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Prevalence of tobacco smoking and electronic cigarette use among adolescents in Italy: Global Youth Tobacco Surveys (GYTS), 2010, 2014, 2018

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Abstract

This study aims to study tobacco smoking and vaping among adolescents in Italy through three repeat national cross sectional surveys conducted before (in 2010, 2014) and after (2018) the 2016 introduction of the European Union - Tobacco Product Directive (EU-TPD) and its transposition into Italy, and before Juul entered the Italian market in 2019.

Prevalence of smoking and vaping, access to cigarettes and electronic cigarettes in adolescents aged 13-15 years were estimated from the 2010, 2014, and 2018 Global Youth Tobacco Surveys (N=1587; N=1428; N=1518, respectively) conducted in Italy.

Prevalence of current smokers and/or current vapers combined, accounting for dual users, non-significantly increased from 20.7% in 2010 to 27.9% in 2018. Although current smokers stalled around 20%, current vapers substantially increased from 0% in 2010, 7.4% in 2014, to 17.5% in 2018, and current exclusive vapers recorded an almost 3-fold significantly increase from 2.9% in 2014 to 8.2% in 2018. Moreover, 42% of ever vapers used nicotine-free electronic cigarettes, and only 5% of current users were frequent vapers (≥ 20 days in the past month). About 65% of current smokers and 76% of current vapers easily accessed to cigarettes or electronic cigarettes in 2018.

After two years from its implementation in 2016, the EU-TPD does not seem to have slowed down the increase in vaping among Italian adolescents before Juul entered the Italian market. Additional research is needed in order to show a clear association between EU-TPD and changes in vaping and smoking in Italy and in the EU.

Key-words: electronic cigarettes; smoking; tobacco; youth; prevalence; surveys; Tobacco Product Directive 40/2014/EU; Italy

INTRODUCTION

Tobacco use is the world's leading cause of preventable morbidity and mortality, resulting in 6.4 million deaths in 2015 – 11.5% of global deaths [1] - and in more than 650,000 deaths in the European Union (EU) —more than 15% of deaths. [2] Among adolescents aged 15-16 years, current (past 30-day) smoking prevalence in Europe declined from 36% in 1999 to 22% in 2015 – a 35% reduction – with significant differences among countries: Finland, Sweden, and Ireland recorded a more than 50% decline, whereas Italy, Croatia, and Slovakia recorded a stalling or a slight decrease, from 37%-40% to 31%-37%. [3,4] In England, among 11-15 year old students, current smokers decreased from 17% in 1998 to 6% in 2016. [5] In the USA current smokers in high school students (commonly aged 14-18 years) declined from 15.8% in 2011 to 8.1% in 2018. [6]

A global picture of electronic cigarette use among adolescents in the European Union (EU) is not available, because surveys have been conducted in few countries and not every year. Ever users ranged from 16.6% in Greece in 2014 in adolescents aged 15 years to 38.5% in Romania. [7] In UK in 11-18-year-old students, current vapers increased from 1.6% in 2014 to 3.4%, in 2018. [8] In the USA, current users among high school students increased from 1.5% in 2011 to 11.7% in 2017, and even to 20.8% in 2018. [6]

In Italy tobacco smoking among adolescents is still high and stalling in last decades (37% in 15-16 year old students; 23% in students aged 13-15 years in 2014-2015) [4]. Moreover, Italy has a regulatory environment on electronic cigarettes quite different from other countries [9,10]: up to 2014, electronic cigarettes were and are still sold as consumer products, no rules on their use in smoke-free public areas were implemented; advertising was allowed. Then a ban in schools, and a sale ban to minors were introduced in 2013, [11] and the 2016 EU Tobacco Products Directive (TPD) with its transposition into Italy, introduced advertising ban on electronic cigarettes and other measures designed to prevent smoking initiation and electronic cigarette use among adolescents, and to restrict youth access to and availability of cigarettes and electronic cigarettes: introducing

larger and mandatory pictorial health warnings covering 65% of cigarette packaging; a ban on characterising flavours including colourings, caffeine and taurine; a ban on selling cigarette packs with <20 cigarettes and roll-your own tobacco packs <30 grams. Moreover, the TPD imposes a nicotine limit of 20 mg/ml for electronic cigarettes, and the information leaflet in electronic cigarettes and refill products must report that the product is not recommended for use by young people and non-smokers. In the electronic cigarette packet, the health warning must cover 30% of the surfaces stating “This product contains nicotine which is a highly addictive substance. It is not recommended for use by non-smokers”. [12]

The 2016 transposition of the TPD into Italy (Law 6/2016) reaffirmed the sale ban to minors of electronic cigarettes and refill containers with nicotine, [13] that was already introduced in Italy in 2013. [11] The transposition introduced additional measures not provided by the TPD to restrict youth access to cigarettes and electronic cigarettes: monitoring that all vending machines are provided with age verification; stricter enforcement of the sale ban to minors, i.e. higher fines, suspension or revocation of license for tobacco retailers who sell tobacco products, electronic cigarettes or e-liquids to minors. Other measures of the transposition were added to protect minors from second-hand smoke exposure: smoking ban in cars with minors and pregnant women; smoking ban in outdoor areas of Pediatric and Gynecologic Departments of hospitals. [13]

Main aim of this paper was to study trends in tobacco smoking and electronic cigarette use among adolescents in Italy through three repeat national cross sectional surveys conducted before (in 2010, 2014) and after (2018) the 2016 introduction of the EU-TPD and its transposition, and before Juul entered the Italian market in 2019.

METHODS

The Global Youth Tobacco Survey (GYTS) is a nationally representative school-based, paper and pencil, cross-sectional survey of students in school grades associated with ages 13–15 years. GYTS has been carrying out in 61 countries worldwide. Further details are reported elsewhere. [14,15]

Briefly, GYTS uses a global standardized methodology that includes a two-stage sample design with schools selected with a probability proportional to enrolment size. The classes within selected schools are chosen randomly and all students in selected classes are eligible to participate in the survey. The survey uses a standard core questionnaire with a set of optional questions that countries can adapt to measure and track key tobacco control indicators. The questionnaire covers many domains: tobacco and electronic cigarettes use, cessation, second-hand smoke, pro- and anti-tobacco media and advertising, access to and availability of tobacco products and electronic cigarettes, knowledge and attitudes regarding tobacco use. The questionnaire is self-administered; using scannable paper-based bubble sheets, it is anonymous to ensure confidentiality.

In Italy, GYTS has been conducting every 4 years since 2010. In 2010 and 2014, GYTS was conducted by the Department of Public Health and Paediatrics of the University of Torino, and in 2018 by the National Health Institute, both under the coordination of the Ministry of Health. The 2010 and 2014 surveys were carried out in the framework of the Health Behaviour in School-aged Children (HBSC) surveys, on a random sub-sample of HBSC schools, but in different classes. [16,17] The Ethics Committee of the University of Torino approved the research protocol of GYTS surveys. Approval was also obtained from the principals of the schools participating in the three surveys. Class teachers administered the survey questionnaires during a regular school day. Parental opt-out consents to participate for the 2010 and 2014 surveys and parental opt-in consents in the 2018 survey were obtained in advance. Students were informed that participation was anonymous and voluntary. The demographic information does not allow identification of individual students involved in the surveys. A total of 1,854 students participated in the 2010 GYTS of which 1,587 were ages 13 to 15 years. The overall response rate was 85.6%. In 2014, a total of 1,822 eligible students in middle school grade 3 and high school grade 1 and grade 2 completed the survey, of which 1,428 were aged 13-15 years. The overall response rate was 77.0%. In 2018, the overall response rate was 77.4%; a total of 1,680 eligible students completed the survey, of which 1,518 were aged 13-15 year.

For this paper, we analyzed figures on prevalence of ever smokers or electronic cigarette users (“Have you ever tried or experimented with cigarette smoking/electronic cigarette use?”), and current smokers or vapers (“During the past 30 days, on how many days did you smoke cigarettes/use electronic cigarettes?”: current user: ≥ 1 day; frequent user: ≥ 20 days); on youth access to tobacco cigarettes and electronic cigarettes (“did anyone refuse to sell you cigarettes/electronic cigarettes because of your age?”; “Last time you smoked/used electronic cigarettes during the past 30 days, how did you get them?”). Questions on electronic cigarettes were not included in the 2010 GYTS, because electronic cigarettes became widespread in Italy since 2012. [9] Questions on ever electronic cigarette use specifying nicotine levels (tried electronic cigarettes with nicotine; with and without nicotine; without nicotine; don’t know); on the number of days of current electronic cigarette users in the last month; on youth access to electronic cigarettes were in the 2018 GYTS only, given that electronic cigarette use among adolescents was at the beginning in Italy in the 2014 survey. Parental smoking status was used as a socioeconomic status (SES) indicator.[18]

Statistical analysis was conducted computing prevalence of ever or current smokers, and youth access to tobacco cigarettes recorded in the three surveys; prevalence of ever or current exclusive electronic cigarette users, dual users, and prevalence of electronic cigarette users recorded in the 2014 and 2018 surveys, and youth access to electronic cigarettes recorded in the 2018 GYTS. The GYTS data are weighted to adjust for sample selection (school and class levels), non-response (school, class, and student levels), and post-stratification of the sample population relative to the grade and sex distribution in the total population. [15] Stata programme was used to compute 95% confidence intervals (95%CI), and weighted prevalence estimates. In order to study trends in current smoking and electronic cigarette use prevalence, a Poisson regression model with robust variance was used for estimating prevalence ratios adjusted for gender, age, and parental smoking status, as a proxy of SES.

RESULTS

Tobacco smoking and electronic cigarettes use: Total ever use of cigarettes and/or electronic cigarettes non-significantly increased from 46.0% in 2010 to 52.2% in 2018. (Figure 1; Table 1, 2) Similarly, combined current cigarette smokers and/or electronic cigarette users non-significantly increased from 20.7% to 27.9% (Figure 1; Table 1,2, Table 3). Although smokers stalled around 20% from 2010 to 2018, a non-significant decrease of both ever and current smokers was observed from 2014 to 2018 (Figure 1; Table 1), and, adjusting for age, gender, and parental smoking status, this decrease was significant (PR=0.78 ; 95%CI: 0.62 – 0.99; Table 3). The decline was steeper in boys (PR=0.63; 95%CI: 0.46-0.88). In both 2014 and 2018 surveys, prevalence of female smokers was higher, and the gap increased in 2018: current smokers in girls (23.6%) was 46% higher than that recorded in boys. Frequent smokers) were 27% of current smokers in 2018 (Figure A1; Table 1).

From 2014 to 2018 a significant increase in ever electronic cigarette users was recorded (40% in boys, 76% in girls). Among ever users in 2018, 45% (40% of boys and 50% of girls) tried electronic cigarettes with nicotine, and 42% nicotine-free electronic cigarettes (52% in boys; 31% in girls; Figure A2; Table 2). Moreover, a doubling of current electronic cigarette users both in boys (from 11.0% to 21.9%) and in girls (from 5.9% to 12.8%) was recorded, also adjusting for potential confounders (PR=2.25; 95%CI:1.77-2.86; Table 3). In both 2014 and 2018 surveys, boys recorded twice the current electronic cigarette use compared to girls (Table 2). In 2018, 5% of current vapers were frequent users (Figure A1). Ever or current exclusive vapers recorded an almost 3-fold significantly increase from 4.0% in 2014 to 11.3% in 2018; from 2.9% in 2014 to 8.2%, respectively (Figure 1). Adjusting for potential confounders, PR for current exclusive users of electronic cigarettes was 2.87 (95%CI: 2.09–3.94, Table 3). Moreover, the decline from 2014 to 2018 of current exclusive smokers of tobacco cigarettes was significant (PR=0.69; 95%CI:0.53-0.91), and dual users almost doubled (PR=1.87; 95%CI:1.13 – 3.07; Table 3).

Access to and availability of tobacco cigarettes and electronic cigarettes: about 90% of current smokers in 2010 and around 65% in 2014 and 2018 surveys were not refused in tobacco retailers to

buy cigarettes because of their age. There was a shift in the purchase source: buying cigarettes in tobacco retailers halved, from 48.8% in 2010 to 19.7% in 2018, whereas buying them in vending machines increased to 15.3% in 2018 (Table 1). Three out of 4 current electronic cigarettes users (76%) were not refused to buy electronic cigarettes or refill products in shops because of their age in 2018. Current users got electronic cigarettes from specialized shops (10.2%) and tobacco retailers (4.0%), or through friends or relatives (78.8%). Few users got electronic cigarettes via the internet (3.1%).

DISCUSSION

Adolescents who currently smoked tobacco cigarettes and/or used electronic cigarettes non-significantly increased from 21% in 2010 to 28% in 2018, and a 3-fold significant increase of exclusive electronic cigarette users were recorded in Italy. Moreover, even though smoking prevalence stalled from 2010 to 2018, significant but little decreases in smoking prevalence from 23% in 2014 to 20% in 2018, and from 18% to 10% among exclusive tobacco cigarette smokers, and a significant increase from 6% to 9% among dual users were recorded.

As already known, prevalence of current smokers in Italy (20% in 2018 GYTS) stalled in the last decades, and in 2018 it was more than thrice than that recorded in UK, where smoking prevalence among adolescents steadily declined from 20% in 1998 to 6% in 2016 [5] Prevalence of current vapers in Italy doubled from 2014 in 2018 (from 8% to 18%), and in 2018 it was thrice than that recorded among 11-15 year old adolescents (6%) in England, where current vapers recorded a 50% increase from 4% in 2014 to 6% in 2016, and did not increase up to 2018. [5,19]. Even though both countries introduced the EU-TPD in 2016, Italy alone recorded a doubling in vaping among adolescents. The rise in electronic cigarette use during 2017-2018 in the USA was consistent with increases in sales of the electronic cigarette Juul. [6] In England no increases in electronic cigarette use were recorded after the introduction of Juul in July 2018. [19] The increase in Italy was observed before Juul entered the Italian market in January 2019. Anyway, we can't rule out – even though it seems unlikely - that nicotine salt vaping products other than Juul could have partially

determined the rise of electronic cigarette use in Italy among adolescents. To our knowledge, other salt vaping products were not widespread in Italy up to the introduction of Juul in January 2019.

It is noteworthy that 42% of ever vapers among Italian adolescents exclusively used nicotine-free electronic cigarettes, and less than 1% were frequent vapers (≥ 20 days in the past 30 days). Nicotine-free electronic cigarette does not determine the development of nicotine addiction among adolescents.

The 3-fold increase of exclusive electronic cigarette users we recorded in Italy, was also observed in other countries: in the UK the proportion of young people who have never smoked but have tried vaping doubled from 14% in 2014 to 30% in 2018. [8] In the USA in 6th-12th graders ever and current exclusive electronic cigarette users 20-fold increased from 0.3% in 2011 to 6.5% in 2014, and from 0.3% to 5.8%, respectively. [20]

The extent to which electronic cigarette-only users would have tried smoking if vaping had not been available, is debated. Studies from North America and UK showed that ever exclusive vapers were 3-fold more likely than never smokers who did not vape, to subsequently experimenting cigarettes, or becoming current smokers, after adjusting for many confounders. [21-25] On the other hand, other Authors are critical on the causal relationship between vaping and subsequent smoking, reporting that electronic cigarette use and tobacco experimentation have common liability, i.e., exclusive electronic cigarette experimenters would have initiated smoking anyway, because they were already favourably disposed towards tobacco use. [26] Against this hypothesis, in the two English cohort studies, electronic cigarette-only users with firm intention not to smoke and/or those with no smokers among their friends – that is, young people not thought to be at high risk of smoking - had a greater likelihood of cigarette experimentation. [22,23] Moreover, other studies in the US showed that electronic cigarettes are not substituting for cigarettes, and are used by youths who are unlikely to have started using tobacco cigarettes. [20,27] Hence, probably electronic cigarette use is introducing new youth to tobacco cigarettes and increases the likelihood of smoking among low-risk group. Against these findings, supporters of the “common liability” theory reported

that during the period when young people are experimenting with electronic cigarettes, smoking prevalence have continued to decline, at least in UK in USA. Thus, electronic cigarette use seems not to be able to increase cigarette smoking initiation and smoking prevalence. [8,26] However, it is also possible that smoking prevalence might have decreased further in the absence of electronic cigarette use. [25] Anyway, use of electronic cigarettes among adolescents could become a public health problem per se, regardless of its link with smoking. [28] In Italy electronic cigarettes do not seem to have determined an increase in tobacco smoking, but to have likely determined a non-significantly increase in the number of adolescents who accessed to at least one of the two products (tobacco and/or electronic cigarettes). Figures in next years will show whether this increase will be confirmed.

About 65% of current smokers and 76% of electronic cigarette users kept on to easily access to cigarettes or electronic cigarettes and refill products after the TPD introduction. The shift in purchasing source for cigarettes - from buying cigarettes in tobacco retailers to buying them from vending machines - reflected the restriction introduced in the transposition, i.e., higher fines, suspension or revocation of license for tobacco retailers who sell tobacco products to minors.

Our findings are subject to some limitations. First, we cannot determine whether dual users of cigarettes and electronic cigarettes initiate use with cigarettes or electronic cigarettes, because this analysis uses cross-sectional data. Second, the 2014 GYTS did not assess frequency of current electronic cigarette use and whether electronic cigarettes contained nicotine. Third, we have no data on electronic cigarette brands used by adolescents, and whether they are nicotine salt vaping products other than Juul, or liquid nicotine products. Fourth, ever and current users of pipe/cigars/cigarillos and of smokeless tobacco products (snuff, chewing tobacco, heated tobacco products) were not included in the analyses, because figures were available for 2018 only, and they would have further complicated analyses. In 2018 ever and current users of pipe/cigarillos/cigars among adolescents in the 2018 GYTS were 12.5% (95% CI: 10.3%-15.0%) and 4.2% (95% CI: 3.0%-5.8%), respectively; ever and current users of smokeless tobacco products were 3.4% (95%

CI: 2.4%-4.7%) and 1.6% (95%CI: 1.0%-2.6%), respectively. Fifth, sample sizes of the three surveys was relatively limited, even though they were representative of population aged 13-15 years old.

Strength of the study is that to our knowledge is the first evaluating electronic cigarette use among adolescents in Italy, and it is the first evaluating the impact of TPD and its transposition in terms of changes in electronic cigarette use and tobacco smoking among Italian adolescents.

Conclusions

After two years from its implementation in 2016, the EU-TPD does not seem to have slowed down the increase in vaping among Italian adolescents. In UK, instead, an increase in vaping among adolescents was not recorded after the EU-TPD introduction. Additional research is needed in order to show a clear association between regulatory changes introduced by EU-TPD and the impact on electronic cigarette use and smoking among adolescents in Italy, UK, and the EU.

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Table 1: Global Youth Tobacco Survey: Ever and current smokers, and youth access to cigarettes, Italy, 2010, 2014, 2018.

GYTS items	2010 % (95%CI)	2014 % (95%CI)	2018 % (95%CI)
Have you ever tried or experimented with cigarette smoking, even one or two puffs?			
<i>Yes (Ever smokers)</i>			
Boys	45.1 (39.4 - 50.9)	46.0 (40.0 - 52.1)	38.0 (32.8 - 43.5)
Girls	46.7 (39.6 - 53.9)	46.9 (41.3 - 52.6)	44.1 (38.7 - 49.7)
Overall	46.0 (40.9 - 51.2)	46.4 (41.5 - 51.4)	41.0 (36.5 - 45.6)
During the past 30 days, on how many days did you smoke cigarettes?			
Current smokers			
Boys, current smokers (≥1 day)	19.4 (15.8 - 23.7)	20.6 (15.5 - 26.9)	16.2 (13.2 - 19.7)
Boys, frequent smokers (≥20 days)	6.3 (4.3 - 9.2)	7.9 (5.0 - 12.2)	4.0 (2.8 - 5.6)
Girls, current smokers (≥1 day)	21.6 (15.8 - 28.6)	26.3 (21.7 - 31.5)	23.6 (19.1 - 28.9)
Girls, frequent smokers (≥20 days)	8.3 (5.3 - 12.9)	7.3 (5.1 - 10.2)	7.0 (4.9 - 9.9)
Overall, current smokers (≥1 day)	20.7 (16.8 - 25.2)	23.4 (19.5 - 28.0)	19.8 (16.6 - 23.5)
Overall, frequent smokers (≥20 days)	7.6 (5.7 - 10.0)	7.6 (5.5 - 10.3)	5.4 (4.1 - 7.1)
Access to tobacco cigarettes (among current smokers)			
During the past 30 days, did anyone refuse to sell you cigarettes because of your age?			
No	91.7 (83.2 - 96.1)	63.8 (58.1 - 69.2)	68.0 (58.8 - 75.9)
Last time you smoked during the past 30 days, you got:			
<i>buying them in a store*</i>	48.8 (41.2 - 56.4)	38.2 (31.5 - 45.3)	19.7 (13.8 - 27.3)
<i>buying them in vending machines</i>	10.7 (7.1 - 15.9)	7.7 (5.3 - 11.0)	15.3 (9.4 - 24.0)
<i>giving money to someone else to buy cigarettes</i>	9.2 (5.3 - 16.5)	15.7 (10.9 - 22.0)	10.8 (7.3 - 15.8)
<i>getting cigarettes from someone else</i>	31.3 (26.4 - 36.6)	38.5 (31.5 - 45.9)	54.1 (45.6 - 62.5)

* 2014: in a store, shop or street vendor / 2018: in a bar, tobacconist, or street vendor

Table 2: Global Youth Tobacco Survey: Ever and current electronic cigarettes users. Italy, 2014, 2018.

GYTS items	2014 % (95%CI)	2018 % (95%CI)	2018 % (95%CI)	
Have you ever tried or experimented with electronic cigarettes? <i>Yes (ever electronic cigarettes users)</i>				
Boys	32.7 (27.2- 38.7)	45.8 (41.3 – 50.4)	with nicotine	5.3 (3.8 - 7.5)
			with & without nicotine	12.9 (10.2 -16.2)
			without nicotine	23.8 (20.3 – 27.7)
			don't know	3.7 (2.5 – 5.5)
Girls	23.3 (18.7 – 28.7)	41.1 (34.9 – 47.6)	with nicotine	7.5 (5.1 - 10.9)
			with & without nicotine	13.1 (10.4 – 16.3)
			without nicotine	12.7 (9.9 – 16.1)
			don't know	7.9 (5.9 - 10.5)
Total	28.0 (23.5- 32.9)	43.5 (39.7 -47.4)	with nicotine	6.4 (4.8 - 8.4)
			with & without nicotine	13.0 (10.8 - 15.5)
			without nicotine	18.4 (16.4 – 20.7)
			don't know	5.7 (4.54 - 7.5)
During the past 30 days (one month), on how many days did you smoke e cigarettes? <i>at least one day (current electronic cigarettes users)</i>				
Boys	11.0 (7.4 - 16.0)	21.9 (18.2 - 26.1)	Frequent users (≥20 days)	1.2 (0.5 – 2.6)
Girls	5.9 (4.1 - 8.5)	12.8 (10.3 - 15.9)	Frequent users (≥20 days)	0.5 (0.2 – 1.3)
Total	8.4 (6.1 - 11.5)	17.5 (15.0 - 20.4)	Frequent users (≥20 days)	0.8 (0.4 – 1.9)

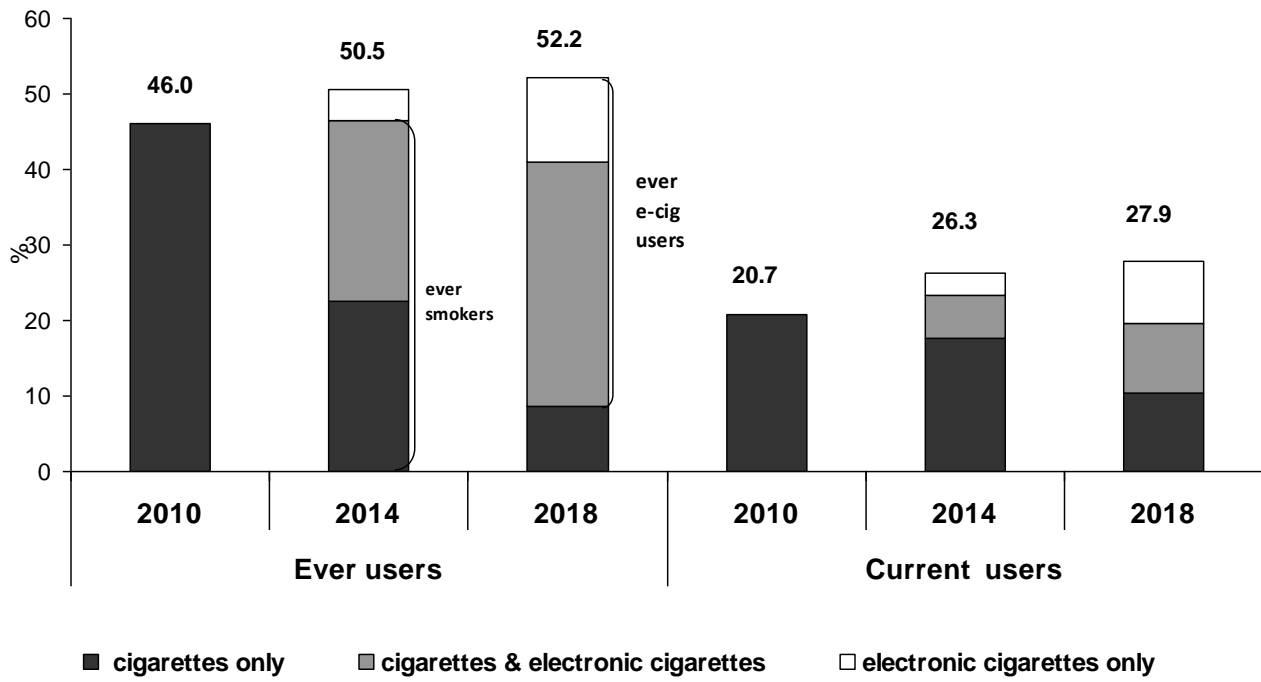
Table 3: Prevalence Ratios (PR) and 95% confidence intervals (95%CI) of current tobacco cigarette smokers, and current electronic cigarette users in 2014 and 2018.

	N (%)	PR (95%CI) §	PR (95%CI) §§
Current tobacco cigarette smokers			
2014	313 (23.4)	1 *	1 *
2018	313 (19.8)	0.84 (0.64 – 1.11)	0.78 (0.62 – 0.99)
Current electronic cigarette users			
2014	120 (8.4)	1 *	1 *
2018	269 (17.5)	2.08 (1.46 – 2.97)	2.25 (1.77 – 2.86)
Current users of electronic cigarette only			
2014	43 (2.9)	1 *	1 *
2018	120 (8.2)	2.85 (1.98 – 4.10)	2.87 (2.09 – 3.94)
Current users of tobacco cigarettes only			
2014	236 (17.7)	1 *	1 *
2018	164 (10.3)	0.58 (0.43 – 0.78)	0.69 (0.53 – 0.91)
Current users of both tobacco products			
2014	77 (5.7)	1 *	1 *
2018	149 (9.4)	1.65 (1.00 – 2.71)	1.87 (1.13 – 3.07)
Current users of electronic cigarettes &/or tobacco cigarettes			
2014	356 (26.3)	1 *	1 *
2018	433 (27.9)	1.06 (0.84 – 1.34)	1.18 (0.93 – 1.48)

§ crude PR with no adjustments

§§ PR adjusted for age, gender, and parental smoking status.

Figure 1: Ever and current smokers and electronic cigarette (e-cig) users, GYTS, 2010-2018, Italy.



Highlights

- Current vapers among Italian adolescents increased from 0% in 2010 to 18% in 2018, whereas current smokers stalled at 20%
- Current exclusive vapers recorded a 3-fold increase from 3% in 2014 to 8% in 2018 before Juul entered the Italian market
- European Union -Tobacco Productive Directive seems not to have slowed down the increase in vaping among Italian adolescents

Journal Pre-proof