Original article

Harm Reduction or Harm Introduction? Prevalence and Correlates of E-Cigarette Use Among French Adolescents

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A B S T R A C T

Purpose: Electronic cigarettes are marketed as a tool to give up or reduce cigarette smoking, and their use has risen sharply in recent years. There is concern that use is increasing particularly among adolescents and that they are not being used as a cessation tool but as a novel experience in their own right.
Methods: The present research assessed prevalence and sociodemographic correlates of e-cigarette use and standard cigarette use and also explored the extent to which e-cigarettes appear to be used as a cessation tool. This was assessed using a questionnaire administered to 1,486 French adolescents aged 16 years.
Results: Prevalence of e-cigarette experimentation was high (54%) and comparable to that for standard cigarettes (55%). Furthermore, 20% of those who had experimented with e-cigarettes had never tried standard cigarettes, and among regular smokers of standard cigarettes, intentions to quit were not associated with e-cigarette usage frequency. Experimentation with both e-cigarettes and standard cigarettes was significantly predicted by higher age, higher socioeconomic status, and parental smoking of standard cigarettes (in particular the father). Being male marginally predicted e-cigarette use, whereas being female significantly predicted standard cigarette use.
Conclusions: These findings give cause for concern: e-cigarette usage experimentation is extremely high, and is not associated with attempts to quit smoking standard cigarettes. Rather, it is exposing adolescents to a highly addictive drug (nicotine) and may pave the way for a future cigarette habit.

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IMPLICATIONS AND CONTRIBUTION

The present research assessed prevalence and correlates of e-cigarette use in French adolescents (mean age = 16 years). The rate of experimentation was extremely high (54%), experimentation was more likely among older, high socioeconomic status males with parents who smoked, and e-cigarettes did not appear to be used as a cessation tool.

Smoking is the single biggest cause of cancer in the world [1]; half of all smokers will be killed by their habit [2]. However, smoking is a highly addictive habit and smokers generally find it very difficult to give up [3]. Electronic cigarettes (e-cigarettes) are thought to be safer alternatives to standard cigarettes; because there is no combustion, users are not exposed to the toxic combustion gases and particles that are responsible for most tobacco-related disease [4]. Similar to nicotine patches and gum, they are marketed as a cessation tool, and recent studies suggest they can be effective in reducing the desire to smoke in the short term [5] and cessation in the longer term [6], although no more so than nicotine patches [7]. Little is known about the long-term effects of e-cigarette usage in humans, but it seems that they may not be entirely harmless; studies on mice have found harmful effects [8], and research has suggested long-term dependence on e-cigarettes may be an issue [7]. E-cigarettes are becoming more and more popular; in a large-scale US study, ever use more than quadrupled from .6% in 2009 to 2.7% in 2010 [9], so research into the potential harmful effects of e-cigarettes is warranted.

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Adult smokers generally report using e-cigarettes as a cessation tool [10]. As such, their use can be classed as a harm reduction technique [11], in that it reduces the harm of recreational drug use (nicotine) without reducing or eliminating the use itself. However, there are concerns that among adolescents, e-cigarettes are not used as a cessation aid but as a novel experience in their own right, with several studies showing that a sizeable proportion of adolescent e-cigarette users have never smoked standard cigarettes [12]. Thus used, rather than reducing the harm of a recreational drug use, e-cigarettes are introducing a recreational drug use that did not exist previously, potentially creating a physical dependence on nicotine that might leave users more vulnerable to becoming future cigarette smokers [13]. Relatedly, among adolescents who are already regular cigarette smokers, smoking of e-cigarettes has been found to be unrelated to cessation intentions [14], or even when found to be related to quit attempts, it is also associated with heaver smoking [15], casting doubt on the utility of the e-cigarette as a cessation tool. Thus, among adolescent nonsmokers, e-cigarettes are potentially harmful, and even among those who are already smokers, they are not useful.

Reports of the prevalence of e-cigarette usage by adolescents have varied widely by region and by year of study, with rates seemingly increasing sharply in recent years. For example, less than 1% of US male adolescents in 2011 [16] and Korean adolescents in 2008 [17] were found to have ever tried e-cigarettes, but 21% of Polish high school and university students had ever tried them in 2010–2011 [18] and 25% of US high school students had tried them in 2013 [19]. In France, prevalence rates seem high, with 31% of a nation-wide sample of French 15–24 year olds having ever tried them at the end of 2013 [20]. The general trend is toward increased usage, and it is likely that these figures will underestimate current usage. Up to date data on prevalence of experimentation and usage will give a better idea of the extent of the problem.

Relative to what is known about the psychosocial correlates of standard cigarette smoking, little is known about the correlates of e-cigarette smoking, and what limited research exists is inconclusive. Although e-cigarette experimentation seems to be higher among females in adults (Australian, Canadian, United Kingdom, and US samples, [21]), among adolescents, e-cigarette experimentation has been shown to be higher in males in Korean [16], Polish [18], and US [22] samples but not in a French sample [12], and in some age groups females experimented more. For standard cigarettes, prevalence has generally been found to be equivalent in males and females [23], and higher in females in countries where female empowerment is high [24]. Although, in general, younger people are more likely to have used e-cigarettes than older adults [21], within the adolescent age group the relationship between age and experimentation is unclear, with some studies finding no relationship [25] but others finding a positive relationship [26], as with standard cigarettes [27]. For socioeconomic status (SES), in adult populations, e-cigarette usage has been shown to correlate positively with SES [21], but no such relationship was found in an adolescent population [25]. For standard cigarette smoking, a negative relationship is generally observed between SES and smoking among adolescents [28]. Finally, e-cigarette usage has been found to be higher among adolescents with a parent who smokes standard cigarettes [18], as is often found for standard cigarettes [27]. Thus, in the present research we explored whether e-cigarette experimentation was correlated with gender, age, SES, and parental

smoking status and whether the pattern of correlates differed to that found for standard cigarettes. This can facilitate the identification of those adolescents at a higher risk of experimenting with e-cigarettes and allow for health education messages to be targeted at these at-risk subgroups.

To summarize, the present research assessed prevalence and correlates of e-cigarette usage, and compared this with standard cigarette usage. We also assessed the extent to which adolescents appeared to be using e-cigarettes as a cessation tool. The study was cross-sectional and assessed variables using a questionnaire administered to a sample of French adolescents. Existing research on e-cigarettes has been limited in terms of cultural contexts: To our knowledge, only two studies have used a French sample [12,20], and both used descriptive statistics to explore correlates of e-cigarette use. The present study aims to establish the correlates of e-cigarette use with more confidence by using inferential statistical analyses. The analyses first looked at the frequency of e-cigarette users who had never smoked standard cigarettes: If e-cigarettes are used primarily as a cessation tool or safer alternative to standard cigarettes, they should only be used by those who are also cigarette smokers. Next, we looked at regular cigarette smokers and examined whether their intentions to quit varied as a function of their e-cigarette usage: To the extent that e-cigarettes are used as a cessation tool, cessation intentions should increase along with e-cigarette usage. In the next stage of the analysis we explored the correlates of e-cigarette experimentation (gender, age, SES, and parental smoking) and compared them with the variables that predict standard cigarette experimentation.

Method

Participants

A total of 1,486 participants (709 females), attending seven different schools, took part in the study. Participants were all in their first year of "lycée" (mean age = 16.13 years, standard deviation = .71 years). All schools were located in the Hauts-de-Seine, a region of higher than French average (but lower than Parisian average) urban density and SES [29]. Each school serves neighborhoods of varying SES, in accordance with the French principle of social diversity (mixité sociale). See Table 1 for descriptive statistics for the sample as a whole. (Ethnic origin of participants is not reported because the collection of this information is prevented by Article 1 of the French constitution.)

Table 1
Descriptive statistics displaying socioeconomic status of sample via family affluence scale (FAS)

	Frequency (%)
FAS1. Own bedroom	
No	30
Yes	70
FAS2. Parental car ownership	
No car	16
One car	47
Two cars or more	37
FAS3. Family holidays in previous year	
None	12
One	21
Two	23
More than two	44