers were also observed in females (26%,  $p=0.631$ ) and in those who do not practice physical activity (27%), but they are not statistically significant.

A statistically significant higher prevalence of smoking was observed among those who drink coffee and those who drink alcohol. Among those who consume coffee, the prevalence is 29% (versus 8% among those who do not drink coffee;  $p<0.0001$ ) and among those who drink alcohol, the

Table 1 - Distribution of demographic, socio-economic and behavioral factors according to smoking status (statistically significant p values are in bold)

		Smokers (n=94; 24.6%)	Ex Smokers (n=93; 24.3%)	Never Smokers (n=195; 51.1%)	p-value (Chi-squared)
Age	18-24	(65/251) 26%	(49/251) 20%	(137/251) 55%	0.010
	25-34	(29/131) 22%	(44/131) 34%	(58/131) 44%	
Gender	Males	(33/147) 22%	(39/147) 27%	(75/147) 51%	0.631
	Females	(61/235) 26%	(54/235) 23%	(120/235) 51%	
Marital status	not married	(90/357) 25%	(83/357) 23%	(184/357) 52%	0.153
	married	(4/25) 16%	(10/25) 40%	(11/25) 44%	
Work	No	(87/325) 27%	(78/325) 24%	(160/325) 49%	0.059
	Yes	(7/57) 12%	(15/57) 26%	(35/57) 61%	
Physical activity	No	(39/146) 27%	(32/146) 22%	(75/146) 51%	0.606
	Yes	(55/236) 23%	(61/236) 26%	(120/236) 51%	
Coffee consumption	No	(7/83) 8%	(19/83) 23%	(57/83) 69%	<0.001
	Yes	(87/299) 29%	(74/299) 25%	(138/299) 46%	
Alcohol consumption	No	(22/157) 14%	(37/157) 24%	(98/157) 62%	<0.001
	Yes	(72/225) 32%	(56/225) 25%	(97/225) 43%	
Residence	Sicily	(65/238) 27%	(67/238) 28%	(106/238) 45%	0.014
	Calabria	(14/67) 21%	(15/67) 22%	(38/67) 57%	
	Latium	(15/77) 19%	(11/77) 14%	(51/77) 66%	

prevalence is 32% (versus 14% among those who do not drink alcohol;  $p < 0.0001$ ).

Also about residence, a higher prevalence of smokers was observed in people from Sicily, but the comparison of the smoking prevalence for the three regions yielded no statistically significant difference ( $p = 0.283$ ); while the prevalence of former smokers and never smokers statistically differed between regions (respectively  $p = 0.044$  and  $p = 0.002$ ).

More than 80% of smokers and former smokers started smoking before the age of 18 and the main reasons given were “curiosity towards the cigarette” (31%) and “spirit of emulation towards peers” (13 %) (data not shown).

Figure 1 shows the type of cigarettes usually smoked: 48% of smokers smoke classic cigarettes and 45% roll their own cigarettes; electronic cigarettes are used by 7% of smokers. These types of tobacco consumption are similar in the three regions considered.

More than half of the smokers (55%) smoked 1 to 5 cigarettes a day, more than a quarter (28%) 6 to 10 cigarettes a day and 17% more than 10 cigarettes a day.

Among electronic cigarettes users, more than 70% stated that they use electronic cigarettes to reduce their consumption of classic cigarettes and/or to stop smoking; all think they smoke less since they started to use them; more than 40% think electronic cigarettes can have harmful effects on health.

Among former smokers, the main reported reasons to quit were the “belief that smoking is bad” (85%), “health problems” (9%) and “economic reasons” (6%).

Table 2 presents the effects of having family members who smoke on smoking status. In families where there is at least 1 smoker, the prevalence of smoking is 34% while in families where nobody else smokes, the prevalence is only 15%.

The presence of at least 1 smoker in the family (smoking status of family)

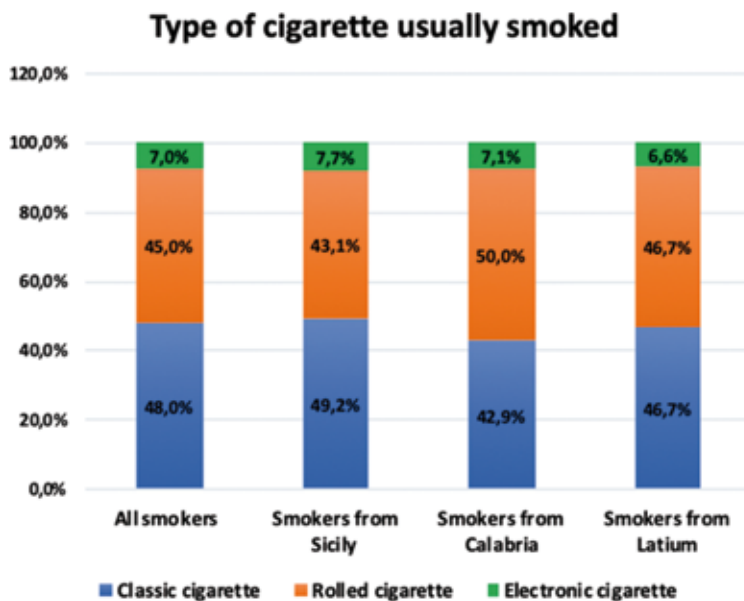


Figure 1 - Type of cigarette consumption

is strongly associated with young adult smoking behavior. The regression analysis shows the adjusted Odds Ratios and 95% Confidence Limits (Table 3). Subjects with family members who smoke are more than three times as likely to be current smokers, compared to those with no family smoking behavior (OR = 3.14, 95%CI 1.8-5.5, p=0.0001). Alcohol use, coffee consumption, work status and age were also found to be independently associated with smoking behavior (p=0.001, p=0.004, p=0.02 and

p=0.04, respectively). Coffee consumption and alcohol drinking are associated with being current smokers: those who drink coffee and alcohol are respectively more than 4 times and almost 3 times more at risk of being current smokers compared with those who do not drink coffee and alcohol (alcohol OR=2.96, 95%CI 1.64-5.34; coffee OR= 4.33, 95%CI 1.80-10.39). Being unemployed is strongly associated with both being a current smoker and an former smoker (OR = 4.76, 95%CI

Table 2 - Family members who smoke and smoking status.

	Presence of at least 1 smoker in the family		p-value (Chi-squared)
	No (n=187)	Yes (n=195)	
Smokers (n=94)	(28/187) 15%	(66/195) 34%	
Former smokers (n=42)	(50/187) 27%	(43/195) 22%	<0.0001
Never smokers (n=7)	(109/187) 58%	(86/195) 44%	

Table 3 - Adjusted odds ratios and 95% confidence interval for the prediction of smoking status.

		Smoking Status	OR	95% CI (Wald)	
Family Smoking Status	Yes vs No	Former smoker	0.98	0.59	1.64
	Yes vs No	Smoker	<b>3.14</b>	<b>1.80</b>	<b>5.48</b>
Age, year		Former smoker	<b>1.05</b>	<b>1.01</b>	<b>1.10</b>
		Smoker	1.01	0.96	1.07
Alcohol consumption	Yes vs No	Former smoker	1.64	0.96	2.80
	Yes vs No	Smoker	<b>2.96</b>	<b>1.64</b>	<b>5.34</b>
Coffee consumption	Yes vs No	Former smoker	1.42	0.76	2.67
	Yes vs No	Smoker	<b>4.33</b>	<b>1.81</b>	<b>10.39</b>
	Unemployed vs employed	Former smoker	<b>4.14</b>	<b>1.43</b>	<b>12.03</b>
	Unemployed vs employed	Smoker	<b>4.76</b>	<b>1.26</b>	<b>17.96</b>
Work Status	Student vs employed	Former smoker	1.49	0.71	3.15
	Student vs employed	Smoker	<b>3.21</b>	<b>1.25</b>	<b>8.27</b>

1.26-17.96, and OR = 4.14, 95%CI 1.43-12.03, respectively). Also being a student is associated with being a smoker (OR = 3.21, 95%CI 1.25-8.27).

## Discussion and conclusions

This study assessed lifestyle characteristics and family habits of Italian young people with the aim to examine factors associated with smoking, including traditional and rolled cigarettes and the use of novel products such as electronic cigarettes.

The prevalence of smokers in our survey (26% in 18-24 years old people) is similar to that reported for Italy in 2017 by the Eurobarometer survey (29% for 15-24 years old people) (5), while is higher in comparison to that reported by the Doxa-Istituto Superiore di Sanità survey (16.2% for 15-24 years old people) also referring to Italy in 2017 (6). Probably due to a different age group, since our study involves 18 years old and not 15 years old as in the Doxa and Eurobarometer survey. Or probably these differences are related to last years' marketing campaign: in fact,

in recent times, tobacco companies have intensively used social media platforms to advertise tobacco use, such as Instagram, Facebook, Twitter, Snapchat (mostly used by young people), by recruiting and paying influencers to publish their photos while using cigarettes or electronic cigarettes.

Smoking prevalence in Sicily and Calabria (South of Italy) is higher than that of Latium (Center of Italy) reflecting the national trends.

Younger people and females seem to smoke more than older people and males, and even if these differences are not statistically significant, these tendencies were observed in the 2017 Eurobarometer survey, where the highest prevalence (34%) was registered for the 15-24 age-group (5) and in the 2019 survey of Doxa-Istituto Superiore di Sanità, which reported a smoking prevalence of 22.4% among women in South of Italy versus 14.0% and 12.1% among women in North and Central Italy, respectively.

In our sample, 17% of people reported to smoke more than 10 cigarettes a day, which is a high number of cigarettes considering the relatively young age of these people.

The types of cigarette smoked do not differ between regions, but notably this study observed a greater percentage of smokers reporting to roll their own cigarettes (45% in all age groups considered; 35% in 18- 24 aged people and 10% in 25-35) in comparison to values reported by the 2017 survey of Doxa-Istituto Superiore di Sanità (national value for “mainly+occasionally use of rolled cigarettes” = 14.8%; value for Center and South of Italy 24.7% and 16.5% respectively; value for young people aged 15-24 years = 26.6%) (6). Our values are also higher than those reported by the 2017 Eurobarometer survey: 33% and 23% for European and Italian people (5). Highlighting that over the years, especially in young people, rolling cigarettes has become more common, probably because less expensive and more “fashionable”.

The prevalence of e-cigarette uses among smokers (7%) in our study is similar to that reported by the Eurobarometer survey for Italy in 2017 (9%), (5).

In this study, people consuming coffee and drinking alcohol are more likely to be smokers: those who drink coffee have more than 4 times and those who drink alcohol have about 3 times the probability of being smokers and these differences are statistically significant. This finding might reflect the fact that possible addictive behaviors might gather together.

Also being unemployed and being a student are statistically associated with being a smoker. A greater stress perceived by these subgroups might influence and support smoking.

Interestingly, the presence of at least one smoker in the family statistically increases more than 3 times the likelihood of being a smoker. On this topic the evidence from the scientific literature is still controversial, because some studies have reported that family members' smoking behavior is predictive of tobacco use in young

people, while other studies did not (19-23). Indeed, parents who smoke may create an environment with attitudes favoring tobacco, may increase the possibility of smoking by allowing it, while smoking siblings may play an important role in promoting smoking via peer influence. Thus, smoking may be considered a normal behavior and it may be “transmitted” from a generation to another. Conversely, tobacco-free homes establishing smoke-free role models for youth, promote tobacco-free generations (24).

There are several limitations of this study that should be kept in mind. One of these is that the sample of young people was recruited via social networks. Nowadays, most young people use social networks irrespective of gender, social class, education, geographical area, etc. but still not everyone might be willing to answer an anonymous questionnaire and we do not know anything about the non-responders. Second, two thirds of responders were females. Males were, therefore, underrepresented, possibly leading to underestimation of factors that are more likely to occur in men. However, in student surveys, it is common to have higher female prevalence (25, 26). Third, the relatively modest e-cigarette users precluded meaningful multivariate analyses of the predictors of this outcome. This will be an important avenue for future investigation.

One strength is that this is a multicenter study which involved young people from three different Italian Regions which yielded comparable results. Another strength is that it gives information on individual and family lifestyle which are associated with smoking, thus highlighting potential important issues where to address individual, family and social support and education to promote healthy lifestyles.

The young adults of today, despite being “digital natives”, and as such potential carriers of change, still “inherit” consumption, entertainment and information. Consequently, it is advisable to direct



primary prevention interventions not only to the younger population, but also towards their family context.

Smoking is a problem of considerable importance, because of its impact on public health and its prevalence show no sign of diminishing among young adults. Indeed, they are the catchment area of the tobacco industry which specifically focuses on marketing strategies (i.e. social media influencers) to hook them and thus assure huge profits for the coming years thanks to tobacco dependence.

To drastically reduce smoking or to pursue Tobacco Endgame requires different strategies with a great multisectoral commitment and decisive interventions, aimed at both preventing the initial approach to cigarettes and encouraging smoking cessation (27, 28), as expressed in the Italian National Prevention Plan 2014-2018 (PNP) (29) which aims to reduce the prevalence of smoking and to reinforce protection against passive smoking, as recommended also by the WHO global action plan for the prevention of chronic diseases (30).

Preventing the first approach to cigarettes by young people, but also intervening on families, which play an important role in influencing young people, and encouraging smoking cessation, are the most important weapons in the hands of Public Health.

## Riassunto

**Famiglia, stili di vita e abitudini al fumo nei giovani adulti: approfondimenti di uno studio multicentrico italiano**

**Introduzione.** Il fumo di tabacco è l'epidemia dell'età moderna a causa dell'enorme carico di malattia e morte che comporta, carico maggiore di quello prodotto da alcol, AIDS, droghe, incidenti stradali, omicidi e suicidi messi insieme. In Italia, il 26% della popolazione fuma e l'alta prevalenza del fumo anche tra i giovani è fondamentale per l'industria del tabacco perché i giovani sono il serbatoio che sostituisce i fumatori che smettono o muoiono. Lo scopo di questo studio è quello di studiare

le abitudini dei giovani e i determinanti che favoriscono il fumo tra i giovani.

**Metodi.** Questo studio trasversale ha arruolato giovani provenienti da tre regioni italiane: Lazio (Italia centrale) Calabria (Italia meridionale) e Sicilia (la più grande isola italiana). Un questionario online, anonimo, a scelta multipla, è stato diffuso attraverso i social networks. Le domande hanno indagato le abitudini e gli stili di vita individuali (fumo, consumo di alcol e caffè, attività fisica), la presenza di un fumatore in famiglia e l'uso di sigarette elettroniche. L'analisi statistica descrittiva e multivariata ha permesso di descrivere le caratteristiche del campione e valutare i fattori associati al fumo. Tutte le analisi statistiche sono state condotte con il software SAS versione 9.4 (SAS Institute Inc., Cary, NC, USA). Tutti i test di ipotesi sono stati a 2 code e il valore di  $p < 0,05$  è stato considerato statisticamente significativo.

**Risultati.** Lo studio ha arruolato 382 soggetti, di età compresa tra i 18 e i 34 anni e la prevalenza di fumatori nel campione è stata del 25%. Una percentuale più alta, e statisticamente significativa, di fumatori è stata osservata tra coloro che bevono caffè e coloro che bevono alcolici. Solo il 48% dei fumatori fuma generalmente sigarette classiche, mentre il 45% fuma sigarette fatte a mano e il 7% usa le sigarette elettroniche. Più della metà dei fumatori ha riferito di fumare da 1 a 5 sigarette al giorno, mentre il 17% più di 10 sigarette al giorno. Nelle famiglie in cui vi era almeno 1 fumatore, si è osservata una percentuale di fumatori del 34%, mentre nelle famiglie in cui nessuno altro fumava la prevalenza è stata solo del 15%. La presenza di almeno 1 fumatore in famiglia è risultata essere fortemente associata al fumo dei giovani adulti: i soggetti con membri della famiglia che fumavano avevano una probabilità tre volte maggiore di essere fumatori rispetto a coloro che non avevano nessuna altra persona che fumava in famiglia (Odds Ratio [OR] = 3,14, intervallo di confidenza al 95% [CI] 1,8-5,5,  $p = 0,0001$ ). Anche il consumo di alcolici e di caffè, la disoccupazione e l'essere studente sono risultati indipendentemente associati in maniera statisticamente significativa al fumo dei giovani adulti (OR alcolici = 2,96, IC 95% 1,64-5,34; OR caffè = 4,33, IC 95% 1,81-10,39; OR disoccupazione = 4,76, IC 95% 1,26-17,96; OR studente = 3,21, IC 95% 1,25-8,27).

**Conclusioni.** Evitare che i giovani divengano fumatori è fondamentale per fermare l'epidemia di tabacco. L'industria del tabacco sta commercializzando nuovi prodotti e sta usando nuove strategie di marketing (ad esempio gli "influencers" nei social media) che spingono i giovani ad utilizzare prodotti e a sviluppare comportamenti che creano dipendenza, minacciando così di annullare i progressi ottenuti negli ultimi decenni nel controllo del tabacco. Azioni efficaci per ridurre drasticamente il nuovo e il vecchio tipo di fumo o per perseguire il "Tobacco Endgame" richiedono un impegno crescente



non solo verso i giovani, ma anche verso le famiglie, che svolgono un ruolo importante nell'influenzare il comportamento dei giovani.

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