

RUNNING HEAD: ATTITUDES TOWARD E-CIGARETTES IN PEOPLE WHO USE  
DRUGS

Attitudes toward Electronic Cigarettes in an Australian Population of People who use Drugs

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### **Statement of Originality**

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying subject to the copyright Act 1968.

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### **Acknowledgement of Collaboration**

I hereby certify that the work embodied in this thesis has been done in collaboration with other researchers. I have included as part of this thesis a statement clearly outlining the extent of collaboration, with whom and under what auspices.

I contributed to the development of the research question, the database search, the statistical analysis, the interpretation of results and editing of the manuscript. Prof Billie Bonevski contributed to the development of the research question, design, the formulation of the methodology, the interpretation of results and editing of the manuscript. Ms Ashleigh Guillaumier assisted in data collection. Mr Nic Croce assisted with the statistical analysis.

\_\_\_\_\_ 4 April 2018

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### Abstract

**Background:** Smoking is the leading cause of preventable death worldwide (World Health Organisation, 2015). The rates of smoking in Australia have been declining in recent years, but not in certain vulnerable populations such as people who use alcohol and other drugs. Smoking cessation strategies have been implemented on both a population and individual level. Smoking cessation strategies have been less successful in this group, and thus the need for new strategies has been recognised. Electronic cigarettes (e-cigarettes) represent a potentially new smoking cessation aid, but little is known about this group's perception of e-cigarettes.

**Method:** A five-item survey was developed and administered to participants ( $N= 405$ ) of six local drug and alcohol treatment centres in the Hunter New England local health district over a three month period in 2016-2017. The survey's questions assessed participants smoking status as well as their perceptions toward e-cigarettes generally, and their usefulness in smoking cessation.

**Results:** 86 percent of participants reported being current smokers of tobacco, with 56 percent reporting ever-use of e-cigarettes. 41 ( $N=168$ ) percent of participants stated that they believed e-cigarettes are helpful as a smoking cessation strategy. 50 ( $N=203$ ) percent of participants reported thinking that tobacco cigarettes were more harmful than e-cigarettes. 60 percent of participants ( $N=243$ ) were of the opinion that e-cigarettes should be used in drug and alcohol clinics to help people quit smoking tobacco.

Using chi-square analysis to investigate associations, a person's smoking status was found to be significantly associated with e-cigarette use ( $\chi^2 (8, N = 405) =20.16, p<0.05$ ), the persons perception of the helpfulness of e-cigarettes as a smoking cessation strategy ( $\chi^2 (4, N = 405)$

=16.70,  $p < 0.05$ ) and the persons perception of the harmfulness of e-cigarettes ( $\chi^2 (6, N = 405) = 90.97, p < 0.001$ )).

**Conclusions:** This may be the first study investigating attitudes toward e-cigarettes in an Australian population of people who use drugs. Results found that awareness and use of e-cigarettes was high, with over half (56 percent) of the sample reporting ever-use of e-cigarettes. Results also closely replicate findings of Stein et al. (2014) who found similar results in a North American sample of tobacco smokers accessing an opioid treatment program.

This research has implications for the legislative context around e-cigarettes in Australia. In summary, a sample of individuals from an at-risk population are currently using e-cigarettes in conjunction with tobacco cigarettes. Many report being interested in e-cigarettes as a smoking cessation strategy in drug and alcohol treatment centres. This warrants further exploration due to the current illegality of distribution of e-cigarettes in Australia. The strengths of this research are noted as the large sample-size and non-invasive nature of the survey. Limitations may include the generalisability of these findings to the larger population of people who use alcohol and other drugs.

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Critical Literature Review

According to the World Health Organisation (WHO) (2015), tobacco smoking is the single biggest cause of premature and preventable death worldwide. Recent data indicates that tobacco smoking causes approximately six million deaths globally per year and tobacco smokers die on average ten years earlier than non-smokers (Centre for Disease Control and Prevention, 2017). The relationship between tobacco smoking and adverse health effects such as cardiovascular disease and cancer have long been recognized (US Department of Health and Human Services, 1990; WHO, 2017). Despite this, many people in Australia and worldwide continue to smoke tobacco cigarettes, with the most recent data suggesting that 12.2 percent of Australians smoke on a daily basis (Australian Institute of Health and Welfare, 2016).

Certain population groups exhibit significantly higher smoking rates than the general population. In high-income countries, the proportion of people who smoke is positively correlated with social disadvantage, with rates increasing as disadvantage increases (Australian Institute of Health and Welfare, 2014). The prevalence of smoking in people with mental health conditions is higher than in the general population, regardless of the specific condition (Lawrence, Mitrou & Zubrick, 2009). Aboriginal people smoke at a rate almost double that of the national average, with nearly 40% of Aboriginal people in New South Wales over the age of 15 smoking tobacco (Australian Bureau of Statistics, 2013).

For the purpose of this paper, people who use alcohol and drugs will refer to those that use these substances at levels detrimental to areas of functioning or what is generally accepted as problem-use. People who use both alcohol and drugs smoke at higher rates than the broader Australian population (Fraser, Gartner and Hall, 2014), with this figure being approximately 40 percent of party-drug users (ecstasy etc) and over 50 percent in non-medical users of other drugs including amphetamine, stimulants and heroin. Guydish et al. (2016) reported this rate to be double of those of a similar demographic characteristics that

were not accessing drug treatment programs, and also significantly higher than people receiving treatment for alcohol-use disorders only. This relationship between alcohol use and smoking has been recorded for some time (Mintz et al., 1985). Reed et al. (2007) found that in a sample of young adults, those who identified as either smokers or occasional smokers drank alcohol at significantly higher dosages and frequencies than those who identified as non-smokers.

A strong link has also been observed between cannabis use and tobacco smoking. Agrawal, Budney and Linskey (2012) identified shared genetic vulnerabilities to the use of both cannabis and tobacco, shared environmental influences, co-administration (the mixing of the two) and the shared method of use as the major reasons for this link. A further study by Hindocha et al. (2015) found that tobacco smoking was a strong predictor of cannabis-use as well as cannabis dependency in a random sample in the United Kingdom. This paper, as well as a systematic review by Mcleod et al. (2004) concluded that the cessation of tobacco smoking could be a powerful facilitator of the cessation of cannabis use and cannabis dependency.

High rates of tobacco smoking have also been observed in samples of people who use amphetamine. Topp et al. (1999) found that in a sample of people who used ecstasy, 98 percent of people had also tried tobacco and 74 percent used tobacco regularly. This was second to only alcohol, which had near universal regular use in the sample.

In another study, smoking status was found to be a powerful predictor of use of both narcotics and opiates (Frosch, Shoptaw, Nahom, & Jarvik, 2000). Further, this positive correlation between smoking and drug use increased in strength as a factor of the dosage of cigarettes smoked. That is, as individuals smoked tobacco at higher rates, the likelihood they used narcotics, opiates or both increased as well. Individuals accessing opioid dependency

programs in the community smoke at even higher rates still (Fraser et al., 2014), with this rate being as high as 92 percent in one study (Clemmey et al, 1997).

Smoking prevalence in Australia has been decreasing steadily in the last decade in the general population (AIHW, 2016). Data suggests that quit rates have increased every two years in Australia since 1991 (Australian Institute of Health and Welfare, 2014). Unfortunately, the same decreases in tobacco smoking have largely not been replicated in the above high-risk groups. In particular, people who use alcohol and drugs appear to be smoking at a rate unchanged for the last ten years. These persistent high rates of smoking only further exacerbate the well-documented health inequalities that this population experience (Shiffman et al., 2008).

It is generally understood that long-term abstinence from tobacco smoking in those who have become tobacco dependent is very difficult due in part to the addictive nature of nicotine (Borland et al., 2004). Most individuals who smoke reported regret around smoking initiation, and have tried to quit on at least one occasion, with most requiring several quit attempts before achieving long-term abstinence. Other factors that have been implicated in the difficulty associated with long-term abstinence in vulnerable subpopulations include the widespread availability and accessibility to tobacco, the level of social acceptability in these vulnerable subpopulations, the perceived importance of tobacco in assisting with stress management, a lack of support and the high prevalence rates in these groups (Twyman, Bonevski, Paul & Bryant, 2014).

It is important to summarise the literature on barriers to quitting tobacco cigarettes in vulnerable subgroups before discussing smoking cessation strategies in any detail. It is beyond the scope of this literature review to discuss the barriers to smoking cessation in the general population. A systematic review of both quantitative and qualitative literature was

completed by Twyman, Bonevski, Paul and Bryant (2014) and has been discussed briefly above. More specifically, this review found that certain barriers were consistently found to be reported in the empirical literature. Firstly, the usefulness of smoking in stress management was found in forty studies. It has been suggested in the above paper that a high level of stress is inherent in the lives of those in vulnerable subgroups. Smoking was consistently used as a way of managing this stress and thus a major barrier to smoking cessation. In one study of people with substance-use disorders, 39 percent of participants cited this as their major barrier to smoking cessation (Dickens, Haw, Popham & Stubbens, 2005).

One possible reason for the higher smoking prevalence in these vulnerable subgroups is the level of social acceptability (Twyman, Bonevski, Paul & Bryant, 2014). The aforementioned paper found that being around others smoking cigarettes was a significant barrier to quitting. Further to this finding, additional studies found that people in these groups were extremely likely to have a family member or friend who smoked tobacco cigarettes, only serving to exacerbate the social acceptability barrier to smoking cessation. Smoking was also found in various studies to be an acceptable and normalised behaviour.

The widespread availability of cigarettes in not only vulnerable populations but also the general population has been cited as a significant barrier to quitting in various studies (Twyman, Bonevski, Paul & Bryant, 2014; Glover, 2015; Goldberg, Moll & Washington, 1996). Various measures have been put in place to address this barrier including limiting the retail outlets of cigarettes where possible, restrictions on advertising and the implementation of smoke-free environments within the community (Bell, Bowers, Bell, McCullough & Salmon, 2010). These strategies are addressed in more detail later in this review.

A lack of support from community and health services was found to be consistently cited as a barrier to smoking cessation in these vulnerable groups (Twyman, Bonevski, Paul

& Bryant, 2014). This review found thirteen qualitative studies and one quantitative study supporting this finding. In some cases, family member's actively discouraging smoking cessation was observed (Kerr, Woods, Knussen, Watson & Hunter, 2013). This speaks to not only a lack of support, but also possibly the level of social acceptability already discussed.

### **Smoking Cessation Strategies**

Numerous strategies have been implemented by both government and non-government bodies worldwide to try to minimise the harm caused by tobacco smoking (WHO, 2005) including restricting smoking in public places, cigarette taxation, mass media campaigns, restrictions to tobacco advertising, health warnings on packages and most recently in Australia plain cigarette packaging. Again, the research suggests that these strategies are not as effective in people who use alcohol, drugs and other high-risk groups (Shiffman et al., 2008).

Strategies to assist with the cessation of smoking are easily understood in two distinct categories, behavioural interventions and pharmacotherapies. Behavioural treatments include (but are not limited to) help-lines such as Quitline, contingency-management, individual counselling, group counselling and support groups. Pharmacotherapy approaches include nicotine replacement therapy (NRT: nicotine patches, chewing gun, inhalers and various other delivery types) as well as medications such as bupropion and varenicline (Cahill et al., 2013).

Electronic cigarettes (e-cigarettes) refer to a very wide and diverse range of electronic devices that vaporise nicotine (and various other substances) to be inhaled by the smoker, replicating not only the sensory stimulation of smoking, but the behavioural component also (Bullen et al., 2013). Vapourised nicotine has been in production for over 20 years, with early research indicating their efficacy as an adjunct to other smoking cessation strategies

(Leischow et al., 1996). This randomised control trial found significant differences in abstinence rates amongst people nicotine inhalers and people using existing nicotine replacement therapies at the one, three and six month mark post commencement of treatment.

In recent years, the development and more widespread use of e-cigarettes globally has led to a body of research into their effectiveness in assisting people with the cessation of smoking. A Cochrane review conducted by McRobbie et al. (2014) sought to investigate the extent of the research into the use of e-cigarettes to assist with smoking cessation. Again, results suggested that only a very small number of studies have been conducted in this area. An updated Cochrane review was completed by Bullen et al. (2016), the results of which are summarised below. In this research, a randomised controlled trial found that e-cigarettes were just as effective as conventional forms of NRT in improving smoking cessation rates. However, data from these findings had confidence intervals that were quite wide, suggesting there was a large amount of population unaccounted variance. This, coupled with the small number of studies conducted in this area, suggest that further research is needed to better understand the role of e-cigarettes as a tool for tobacco smoking cessation.

Research by Douglas, Hall and Gartner (2015) suggested that public policy shift toward making all tobacco products less attractive to new and current users rather than focusing on the potential, and not yet known, adverse health effects of e-cigarettes. McNeill et al. (2015) published an evidence update on e-cigarettes reporting that they may be up to 95 percent less harmful than tobacco cigarettes. Reasons for this safety outlined in this evidence update were that many of the chemicals known to cause smoking-related disease are absent in e-cigarettes, the risk of nicotine poisoning is negligible and e-cigarette vapour in the ambient air poses no risk to bystanders.

These findings were heavily criticised by Polosa (2015) as hasty and misleading, as the original source of the figure of “95 percent less harmful” was explicit in stating that the evidence supporting this claim was very weak and based on expert opinion (Nutt et al., 2014). Further, the recruitment criteria for these experts did not include any exclusion criteria (Polosa, 2015). In addition, Polosa (2015) also highlights the extensive conflicts that the authors of the original papers openly declared. McNeill et al. (2015) failed to report that one of the authors in the Nutt et al. (2014) openly states that they are a consultant to a prominent e-cigarette distributor.

Irrespective of these criticisms, more recent literature has continued to report that e-cigarettes are less harmful than tobacco cigarettes (Nutt et al., 2016; Farsalinos and Polosa, 2015; Farsalinos et al., 2016). Similar findings to those in McNeill et al. (2015) were reported by Farsalinos and Polosa (2014) in a systematic review, in that long-term use of e-cigarettes is a far healthier alternative to tobacco smoking. A further study by Farsalinos et al. (2016) found that the use of e-cigarettes to assist with smoking cessation led to no new adverse health effects and a potential decrease in diastolic blood pressure, the heightening of which is a known effect of tobacco smoking.

In a study by Goniewicz et al. (2013), e-cigarettes were found to lead to nine to 450 times fewer toxins and carcinogens than tobacco cigarettes. These results were replicated by Goniewicz et al. (2017), who found that while the quantity of nicotine consumed by those randomly allocated to a condition smoking e-cigarettes was comparable to a group randomly allocated to smoking tobacco cigarettes, the exposure to toxins for those in the e-cigarette condition was substantially reduced.

Awareness and use of e-cigarettes is increasing globally, with research finding that one in five current smokers in a United States sample had tried an e-cigarette between 2010

and 2013 (King et al., 2013). In Australia, recent data found that 31 percent of Australian's over the age of 14 reported ever-use of an e-cigarette. One study reported that in a sample of adolescents and young adults, the awareness of e-cigarettes was nearly absolute (Greenhill, Dawkins, Finn, Notley and Turner, 2016). This same study highlighted the need for further research into this awareness. In a British sample, individuals reporting to use e-cigarettes increased from 700,000 in 2013 to 2.6 million in 2015 according to government data (Action on Smoking and Health, 2016). Information taken from the Public Health UK (2016) evidence update on e-cigarettes suggest that e-cigarettes have become the most widely-used NRT in the United Kingdom.

Research is starting to emerge into e-cigarette awareness and usage in an Australian population. A study conducted by Twyman et al. (2015) sought to investigate the attitudes to and awareness of e-cigarettes in a population of Australians from a low socioeconomic status. This research found that, despite the restricted availability of e-cigarettes in Australia, individuals from socially disadvantaged backgrounds had awareness and understanding of e-cigarettes similar to those found in the general population. Moreover, 77 percent of participants in this research reported to being familiar with e-cigarettes and 37 percent had tried e-cigarettes within the last 12 months. However, this research did not discriminate between individuals that had used e-cigarettes with nicotine and those that had used non-nicotine varieties. Further, while this research had interesting implications for a socially disadvantaged population, the results cannot be generalised to other populations, particularly people who use other psychoactive drugs.

A further study by Dunlop, Currow, Dessaix and Lyons (2016) investigated the current use of e-cigarettes amongst a New South Wales population of tobacco smokers or those who had recently ceased tobacco smoking. In a large sample (nearly three thousand), the results of this research indicated that e-cigarettes use increased from seven percent

smokers to nine percent of smokers from 2013 to 2016. Further, the group with the highest usage rates (16 percent) were aged 16 to 29. More importantly, this research yielded statistically significant results suggesting that many of these users of e-cigarettes were using them to assist with the cessation of tobacco smoking or because the perceived health impacts of e-cigarettes were less harmful than tobacco.

### **Electronic-Cigarettes in People Who Use Drugs**

It is known that individuals who have recently used alcohol, drugs or have a substance use disorder are at a higher risk of tobacco smoking (Guydish et al., 2016). This same research suggests that the majority of respondents (70.5 percent) wanted to cease smoking or had thought about it at some stage.. Despite this, very limited research exists investigating the potential of e-cigarettes for assisting with the cessation of smoking in people who use other psychoactive drugs.

Stein et al. (2014) investigated the attitudes toward e-cigarettes in participants in a North American community opioid treatment program. In this study, 65 percent of participants were tobacco-smokers. The results of this study indicated that 98.7 percent of participants were familiar with e-cigarettes with 73 percent of participants having used an e-cigarette at some point. Further, this research found that 33.1 percent of participants had used an e-cigarette in the past 30 days. This research provides that many participants viewed e-cigarettes as less harmful than combustible cigarettes and many others had used e-cigarettes in successful quit attempts. However, this data was cross-sectional and did not provide an account of changing attitudes over time. Further, this sample was 85 percent Caucasian, limiting the generalisability of the findings.

This literature review has aimed to explicate the current state of tobacco smoking in Australia, particularly with respect to the vulnerable subgroup of people who use alcohol and

other drugs. In doing so, the barriers to quitting in vulnerable populations have been outlined, as have the current, most widely-used nicotine replacement therapies (NRT) and social policies aimed at reducing the harm that tobacco smoking continues to cause. It is concluded that e-cigarettes represent a potentially helpful alternative as they satisfy not only the addictive component of tobacco smoking (nicotine), but the behavioural component also. While the existing literature on the health impacts of e-cigarettes has also been addressed, it is clear that further research is needed into the perceptions and acceptability of e-cigarettes in these vulnerable populations, particularly people who use alcohol and drugs.

**Manuscript**

Attitudes toward Electronic Cigarettes in an Australian Population of People who use Drugs

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The World Health Organisation (WHO) (2015) reports that tobacco smoking is the single biggest cause of premature and preventable death worldwide. Recent data indicates that tobacco smoking causes approximately six million deaths globally per year and tobacco smokers die on average ten years earlier than non-smokers (Centre for Disease Control and Prevention, 2017). The relationship between tobacco smoking and adverse health effects such as cardiovascular disease and cancer have long been recognized (US Department of Health and Human Services, 1990; WHO, 2017). The associated health benefits of ceasing smoking are just as well documented (WHO, 2017). Despite this, people in Australia and worldwide continue to smoke tobacco cigarettes, with recent data suggesting that 12.2 percent of Australians aged 14 or older smoke on a daily basis (Australian Institute of Health and Welfare, 2016).

Certain population groups exhibit significantly higher smoking rates than the general population. In high-income countries, the proportion of people who smoke is positively correlated with social disadvantage, with rates increasing as disadvantage increases (Australian Institute of Health and Welfare, 2014). The prevalence of smoking in people with mental health conditions is higher than in the general population, regardless of the specific condition (Lawrence, 2009). Aboriginal people smoke at a rate almost double that of the national average, with nearly 40 percent of Aboriginal people in New South Wales over the age of 15 smoking tobacco (Health Stats New South Wales, 2016).

People who use both alcohol and drugs smoke at higher rates than the broader Australian population (Fraser, Gartner & Hall, 2014). For the purpose of this paper, people who use alcohol and drugs will refer to those that use these substances at levels detrimental to areas of functioning or what is generally accepted as problem-use, with the Australian Institute of Health and Welfare (2014) finding that those who had recently used alcohol or drugs were up to three times more likely to smoke tobacco cigarettes. The relationship

between alcohol use and smoking has been recorded for some time (Mintz et al., 1985). Reed et al. (2007) found that in a sample of young adults, those who identified as either smokers or occasional smokers drank alcohol at significantly higher dosages and frequencies than those who identified as non-smokers.

A strong link has also been observed between cannabis use and tobacco smoking (Agrawal, Budney & Linskey, 2012). That review identified a number of reasons for this link: shared genetic vulnerabilities to the use of both cannabis and tobacco, shared environmental influences, coadministration (the mixing of the two) and the shared method of use. A later study by Hindocha et al. (2015) found that tobacco smoking was a strong predictor of cannabis-use as well as cannabis dependency in a random sample in the United Kingdom. This paper, as well as a systematic review by Mcleod et al. (2004) concluded that the cessation of tobacco smoking could be a powerful facilitator of the cessation of cannabis use and cannabis dependency.

Similar patterns have also been observed in samples of people who use amphetamine. Topp et al. (1999) found that in a sample of people who regularly used ecstasy, 98 percent had tried tobacco and 74 percent used tobacco regularly. This was second only to use of alcohol by the same sample, which had near universal regular use.

In another study, smoking was found to be a powerful predictor of use of both narcotics and opiates (Frosch, Shoptaw, Nahom, & Jarvik, 2000). Further, this positive correlation between smoking and drug use increased in strength as a factor of the dosage of cigarettes smoked. That is, as individuals smoked tobacco at higher rates, the likelihood they used narcotics, opiates or both increased as well. Individuals accessing opioid dependency programs in the community smoke at even higher rates still (Fraser et al., 2014), with this rate being as high as 92 percent in one study (Clemmey et al., 1997).

Smoking prevalence amongst the general Australian population has been decreasing steadily over the last decade (ABS, 2013). Data suggests that quit rates have increased every two years in Australia since 1991 (Australian Institute of Health and Welfare, 2014). The same decreases in tobacco smoking have largely not been replicated in the groups outlined above, particularly those who use drugs (Guydish et al., 2016). These persistent high rates of smoking only further exacerbate the well-documented health inequalities that this population experience (Shiffman et al., 2008).

It is generally understood that long-term abstinence from tobacco smoking in those who have become tobacco dependent is very difficult due in part to the addictive nature of nicotine. Most individuals who smoke report regret about starting smoking, and have tried to quit on at least one occasion (Borland et al., 2004), with most requiring several quit attempts before achieving long-term abstinence. Other factors that have been implicated in the difficulty associated with long-term abstinence in vulnerable subpopulations include the widespread availability and accessibility to tobacco, the level of social acceptability in these vulnerable subpopulations, the importance of tobacco in assisting with stress management, a lack of support and the high prevalence rates in these groups (Twyman, Bonevski, Paul & Bryant, 2014).

Numerous strategies have been implemented by both government and non-government bodies worldwide to try to minimise the harm caused by tobacco smoking (WHO, 2003) including restricting smoking in public places, cigarette taxation, mass media campaigns, restrictions to tobacco advertising, health warnings on packages and most recently in Australia plain cigarette packaging. Again, the research suggests that these strategies are not as effective in people who use alcohol, drugs and other high-risk groups (Shiffman et al., 2008). Individuals in the high-risk group of people who use drugs not only

are at a higher risk of developing smoking habits, but also have tobacco smoking relapse rates higher than those in the general population (Prochaska et al., 2004).

Strategies to assist with the cessation of smoking are easily understood in two distinct categories, behavioural interventions and pharmacotherapies. Behavioural treatments include (but are not limited to) help-lines such as Quitline, contingency-management, individual counselling, group counselling and support groups. Pharmacotherapy approaches include nicotine replacement therapy (NRT: nicotine patches, chewing gun, inhalers and various other delivery types) as well as medications such as bupropion and varenicline (Cahill et al., 2013).

Electronic cigarettes (e-cigarettes) refer to a very wide and diverse range of electronic devices that vaporise nicotine (and various other substances) to be inhaled by the smoker, replicating not only the sensory stimulation of smoking, but the behavioural component also (Bullen et al., 2013). Nicotine inhalers have been in production for over 20 years, with early research indicating their efficacy as an adjunct to other smoking cessation strategies (Leischow et al., 1996). This randomised control trial found significant differences in abstinence rates amongst people using inhalers and people using existing NRT at the one, three and six month mark post commencement of treatment.

In recent years, the development and more widespread use of e-cigarettes globally has led to growth in research into their safety and effectiveness in assisting people with the cessation of smoking. A Cochrane review conducted by McRobbie et al. (2014) sought to investigate the extent of the research into the use of e-cigarettes to assist with smoking cessation. Again, results suggested that only a very small number of studies have been conducted in this area. An updated Cochrane review was completed by Bullen et al. (2016), the results of which are summarised below. In this research, a randomised controlled trial

found that e-cigarettes were just as effective as conventional forms of NRT in improving smoking cessation rates. However, data from these findings had confidence intervals that were quite wide, suggesting there was a large amount of population unaccounted variance. This, coupled with the small number of studies conducted in this area, suggest that further research is needed to better understand the role of e-cigarettes as a tool for tobacco smoking cessation.

Due to the potential of e-cigarettes as a form of NRT, the relationship between an individual's smoking status (current smoker, previous smoker, and never-smoker) is well-studied in the existing literature. The usefulness of e-cigarettes as a smoking cessation tool are negated if they are taken up by never-smokers, who did not already smoke tobacco cigarettes. Wills et al. (2014) found that in a population of American adolescents, e-cigarettes were most widely used by "low-moderate" risk individuals. That is, people who had minimal risk factors for smoking initiation and many protective factors. This research suggested that it was possible e-cigarettes were targeting those less susceptible to tobacco product use in the first place.

Dutra and Glantz (2014) further investigated this relationship between smoking status and e-cigarette use in a population of North American high school students. In this study, e-cigarette use was related to current tobacco smoking and a lower possibility that the person was actively trying to abstain from tobacco cigarettes. This paper suggested that it's possible that e-cigarette use encourages tobacco use in this population. This idea, that e-cigarette use promotes initiation of tobacco use is mentioned frequently in the literature (US Department of Health and Human Services, 2014; McNeill et al. 2015).

Research by Gartner, Douglas and Hall (2015) suggested that individuals who opt to use e-cigarettes as an alternative to tobacco face fewer health risks and recommended that

public policy shift toward making all tobacco products less attractive to new and current users rather than focusing on the potential, and not yet known, adverse health effects of e-cigarettes. McNeill et al. (2015) published an evidence update on e-cigarettes reporting that they may be up to 95 percent safer than tobacco cigarettes. Reasons for this safety outlined in this evidence update were that many of the chemicals known to cause smoking-related disease are absent in e-cigarettes, the risk of nicotine poisoning is negligible and e-cigarette vapour in the ambient air poses no risk to bystanders.

These findings were heavily criticised by Polosa (2015) as hasty and misleading, as the original source of the figure of “95 percent less harmful” was explicit in stating that the evidence supporting this claim was very weak and based on expert opinion (Nutt et al., 2014). Further, the recruitment criteria for these experts did not include any exclusion criteria (Polosa, 2015). In addition, Polosa (2015) also highlights the extensive conflicts that the authors of the original papers openly declared. McNeill et al. (2015) failed to report that one of the authors in the Nutt et al. (2014) openly states that they are a consultant to a prominent e-cigarette distributor.

Irrespective of these criticisms, more recent literature has continued to report that e-cigarettes are less harmful than tobacco cigarettes (Nutt et al., 2016; Farsalinos and Polosa, 2015; Farsalinos et al., 2016). Similar findings were reported by Farsalinos and Polosa (2014) in a systematic review, in that long-term use of e-cigarettes is a far healthier alternative to tobacco smoking. A further study by Farsalinos et al. (2016) found that the use of e-cigarettes to assist with smoking cessation led to no new adverse health effects and a potential decrease in diastolic blood pressure, the heightening of which is a known effect of tobacco smoking.

In a study by Goniewicz et al. (2013), e-cigarettes were found to lead to nine to 450 times fewer toxins and carcinogens than tobacco cigarettes. These results were replicated by

Goniewicz et al. (2017), who found that while the quantity of nicotine consumed by those randomly allocated to a condition smoking e-cigarettes was comparable to a group randomly allocated to smoking tobacco cigarettes, the exposure to toxins for those in the e-cigarette condition was substantially reduced.

Awareness and use of e-cigarettes is increasing globally, with research finding that one in five current smokers in a United States sample had tried an e-cigarette between 2010 and 2013 (King et al., 2013). One study reported that in a sample of adolescents and young adults, the awareness of e-cigarettes is nearing absolute (Greenhill, Dawkins, Finn, Notley & Turner, 2016). This study highlighted the need for further research into this awareness, as very little is known about the source or semantics of this awareness.

Rates of e-cigarette usage in the United States were reported to be increasing from 1.8 percent to 13 percent in smoking populations from 2010 to 2013 and increasing more modestly among non-smokers over the same time period (McMillen et al., 2015). In a British sample, individuals reporting to use e-cigarettes increased from 700,000 in 2013 to 2.6 million in 2015 according to government data (Action on Smoking and Health, 2017).

Research is starting to emerge into e-cigarette awareness and usage in an Australian population. A study conducted by Twyman et al. (2015) sought to investigate the attitudes to and awareness of e-cigarettes in a population of Australians from a low socioeconomic status. This research found that, despite the restricted availability of e-cigarettes in Australia, individuals from socially disadvantaged backgrounds had awareness and understanding of e-cigarettes similar to those found in the general population. Moreover, 77 percent of participants in this research reported to being familiar with e-cigarettes and 37 percent had tried e-cigarettes within the last 12 months. However, this research did not discriminate between individuals that had used e-cigarettes with nicotine and those that had used non-

nicotine varieties. Further, while this research had interesting implications for a socially disadvantaged population, the results cannot be generalised to other populations, particularly people who use other psychoactive drugs.

A further study by Dunlop, Currow, Dessaix and Lyons (2016) investigated the current use of e-cigarettes amongst a New South Wales population of tobacco smokers or those who had recently ceased tobacco smoking. In a large sample (nearly three thousand), the results of this research indicated that e-cigarettes use increased from seven percent smokers to nine percent of smokers from 2013 to 2016. Further, the group with the highest usage rates (16 percent) were aged 16 to 29. Importantly, this research yielded statistically significant results suggesting that many of these users of e-cigarettes were using them to assist with the cessation of tobacco smoking or because the perceived health impacts of e-cigarettes were less harmful than tobacco.

It is known that individuals who have recently used alcohol, drugs or have a substance use disorder are at a higher risk of tobacco smoking (Guydish et al., 2016). This same research suggests that the majority of respondents (70.5 percent) wanted to cease smoking or had thought about it at some stage, findings consistent with research within the general population. Despite this, very limited research exists investigating the potential of e-cigarettes for assisting with the cessation of smoking in people who use other psychoactive drugs.

Bonevski et al. (2015) suggests that one potential reason for this lack of investigation is the illegality of e-cigarettes in Australia. Previous research has called for new approaches to smoking cessation in the already discussed high-risk groups, specifically people who use drugs (Hall et al., 2015). It has been suggested that e-cigarettes could be a potentially efficacious alternative to tobacco for not only harm-minimisation in people who use drugs, but the overall goal of abstinence. An article by Morphet, Carter, Hall and Gartner (2016)

discussed the illegality of e-cigarettes in Australia in detail, suggesting that regulating their use as a smoking cessation aid may lead to increased use and more successful quit attempts.

Stein et al. (2014) investigated the attitudes toward e-cigarettes of participants in a North American community opioid treatment program. In this study, 65 percent of participants were tobacco-smokers. The results of this study indicated that 98.7 percent of participants were familiar with e-cigarettes with 73 percent of participants having used an e-cigarette at some point. Further, this research found that 33.1 percent of participants had used an e-cigarette in the past 30 days. This research provides evidence that many participants viewed e-cigarettes as less harmful than combustible cigarettes and many others had used e-cigarettes in successful quit attempts. However, this data was cross-sectional and did not provide an account of changing attitudes over time. Further, this sample was 85 percent Caucasian, limiting the generalisability of the findings.

### **Aims and Hypothesis**

Research into the use of e-cigarettes to assist smoking cessation in people who use drugs is in its infancy. Further data is important for shaping future policy in Australia on e-cigarette availability and access. The aim of the current study is to investigate the attitudes, interest and use of e-cigarettes in an Australian sample of people receiving treatment for their alcohol and other drug use by smoking status. This will provide important international comparison to studies such as Stein et al. (2014), given access to e-cigarettes is restricted in Australia, unlike the United States of America where they are readily available.

Based on the findings of Stein et al. (2014) and Twyman et al. (2015) it is hypothesised that people in this population believe e-cigarettes to be helpful in smoking cessation, less harmful than tobacco cigarettes and suitable for use in community drug and alcohol treatment centres.

## **Methods**

### **Setting**

The setting for this research was six New South Wales Health drug and alcohol community based treatment centres, (Drug & Alcohol Clinical Services or DACS) in the Hunter New England Local Health District and the Alcohol and Drug Unit at the Calvary Mater Hospital (inpatient and outpatient). The DACS included the Newcastle Pharmacotherapy Service, the Newcastle Stimulant Treatment Program and Cannabis Clinic, Cessnock Pharmacotherapy Service, Lower Mid North Coast Drug and Alcohol services (Taree), Northern Drug and Alcohol services (Tamworth) and Alcohol and Drug Unit at the Calvary Mater Hospital in Newcastle.

### **Procedures**

Prior to undertaking this research, ethics approval was received from the HNE Health Human Research and Ethics Committee (Approval number: H-2017-0059). Participants were recruited directly from the waiting areas of the DACS & Calvary Mater services where data was collected. Data was collected using the patient experience tracker system (PETS) devices provided by CFS Australia. The PETS device are small electronic devices that allow patients to respond to up to six questions in an anonymous, confidential way. Each question is presented in a column with touch-buttons for the corresponding response options (see Appendix 1). The PETS device was located at the desk that participants would check-in to the service for their appointment. A participant information sheet was placed in the waiting area of these facilities above the PETS device which outlined, in detail, the nature of the research. Completion of the five-item survey was considered implied consent, no identifiable information was collected from participants.

## Measures

Items were adapted from similar previous surveys (Twyman et al., 2015).

### Smoking Status

To assess smoking status, participants were asked “Do you currently smoke tobacco (eg. Cigarettes, roll-your-own, pipes)?”, with response options being (1) Yes, daily; (2) Yes, occasionally; (3) No, I have stopped; (4) No, never smoked.

### E-cigarette Use

Participants were presented with an information sheet that included an image of an e-cigarette. Prior to the questions on use, attitudes and perception a brief introduction to e-cigarettes was presented in the text of the survey. The description read: “The following questions are about electronic (e-cigarettes/vaporisers.” To assess use, participants were asked “Do you currently use e-cigarettes?” with response options being (1) Yes, with nicotine; (2) Yes, without nicotine; (3) No, but I used to; (4) No, but I have tried; or (5) No, never.

### E-cigarette attitudes and perception

To assess attitudes and perceptions participants were asked “How helpful do you think e-cigarettes are for quitting or cutting down on smoking tobacco cigarettes?” with response options being (1) Very unhelpful; (2) Unhelpful; (3) Neither helpful or unhelpful; (4) Helpful; or (5) Very helpful. To further assess attitudes, participants were asked “What do you believe is more harmful – tobacco cigarettes or e-cigarettes/vaping? with options (1) Tobacco cigarettes; (2) E-cigarettes; (3) both are equally harmful; and (4) neither are harmful. Finally, participants were asked “Should e-cigarettes be used in drug and alcohol clinics to help people quit smoking tobacco?” (1) No; (2) Yes; and (3) Unsure.

### **Data Analysis**

Data was analysed using IBM's Statistical Package for the Social Sciences (SPSS), with statistical support being provided by the University of Newcastle statistics department. Descriptive statistics were calculated for the five variables (questions on the survey). Percentages and 95 percent confidence intervals were calculated for the number of participants that responded using each response option to the five items. Chi-square analysis was carried to investigate the effect of the participant's current smoking status on each of the other four items on the survey.

### **Results**

A total of 405 participants completed the survey across six drug and alcohol treatment centres during the six-week period. Though identifiable information was not collected, patient demographics for the period were a mean age of 37.7 ( $SD= 10.8$ ) years with 31 percent of patients being female, 69 percent male. No participants data was excluded from the analysis, all participants completed the survey in its entirety.

#### **Smoking Status**

Most participants (86 %) reported that they currently smoked tobacco cigarettes ( $N=347$ ), eight percent reported that they had previously smoked tobacco cigarettes but were not currently ( $N=32$ ) and six percent reported that they had never smoked ( $N=26$ ).

#### **E-Cigarette Use**

Almost half (44 percent) of participants reported that they had never tried e-cigarettes ( $N=178$ ), 22 percent reported that they had tried cigarettes on occasion ( $N=90$ ), eight percent reported that they previously used e-cigarettes regularly ( $N= 34$ ), seven percent reported that

they currently used e-cigarettes without nicotine (N=27) and 19 percent reported that they currently used e-cigarettes with nicotine (N=76).

Table 1. E-cigarette Use

Question	Responses	Total %	Smokers %
<b>Do you currently use e-cigarettes?</b>	Yes, with nicotine	19% (N=76)	20% (N=68)
	Yes, without nicotine.	7% (N=27)	6% (N=21)
	No, but I used to.	8% (N=34)	8% (N=27)
	No but I have tried.	22% (N=90)	23% (N=80)
	No, never.	44% (N=178)	44% (N=151)

### **E-Cigarette Use of Current Smokers**

44 percent of smokers reported that they had never tried e-cigarettes (N=151), 23 percent reported that they had tried cigarettes on occasion (N=80), eight percent reported that they previously used e-cigarettes regularly (N= 27), six percent reported that they currently used e-cigarettes without nicotine (N=21) and 20 percent reported that they currently used e-cigarettes with nicotine (N=68).

### **Attitudes and Perception toward E-Cigarettes in Sample**

When asked how helpful participants thought e-cigarettes might be to assist with quitting tobacco cigarettes, 48 percent of participants reported that they believed them to be helpful (N=195), 25 percent reported that they believed them to be unhelpful (N=101), and 27 percent reported believing them to be neither helpful or unhelpful (N=109).

When asked about how harmful they perceived e-cigarettes to be, 55 percent of participants reported that tobacco cigarettes were more harmful than e-cigarettes ( $N=223$ ), 25 percent reported thinking that both were equally harmful ( $N=100$ ), 14 percent reported believing e-cigarettes were more harmful ( $N=56$ ) and six percent believed that neither tobacco or e-cigarettes were harmful ( $N=26$ ).

When asked if e-cigarettes should be used in drug and alcohol clinics to assist with quitting tobacco cigarettes, 65 percent of participants stated they should ( $N=264$ ), 24 percent stated they were not sure ( $N=97$ ) and 11 percent reported thinking e-cigarettes should not be used ( $N=44$ ).

### **Attitudes and Perception of Current Smokers toward E-Cigarettes**

When asked how helpful smokers thought e-cigarettes might be to assist with quitting tobacco cigarettes, 48 percent of participants reported that they believed them to be helpful ( $N=168$ ), 26 percent reported that they believed them to be unhelpful ( $N=90$ ), and 26 percent reported believing them to be neither helpful or unhelpful ( $N=89$ ).

When asked about how harmful they perceived e-cigarettes to be, 59 percent of smokers reported that tobacco cigarettes were more harmful than e-cigarettes ( $N=203$ ), 25 percent reported thinking that both were equally harmful ( $N=86$ ), 14 percent reported believing e-cigarettes were more harmful ( $N=47$ ) and three percent believed that neither tobacco or e-cigarettes were harmful ( $N=11$ ).

When asked if e-cigarettes should be used in drug and alcohol clinics to assist with quitting tobacco cigarettes, 70 percent of smokers stated they should ( $N=243$ ), 19 percent stated they were not sure ( $N=67$ ) and 11 percent reported thinking e-cigarettes should not be used ( $N=37$ ).

### **Association between smoking status and attitudes and use of e-cigarettes**

Smoking status was associated with e-cigarette use,  $\chi^2 (8, N = 405) = 20.16, p < 0.05$ .

This was mostly explained by non-smokers who had never tried e-cigarettes (73.1 percent of non-smokers) and ex-smokers who had never tried e-cigarettes (25 percent of ex-smokers).

Smoking status was associated with the perception that e-cigarettes might be helpful,  $\chi^2 (4, N = 405) = 16.70, p < 0.05$ . This was mostly explained by ex-smokers who did not perceive e-cigarettes to be either helpful or unhelpful (53.1 percent of ex-smokers) and ex-smokers who believed e-cigarettes to be helpful (28.1 percent of ex-smokers). Table 2. A summary of survey responses to attitudinal questions ( $N = 405$ ).

Question	Responses	Total %	Smokers %	Ex-Smokers %	Non-Smokers %
<b>How helpful do you think e-cigarettes are for quitting or cutting down smoking tobacco?</b>	Helpful	48% (N=168)	48% (N=195)	28% (N=9)	69% (N=18)
	Neither helpful or unhelpful	26% (N=89)	27% (N=109)	53% (N=17)	12% (N=3)
	Unhelpful	26% (N=90)	25% (N=101)	19% (N=6)	19% (N=5)
<b>What do you believe is more harmful – tobacco cigarettes or e-cigarettes/vaping?</b>	Tobacco cigarettes	59% (N=203)	55% (N=223)	47% (N=15)	19% (N=5)
	E-cigarettes	14% (N=47)	14% (N=56)	19% (N=6)	12% (N=3)
	Both are equally harmful	25% (N=86)	25% (N=100)	28% (N=9)	19% (N=5)
	Neither are harmful	3% (N=11)	6% (N=26)	6% (N=2)	50% (N=13)
<b>Should e-cigarettes be used in drug and alcohol clinics to help people quit smoking tobacco?</b>	Yes	70% (N=243)	65% (N=264)	44% (N=14)	27% (N=7)
	Unsure	19% (N=67)	24% (N=97)	44% (N=14)	62% (N=16)
	No	11% (N=37)	11% (N=44)	12% (N=4)	11% (N=3)

Smoking status was associated with participants perception of the harmfulness of e-cigarettes,  $\chi^2 (6, N = 405) = 90.97, p < 0.001$ . This was mostly explained by non-smokers who perceived neither e-cigarettes or tobacco cigarettes to be harmful or tobacco cigarettes to be more harmful. This effect was also explained by smokers who believed tobacco cigarettes to be more harmful (58.5 percent of smokers).

Finally, smoking status was associated with whether or not the participant believed that e-cigarettes should be used in drug and alcohol clinics,  $\chi^2 (4, N = 405) = 33.14, p < 0.001$ . This was explained by non-smokers who were unsure, or believed that they should be used. This effect was also explained by smokers who were unsure, or believed that they should be used. Table 3. Association between smoking status and other variables.

Variable	Chi-Square Statistic and Significance	Explanation of Effect
<b>E-cigarette use</b>	$\chi^2 (8, N = 405) = 20.16, p < 0.05$	73% ( $N=19$ ) non-smokers reported never-use of e-cigarettes 25% ( $N=8$ ) ex-smokers did not use e-cigarettes
<b>Perception of helpfulness of e-cigarettes</b>	$\chi^2 (4, N = 405) = 16.70, p < 0.05$	28% ( $N=9$ ) of ex-smokers perceived e-cigarettes to be helpful
<b>Perception of harmfulness of e-cigarettes</b>	$\chi^2 (6, N = 405) = 90.97, p < 0.001$	59% ( $N=203$ ) of smokers believed tobacco cigarettes to be more harmful

<b>Attitude toward e-cigarettes</b>	$\chi^2 (4, N = 405) = 33.14,$	92% ( $N=243$ ) of smokers
<b>being used in DACS</b>	$p < 0.05$	believed e-cigarettes should be used

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## Association between E-Cigarette Use and Attitudes toward E-Cigarettes

### *Helpfulness of E-cigarettes*

#### *Current Users of E-Cigarettes*

43 percent of users of e-cigarettes reported that they believed e-cigarettes to be helpful in cutting down on tobacco cigarettes ( $N=44$ ), 43 percent reported that they believed them to be unhelpful ( $N=44$ ), and 14 percent reported believing them to be neither helpful or unhelpful ( $N=15$ ).

#### *Ex-Users of E-Cigarettes*

65 percent of ex-users of e-cigarettes reported that they believed them to be helpful in cutting down on tobacco cigarettes ( $N=81$ ), 10 percent reported that they believed them to be unhelpful ( $N=13$ ), and 24 percent reported believing them to be neither helpful or unhelpful ( $N=30$ ).

#### *Never-Users of E-Cigarettes*

39 percent of never users of e-cigarettes reported that they believed them to be helpful in cutting down on tobacco cigarettes ( $N=70$ ), 25 percent reported that they believed them to be unhelpful ( $N=44$ ), and 36 percent reported believing them to be neither helpful or unhelpful ( $N=64$ ).

### *Harmfulness of E-Cigarettes*

*Current Users of E-Cigarettes*

59 percent of users of e-cigarettes reported that they believed tobacco cigarettes to be more harmful than e-cigarettes ( $N=61$ ), 22 percent reported that they believed e-cigarettes to be more harmful ( $N=22$ ), 1 percent reported believing neither were harmful ( $N=2$ ) and 18 percent reported believing that both were equally harmful ( $N=18$ ).

*Ex-Users of E-Cigarettes*

62 percent of ex-users of e-cigarettes reported that they believed tobacco cigarettes to be more harmful than e-cigarettes ( $N=77$ ), 4 percent reported that they believed e-cigarettes to be more harmful ( $N=5$ ), 4 percent reported believing neither were harmful ( $N=5$ ) and 30 percent reported believing that both were equally harmful ( $N=137$ ).

*Never-Users of E-Cigarettes*

47 percent of never-users of e-cigarettes reported that they believed tobacco cigarettes to be more harmful than e-cigarettes ( $N=85$ ), 16 percent reported that they believed e-cigarettes to be more harmful ( $N=29$ ), 12 percent reported believing neither were harmful ( $N=19$ ) and 25 percent reported believing that both were equally harmful ( $N=45$ ).

***E-Cigarette Use in DACS Clinics****Current Users of E-Cigarettes*

73 percent of users of e-cigarettes reported that they believed e-cigarettes should be used in DACS clinics ( $N=75$ ), 6 percent were unsure ( $N=7$ ), 21 percent reported believing that they should not be used ( $N=21$ ).

*Ex-Users of E-Cigarettes*

78 percent of ex-users of e-cigarettes reported that they believed e-cigarettes should be used in DACS clinics ( $N=97$ ), 19 percent were unsure ( $N=24$ ), 3 percent reported believing that they should not be used ( $N=4$ ).

#### *Never-Users of E-Cigarettes*

52 percent of never-users of e-cigarettes reported that they believed e-cigarettes should be used in DACS clinics ( $N=93$ ), 11 percent were unsure ( $N=19$ ), 37 percent reported believing that they should not be used ( $N=66$ ).

E-Cigarette use was associated with attitudes toward their helpfulness,  $\chi^2(4, N = 405) = 69.31, p < 0.001$ , attitudes toward their harmfulness,  $\chi^2(12, N = 405) = 96.48, p < 0.001$  and whether or not the participant believed that e-cigarettes should be used in drug and alcohol clinics,  $\chi^2(8, N = 405) = 56.33, p < 0.001$ .

## **Discussion**

The aim of this study was to investigate the attitudes toward e-cigarettes in an Australian population of people who used drugs. It was hypothesised that people in this sample would be interested in e-cigarettes and their attitudes toward them would be positive. Two thirds of the current sample believed that e-cigarettes should be used in drug and alcohol treatment centres to assist people with smoking cessation. This number was even higher amongst current smokers, with 70 percent believing e-cigarettes should be used for smoking cessation. Whether or not the responder currently smoked tobacco cigarettes was associated with e-cigarette use, beliefs about their helpfulness or harmfulness and belief about whether they should be used in centres for assisting with smoking cessation. The responders experience with e-cigarettes was also associated with beliefs about their helpfulness or

harmfulness and belief about whether they should be used in centres for assisting with smoking cessation.

To the author's knowledge, this may be the first study investigating attitudes toward e-cigarettes in an Australian population of people who use drugs. Results in the study closely correlate to those previously reported by Twyman et al. (2015), who investigated socioeconomically disadvantaged people's use and attitudes towards e-cigarettes. In Twyman et al. (2015), 38 percent of participants had used an e-cigarette in some capacity, comparable with the current papers figure of 48 percent. 58 percent of participants in this study believed that e-cigarettes were less harmful than tobacco cigarettes and 51 percent of participants believed that e-cigarettes may be helpful in the cessation of smoking. A small percentage of the current sample reported using e-cigarettes without nicotine. This may mean they are using the devices with flavouring or with other substances (cannabis, for example).

Further, results in this study also provide support for the findings of Stein et al. (2014), who investigated attitudes and awareness of e-cigarettes in a similar population (opioid dependent service-users) in North America. This research found that 97 percent of participants had heard of e-cigarettes and 75 percent of participants had ever used an e-cigarette in some capacity (considerably higher than our figure of 48 percent). It is likely that this is due to e-cigarettes being more readily available in the United States, where the sale and distribution of e-cigarettes and liquid nicotine is currently legal. Stein et al. (2014) also noted that the high percentage of participants who had ever used e-cigarettes may have simply reflected the growing popularity of e-cigarettes in recent years.

The sample studied by Stein et al. (2014) was somewhat more homogenous than that in the current sample, with all being participants of opioid dependence programs and current tobacco smokers. While Stein et al. (2014) only investigated smokers, previous research has

found that the smoking rates are extremely high in opioid dependent people, as high as 97% (Clemmey et al., 1997). This is considerably higher than the 86% reported in the current sample, and may account for some of the increased awareness and use of e-cigarettes in the sample studied by Stein et al. (2014). Our research also suggests a relationship between whether someone smokes and whether they use e-cigarettes, so it is unsurprising that Stein et al. (2014) reported higher rates of e-cigarette use.

The findings of this study has implications for the current legislative context e-cigarettes in Australia. As previously stated, the sale and distribution of liquid nicotine is currently illegal in all states and territories of Australia. This research, as well the growing body of empirical literature, suggests that people are aware of and are already using e-cigarettes. Further, the majority of the participants in this sample perceive them to be less harmful to your health than tobacco cigarettes. As stated previously, recent data from Public Health UK suggests that e-cigarettes may be up to 95 percent healthier than tobacco cigarettes (McNeill et al. 2015). While it is acknowledged that the empirical research into the health impacts of e-cigarettes is new and requires further exploration, the existing evidence is promising.

People who use drugs continue to smoke at very high rates (Guydish et al., 2016) and have significant difficulties in remaining abstinent. The current data has implications for the consideration of a harm-minimisation model for this group in particular. That is, while it widely acknowledge that abstinence from smoking is preferable, e-cigarettes may represent a new, effective type of NRT that could prove less harmful for people who use drugs. Given the existing literature suggests that e-cigarettes are a healthier alternative to tobacco cigarettes, their utilisation in smoking cessation for people who use drugs may be in keeping with harm-minimisation principles.

### **Strengths and Limitations**

The main strength of this cross-sectional survey is its large sample size, particularly in a subgroup that is notoriously difficult to collect data on (Stein et al., 2014). This was achieved by using a simple, anonymous (and thus non-invasive) survey at the point of contact for these individuals. By reaching these individuals in a waiting room, there was no time inconvenience or additional effort that could potentially hinder motivation to complete the survey.

It is reasonable to suggest that the participants in this study may not be representative of all people who use drugs. That is, participants were accessing drug and alcohol treatment centres which may mean they have unique characteristics that influence their perception of tobacco smoking and e-cigarettes more generally. Twyman et al. (2015) found that word-of-mouth was the most common means by which people discovered e-cigarettes. Similarly, this paper also found that borrowing a friend's was the most common means first use of e-cigarettes. Twyman et al. (2015) extrapolated that there is a strong sense of community and socialisation that may be driving e-cigarette awareness and attitudes in the socioeconomically disadvantaged subgroup. It is logical to suggest that the same might be true for this group of people who use drugs, this could potentially confound the findings of this research. That is, the participants of this research may have had positive views toward e-cigarettes that were shared with other participants as they were part of their social group.

The lack of information collected on the current sample is a major limitation of the study. While broad demographics were available on the users of the DACS services generally, more specific information was not available for reasons of confidentiality and because making the survey process more laborious may have made prohibited people from

completing it and thus impacted on sample size. Not having demographics on the current sample means that the attitudes reported in the survey are not able to be attributed to more specific subgroups such as age-ranges, gender, dosage of tobacco and other drugs used. Further, the restrictive nature of the PETS devices themselves only allowed for six questions. Had more questions been able to be asked, various other relationships could have been investigated including comparing views on e-cigarettes to other more established forms of NRT.

## **Conclusion**

This research has aimed to investigate attitudes toward e-cigarettes in Australia in the vulnerable subgroup of people who use alcohol and other drugs. In doing so, the barriers to quitting in vulnerable populations have been outlined, as have the current, most widely-used nicotine replacement therapies (NRT) and social policies aimed at reducing the harm that tobacco smoking continues to cause. E-cigarettes represent a potentially helpful alternative as they satisfy not only the addictive component of tobacco smoking (nicotine), but the behavioural component also. The existing literature on the health impacts of e-cigarettes has also been addressed. The current study found that in an Australian sample of people who use drugs, about half reported ever-use of e-cigarettes. The current research also found that the sample were interested in e-cigarettes as a smoking cessation aid. It is clear that further research is needed into the long-term impacts of e-cigarettes, but the existing literature suggests that they may be a less harmful alternative to tobacco cigarettes and worthy of inclusion in the field of smoking cessation.

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Appendix A

PETS device as it was presented to participants.

Template 1: HNE- Electronic Cigarettes

**READY**

**ELECTRONIC CIGARETTES**

Please take a moment to give your feedback  
Most of these questions are about electronic cigarettes,  
often called e-cigarettes. Using e-cigarettes is  
sometimes referred to as "vaping"

Do you currently smoke tobacco  
(eg. cigarettes, roll-your-own, pipes)?

YES, DAILY	YES, OCCASIONALLY	NO, I HAVE STOPPED	NO, NEVER SMOKED
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The next questions are about electronic cigarettes (e-cigarettes/vaporisers).

Do you currently use e-cigarettes?

YES, WITH NICOTINE	YES, WITHOUT NICOTINE	NO, BUT I USED TO	NO, BUT I HAVE TRIED	NO, NEVER
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How helpful do you think e-cigarettes are for quitting or cutting down on smoking tobacco cigarettes?

VERY UNHELPFUL	UNHELPFUL	NEITHER HELPFUL OR UNHELPFUL	HELPFUL	VERY HELPFUL
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What do you believe is more harmful – tobacco cigarettes or e-cigarettes/vaping?

TOBACCO CIGARETTES	E-CIGARETTES	BOTH ARE EQUALLY HARMFUL	NEITHER ARE HARMFUL
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Should e-cigarettes be used in drug and alcohol clinics to help people quit smoking tobacco?

NO	YES	UNSURE
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**THE UNIVERSITY OF NEWCASTLE AUSTRALIA**  

**NSW GOVERNMENT**  
**Health** Hunter New England Local Health District  
 THANK YOU FOR YOUR FEEDBACK

## **Appendix B**

Participant Information Statement as it was presented in the setting. These were printed and displayed in the waiting room.

### **Attitudes and Interest toward E-cigarettes in an Australian Sample of People who use Drugs and Alcohol**

**Document Version 2: dated 13/12/2016**

The Drug and Alcohol Treatment Service has given us permission to ask you if you would like to take part in a project to help researchers understand your knowledge of electronic cigarettes.

#### ***Who is doing the research?***

A/Prof Billie Bonevski from the University of Newcastle is conducting this research. The project is funded by the National Health and Medical Research Council as well as the Cancer Council NSW. This survey component of the research will form part of Mr Louis Silberberg's studies at the University of Newcastle, supervised by A/Prof Billie Bonevski, Prof Adrian Dunlop and A/Prof Ross Wilkinson.

#### ***Why is the project being done?***

The aim of the survey is to investigate the awareness, understanding and attitudes toward electronic cigarettes in people who use drugs.

#### ***Who can take part?***

Anyone who is

- Over 18 years of age
- Can read English
- A client of the Drug and Alcohol Treatment Service

#### ***What will you be asked to do?***

While waiting in the waiting room at the Drug and Alcohol Treatment Service, you may be asked to complete a short, five question survey about electronic cigarettes that is loaded onto the tablet device in this area.

Following this, you may also be asked to participate in 10-20 minute interview about your responses on the five question survey.

***How much of my time will it take?***

The survey will take about five minutes to complete. You will be able to complete the online survey using the touch screen tablet at the Drug and Alcohol Treatment Service.

If you agree to participate in the follow-up interview, it will take approximately 10-20 minutes.

***What choice do you have?***

It is up to you to take part in this research. Only people who agree by completing the survey will be included. If you do not wish to participate, your decision will not affect you as a client of the Drug and Alcohol Treatment Service in any way.

If you do take part, you can stop at any time without giving a reason, however as the survey is anonymous, we are unable to withdraw the information you provide up until that point as we cannot identify your individual data.

***How will your privacy be protected?***

The online survey is anonymous and therefore we will not be collecting personally identifying information as part of this survey. The survey website is hosted by a secure University of Newcastle domain and all data is encrypted. Only research staff directly associated with this project will have access to the data. Electronic files of collected data will be password protected and stored on a secure University of Newcastle server. Data will be stored in this manner for seven years following publication to enable the research team to answer any queries about the data that may arise after the publication of results. After seven years have elapsed, electronic files will be deleted.

***How will the information be used?***

The results may be used by the Cancer Council NSW to help people quit smoking and may be published in scientific journals, used in presentations and included in a thesis submitted for Mr Silberberg's university studies.

***What are the risks and benefits of participating?***

You are providing valuable information that may assist in the development of programs to help people wanting to quit tobacco smoking. There are no risks with participating in this study.

***What do you need to do to participate?***

Read this information statement and be sure you understand everything before you agree to participate. If you agree, click through to the next page to begin the online survey.

***For more information***

If you have any questions or want more information, please contact:

Prof Billie Bonevski  
University of Newcastle  
[Billie.Bonevski@newcastle.edu.au](mailto:Billie.Bonevski@newcastle.edu.au)  
(02) 4033 5710

OR

Mr Louis Silberberg  
University of Newcastle  
[louis.silberberg@uon.edu.au](mailto:louis.silberberg@uon.edu.au)

Thank you for your time!

#### Complaints about this research

This research has been approved by the Hunter New England Human Research Ethics Committee of Hunter New England Local Health District, Reference 16/11/16/5.07

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to Dr Nicole Gerrand, Manager Research Ethics and Governance, Hunter New England Local Health District, Locked Bag 1, New Lambton NSW 2305, telephone (02) 49214950, email [HNELHED-HREC@hnehealth.nsw.gov.au](mailto:HNELHED-HREC@hnehealth.nsw.gov.au)