

Predictors of E-Cigarette Initiation: Findings From the Youth and Young Adult Panel Study

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ABSTRACT

OBJECTIVES: Although previous studies have identified reasons why youth try e-cigarettes, longitudinal research is needed to identify predictors of e-cigarette initiation. This study assesses predictors of e-cigarette initiation among youth and young adults in the 2018-2019 Youth and Young Adult Panel Study.

METHODS: This study examined the proportion of Canadian participants aged 16 to 25 ($n = 137$) reporting never use of e-cigarettes at baseline in 2018. Individuals were categorized as not initiated and initiated at 12-month follow-up. We examined demographic characteristics, substance use, health status, social influences and perception by initiation category. Adjusted odds ratios (AORs) were calculated using logistic regression models and multivariable logistic regression model.

RESULTS: Among the 137 never e-cigarette users at baseline, 59% remained never users while 41% initiated use of e-cigarettes during the 12-month follow-up. The results of multivariable logistic regression analysis showed that regularly seeing anyone use e-cigarettes (AOR: 4.11; 95% CI: 1.04, 16.31) and seeing anyone use e-cigarettes very often or always at baseline (AOR: 4.54; 95% CI: 1.21, 17.01) is associated with initiating e-cigarette use among youth and young adults.

CONCLUSION: The results revealed social influences to be the most important predictors of initiation among youth and young adults. Interventions to prevent youth and young adults from initiating e-cigarette use should expand from only focusing on peer use to reducing use in public space such as parks and recreational facilities.

KEYWORDS: Vaping, e-cigarette, youth, young adults, adolescents, social influences, peer use

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Introduction

Electronic cigarettes (e-cigarettes) are handheld electronic devices typically designed to deliver nicotine in aerosol form (vapor) to users.¹ E-cigarettes create an aerosol by heating e-liquids usually containing glycerin, nicotine, and flavoring additives.² Since the introduction of e-cigarettes to the U.S. market in 2007, the types of tobacco products used by Americans has dramatically shifted, especially among young people.^{2,3} As of 2014, e-cigarettes are the most commonly used tobacco product among American youth, exceeding conventional cigarettes.³ Among high school students, current e-cigarette use increased dramatically from 1.5% in 2011 to 20.8% in 2018.³ Similar to American youth, Canadian youth and young adults are also using e-cigarettes at increasing rates. The 2018-19 Canadian Student Tobacco, Alcohol and Drugs Survey reported current e-cigarette use (with or without nicotine) doubled (20% in 2018-19 vs 10% in 2016-17) among students in grade 7 to 12, with prevalence higher among students in grade 10 to 12 (29%).⁴ The 2017 Canadian Tobacco, Alcohol and Drugs Survey reported current use of e-cigarettes was more prevalent among young people, with about 6% of young

adults aged 20 to 24 who reported current use of e-cigarettes compared to only 2% of adults aged 25 years and older.⁵

E-cigarettes can expose youth and young adults to several chemicals including nicotine, carbonyl compounds, and volatile organic compounds.⁶ These chemicals are known to have adverse health effects.⁶ Nicotine is addictive and harmful to developing brains of youth and young adults.⁶ Further, the health effects of heated and aerosolized constituents—such as solvents, flavorants, and toxicants—are unknown.⁶ There is also an increasing body of literature indicating e-cigarette use is associated with future conventional cigarette smoking.^{1,7-11} However, the evidence is limited to self-report measures.¹⁰ Given the addictiveness and harmful effects of e-cigarettes, it is crucial to identify predictors of e-cigarette initiation among youth and young adults to prevent them from initiating.

Age, sex, and ethnicity have been identified as predictors of e-cigarette use. A systematic review examining differences in use between different sociodemographic groups found ever use (having tried an e-cigarette at least once) and current use (within the past 30 days) was more prevalent among older adolescents and young adults, males, and people of white



ethnicity.¹² Evidence suggests intention to quit smoking is a predictor of vaping initiation among youth and young adults. A systematic review found e-cigarettes use is increasing among current smokers and being used to reduce/quit smoking.¹³ The review found majority of vaping occurred among current smokers.¹³ Another important factor is social influences. Social influences has been well-studied in tobacco research, with evidence to support an association between peer and social influences and increasing the risk of tobacco use.¹⁴ Research suggests youth and young adults who see their peers or parents smoke may develop positive attitudes about tobacco smoking, which may lead to initiating the behavior themselves.¹⁴ A similar mechanism may be plausible for e-cigarette initiation. A systematic review examining social influences on e-cigarette initiation and use found social influences to play a complex role in e-cigarette uptake and use.¹⁵

The increasing popularity of e-cigarettes among young people is likely related to their sleek design, ability to be used discreetly, and youth-appealing flavors.¹⁶ The most commonly cited reasons for use among American youth and young adults are curiosity, flavoring/taste, and low perceived harm compared to other tobacco products.⁶ Research commissioned by Health Canada found the most commonly cited reason for vaping among Canadian youth 13 to 19 are friends using, flavors, curiosity, and being offered a vape.¹⁷ Although previous studies examined predictors of e-cigarette use among youth and young adults, most are limited in that they are cross-sectional.¹⁸⁻²² There is limited longitudinal research examining predictors of e-cigarette initiation among youth and young adults. One U.S. nationally representative longitudinal cohort study, the Population Assessment of Tobacco and Health (PATH) Study examined susceptibility to e-cigarette use among youth. In the analysis, they examined whether participants would try an e-cigarette soon and whether they would use if one of their friends were to offer them an e-cigarette, but they did not examine social influences such as friends using or seeing anyone use.²

A longitudinal study identifying predictors of continued e-cigarette use among youth found the following: low cost, ability to use e-cigarettes anywhere, and the desire to quit smoking conventional cigarettes. However, this study assessed only continued use and only among youth.¹⁸ A longitudinal study of Argentinian secondary school students from 2014 found higher sensation seeking, being a current smoker, having close friends that smoke cigarettes and being highly exposed to tobacco products ads online to be risk factors for trying e-cigarette.²³ However, this study did not use random sampling and was conducted in Argentina, therefore, results may not generalize to other populations.

In order to prevent initiation of e-cigarettes, it is crucial to identify factors associated with initiating e-cigarette use among youth. To fill this research gap, the present longitudinal study was conducted to identify predictors of e-cigarette initiation among youth and young adults in Canada. Our study

contributes to the current literature as the findings could be applicable to the development of tailored programs.

Method

Participants and procedure

Data are from baseline and 12-month follow-up surveys of the Youth and Young Adult Panel Study conducted from February 2018 and March 2019, respectively. The study used REDCap, a secure, web-based survey software platform, to collect self-report information on patterns of e-cigarette use among Canadian youth and young adults (16–26 years of age) over a 12-month period. Participants were eligible if they were 16 to 25 years of age, Canadian residents, and completed the online survey in English.²⁴ This longitudinal study recruited 1048 youth and young adults, using quota sampling to ensure sufficient numbers (60%) of regular vapers (vaping at least weekly in the past month) were recruited. Participants were asked the following question to determine quota: “In the past 4 weeks, did you vape e-cigarettes every week?” Individuals who responded “Yes” were categorized as a regular e-cigarette user and those who reported “No” were categorized as non-regular.²⁴ Participants were recruited from social media platforms including Instagram, Google, and Reddit and recontact list from a Smoke-Free Ontario initiative for young adults. Participants were invited to answer detailed online surveys about vaping and other behaviors at the time of recruitment and at 12-month follow-up. All data were checked for fraudulent attempts to participate multiple times and for data quality.²⁴ Of the 1036 baseline participants who had not previously asked to withdraw from the study, 668 completed the 12-month follow-up survey (response rate = 64%). Eligible participants for this study were those who reported to have never used e-cigarettes at baseline (n = 137). Eligible participants received \$10 e-gift card honorarium and a chance to win 1 of 2 \$250 gift cards.²⁴

Measures

Demographics

Demographics included age, sex (male, female), race (white, non-white).

E-cigarette use

At baseline, never vapers were identified by responding “no” to the questions “Have you ever vaped?” Only individuals who report never vaping at baseline are included in the study. At 12-month follow-up, participants were asked “How often do you currently vape?” Those responding “I have never vaped” were classified as non-initiators, while those responding any other response (Daily or almost daily/Less than daily, but at least once a week/Less than weekly, but at least once a month/Less than monthly/Not at all) were categorized as e-cigarette

initiators during the past 12 months. The item “how often do you currently vape” was the recommended definition for e-cigarette use by Pearson et al.²⁵

Health status

At baseline, participants were asked to rate their overall health and mental health on a 5-point scale which was categorized as excellent/very good, good, or fair/poor. At baseline, participants were also asked to rate their stress on most days using a 5-point scale, which was categorized as not at all stressful/not very stressful, a bit stressful, or quite a bit stressful/extremely stressful.

Substance use

At baseline, participants were asked about the last time they used alcohol, cannabis, cigarettes, and other tobacco product such as cigars, pipes, chewing tobacco, bidis, kreteks. Participants responding, “in the past 30 days” were classified as current users, non-current users responded “1 to 12 months ago” or “more than 1 year ago,” and never users reported they had never used each product.

Social influences

At baseline, participants reported how many of their closest friends used e-cigarettes, cannabis, and cigarettes, which were categorized as none or some/most. Participants were also asked how often they have seen anyone vape in the past 7 days (never, rarely/sometimes, very often/always). This question was obtained from the 2016 CAMH Monitor.²⁶ This question did not specify about seeing someone other than a friend or family member use an e-cigarette since it was included to determine environmental influences more broadly which can normalize vaping behaviors.

Perception

Participants were asked about the risk to long-term health of regularly vaping with and without nicotine at baseline. Participants were asked to choose 1 of the 4 options: no risk, slight risk, moderate risk or great risk. These questions were categorized as no risk/slight risk versus moderate risk/great risk.

Statistical analyses

Descriptive statistics were examined using chi-square tests of independence to identify differences between those who did not initiate and those who did initiate vaping. Logistic regression models were conducted to examine adjusted odds ratios (AORs) and 95% confidence intervals (CIs) for race, general health, mental health, stress most days, alcohol use, cannabis

use, friends use e-cigarettes, friends smoke, friends use cannabis, seeing anyone use e-cigarettes, risk of regularly vaping with nicotine and risk of regularly vaping without nicotine, controlling for age and sex. Multivariable logistic regression model was also conducted to examine variables with significant association with vaping initiation in logistic regression models. SAS version 9.4 was used for all data analyses.²⁷

Results

At baseline, 137 respondents reported never vaping. Among those who reported never vaping at baseline, 4 reported daily or almost daily, 3 reported less than daily but at least once a week, 4 reported less than weekly but at least once a month, 14 reported less than monthly, 31 reported not at all, and 81 reported never vaping at 12 month follow. Therefore, 59% (n=81) remained never users while 41% (n=56) initiated use of e-cigarettes during the 12-month follow-up. Respondents who reported “not at all” at follow-up were grouped as initiating use of e-cigarettes since 94% of these respondents had vaped in the past year. They have also vaped 10 times or less in their lifetime. No significant difference was detected between participants who did not initiate and participants who initiated vaping by age, gender, education and race (Table 1).

As shown in Table 2, there are significant differences between initiation status in terms of cannabis use, friends using e-cigarettes, friends smoking, friends using cannabis, seeing people use e-cigarettes, and perception of risk of vaping without nicotine. A significantly higher percentage of baseline cannabis users initiated e-cigarette use (83.3%) compared to baseline non-cannabis users (34.8%). A significantly higher portion of those with no close friends using e-cigarettes at baseline did not initiate at 12-months follow-up (72.3%) compared to those that have some or most close friends using e-cigarettes at baseline (52.2%). Similarly, a significantly higher portion of young people who reported having no close friends smoking cigarettes at baseline did not initiate e-cigarette use at follow-up (66.3%) compared to those with friends who smoke at baseline (49.1%). Among participants who reported no close friends using cannabis at baseline, a significantly higher portion reported not initiating e-cigarettes (76.5%) compared to those with friends who use cannabis at baseline (53.4%). Among youth and young adults who reported never or rarely seeing anyone vape in the last 7 days, a significantly higher portion did not initiate e-cigarette use (84.4%) compared to those who have seen someone use e-cigarettes (46.6%). Also, a significantly higher portion of young people who perceived risk of vaping without nicotine to be moderate or great did not initiate e-cigarette use (78.9%) compared to those who perceived no or slight risk (51.1%).

As shown in Table 3, youth and young adults who had perceived moderate or great risk of regularly vaping without nicotine exhibited lower odds of initiating e-cigarette use, after adjusting for age and sex. However, youth and young adults

Table 1. Descriptive statistics of those who did not and did initiate e-cigarette use at 12-month follow-up; Youth and Young Adult Panel Study Wave 1 and Wave 5, 2019 (N= 137).

	DID NOT INITIATE		INITIATED		P-VALUE
	N	% OR MEAN (SD)	N	% OR MEAN (SD)	
Total sample	81		56		
Gender					.967
Male	35	43.2	24	42.9	
Female	46	56.8	32	57.1	
Age	81	17.8 (2.38)	56	17.3 (1.61)	
Education					.078
Less than or high school	47	58.0	40	71.4	
Completed high school	22	27.2	14	25.0	
College, university or higher	12	14.8	2	3.57	
Race					.419
Non-white	25	30.9	21	37.5	
White	56	69.1	35	62.5	

Chi-square tests were performed.

who currently used alcohol (AOR: 2.66; 95% CI 1.11, 6.41), currently used cannabis (AOR: 13.78; 95% CI 1.42, 134.03), not currently using cannabis (AOR: 4.47; 95% CI 1.45, 13.79), had friends that used cannabis (AOR: 3.80; 95% CI 1.48, 9.72), used e-cigarettes (AOR: 2.34; 95% CI: 1.09, 5.02), and smoked (AOR: 2.23; 95% CI: 1.09, 4.56) showed higher odds of initiating e-cigarettes. Participants who saw anyone use e-cigarettes in the past 7 days also had higher odds of initiating e-cigarettes (AOR: 5.97; 95% CI: 1.99, 17.96).

The results of multivariate logistic regression analysis showed that regularly seeing anyone use e-cigarettes is associated with initiating e-cigarette use among youth and young adults, with those who saw anyone use e-cigarettes sometimes have 4.11 (95% CI: 1.04, 16.31) times the odds of initiating e-cigarette use compared to those who did not see people vape. Youth and young adults who saw anyone use e-cigarettes very often or always have 4.54 (95% CI: 1.21, 17.01) times the odds of initiating vaping compared to young people who did not see anyone vape (Table 4).

Discussion

The current study is one of the first longitudinal studies to examine determinants of e-cigarette initiation among youth and young adults. The results of the logistic regression analyses controlling for age and sex showed that alcohol use, cannabis use, friends using e-cigarettes, friends smoking, friends using cannabis, seeing anyone use e-cigarettes, and perception of risk of vaping without nicotine were associated with initiating e-cigarette use. Further, the multivariate logistic regression model showed that seeing anyone use e-cigarettes and perception of risk of vaping without nicotine are associated with initiating e-cigarette use.

Consistent with existing research, our findings indicate friends using e-cigarettes and low perceived harm of using e-cigarettes are associated with e-cigarette initiation.^{6,18} Based on this finding, educational campaigns or similar initiatives that address peer use and perceptions of harm to prevent youth uptake of e-cigarettes would appear to be particularly relevant for youth and young adults. Educational campaigns should provide information to youth and young adults about how to handle peer pressure and about known harmful effects of vaping. Young people who have friends who use e-cigarettes have greater accessibility to e-cigarettes as they may be accessing these products through their friends. Since the perception of e-cigarettes (without nicotine) as moderate or great health risk worked as a protective factor, interventions to reduce youth and young adult initiation must include education about the harms associated with e-cigarette use. Interventions should include information about known risks of vaping nicotine and other constituents of e-cigarette aerosols. Interventions or prevention programs focusing on resistance self-efficacy or vaping expectancies may want to consider peer pressure and social influences within the programs. Prevention programs focused on resistance self-efficacy aim to help youth and young adults resist prodrug influences.²⁸ Our findings support prevention programs that include methods to change perceptions and beliefs about social influences. Vaping expectancies are beliefs about outcomes associated with vaping.²⁹ These beliefs can include social benefits such as social facilitation or influence on others.²⁹ Our findings support examining vaping expectancies as they may aid in more informed targets for interventions.

Table 2. Descriptive statistics of those who did not and did initiate e-cigarette use at baseline; Youth and Young Adult Panel Study Wave 1 and Wave 5, 2019 (N= 137).

	DID NOT INITIATE		INITIATED		P-VALUE
	N	% (95% CI) OR MEAN (SD)	N	% (95% CI) OR MEAN (SD)	
Total sample	81		56		
General health					.363
Excellent/very good	55	55.6	44	44.4	
Good	21	70.0	9	30.0	
Fair/poor	5	62.5	3	37.5	
Mental health					.722
Excellent/very good	36	62.1	22	37.9	
Good	23	59.0	16	41.0	
Fair/poor	21	53.9	18	46.1	
Stress most days					.557
Not at all stressful/not very stressful	8	47.1	9	52.9	
A bit stressful	37	60.7	24	39.3	
Quite a bit stressful/extremely stressful	36	61.0	23	38.9	
Other tobacco product use					.164
Never	79	59.9	53	40.1	
Not current	0	0	2	100	
Current	1	100.0	0	0	
Cigarette use					.280
Never	78	61.9	48	38.1	
Not current	3	42.9	4	57.1	
Current	0	0	1	100	
Cannabis use					.007
Never	73	65.2	39	34.8	
Not current	7	36.8	12	63.2	
Current	1	16.7	5	83.3	
Alcohol use					.223
Never	37	68.5	17	31.5	
Not current	18	54.5	15	45.5	
Current	26	53.1	23	46.9	
Friends use e-cigarettes					.023
None	34	72.3	13	27.7	
Some or most	47	52.2	43	47.8	
Friends smoke					.044
None	53	66.3	27	33.7	

(Continued)

Table 2. (Continued)

	DID NOT INITIATE		INITIATED		P-VALUE
	N	% (95% CI) OR MEAN (SD)	N	% (95% CI) OR MEAN (SD)	
Some or most	28	49.1	29	50.9	
Friends use cannabis					.018
None	26	76.5	8	23.5	
Some or most	55	53.4	48	46.6	
Seeing someone use e-cigarettes					0.002
Never/rarely	27	84.4	5	15.6	
Sometimes	27	57.5	20	42.6	
Very often/always	27	46.6	31	53.4	
Perceptions					
Risk of regularly vaping with nicotine					0.395
No/slight risk	6	75.0	2	25.0	
Moderate/great risk	73	59.8	49	40.2	
Risk of regularly vaping without nicotine					.019
No/slight risk	46	51.1	44	44.0	
Moderate/great risk	22	78.9	7	24.1	

Chi-square tests were performed.

Table 3. Logistic regression assessing initiation of e-cigarette use at 12-month follow-up and controlling for age and sex; Youth and Young Adult Panel Study Wave 1 and Wave 5, 2019 (N=137).

PREDICTOR VARIABLE	CRUDE OR (95% CI)	P-VALUE	ADJUSTED OR (95% CI)	P-VALUE
Sociodemographic indicators				
Sex				
Female	ref		ref	
Male	0.99 (0.50, 1.96)	.976	0.97 (0.49, 1.94)	.932
Age	0.89 (0.75, 1.06)	.205	0.97 (0.49, 1.94)	.930
Race				
White	0.74 (0.36, 1.53)	.419	0.78 (0.38, 1.62)	.503
Health and social factors				
General health				
Excellent/very good	ref		ref	
Good	0.54 (0.22, 1.29)	.383	0.45 (0.18, 1.13)	.088
Fair/poor	0.75 (0.17, 3.31)	.975	0.72 (0.16, 3.32)	.675
Mental health				
Excellent/very good	ref		ref	
Good	1.14 (0.50, 2.61)	.383	1.22 (0.52, 2.85)	.654
Fair/poor	1.40 (0.62, 3.20)	.975	1.39 (0.59, 3.29)	.453

(Continued)

Table 3. (Continued)

PREDICTOR VARIABLE	CRUDE OR (95% CI)	P-VALUE	ADJUSTED OR (95% CI)	P-VALUE
Stress most days				
Not at all/not very	ref		ref	
A bit	0.58 (0.20, 1.70)	.483	0.53 (0.17, 1.59)	.254
Quite a bit/extremely	0.57 (0.19, 1.68)	.449	0.52 (0.17, 1.69)	.290
Alcohol use				
Never	ref		ref	
Not current	1.81 (0.74, 4.43)	.509	1.98 (0.80, 4.89)	.140
Current	1.93 (0.86, 4.30)	.329	2.66 (1.11, 6.41)	.029
Cannabis use				
Never	ref		ref	
Not current	3.21 (1.17, 8.81)	.948	4.47 (1.45, 13.79)	.009
Current	9.36 (1.06, 82.94)	.142	13.78 (1.42, 134.03)	.024
Friends use e-cigarettes				
None	ref		ref	
Some or most	2.39 (1.12, 5.12)	.025	2.34 (1.09, 5.02)	.028
Friends smoke				
None	ref		ref	
Some or most	2.03 (1.01, 4.08)	.046	2.23 (1.09, 4.56)	.028
Friends use cannabis				
None	ref		ref	
Some or most	2.84 (1.17, 6.85)	.021	3.80 (1.48, 9.72)	.001
Seeing someone use e-cigarettes				
Never/rarely	ref		ref	
Sometimes	4.00 (1.31, 12.21)	.241	4.12 (1.34, 12.70)	.014
Very often/always	6.20 (2.10, 18.34)	.004	5.97 (1.99, 17.96)	.002
Risk of regularly vaping with nicotine				
No/slight risk	ref		ref	
Moderate/great risk	2.01 (0.39, 10.39)	.403	2.13 (0.41, 11.13)	.371
Risk of regularly vaping without nicotine				
No/slight risk	ref		ref	
Moderate/great risk	0.33 (0.13, 0.86)	.023	0.34 (0.12, 0.88)	.027

All models were adjusted for age and sex with the exception of the regressions including age (adjusted for sex only) and sex (adjusted for age only) as predictors.

Substance use, which has been associated with vaping initiation in prior studies, showed a different relationship with vaping initiation in this study.² Specifically, the substance use variables were not associated with vaping initiation in the multivariate logistic regression analysis. This may have been due to a small sample size.

Although many consider e-cigarettes a harm reduction tool for people who smoke conventional cigarettes when completely substituting for them, they are a harmful product to youth and young adults.⁶ E-cigarette products, such as JUUL, can contain high concentrations of nicotine.⁶ Nicotine is highly addictive and can harm the developing brain which continues to develop until the

Table 4. Multivariable logistic regression assessing initiation of e-cigarette use at 12-month follow-up; Youth and Young Adult Panel Study Wave 1 and Wave 5, 2019 (N = 137).

PREDICTOR VARIABLE	OR	95% CI
Sex		
Female	ref	
Male	1.04	(0.43, 2.53)
Age		
	0.80	(0.62, 1.03)
Alcohol use		
Never	ref	
Not current	1.46	(0.49, 4.39)
Current	1.90	(0.66, 5.46)
Cannabis use		
Never	ref	
Not current	4.25	(1.03, 17.51)
Current	2.36	(0.22, 25.19)
Friends use e-cigarettes		
None	ref	
Some or most	1.53	(0.52, 4.51)
Friends smoke		
None	ref	
Some or most	0.57	(0.22, 1.47)
Friends use cannabis		
None	ref	
Some or most	1.51	(0.41, 5.51)
Seeing someone use e-cigarettes		
Never/rarely	ref	
Sometimes	4.11	(1.04, 16.31)*
Very often/always	4.54	(1.21, 17.01)*
Risk of regularly vaping without nicotine		
No/slight risk	ref	
Moderate/great risk	0.33	(0.11, 0.99)

*Statistically significant at $P \leq .05$.

age of 25.⁶ Individuals who are exposed to nicotine during their adolescence have poor learning, memory, and attention. Nicotine use in adolescence can also increase the risk of addiction to other substances.⁶ The health effects of constituents—such as solvents, flavor additives, and toxicants—are also unknown and can pose further harm.⁶ However, youth and young adults who are current smokers may benefit from completely switching to e-cigarettes as they may be less harmful than conventional cigarettes.¹³

The present study has limitations. First, this study is based on self-reported measures which may result in self-report bias such as recall bias and social desirability. Second, the sample of never e-cigarette users at baseline were predominately female which may reduce the generalizability of the results if there are sex differences in reasons why youth or young adults might initiate. Third, the sample size of this study is small, resulting in wider confidence intervals and reduced precision. Fourth, the study used a convenience sampling method to recruit participants who were easy to reach. Therefore, these participants are not necessarily representative of all youth and young adults. Therefore, conclusions made from this study should be taken with caution as the study is vulnerable to selection bias. Replication with a larger, population-based sample is needed. Future research on other constructs, such as parental influence and school environment, is also be desirable.

Our findings extend existing research on the strong association of social influences on e-cigarette initiation in that we examined the influence of social exposure (seeing anyone use e-cigarettes) on youth and young adult e-cigarette use. Our study also demonstrated that young people who saw anyone vape had a higher odd of vaping themselves. Previous studies have shown that exposures to e-cigarette advertisements, peer use, and parent/family use increase the risk of youth using e-cigarettes.^{18,30} Our findings expand on this to demonstrate that social exposure is not limited to family and friends. It could be beneficial to provide to youth this kind of information through educational campaigns to prevent youth initiation and invest in prevention measures to reduce use in public space such as parks and recreational facilities.

Author Contributions

RS, LD, and SO conceived the analysis and assisted with data collection and survey design. NJ conducted data analysis. NJ drafted the article. All authors contributed to interpretation and editing of the manuscript.

Ethical Approval

All research was conducted under ethical of the University of Toronto Research Ethics Board.

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