Perceptions of, factors underlying, and reasons for e-cigarette use among Australia's young adults

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Abstract

Recent studies have found that the use of electronic cigarettes (e-cigarettes) is on the rise among non-smokers and that vaping may potentially be a gateway to smoking (Romijnders et al. 2018). In order to combat rates of e-cigarette initiation and use among young adults, the aim of this paper is to understand how young adults view e-cigarettes and the reasons behind their use. A systematic review of the Australian literature on adolescent e-cigarette use was conducted. It was found that this demographic of individuals was unsure of how they felt regarding legislation of e-cigarettes but were against restrictive regulation. Australian young adults were found to be largely misinformed regarding the efficacy of e-cigarettes as smoking cessation devices. A considerable number were unaware of the health risks associated with e-cigarette use. Factors associated with use included being male, alcohol and cigarette use, financial instability, and younger age. Furthermore, evidence was found against the use of e-cigarettes in smoking cessation and it was discovered that a large reason for usage is enjoyment. It is believed that this review will identify key areas for scientists, public health professionals, and regulators to develop effective interventions against e-cigarette use among young Australian adults.

1 Introduction

Electronic cigarettes (also known as e-cigarettes) are battery-powered devices which release vapour by heating various types of liquids (Scott et al. 2019). These devices are often used in conjunction with nicotine liquid and come in flavoured or non-flavoured varieties (Scott et al. 2019). Those that are used with nicotine liquids are sometimes referred to as ENDS (electronic nicotine delivery systems) (Yong et al. 2015). E-cigarettes are commonly advertised as an alternative to smoking and a harm reduction strategy for smokers to quit smoking, although the literature is conflicting in terms of support for these purposes (Yong et al. 2015). The act of using such devices is known as 'vaping' and this practice is known to be associated with a variety of ill health effects such as nicotine addiction, acute nicotine poisoning, and increased risks of cardiovascular events (Rom et al. 2015). In Australia, the legislation around the use of these devices varies between states and is riddled with complexity (Scott et al. 2019). E-cigarettes are sold under the category of tobacco or consumer product law, whereas the nicotine liquid which is used within these devices is labelled as a restricted drug and is categorised under the Australian Poisons Standard as Schedule 4 with a prescription, or a Schedule 7 dangerous poison substance without a prescription (Scott et al. 2019). Despite this, any individual, including minors, can purchase both the e-cigarette and nicotine liquid products online (Scott et al. 2019). Scheduling is a national categorisation system that regulates the availability of substances to the public. Medicines are classified into various schedules depending on the threat the compound poses to public health and safety. Due to the online availability of e-cigarettes, users are able to circumvent the regulations that exist to protect the health of individuals.

Recent research has found that e-cigarette use is on the rise among non-smokers and that vaping may potentially be a gateway to smoking (Romijnders et al. 2018). Because the appeal of e-cigarettes is increasing among those who have no interest in smoking cessation, it is important to study the reasons for e-cigarette use (Romijnders et al. 2018). Young adults are of high concern, due to this age bracket being associated with increased curiosity and experimentation (Wolfenden et al. 2018). Furthermore,

the marketing of e-cigarettes is designed and flavoured to attract this audience (Wolfenden et al. 2018). Recent evidence shows that the main reason for use of e-cigarettes among young adults in Australia is simply enjoyment and/or social influences (Jongenelis, Brennan, et al. 2019). This suggests that young adults are potentially underestimating the negative health effects associated with the use of these devices (Wolfenden et al. 2018).

In order to combat rates of initiation and e-cigarette use among young adults, it is necessary to understand what drives this activity. The aim of this paper is to examine how e-cigarettes are perceived, the factors associated with vaping, and the reasons behind vaping in young Australians. A systematic search of the Australian literature on adolescent e-cigarette use was conducted. Its findings provide an overview of young adult e-cigarette users in Australia. Young adults were defined as individuals aged between 18 and 25, as this was the most common age range used for studies on this population in the literature (Jongenelis, Brennan, et al. 2019; Jongenelis, Kameron, Rudaizky and Pettigrew 2019; Jongenelis, Kameron, Rudaizky, Slevin, et al. 2019). It is believed that this overview will highlight key areas for scientists, public health professionals, and regulators to develop effective interventions to curb e-cigarette use among young Australian adults.

This review begins by describing the search strategy used to select articles for inclusion in the analysis. It then details the characteristics of the articles selected and their limitations. The paper then goes on to describe the perceptions of, factors associated with, and reasons behind e-cigarette use (as identified in the studies included). In the discussion, the results are put into context using global comparisons. The paper then addresses the practical implications of the results, the limitations of the review, and avenues for future research.

2 Methodology

A systematic approach was employed to find relevant articles in the literature (see Figure 1). The key words ‘e-cigarette’, ‘electronic cigarette’, ‘vaping’, and ‘young adult’ were used in multiple databases (Scopus, Web of Science, and PubMed), with most articles being obtained through PubMed. These key terms were combined with the terms ‘perceptions’, ‘reasons’, and ‘factors’, as these allowed the results to become more specific to the research question. The results of these searches were further filtered to studies which focused on young adults by adding the search terms ‘young’ and ‘youth’. Search filters were employed to find Australian studies.

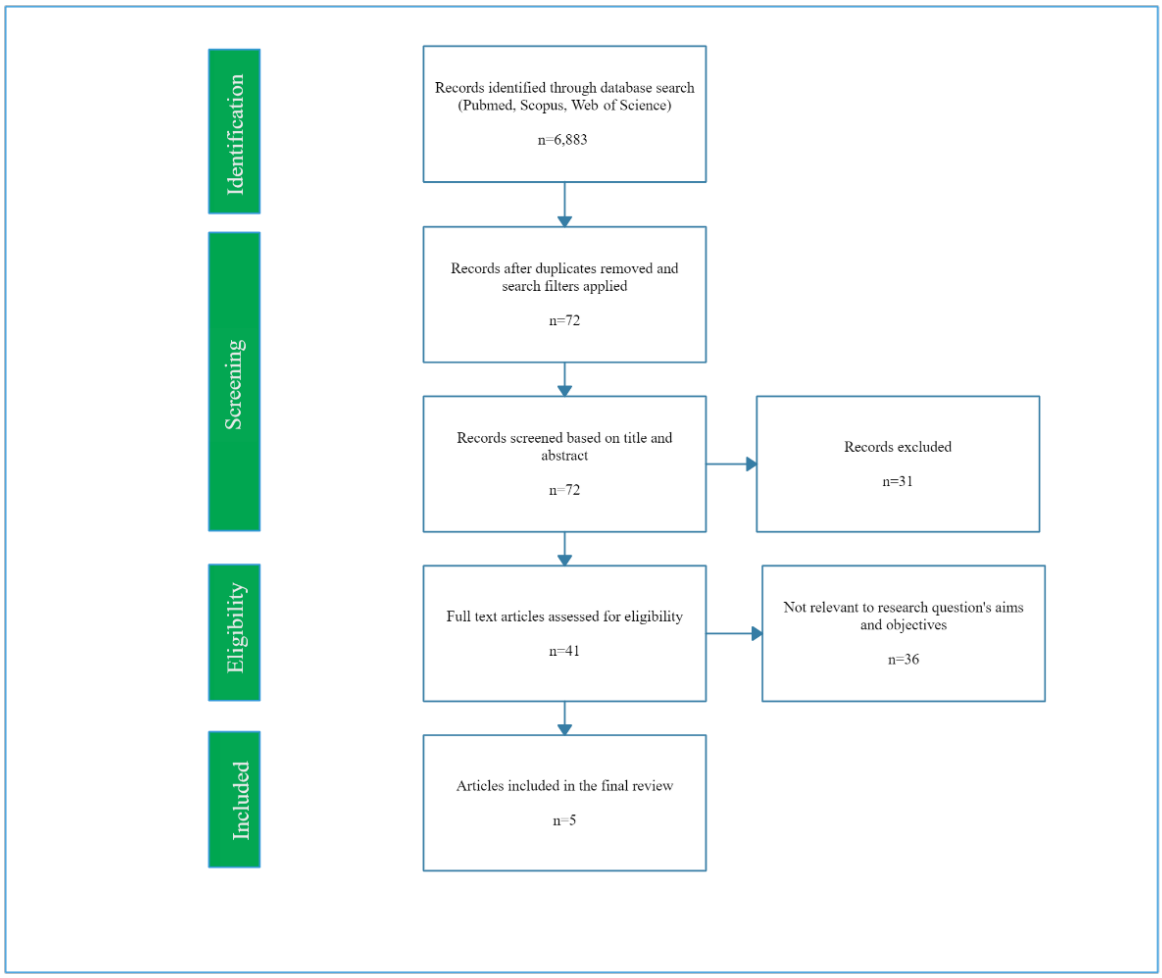

Figure 1: Flow chart of research process with inclusionary and exclusionary criteria

Source: Author's summary of process.

Articles which were deemed to not be reputable scientific sources were excluded. Articles were limited to those published within the last five years; however, no articles were ineligible due to widespread e-cigarette use being a recent occurrence. Other types of articles that were excluded were those which focused on toxicology/health effects, marketing, regulation, or harm reduction of e-cigarettes. Finally, studies which focused on 'youth', but conducted the study using age brackets outside of 18–25, were excluded. The databases used included Scopus, Web of Science, and PubMed, as these are reputable collections of articles within the health arena. Initial searches produced 6,883 results, which were narrowed down to 278 using the term 'Australia'. By adding the search terms 'youth' and 'young', this was further reduced to 95. Duplicate articles were removed, leaving 72 records.

Articles were narrowed down further based on relevance; the title and abstract were used to find 41 studies. These articles were critiqued after analysing the full text to ensure compatibility for comparison with each other, leading to 5 eligible studies. Factors that made articles incompatible included a limited focus on youth, those that centred on toxicology, and those that did not use Australian participants. The key features of each article were noted, including study design, focus, results, strengths, and weaknesses. Overarching themes and recurring trends were identified, allowing a consensus on the literature pertaining to the research question to be developed. This furthermore allowed gaps in the literature to be discovered.

3 Results

3.1 Article features

Five studies were identified as exploring the factors associated with e-cigarette use among youth in Australia. Cross-sectional online surveys are the main forms of data collection in all five studies. Four studies were conducted in Australia and one analysed data from Australia and the United Kingdom. Three studies utilised a recruiting platform known as PureProfile to find participants (Jongenelis, Brennan, et al. 2019; Jongenelis, Kameron, Rudaizky and Pettigrew 2019; Jongenelis, Kameron, Rudaizky, Slevin, et al. 2019). One study used participants from the 1989–1995 cohort of the Australian Longitudinal Study on Women's Health to recruit respondents for its own study (Melka et al. 2019). Another analysed data from the 2010 and 2013 rounds of the International Tobacco Control Four Country Survey (Yong et al. 2015). PureProfile is known to employ methods that ensure diverse geographical and socio-economic backgrounds in the participants it recruits to the study (Jongenelis, Brennan, et al. 2019). The three studies that used this platform to recruit participants were all contributed to by the same author (to some degree), and furthermore utilised similar statistical analyses and methods (Jongenelis, Brennan, et al. 2019; Jongenelis, Kameron, Rudaizky and Pettigrew 2019; Jongenelis, Kameron, Rudaizky, Slevin, et al. 2019).

The sample sizes of the participants in these studies varied greatly. Three studies had 1,116 participants and one had 1,500 participants, which is relatively low in comparison to the population of young adults in Australia. A study specifically focusing on young Australian women had 8,915 participants, which is significantly greater than other studies, but still not enough to be representative of all young Australians (Melka et al. 2019). The specific states/areas in Australia in which the participants lived was not mentioned in any of the five included studies. This makes it difficult to discern how generalisable these results are to the whole of Australia.

Overall it is clear that there is a severe lack of research in this field. Only one form of data collection (online surveys) has been used in the entirety of the literature and there is a great need for longitudinal studies due to the nature of the topic. This is most likely a result of general public access to e-cigarettes being a somewhat recent event. Additionally, there are no studies observing Indigenous participants. This is important as the rate of smoking among Indigenous individuals is three times greater than that of the general population and it is possible that this may also be true for e-cigarettes (Clough et al. 2018). Additionally, a notable absence in the Australian literature for young adults is the role of flavourings in e-cigarette use (Jongenelis, Kameron, Rudaizky, Slevin, et al. 2019). This is important as studies conducted in the United States have determined that flavourings are a significant reason for e-cigarette use in youth (Ambrose et al. 2015).

3.2 Perceptions of e-cigarettes

It is important to understand how e-cigarettes are perceived by young adults in order to discover the potential reasons for usage. In the literature, the perceptions of the harms of e-cigarettes is mixed. A study conducted by Jongenelis, Kameron, Rudaizky, Slevin, et al. (2019) found that 25 per cent of respondents believed that e-cigarettes had no negative health effects and only just over 50 per cent believed that they were addictive. Furthermore, a sizeable portion of participants were unsure whether e-cigarettes were more or less harmful (20–26 per cent) or addictive (20–37 per cent) than cigarettes. Interestingly, the study also found that those who were e-cigarette users were more likely to report that these devices were harmful and addictive than non-users (Jongenelis, Kameron, Rudaizky, Slevin, et al. 2019).

Other studies have found that participants were unsure about their perception of the legality of e-cigarettes (Jongenelis, Kameron, Rudaizky and Pettigrew 2019). One study measuring the responses of participants to various forms of e-cigarette legislation found that 32–58 per cent of respondents chose the 'neither agree nor disagree' or 'I don't know' option for the presented statements (Jongenelis, Kameron, Rudaizky and Pettigrew 2019). The greatest amount of support (although only moderate in extent) was for treating e-cigarettes as tobacco products, with nearly a third of respondents agreeing

with this notion (Jongenelis, Kameron, Rudaizky and Pettigrew 2019). It was observed that those who believed e-cigarettes to be more harmful were more likely to support restrictive policies against e-cigarettes. Even though the evidence of e-cigarettes as an aid for smoking cessation is conflicting in the literature, a study conducted by Jongenelis, Kameron, Rudaizky and Pettigrew (2019) found that almost 50 per cent of respondents believed that e-cigarettes could help smokers quit smoking or reduce their intake.

3.3 Factors associated with e-cigarette use

Gender was a factor associated with e-cigarette use, with males having overall higher rates of use (Jongenelis, Brennan, et al. 2019; Melka et al. 2019). Jongenelis, Brennan, et al. (2019) found that both male smokers and non-smokers were more likely to use e-cigarettes than their female counterparts.

E-cigarette use was associated with a plethora of factors ranging from financial stability, past cigarette use, alcohol use, and urban residence. A study by Melka et al. (2019) specifically focusing on women found that those who felt that it was difficult to manage their available income were more likely to have used e-cigarettes in the past year than those who felt it was easy to manage their available income. Ex-smokers had a 5 times greater likelihood of using e-cigarettes in the past year and those who currently smoked cigarettes had 10 times higher odds of past-year e-cigarette use when compared to those who were never cigarette smokers (Melka et al. 2019). Furthermore, women who reported consuming unsafe levels of alcohol (drinking greater than two standard drinks on any single day), had a greater probability of using e-cigarettes in the past year than participants who did not (Melka et al. 2019). Results for those who had ever used e-cigarettes further revealed positive correlations with urban residence, binge drinking, and intimate partner violence (Melka et al. 2019).

Age was a factor that was highly correlated with e-cigarette use (Melka et al. 2019; Yong et al. 2015). Awareness of e-cigarette devices was higher in those who were younger than older (Yong et al. 2015). Furthermore, it was found that in both the United Kingdom and Australia, younger people were more likely to have tried e-cigarettes than those who were older (Yong et al. 2015).

3.4 Reasons for use

The review of literature revealed mixed evidence around the use of e-cigarettes as devices to help quit smoking. A study focusing on young Australian women found that more than one quarter of individuals who reported using e-cigarettes in the past year and those who had ever used an e-cigarette, had never smoked a cigarette. These results demonstrate that smoking cessation was in no way a reason for use among this population (Melka et al. 2019). Furthermore, Jongenelis, Brennan, et al. (2019) found that only 14 per cent of smokers and 11 per cent of non-smokers reported using e-cigarettes to quit smoking. These statistics show that a clear majority of e-cigarette users are not using the device for the purpose of smoking cessation.

One study found that the most frequent reason for the use of ENDS (electronic nicotine delivery systems) among smokers (23 per cent) and non-smokers (26 per cent) was because it was fun, enjoyable, and/or cool (Jongenelis, Brennan, et al. 2019). These findings are striking as e-cigarettes have the perception of being used as aids to help quit smoking. However, nearly twice as many smokers and non-smokers are using them for enjoyment as opposed to smoking cessation (14 per cent vs 23 per cent among smokers and 11 per cent vs 26 per cent for non-smokers), when comparing the results of the two studies conducted by Jongenelis, Brennan, et al. (2019). Yong et al. (2015) noted the importance of researching the role of flavours in reasons for e-cigarette use. While this is an area widely accepted as a key factor in use of e-cigarettes in the United States and internationally, it was absent in the Australian literature. Overall, the results have demonstrated a lack of studies which have identifying reasons for e-cigarette use within an Australian context.

4 Discussion

A key strength of the literature is documentation of the perceptions of e-cigarettes among young adults. Nearly all of the studies reviewed analysed the positions held by young adults on e-cigarette legislation and perceptions of harm that these devices hold (Jongenelis, Brennan, et al. 2019; Jongenelis, Kameron, Rudaizky and Pettigrew 2019; Jongenelis, Kameron, Rudaizky, Slevin, et al. 2019; Romijnders et al. 2018). Moreover, a large portion of young adults in Australia are unsure of the harms of these devices and a significant number oppose restrictive legislation. Jongenelis, Kameron, Rudaizky, Slevin, et al. (2019) found that those who were e-cigarette users were more likely to report that these devices were harmful and addictive than non-users. This suggests that there is a disconnect around the way e-cigarettes are perceived by non-users, as non-users underestimate the real dangers they hold. It is important to understand the perceptions of e-cigarettes among young adults in order to create educational programs and interventions which protect them from the harms of vaping.

There were numerous factors positively associated with e-cigarette use including being male, increased alcohol and cigarette use, lower financial stability, and lower age (Jongenelis, Brennan, et al. 2019; Melka et al. 2019). Further research must be conducted to determine if these factors are causal agents or are just correlated with e-cigarette use. Lower ages and being male are factors that may increase rates of e-cigarette use due to increased risk-taking behaviours (Jongenelis, Brennan, et al. 2019). Cigarette use may correlate with greater e-cigarette use due to individuals utilising them to quit smoking, however this is debated heavily within the literature (Jongenelis, Brennan, et al. 2019).

Originally marketed as tools to quit smoking, smoking cessation is perceived to be a primary factor for their use (Wolfenden et al. 2018). However, the World Health Organization and a multitude of government and health organisations do not endorse this use. This is due to concerns around the evidence for their effectiveness as a cessation aid, safety, and the potential for e-cigarette experimentation in youth to heighten subsequent cigarette use (Wolfenden et al. 2018). The current review of the literature found evidence against the use of e-cigarettes as an aid for smoking cessation, thus supporting this position.

Smoking cessation is believed to be a key reason for use of e-cigarettes; however, the literature opposes this perception. A study specifically focusing on young Australian women found that more than one quarter of individuals who reported using e-cigarettes in the past year and those who had ever used an e-cigarette, had never smoked a cigarette (Melka et al. 2019). Additionally, Jongenelis, Brennan, et al. (2019) found that only 14 per cent of smokers and 11 per cent of non-smokers reported using e-cigarettes to quit smoking. This is in great contrast to the perceptions of young Australian adults of the role of e-cigarettes as smoking cessation devices with Jongenelis, Kameron, Rudaizky, Slevin, et al. (2019) finding that nearly half of all respondents believed that e-cigarettes could help smokers quit smoking or reduce their intake. This suggests that greater action must be taken in informing young adults of the mixed evidence around e-cigarettes and smoking cessation. Furthermore, it was found that e-cigarette use could potentially increase rates of smoking, causing a gateway effect (Soneji et al. 2017). Evidence for this gateway hypothesis is lacking in the current literature; however, a recent meta-analysis of nine longitudinal studies (17,000 participants) discovered that the use of e-cigarettes among non-smokers was correlated with a four times increased odds of past 30-day cigarette use (Soneji et al. 2017). Although this is merely a correlation and was not conducted on young adults, further studies in this area could determine the legitimacy of the gateway hypothesis within Australia. The paper ultimately concluded by stating that strong e-cigarette regulation could lower use among youth and limit the burden of smoking in the future population of young Australian adults (Soneji et al. 2017).

For years, e-cigarette use has been on the rise in young adults in Australia, with flavourings being suspected to be a root cause. In the 2016 National Drug Strategy Household Survey, it was found that 7.1 per cent of young Australian adults had ever used e-cigarettes (Wolfenden et al. 2018). This is a great increase from that reported in 2013 (4.3 per cent) (note that changes in classification of e-cigarettes between surveys make this comparison difficult) (Wolfenden et al. 2018). Youth are especially at risk of using these devices as nicotine e-cigarettes are marketed to young people through the novelty of vaping and the various fluid flavours available (Dai and Hao 2016). Companies have produced a wide range of flavours such as fruits, desserts, and coffee, which resemble familiar treats (Dai and Hao 2016).

A key gap in the current literature is an analysis of the role of flavouring e-cigarette use in Australia (Jongenelis, Kameron, Rudaizky, Slevin, et al. 2019). A study conducted from 2013 to 2014 by Ambrose et al. (2015) discovered that the availability of appealing flavours was the leading reason for e-cigarette use in the United States with 81 per cent of young adult users citing this reason. Therefore, it is important to establish whether flavourings also hold a significant role in use among young adults in Australia.

5 Applications

Based on these findings, awareness campaigns communicating the risks and dangers of e-cigarette use can be tailored to young adults, resulting in more effective campaigns. As mentioned, it is clear that a large portion of the population are misinformed and/or unaware of the negative health effects associated with e-cigarette use. If campaigns highlighted the possible risks of nicotine addiction, acute nicotine poisoning, increased risks of cardiovascular events, and the fact that there is unclear evidence supporting e-cigarettes as smoking cessation devices, young adults may be less inclined to initiate or continue e-cigarette use.

6 Limitations

A key limitation is the lack of variety in the studies used. There is a clear lack of overall number of studies and furthermore the studies that have been conducted have all used online surveys in order to collect data. This is not ideal, as it does not allow for those who have poor access to the internet to participate. This can result in participation bias, in which participants that possess certain traits become over- or underrepresented in the data. Cigarettes are used in higher rates by those in lower socio-economic classes and this may hold true for e-cigarettes. Thus, individuals who are unable to afford computers or phones and pay for internet may be unable to participate in online surveys. Furthermore, of the five included studies in this review of the literature, three have been conducted by the same team of researchers. In order for results to be valid, they must be reproducible by other groups of researchers in order to overcome potential biases in data collection and analysis. This is especially important for the included studies that used coding of qualitative data.

7 Future research

Multiple gaps in the literature were identified. No studies to date within the databases explored have examined the use of e-cigarettes among young Indigenous Australians or the role flavouring plays in reasons for use. Moreover, there is a lack of studies analysing the factors associated with, perceptions of, and reasons for use of e-cigarettes among young Australian adults. More studies must be conducted on the negative health effects associated with e-cigarette use, as this information could prove to be highly useful in creating awareness campaigns. Additionally, the role of flavourings in the use of e-cigarettes among young Australian adults is an important gap in the literature that must be filled.

8 Conclusion

This review of the literature into perceptions, factors associated with, and reasons for e-cigarette use among young Australian adults revealed much information. Overall, this population of individuals are unsure of how they feel regarding legislation of e-cigarettes, but are against restrictive regulation. Australian young adults are largely misinformed regarding the efficacy of e-cigarettes as smoking cessation devices, and a portion are unaware of the health risks associated with e-cigarette use. Factors associated with e-cigarette use include being male, alcohol and cigarette use, financial stability, and age. Evidence was found against the use of e-cigarettes in smoking cessation and it was discovered that a large reason for use was enjoyment.

Ultimately, information about e-cigarette use in young adults is necessary to combat misperceptions and educate these individuals on the risks and dangers of e-cigarette use. In the current literature, a gap was identified in the impact of flavouring of e-cigarettes and how this might affect their use by young adults in Australia. For scientists, public health professionals, and regulators, this review provides insight into the use of e-cigarettes among Australian young adults.

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