Addictive Behaviors Reports 16 (2022) 100458

Contents lists available at ScienceDirect

Addictive Behaviors Reports

journal homepage: www.elsevier.com/locate/abrep

Identifying changes in e-cigarette use among a longitudinal sample of Canadian youth e-cigarette users in the COMPASS cohort study, 2017/18–2018/19

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ARTICLE INFO

Keywords:
Adolescent
E-cigarette use
Escalate
Reduce
Quit

ABSTRACT

Objectives: There are few studies describing longitudinal changes in vaping patterns among current youth e-cigarette users. The objective of this study was to identify-one-year changes in e-cigarette use patterns among a longitudinal sample of Canadian youth e-cigarette users between 2017/18 and 2018/19.

Methods: The longitudinal sample included n = 4,071 current (past 30-day) e-cigarette users in grades 9–11 attending schools in four Canadian provinces. Students reported the number of days they used e-cigarettes in the past 30 days in 2017/18 and 2018/19. Based on responses, students could have escalated, reduced, stopped, or maintained their level of vaping. The prevalence of each e-cigarette use pattern was identified across demographic characteristics and regression models identified significant predictors of each use pattern.

Results: Over one year, 49.2% of current youth e-cigarette users escalated, 12.8% reduced, 20.2% stopped, and 17.8% maintained their frequency of e-cigarette use. Baseline e-cigarette use frequencies varied according to use pattern. Current youth e-cigarette users with higher baseline vaping frequencies had lower odds of escalating and stopping e-cigarette use and higher odds of reducing e-cigarette use relative to maintaining the same frequency of use.

Conclusions: While about half of current youth e-cigarette users increased their frequency of e-cigarette use over a 1-year period, a significant number also decreased or stopped vaping at a time when the prevalence of youth e-cigarette use increased rapidly in Canada. There is a need for longitudinal data to monitor and evaluate changes to e-cigarette use patterns that may be in response to changing public health policies.

1. Introduction

The prevalence of e-cigarette use (or vaping) among adolescent populations in Canada and the United States (US) has increased over the last decade (Cole et al., 2020; Johnston et al., 2021; Levy et al., 2018). For example, between 2013 and 2018, the prevalence of current e-cigarette use among a sample of Ontario, Canada high school students increased from 7.6 % to 25.7 % (Cole et al., 2020), and nationally representative data suggest that the prevalence of current e-cigarette use among Canadian youth aged 16 to 19 years doubled between 2017 (8.4 %) and 2019 (17.8 %)(Hammond, Rynard, et al., 2020). Other nationally representative data indicate that the prevalence of current e-cigarette use among Canadian youth in grades 7 to 12 doubled from 10 % in 2016/17 to 20 % in 2018/19 (Health Canada, 2019). It was during this period that nicotine-containing devices became legally available for sale in the Canadian market (Tobacco and Vaping Products Act, 2018) and vaping devices and brands were more widely advertised online and in stores (Hammond, Reid, et al., 2020). Under this Act, the minimum legal age for purchasing e-cigarettes was 18 or 19 years (depending on the province), however labelling, packaging, and advertising restrictions were not in place. While the long-term consequences of e-cigarette use are relatively unknown, it is known that nicotine is highly addictive and has a negative impact on the developing adolescent brain (U.S. Department of Health and Human Services, 2014) and as such, e-cigarettes with nicotine should not be used by youth.

Despite the rising prevalence of youth e-cigarette use, relatively few

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https://doi.org/10.1016/j.abrep.2022.100458
Received 18 April 2022; Received in revised form 11 August 2022; Accepted 18 September 2022
Available online 20 September 2022

studies report the frequency of vaping (e.g., number of days used e-cigarettes in the past month), which is necessary to fully understand the potential public health impact of vaping. Those that do report vaping frequency indicate that 68–80 % of current youth e-cigarette users vape infrequently (<10 days per month) (Bold et al., 2017; Villanti et al., 2017). Other repeat cross-sectional data indicate that 1.8–5.7 % of youth aged 16 to 19 years in Canada reported using e-cigarettes 20 or more days in the past 30 days between 2017 and 2019 (Hammond, Rynard, et al., 2020). While these cross-sectional and repeat cross-sectional data provide a glimpse into youth vaping behaviours, they do not provide in-depth insight into how youth e-cigarette use changes over time. Students who use e-cigarettes may keep the same level (i.e., maintain), increase (i.e., escalate), or decrease their level of vaping (i.e., reduce or stop), and knowledge of these e-cigarette use patterns can be used to develop more robust prevention and cessation efforts.

There are few studies that have examined longitudinal changes in e-cigarette use patterns. These studies estimate that 4–34 % of students (aged 12–19 years) escalate the frequency of vaping nicotine over 2–5 years (Harrell et al., 2021; Lanza et al., 2020; Park et al., 2020; Westling et al., 2017). There are limited data indicating that some youth stop vaping (Stanton et al., 2020). Given the relative lack of longitudinal data describing changes in vaping patterns among current youth e-cigarette users and the changes in vaping devices since these longitudinal studies were conducted, there is a need for more current data showing changes in e-cigarette use patterns among current youth e-cigarette users. In particular, given that the prevalence of youth e-cigarette use in Canada increased significantly between 2017 and 2019 when nicotine-containing devices became legally available (Cole et al., 2020; Hammond, Rynard, et al., 2020), data showing changes in vaping patterns among current youth e-cigarette users can help public health professionals fully understand the youth vaping epidemic, including how many youth are interested in quitting or reducing e-cigarette use, and aid in evaluating the impact of e-cigarette prevention policies and programs.

Therefore, the objective of this study was to identify one-year changes in e-cigarette use patterns among a large, longitudinal sample of Canadian youth who were current e-cigarette users between 2017/18 and 2018/19 when the largest increase in e-cigarette use prevalence occurred. We also explored whether e-cigarette use patterns differed among sociodemographic groups (e.g., grade, gender, ethnicity) in the sample.

2. Materials & methods

The current study used two years of linked longitudinal data from students participating in the COMPASS study. The COMPASS study is a CIHR-funded (2012–2027) school-based prospective cohort study that collects data annually from a rolling cohort of students in grades 9–12 (Secondary I-V in Quebec) and the schools they attend in a convenience sample of schools in Canada (Leatherdale et al., 2014). Participating schools permitted active-information passive consent parental permission protocols (passive consent), whereby parent(s) or guardian(s) of students were provided an information letter describing the study and asked to email study staff if they did not want their child to participate (Thompson-Haile & Leatherdale, 2013). All students in participating schools were eligible to participate. A full description of the COMPASS study methods can be found in print (Leatherdale et al., 2014) or online (https://www.compass.uwaterloo.ca). The COMPASS study received ethics approval from the University of Waterloo Research Ethics Board (#30118) and appropriate school board review committees. This secondary data analysis received ethics approval from the Ontario Tech University Research Ethics Board (#15884).

2.1. Participants

This study used data from a sample of current (past 30-day) youth e-cigarette users in Year 6 (2017/18, baseline) and Year 7 (2018/19, follow-up) of the COMPASS study. These study waves were selected given that the legal sale of e-cigarettes with nicotine occurred during this time and these waves were prior to the COVID-19 pandemic when changes to data collection methods occurred. At baseline, n = 40,887 students in grades 9–11 (secondary III-IV in Quebec) attending n = 112 secondary schools across Ontario (n = 58), Quebec (n = 31), British Columbia (n = 14), and Alberta (n = 8) participated (81.1 % student participation rate). Student non-response was primarily a result of student absenteeism the day of the data collection.

A series of steps were used to narrow the sample to baseline current youth e-cigarette users with data at both baseline and follow-up (flow diagram in Supplementary Fig. 1). Given our focus on identifying changes in vaping behaviours among current youth e-cigarette users, in *Step 1*, students who had not used e-cigarettes in the last 30 days at baseline were removed from the sample (n = 31,396), as were students who had missing e-cigarette use data at baseline (n = 633). This left a sample of n = 8,858 current (past 30-day) youth e-cigarette users. *Step 2* involved linking these current youth e-cigarette users between baseline and follow-up using a unique code generated by each student (Battista et al., 2019). Of those current youth e-cigarette users (n = 8,858), 46.3 % (n = 4,102) could be linked at follow-up. Loss to follow-up was primarily a result of student absenteeism the day of the data collection. Of the 4,102 students with linked data, n = 31 had missing e-cigarette use data at follow-up and were removed (*Step 3*), leaving a final linked sample of n = 4,071. Given that very few students (n = 2) had missing values for grade, gender, or ethnicity, they were retained in the analytic sample. Current e-cigarette users who could be linked at follow-up tended to be in grade 9 or 10, female, white, and reported lower vaping frequencies at baseline relative to current e-cigarette users who could not be linked (Supplementary Table 1).

2.2. Measures

Student-level data were collected during class time using the COMPASS questionnaire (Cq), a machine-readable paper survey (Bredin & Leatherdale, 2014). At the time of the survey, the Cq referred to vaping devices as “e-cigarettes” and did not include a definition or examples of devices. The survey also did not differentiate between e-cigarettes with or without nicotine. Consistent with validated measures for cigarette smoking (Wong et al., 2012), students reported the number of days in the last 30 days that they used e-cigarettes [response options: none, 1 day, 2 to 3 days, 4 to 5 days, 6 to 10 days, 11 to 20 days, 21 to 29 days, and 30 days (every day)]. Based on responses to this question at baseline and follow-up, current e-cigarette users who *escalated* vaping reported increasing the number of days they used e-cigarettes between baseline and follow-up, those who *reduced* vaping reported decreasing the number of days they used e-cigarettes between baseline and follow-up but still reported using e-cigarettes in the last 30 days, those who *stopped* vaping did not report e-cigarette use in the last 30 days at follow-up, and those who *maintained* vaping reported using e-cigarettes for the same number of days at baseline and follow-up. The Cq also included demographic questions consistent with other Canadian surveys including student grade (9, 10, 11), self-reported ethnicity (White, Black, Asian, Latin American/Hispanic, Other) and gender (female, male).

2.3. Analysis

Statistical analyses were conducted using SAS software, Version 9.4 (SAS Institute Inc, 2012). We identified the prevalence of escalating, reducing, stopping, and maintaining vaping in the sample of current e-cigarette users overall and by demographic characteristics. We also examined changes in e-cigarette use frequencies across e-cigarette use patterns and gender to better understand one-year changes in student behaviours among current e-cigarette users. Finally, we identified

associations between demographic characteristics and e-cigarette use patterns using multilevel logistic regression models, which accounted for student-level clustering within schools. Models were stratified by gender. Due to the small number of respondents in some categories, ethnicity was grouped as "White" versus "non-White" (which included any student who reported an ethnicity other than "White", including multiple ethnicities) in regression analyses. Similarly, e-cigarette use frequencies were grouped as 1–5 days, 6–10 days, 11–19 days, and > 20 days in regression analyses due to the small number of respondents in some categories.

3. Results

Just over half of the sample of current e-cigarette users were male (54.3 %), with 33.2 % of students in grade 9, 41.3 % in grade 10, and 25.6 % in grade 11; 77.1 % were white and 53.8 % were from Ontario, Canada.

At baseline, 29.2 % of current e-cigarette users reported vaping 1 day, 25.2 % reported vaping 2–3 days, 11.9 % reported vaping 4–5 days, 9.0 % reported vaping 6–10 days, 9.9 % reported vaping 11–20 days, 6.5 % reported vaping 21–29 days, and 8.3 % reported vaping 30 days (everyday) in the past 30 days. Over one year (2017/18–2018/19), 49.2 % of baseline current youth e-cigarette users escalated their frequency of use, 12.8 % reduced their frequency of use, 20.2 % stopped using e-cigarettes, and 17.8 % maintained the same frequency of e-cigarette use. At follow-up, 20.2 % of students reported vaping 0 days, 9.0 % reported vaping 1 day, 11.3 % reported vaping 2–3 days, 6.8 % reported vaping 4–5 days, 7.5 % reported vaping 6–10 days, 9.4 % reported vaping 11–20 days, 11.3 % reported vaping 21–29 days, and 24.6 % reported vaping 30 days (everyday) in the past 30 days. Table 1 presents the prevalence of e-cigarette use patterns according to sociodemographic characteristics.

Table 1
Prevalence of e-cigarette use patterns among the sample of current youth e-cigarette users at baseline according to sociodemographic characteristics, 2017/18–2018/19 COMPASS study.

Characteristic	Escalated e-cigarette use n (%)	Maintained e-cigarette use n (%)	Reduced e-cigarette use n (%)	Stopped using e-cigarettes n (%)	Chi-square (df)
Overall	2003 (49.2)	725 (17.8)	519 (12.8)	824 (20.2)	
Grade					
9	698 (51.3)	249 (18.3)	151 (11.1)	264 (19.4)	9.7 (6) p = 0.137
10	805 (48.0)	284 (16.9)	227 (13.5)	361 (21.5)	
11	500 (48.5)	191 (18.5)	141 (13.7)	199 (19.3)	
Gender					
Female	869 (46.7)	309 (16.6)	242 (13.0)	440 (23.7)	26.9 (3) p < 0.001
Male	1133 (51.3)	416 (18.8)	277 (12.5)	384 (17.4)	
Ethnicity					
White	1560 (50.1)	565 (18.1)	397 (12.7)	594 (19.1)	27.9 (12) p = 0.006
Black	41 (43.2)	18 (19.0)	13 (13.7)	23 (24.2)	
Asian	86 (42.2)	31 (15.2)	20 (9.8)	67 (32.8)	
Latin American/ Hispanic	40 (47.1)	17 (20.0)	8 (9.4)	20 (23.5)	
Other/ mixed [a]	276 (48.3)	94 (16.5)	81 (14.2)	120 (21.0)	

[a] this group includes students who identified as "off-reserve Aboriginal", who identified as another ethnic group not listed in the survey question (other), and who selected more than one response to the survey question (multiracial).

Table 2 presents the number of days current youth e-cigarette users reported using e-cigarettes in the past 30 days at baseline among those who maintained and stopped using e-cigarettes over one year. While half of students (50.2 %) who maintained e-cigarette use reported using e-cigarettes 1–5 days at baseline, more than one third (36.7 %) reported using e-cigarettes > 20 days in the past 30 days. Female students tended to report lower frequencies of e-cigarette use than males. The vast majority of students (83.4 %) who stopped using e-cigarettes reported using e-cigarettes 1–5 days at baseline, and similar to the pattern among those who maintained e-cigarette use, female students tended to report lower frequencies of e-cigarette use than males.

Fig. 1 presents the change in frequency of past 30-day e-cigarette use among those who escalated their e-cigarette use over one year. While the majority of students (72.6 %) reported using e-cigarettes 1–5 days at baseline, at follow-up only 16.9 % of students reported using e-cigarettes 1–5 days in the past 30 days; in contrast, the proportion of students who reported using e-cigarettes > 20 days increased almost 10-fold over one-year (6.5 % at baseline vs 57.8 % at follow-up). The pattern of increasing frequency of use was similar across gender, although male students tended to report a higher frequency of e-cigarette use at both baseline and follow-up relative to female students.

Fig. 2 presents the change in frequency of past 30-day e-cigarette use among those who reduced their e-cigarette use over one year. While over one-third of students (37.2 %) reported using e-cigarettes 1–5 days at baseline, this proportion doubled to 76.9 % at follow-up. While almost one-third of students (30.3 %) reported using e-cigarettes > 20 days at baseline, only 7.1 % reported this frequency of e-cigarette use at follow-up. The pattern of reduced frequency of use was similar across gender, although female students tended to report a lower frequency of e-cigarette use at both baseline and follow-up relative to male students.

Multilevel logistic regression models identified few sociodemographic characteristics associated with each e-cigarette use pattern (Supplementary Table 2). Relative to those who maintained the same level of e-cigarette use, male current youth e-cigarette users had 1.27 95 % CI [1.05–1.54] higher odds of escalating e-cigarette use relative to female students. A ceiling effect was observed among current youth e-cigarette users who vaped > 20 days in the past 30 days; these youth had 0.13 95 % CI [0.06–0.16] lower odds of escalating e-cigarette use relative to those who vaped 1–5 days in the past 30 days. Relative to those who maintained the same level of e-cigarette use, current youth e-cigarette users who vaped 6–10 and 11–19 days in the past 30 days had over 3 times higher odds of reducing e-cigarette use relative to those who vaped 1–5 days in the past 30 days (OR 3.86, 95 % CI [2.17–6.88], and OR 3.13, 95 % CI [1.89–5.22], respectively). Finally, relative to those who maintained the same level of e-cigarette use, current youth e-cigarette users in grade 10 had 1.44 95 % CI [1.05–1.97] higher odds of stopping e-cigarette use relative to those in grade 9, those indicating a non-White ethnicity had 1.34 95 % CI [1.03–1.74] higher odds of stopping e-cigarette use relative to those indicating a White ethnicity, and those who vaped 11–20 and > 20 days in the past 30 days had lower odds of stopping e-cigarette use relative to those who vaped 1–5 days in the past 30 days (OR 0.43, 95 % CI [0.24–0.74], and OR 0.10, 95 % CI [0.06–0.16], respectively). Similar results were obtained when the sample was stratified by gender (Supplementary Tables 3 & 4).

4. Discussion

We found that between 2017/18 and 2018/19, most student e-cigarette users in our longitudinal cohort reported significantly changing their e-cigarette use frequency. While about half of baseline e-cigarette users reported that they increased their frequency of e-cigarette use, a significant number (33.0 %) also reported decreasing or stopping e-cigarette use completely during a time when the largest increase in youth e-cigarette use prevalence was reported by Canadian

Table 2
Baseline e-cigarette use frequencies reported by the sample of current youth e-cigarette users who maintained and stopped using e-cigarettes over one year, by gender, 2017/18–2018/19 COMPASS study.

E-cigarette use pattern		1 day n (%)	2–3 days n (%)	4–5 days n (%)	6–10 days n (%)	11–20 days n (%)	21–29 days n (%)	30 days n (%)
Maintained e-cigarette use	Overall	189 (26.1)	142 (19.6)	33 (4.6)	38 (5.2)	57 (7.9)	47 (6.5)	219 (31.2)
	Female	110 (35.6)	79 (25.6)	14 (4.5)	19 (6.2)	21 (6.8)	14 (4.5)	52 (16.8)
	Male	79 (19.0)	63 (15.1)	19 (4.6)	19 (4.6)	36 (8.7)	33 (7.9)	167 (40.1)
Stopped using e-cigarettes	Overall	382 (46.4)	224 (27.2)	81 (9.8)	43 (5.2)	45 (5.5)	18 (2.2)	31 (3.8)
	Female	211 (48.0)	126 (28.6)	47 (10.7)	17 (3.9)	25 (5.7)	9 (2.1)	5 (1.1)
	Male	171 (44.5)	98 (25.5)	34 (8.9)	26 (6.8)	20 (5.2)	9 (2.3)	26 (6.8)

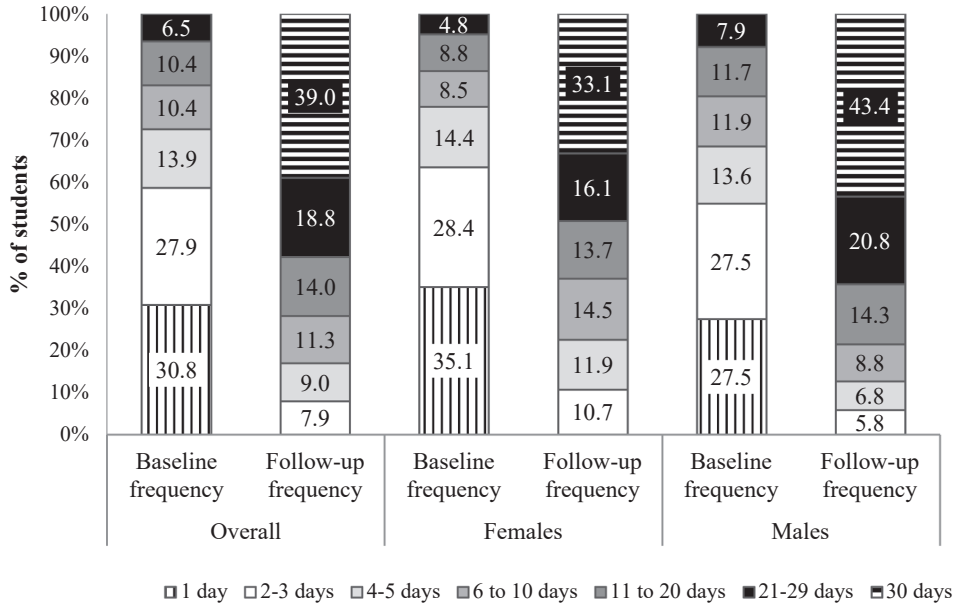

Fig. 1. Change in e-cigarette use frequency between baseline and follow-up among the sample of current youth e-cigarette users who escalated e-cigarette use over one year, by gender, 2017/18–2018/19 COMPASS study. Note: n = 519 (n = 242 female and n = 277 male) current youth e-cigarette users who reported escalating vaping between baseline (2017/18) and follow-up (2018/19).

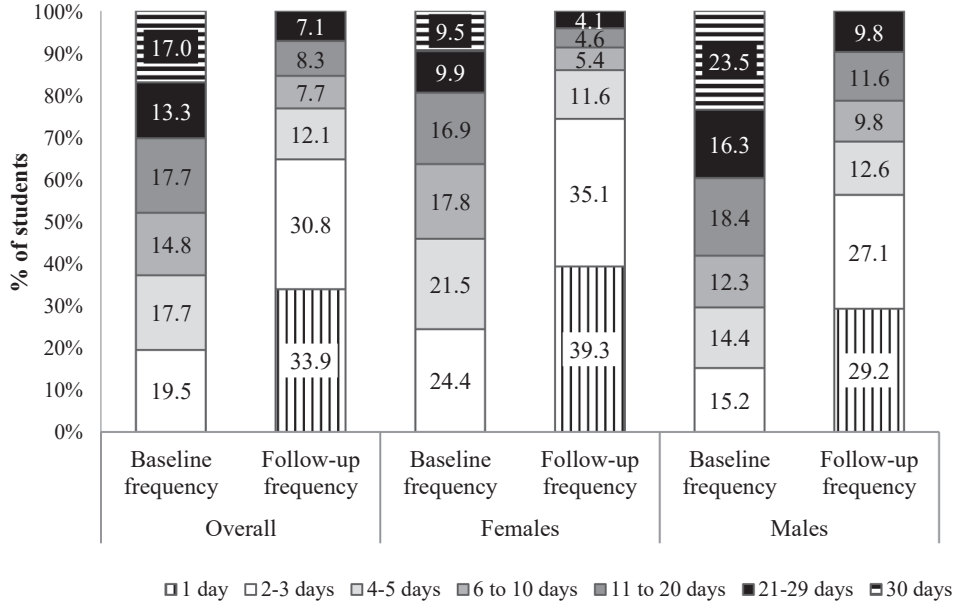

Fig. 2. Change in e-cigarette use frequency between baseline and follow-up among the sample of current youth e-cigarette users who reduced e-cigarette use over one year, by gender, 2017/18–2018/19 COMPASS study. Note: n = 2003 (n = 869 female and n = 1133 male) current youth e-cigarette users who reported escalating vaping between baseline (2017/18) and follow-up (2018/19).

surveillance systems (Cole et al., 2020; Hammond, Rynard, et al., 2020). We observed some differences in the demographic characteristics and e-cigarette use frequencies of students within each e-cigarette use pattern. These results highlight the need for longitudinal data to continue to monitor and evaluate changes to e-cigarette use patterns that may be in response to changing public health policies, such as recent federal policies that limit the nicotine concentration in vaping products.

Although two-thirds (66.3 %) of youth reported infrequent e-cigarette use at baseline (i.e., < 5 days in the last 30 days), indicating some level of experimentation, it is concerning that many youth already reported high frequencies of e-cigarette use at baseline. For example, 21.4 % of female students and 48.1 % of male students who maintained e-cigarette use reported using e-cigarettes > 20 days in the last month at baseline. Using e-cigarettes > 20 days in the last month was even higher among female and male students who escalated vaping (49.3 % and 64.3 %, respectively). The results of our regression models further support the lower likelihood of escalating (relative to maintaining) e-cigarette use when students report using e-cigarettes > 20 days in the last month. Given the high dose of nicotine in many e-cigarette products (EL-Hellani et al., 2018) and the risk of nicotine addiction, there is a need for continued monitoring of the frequency of e-cigarette use among youth, particularly as public health policies change.

Our results reinforce current literature that suggests that escalating e-cigarette use among adolescents is occurring and is a significant issue (Bold et al., 2016; Goldenson et al., 2017; Lanza et al., 2020; Park et al., 2020; Westling et al., 2017). The prevalence of escalating e-cigarette use over one year in our sample was quite high compared to other studies. Evidence from the US indicates that the prevalence of continuing and escalating e-cigarette use ranged between 4 % and 34 % (Harrell et al., 2021; Lanza et al., 2020; Park et al., 2020; Westling et al., 2017). Escalating e-cigarette use was also more common compared to the prevalence of escalating cannabis use (29.5 %) found in another study using COMPASS data (Zuckermann et al., 2019). Our data were collected during a period when devices with nicotine (such as the brand Juul®) became legal and increasingly available in the Canadian market (Tobacco and Vaping Products Act, 2018). Different data collection periods and regulatory environments may account for some of the differences in the proportions of youth who escalated e-cigarette use, highlighting the importance of local and national surveillance systems for evaluating the potential impact of e-cigarette policies on youth e-cigarette use patterns.

Of surprise, about one-third of current youth e-cigarette users in our study reported reducing (12.8 %) or stopping e-cigarette use (20.2 %) over a one-year period of time. Other cross-sectional studies from the US have reported that many students have seriously thought about quitting and reported past-year quit attempts (Dai, 2021; Smith et al., 2021) and recent Canadian data indicate that 63 % of youth aged 15 to 19 years have tried to quit using e-cigarette in the last year (Health Canada, 2020). However, to the best of our knowledge, these are the first data identifying the prevalence of youth actually reducing or stopping e-cigarette use, filling a critical knowledge gap. The regression model results indicate that students who used e-cigarettes less frequently at baseline were more likely to reduce (relative to maintain) e-cigarette use at follow-up, while students who used e-cigarettes more frequently at baseline were less likely to stop (relative to maintain) e-cigarette use at follow-up. Given these findings, it is possible that youth who vape less frequently are less addicted and may not require the use of e-cigarette cessation programs to quit vaping but could still benefit from public health messaging encouraging them to stop using e-cigarettes. Additional research is needed to understand why these youth reduced and stopped e-cigarette use, which could help to inform future cessation interventions. While it is encouraging that a significant number of students were able to reduce the frequency or stop using e-cigarettes, it is apparent that it was not sufficient to prevent a rise in youth e-cigarette use during this time. Other data from this cohort study indicate that almost one third of students who had not yet initiated e-cigarette use tried e-cigarettes over one follow-up year (Williams et al., 2021). Given that youth e-cigarette use continues to be a significant public health concern, evidence-informed cessation and prevention programs are urgently needed.

4.1. Strength and limitations

A key strength of this study is the use of a large, school-based longitudinal data set to identify-one-year changes in e-cigarette use patterns. To our knowledge, these are the first Canadian data to present changes in e-cigarette use patterns among current youth e-cigarette users, and these data could serve as a baseline for future evaluations of e-cigarette policies. Our study is not without limitations. Since the Cq did not include a definition of an e-cigarette or examples of common brands, our results may underreport the prevalence of youth e-cigarette use. Furthermore, the use of a convenience sample and attrition of current e-cigarette users between baseline and follow-up limits the generalizability of the findings. The survey question included defined categorical responses which may not represent the usual e-cigarette use pattern of students. Our results may underestimate the proportion of youth who escalated/reduced e-cigarette use and overestimate the proportion of youth who maintained e-cigarette use given that the distances between successive response options was not the same (i.e., a change in e-cigarette use from “1 day” to “2 to 3 days” in the past 30 days is not equivalent to a change in e-cigarette use from “11 to 20 days” to “21 to 29 days” in the past 30 days); there may be students who escalated or reduced the frequency of e-cigarette use but are still captured by the same response category. Future studies should consider alternative ways of capturing e-cigarette use frequency.

4.2. Conclusions

Over one year, most youth in our sample who reported current e-cigarette use at baseline reported changing their e-cigarette use frequency at a one-year follow-up. While about half of these students increased their frequency of e-cigarette use, about one-third also reported decreasing or stopping e-cigarette use completely. Few sociodemographic characteristics differentiated vaping patterns. Additional longitudinal data are needed to monitor and evaluate changes to e-cigarette use patterns that may be in response to changing public health policies.

Role of Funding Sources

The COMPASS study has been supported by a bridge grant from the CIHR Institute of Nutrition, Metabolism and Diabetes (INMD) through the “Obesity – Interventions to Prevent or Treat” priority funding awards (OOP-110788; awarded to STL), an operating grant from the CIHR Institute of Population and Public Health (IPPH) (MOP-114875; awarded to STL), a CIHR project grant (PJT-148562; awarded to STL), a CIHR bridge grant (PJT-149092; awarded to KP/STL), a CIHR project grant (PJT-159693; awarded to KP), and by a research funding arrangement with Health Canada (#1617-HQ-000012; contract awarded to STL), a CIHR-Canadian Centre on Substance Abuse (CCSA) team grant (OF7 B1-PCPEGT 410–10-9633; awarded to STL), and a SickKids Foundation New Investigator Grant, in partnership with CIHR Institute of Human Development, Child and Youth Health (IHDCYH) (Grant No. NI21-1193; awarded to KP) funds a mixed methods study examining the impact of the COVID-19 pandemic on youth mental health, leveraging COMPASS study data. The COMPASS-Quebec project additionally benefits from funding from the Ministère de la Santé et des Services sociaux of the province of Québec, and the Direction régionale de santé publique du CIUSSS de la Capitale-Nationale. This work was supported by an operating grant from CIHR (#170256; grant awarded to AGC).

The funding sources had no role in the study design; in the collection, analysis and interpretation of data; in the writing of the manuscript; or

in the decision to submit the article for publication.

CRediT authorship contribution statement

Adam G. Cole: Conceptualization, Methodology, Writing – original draft, Supervision, Funding acquisition. **Michael Short:** Writing – review & editing. **Negin Aalaei:** Writing – review & editing. **Mahmood Gohari:** Methodology, Software, Formal analysis, Writing – review & editing. **Scott T. Leatherdale:** Investigation, Resources, Writing – review & editing, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.abrep.2022.100458.

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