Electronic cigarettes: What motivates people to use them?

Spencer Kaspick[1], Helen Heacock PhD[2]

[1] Lead Author and Researcher, B.Tech Student, School of Health Sciences, British Columbia Institute of Technology, 3700 Willingdon Avenue, Burnaby BC, V5G 3H2

[2] Supervisor, School of Health Sciences, British Columbia Institute of Technology, 3700 Willingdon Avenue, Burnaby BC, V5G 3H2

ABSTRACT

Background: Electronic cigarettes are a widely-used, yet still emerging technology. As such, there is relatively little data regarding the reasons why people take up their use. Many claim to use them as a smoking-cessation method. Concern exists that experimentation in non-smokers may lead to nicotine addiction and subsequent smoking. The purpose of this study was to determine the primary reasons for the commencement of electronic cigarette use, and to suggest way in which these findings could affect current policies and regulations pertaining to electronic cigarettes.

Methods: A survey examining electronic cigarette use was prepared. The survey contained questions respecting primary motivation for use, frequency of use, present and former smoking status as well as agreement with common perception about electronic cigarettes. Basic demographic information was also collected. The survey was posted to "www.reddit.com" and was accessible to users who used electronic cigarettes themselves via the "/r/electronic_cigarettes" sub-Reddit for a period of five days. Once responses were collected, Chi-square tests of independence were run to determine if any associations existed. Responses were also compared to previous studies of a similar nature to see if any similarities existed.

Results: In total, 155 responses were received. The majority of the respondents were males (89.7%) between the ages of 19 and 28 (47.7%). 30.32% listed their occupation as "student", and almost three-quarters of the respondents had some post-secondary experience. 78.1% of respondents were former smokers, and 61.3% identified their primary reason for electronic cigarette use as "to quit smoking." Chi-squared tests for association between responses yielded statistically-significant associations between being a previous smoker and believing that electronic-cigarettes are healthier than conventional cigarettes, and between gender (specifically being male) and reasons for electronic cigarette use (specifically "to quit smoking"). However, the latter result was possibly skewed by a higher response rate from males as opposed to females.

Conclusion: The high proportion of previous smokers among electronic cigarette users suggested that quitting smoking was the most common reason individuals take up electronic cigarette usage. It is therefore suggested that studies be done to determine if their use is less harmful than that of conventional cigarettes, and that existing legislation regarding their use in public be modified in light of this evidence. It is also suggested that they be given consideration as a legitimate means of smoking cessation.

INTRODUCTION

Since their invention in 2003, the use of electronic cigarettes (e-cigarettes) has become both popular and widespread. For example, the proportion of 18-24 year olds who have tried e-cigarettes increased from 0.0% to 14.2% between the years 2010 and 2013 (17). Reasons for this increase have been the subject of many studies, and they include using them as a means to quit smoking (7), curiosity (9), and social pressure, especially amongst the young (17). However, few studies have simply asked users the open-ended question, "why do you use e-cigarettes?", as opposed to focusing on one reason or hypothesis. The literature review component of this study aimed to bring together a variety of studies with the view to gaining a broad understanding of people's motivations for using these devices.

Understanding this basic question has significant implications for the field of public health. It is generally agreed that these devices are potentially helpful in reducing tobacco use among current smokers (3). There also exists concerns that non-smokers are using electronic cigarettes experimentally without any previous tobacco use. In doing so, it is postulated that the user could inadvertently develop a nicotine dependancy where none existed before (6). By gaining an understanding of which of these categories should be addressed more urgently, the public health professional can direct their resources in a way that improves the health of the most people.

EVIDENCE REVIEW

Review Findings

Use in Current Smokers - It is estimated that current smokers are 70.8% more likely to try e-cigarettes than non-smokers (3).

Smokers appeared to to view e-cigarettes as a tool to help them give up smoking conventional cigarettes (7)(10). A study by Rutten et al reported that one quarter of the smokers they interviewed tried e-cigarettes with a view to quitting (12), while a study by Vickerman et al revealed that 51.3% of the smokers surveyed used e-cigarettes as a method to quit (15). It was also reported that late-model e-cigarettes better replicate the experience of combusted tobacco, thus making the transition to e-cigarettes easier for some (5).

Smokers also preferred using e-cigarettes as opposed to smokeless tobacco, both of which they viewed as "cleaner" and more convenient than conventional cigarettes (1). Where a desire to give up nicotine altogether did not exist, e-cigarettes appeared to provide some with an ash/smell/smoke-free nicotine hit, despite the availability of conventional nicotine-replacement therapies (1). Convenience also played into the preference for e-cigarettes over conventional cigarettes, as their use indoors has historically permitted, as well as in outdoor areas where smoking tobacco is disallowed (14). However, recent (as of 2016) legislative changes in jurisdictions such as British Columbia have classed e-cigarettes with conventional cigarettes, thus prohibiting their use inside public buildings and workplaces and limiting their convenience in this regard (26).

Economic considerations also came up within the searches done. For example, 40.8% of respondents in a study done in Malaysia found that using e-cigarettes were cheaper than using conventional cigarettes (4).

Use in Non-Smokers- Somewhat less information was found with respect to the use of e-cigarettes in non-smokers, and their motivations for doing so. This may be explained by interest in using e-cigarettes from non-smokers being markedly lower than that of current smokers. From a survey of Romanian adult university

students who admitted to trying e-cigarettes, 5.5% of them were non smokers, compared to 53.3% of them being current smokers (18). Those who reported trying them cited curiosity as their motivation for doing so. These results were comparable to those presented by Dautzenberg et al, who found that 10% of Parisian teenage e-cigarette users were non-smokers (16).

A study by Pepper et al suggested that e-cigarette users fell into one of two categories: goal-oriented and non-goal oriented (9). The goal-oriented group consisted of smokers who wished to quit, and the non-goal oriented group consisted partly of non-smokers trying e-cigarettes out of curiosity (the rest of this group consisted of smokers who used for a variety of other reasons such as smoking bans, social pressure from relatives and personal experimentation). Of the non-goal oriented group, 81% discontinued their use after one month or less, citing lack of interest and/or satisfaction.

Regarding younger users, Kong et al found that middle school children who had not previously smoked cigarettes used e-cigarettes to assert their independence (8). Hwang et al noted that 3.8% of Korean adolescents (age 13-18) had tried e-cigarettes, with 1.2% being current users (17). Factors involved in their use by non-smoking teenagers was significantly associated with cigarette smoking by peers and friends.

Interpretation of Findings

In searching for reasons why people take up e-cigarette use, it appeared that the most common reason was to quit or cut down on smoking conventional cigarettes. Success rates were found to be variable, from very effective (6) to not as effective (2). The efficacy of these devices for quitting smoking must continue to be studied, not simply from a chemical standpoint (namely, the replacement of nicotine) but from a psychological one as well. The appeal seems clear: a device that closely replicates the action of smoking cigarettes is bound to appeal those who are used to smoking cigarettes. Perceived lack of health effects (both long and short term) play into the appeal as well. E-cigarettes do not appear to be a direct cigarette substitute for users but rather a “crutch”, combined with the previously-existing desire to quit smoking. This claim is supported by the fact that those who take up e-cigarette use without any particular goal in mind tend to not use them for any extended period of time (9). If shown to be advantageous in the clinical and academic arena, e-cigarette use could prove useful in helping many current smokers give up tobacco use altogether.

A secondary factor for e-cigarette use was convenience. Those who use them for this purpose appear unwilling or unable to give up smoking altogether, and use these devices to get the nicotine they need in areas where smoking a cigarette would be frowned upon. These areas include indoor spaces, and areas where smoking is prohibited by law. This opens up another area of study for environmental health researchers and practitioners: the effect of exhaled vapour from e-cigarettes on non-users. This avenue of research is, however, hampered by a lack of data on the long-term health effects of e-cigarettes, both on users and on non-users. As more evidence becomes available, informed decisions about where they may and may not be used can be made.

There was little in the way of evidence to suggest that any great number of people take up e-cigarettes on their own accord without first having some exposure to/experience with conventional tobacco products. While longer-term use of e-cigarettes have been reported as being less expensive than conventional cigarettes, the up-front cost of these devices is comparatively high (8). A lack of

commitment to their use could translate into not wanting to begin altogether.

In addition to this, an area of concern in the public health sphere is the use of e-cigarettes in children and adolescents who otherwise would not smoke cigarettes. The scope of this review touched on some of these concerns, most of which had to do with the impressionability of children and teenagers. Use in children was strongly tied to wether or not their friends and peers smoked conventional cigarettes (17). It is reasonable to speculate that they simply want to "fit in" with those that they look up to. At that age as well, many teens want to assert some independence, and e-cigarettes might be a way of expressing this (8). Fortunately, a lower proportion of children/teens have stuck with e-cigarette usage for any appreciable time after initial trial (17). Enforcing existing age-restrictions on the purchase of tobacco and vapour products (26) are effective methods of combating these issues (13). Teenage impressionability could also be used to reduce e-cigarette use by way of educational campaigns. Labelling such devices as "uncool" would certainly resonate with the image-conscious teenager (8).

Evidence Review Conclusion

With the current evidence available, this literature review has shed light on some reasons why people use e-cigarettes, and what the implications of these conclusions are. Their use is most prevalent among those attempting to quit or cut back on smoking. Should e-cigarettes be proven effective in helping individuals quit, their usefulness in reducing tobacco use becomes clear. Some use these devices as a way to fulfill their need for nicotine, while remaining in compliance with anti-smoking laws. This presents the issue of second-hand exposure to vapour for those who do not use e-cigarettes. These potential effects must continue to be studied, and any legislation made respecting their use should be made in accord with the evidence compiled. E-cigarette use among non-smokers was very uncommon, and those who tried them out of curiosity generally ceased using electronic cigarettes after a short time. Use by adolescents and children who had not previously smoked cigarettes was also uncommon, but was apparently caused by peer influence.

The field of e-cigarette study and their usage is still relatively new. However, current evidence suggests that they are chiefly being used by current smokers with a view to quitting. Therefore, the prudent public health practitioner should see this as an opportunity to encourage e-cigarette users to continue their efforts to quit smoking conventional cigarettes, and devote the majority of their concerns to this area. But as the usage of e-cigarettes continues to evolve, it is not unwise to monitor trends involving their use by non-smokers, and to address these accordingly. A solid, and continual understanding of why people use e-cigarettes will serve the public health practitioner, and by extension the public, well.

RESEARCH METHODS

Materials

Materials used in this study were one laptop loaded with the appropriate software for data collection, statistical processing and report writing (SPSS, Apache OpenOffice suite, Google Forms) and an internet connection.

Method of Data Collection

An eleven-question survey pertaining to e-cigarette use was prepared in the application Google Forms. Data was collected by polling the popular internet forum Reddit, under the sub-forum "/r/electronic_cigarette". A link to the survey was posted to this sub-forum on February 9th 2017 at 1:30 PST, and closed to new responses on

February 14th, 2017 at 1:30 PST. Afterwards, the data collected was downloaded to SPSS where statistical processing was performed.

Inclusion and Exclusion Criteria

Anyone who had ever used an electronic cigarette and was a member of the "/r/electronic-cigarette" sub-forum on Reddit was eligible to participate in the study.

Ethical Considerations

As the study relies on data collected from human subjects, all aspects of the survey adhered to the ethical principles of "autonomy" and "beneficence" (19). Autonomy means that the subject participated in the study voluntarily and of their own free will. Beneficence means that contributing to this study subjected the respondent to no risk of harm outside that of day-to-day living. The consent statement was provided at the outset of the survey, and it was made clear that completion and submission of the survey signalled agreement with it.

STASTISTICAL ANALYSES AND RESULTS

Principles of Analysis

The data collected in the survey was nominal. Variables extracted from the survey were compared against each other to determine if any associations existed. This was accomplished by a Chi-square test for independence (22), with the confidence interval set at 95% (p=0.05). The statistical package used was SPSS.

Descriptive Statistics

Males were the most represented gender, with 89.7% or respondents identifying as such. Almost half of the respondents fell in the 19-28 year old age range (see Figure 1).

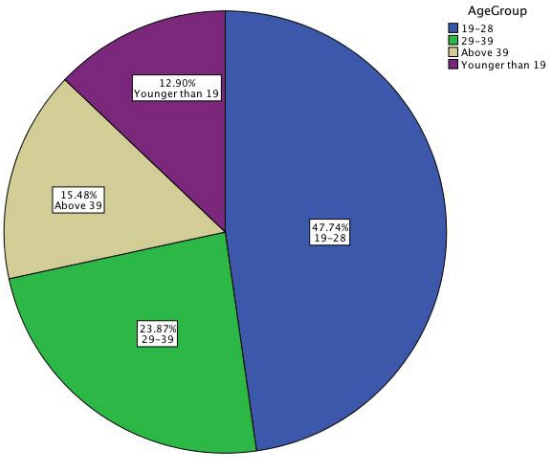

Figure 1- Age of respondents

Regarding the occupation of the respondents, 30.3% identified themselves as students, and professionals (such as engineers, lawyers etc.) were the next most prevalent group at 17.4% of respondents (see Figure 2).

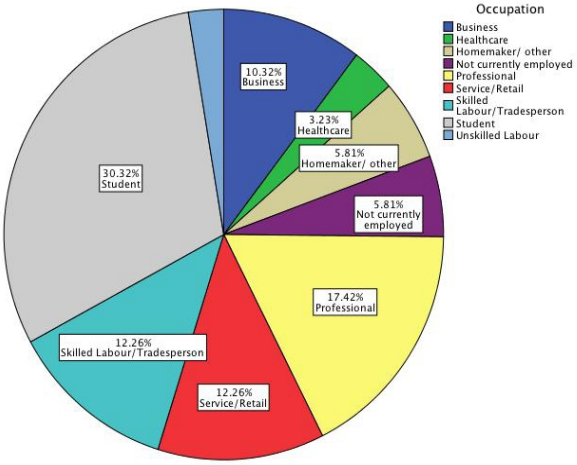

Figure 2- Occupation of respondents

43.9% of respondents reported their education level being at "Some college/vocational", and 24.5% reported holding a bachelor's degree. 26.5% held a high school diploma or less, and 5.1% reported themselves as having a "Masters degree or higher".

Regarding smoking status, 92.3% of respondents did not

report being current smokers. However when asked about previous smoking status, 78.1% identified as ex-smokers.

When asked about their prime motivation for commencing e-cigarette use, the majority responded with "to quit smoking" (61.3%),18.7% listed their main reason as "curiosity", and the remainder held to various other reasons (see Figure 3).

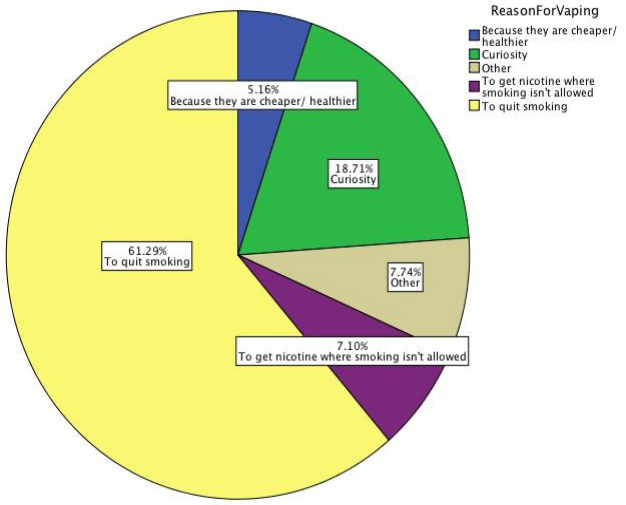

Figure 3- Reasons for commencing e-cigarette use

Inferential Statistics

A Chi-square analysis (at the 95% confidence level) was conducted to ascertain whether or not statistically-significant associations existed between any two sets of results.

Table 1- Summary of statistically-significant findings

Ho: No association exists between smoking prior to electronic cigarette use and frequency of usefulness **Ha**: An association exists between smoking prior to electronic cigarette use and frequency of use. **P-value**: 0.00 **Conclusion**: Reject Ho, there is a statistically-significant association between smoking prior to electronic cigarette use and frequency of use
Ho: No association exists between gender and reasons for electronic cigarette use **Ha:** An association exists between gender and electronic cigarette usefulness **P-value**: 0.04 **Conclusion**: Reject Ho and conclude that there is a statistically-significant association between gender and electronic cigarette use
Ho: No association exists between smoking prior to electronic cigarette use and the belief that electronic cigarettes are more healthful than conventional cigarettes **Ha**: An association exists between smoking prior to electronic cigarette use and the belief that electronic cigarettes are more healthful than conventional cigarettes **P-value**: 0.04 **Conclusion**: Reject Ho and conclude that there is a statistically-significant association between smoking prior to electronic cigarette use and the belief that electronic cigarettes are more healthful than conventional cigarettes
Ho: No association exists between age group and education levels of electronic cigarette users **Ha:** An association exists between age group and education levels of electronic cigarette users **P-value**: 0.00 **Conclusion**: Reject Ho and conclude there is a statistically-significant association between age group and education levels of electronic cigarette users

Table 2- Summary of non-significant findings

Ho: No association exists between smoking prior to electronic cigarette use and current electronic cigarette use **Ha**: An association exists between smoking prior to electronic cigarette use and current electronic cigarette use **P-value**: 0.65 **Conclusion**: Fail to reject Ho and conclude that no statistically-significant association exists between smoking prior to electronic cigarette use and current electronic cigarette use
Ho: No association exists between smoking prior to electronic cigarette use and the belief that electronic

cigarette are less expensive than conventional cigarettes **Ha**: An association exists between smoking prior to electronic cigarette use and the belief that electronic cigarette are less expensive than conventional cigarettes **P-value**: 0.69 **Conclusion**: Fail to reject Ho and conclude that no statistically-significant association exists between smoking prior to electronic cigarette use and the belief that electronic cigarette are less expensive than conventional cigarettes
Ho: No association exists between smoking prior to electronic cigarette use and the belief that electronic cigarette use is more socially acceptable than conventional cigarette use **Ha**: An association exists between smoking prior to electronic cigarette use and the belief that electronic cigarette use is more socially acceptable than conventional cigarette use **P-value**: 0.36 **Conclusion**: Fail to reject Ho and conclude that no statistically-significant association exists between smoking prior to electronic cigarette use and the belief that electronic cigarette use is more socially acceptable than conventional cigarette use

DISCUSSION

According to the findings produced by the survey, users of electronic cigarettes were predominantly male (89.7%) and between the ages of 19 and 28 (47.7%). These proportions agree with the research compiled by Chapman et al (24).

Additionally, 92.3% of the respondents indicated that they did not smoke cigarettes at the time of polling, and 76.0% identified as previous smokers. This lends credence to the hypothesis that many who adopted electronic cigarette usage did so to quit smoking traditional cigarettes (17), as 61.0% of respondents also claimed that quitting smoking was their prime reason for using electronic cigarettes. This is further backed up by fact that 95.0% of respondents indicated that they used electronic cigarettes on a daily basis, perhaps to keep nicotine cravings at bay or to provide a surrogate for smoking a traditional cigarette.

Also noteworthy were the 18.7% of respondents who claimed curiosity as their prime motivation for using electronic cigarettes. Given that 24.0% of respondents indicated that they had not previously smoked, the possibility exists that some have used electronic cigarettes for reasons other than quitting smoking. Within the scope of this study however, it is unknown whether or not this finding provides evidence that e-cigarette usage can facilitate nicotine dependancy.

73.6% of respondents polled had experience in post-secondary education. As well, 30.3% of the respondents identified their occupation as “student”. While this result is remarkable it must be substantiated by further studies, as few if any studies to date appear to have polled electronic cigarette users about their specific occupations or education levels in general.

Not surprisingly, many respondents believed that using electronic cigarettes was better for their health than smoking traditional cigarettes (11). 63.9% believed that using electronic cigarettes was less expensive than smoking conventional cigarettes. This introduces an economic argument into the equation, namely that an additional benefit of switching to electronic cigarettes is cost savings.

Electronic cigarette users generally do not see any social benefits in using them. When asked wether or not electronic cigarettes were more socially acceptable than conventional cigarettes, 45.2% expressed a neutral opinion while 25.2% disagreed altogether. This may be due to the fact that electronic cigarette use is restricted in British Columbia much the same way as traditional cigarettes are

by both private citizens and some governments (26).

LIMITATIONS

Only one source was used for polling electronic cigarette users, specifically "www.reddit.com". This influenced the data, as the majority of Reddit users were young males under the age of 35 (25). It was the intention of the researcher to include data collected from other internet forums dealing with electronic cigarettes. However the lengthy process of contacting the administrators of these forums to obtain permission to conduct the survey proved to be too restrictive. Using data collected from Reddit may exclude older electronic cigarette users who may not use the internet as frequently as their younger counterparts, as well as electronic cigarette users who do not use Reddit.

It should also be noted that the sample size only consisted of 155 respondents. This meant that the conclusions drawn from this data may not be as robust as that which is drawn from a similar study with a larger sample size.

KNOWLEDGE TRANSLATION

According to the survey, many people who use electronic cigarettes do so to quit smoking tobacco. As time progresses, more scientific evidence will become available as to whether or not this is a viable means of actually quitting. Once that fact is established, educational campaigns will occur. Studies such as this one identify key demographics that could be effectively targeted in this campaign, and how resources can be used the most efficiently.

The results indicated that 95% of respondents used electronic cigarettes on a daily basis. This provides an excellent opportunity to study the health effects of using them. They may be compared with individuals of a similar demographic, namely those who smoke cigarettes and those who do not. This information will be vital in determining whether or not electronic cigarette use poses a health hazard that outweighs any potential benefits (such as quitting smoking). The second-hand effects of the vapour may also be studied. This insight would be useful in places like the Canadian province of British Columbia, where their use in public spaces was disallowed much the same as conventional tobacco cigarettes effective September 2016 (26). Long-term studies of electronic cigarette exposure (both first and second-hand) would provide the evidence necessary to determine if such bans are justified from a health perspective.

As smoking appears to precede most regular electronic cigarette use, these same demographics may also be used to identify which groups of people are likely to begin smoking in the first place. This information may be used in conjunction with smoking rate data from other sources. Inversely, the opportunity also exists to determine if, and to what extent, tobacco use follows the initial adoption of electronic cigarettes.

FUTURE RESEARCH PROJECTS

- A study that asks similar questions, but does not rely on only one source of data
- A study that asks similar questions, but uses data collected in-person as opposed to strictly internet-collected data.
- A study that determines if nicotine addiction is facilitated by e-cigarette use
- A study that determines if tobacco use follows initial electronic cigarette use

CONCLUSION

The purpose of this paper was to gain a better understanding of who uses electronic cigarettes and why. As the use of these devices in on the rise, it is important to

understand these questions. As future research determines the health effects of these devices (or lack thereof), we must know which demographics to target with educational campaigns on the subject. This research would also provide valuable guidance on how new legislation and policies regarding electronic cigarettes should be constructed. This study has indicated that young, college-educated males with a desire to quit smoking cigarettes are the most likely to use electronic cigarettes. Their desire to do so is strong, as the vast majority of them partake of these devices on a daily basis.

The study of electronic cigarettes is a frontier in the field of public health. In order to make wise decisions that will impact the health of people for many years to come, researchers need to collect as much data as possible on the subject and interpret it with the utmost discretion. It is the sincere hope of the writer that the research provided adds to this base of knowledge, and that is helps lead people to better lives through the combined efforts of all public health professionals.

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