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A typology of vaping:

Identifying differing beliefs, motivations for use, identity and political interest amongst e-cigarette users

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Abstract

Background: The aim of this study was to identify and differentiate socially shared accounts of e-cigarette use (vaping) using Q-methodology, combining factor analysis with qualitative comments.

Methods: Seventy statements on e-cigarettes, drawn from media, academic and online discussions, were sorted by participants along a continuum of agreement/disagreement, commenting on strongly ranked items. Each participant thus created their own 'account' of their vaping. A by-person correlation matrix of the sorts was conducted, then factor analysed, to identify similar accounts ($p<0.01$). Fifty-five UK vapers participated by post, 55% male, mean age of 46, 84% only vaping/16% vaping and smoking, 95% vaping daily.

Results: Three accounts of e-cigarettes were identified. The first two were associated with having quit smoking; the third with ongoing tobacco smoking and vaping. In Factor One, 'Vaping as Pleasure', vaping was characterized as enjoyable, with long-term use envisaged and a medical model of vaping rejected. Factor One participants also held a strong vaping identity and were politically motivated to maintain the rights of adults to vape. In Factor Two, 'Vaping as Medical Treatment', vaping was understood as a pragmatic choice about how to medicate one's smoking addiction, with the aim being to treat and ultimately reduce nicotine dependence. In Factor Three, 'Ambivalent E-Cigarette Use', participants reported fewer benefits and harboured more negative beliefs about e-cigarettes; they also strongly rejected a vaper identity, having no interest in online forums or being labelled a 'vaper' themselves.

Conclusion: The UK e-cigarette users in this sample were not a homogeneous group; differing in their beliefs, motivations for use, identity and political interest. In particular they diverged on whether they accepted a medicalized account of vaping and identified as a vaper. Public health messages targeted to one group of e-cigarette users may not resonate with others.

Tobacco smoking remains a global pandemic, affecting an estimated 1.2 billion people and causing nearly six million deaths annually (WHO, 2011).The role that e-cigarettes should play in tobacco control is hotly contested and has been played out within the media. This paper examines how, amid the controversy and headlines, vapers themselves 'make sense' (Radley, 1995) of their own vaping practices. More specifically, it seeks to identify differing accounts of e-cigarette use/vaping and the dimensions on which they vary. This paper then offers a situated analysis of these accounts within wider discourses concerning harm reduction, the medicalization of addictive behaviours, the pleasure dimension as well as users' identity (or not) as vapers.

Introduction

The rapid adoption of e-cigarette use or 'vaping' across the world has divided the public health community. E-cigarettes or ENDS (Electronic Nicotine Delivery Systems) contain propylene glycol, glycerol, flavourings, other chemicals and usually nicotine (Callahan-Lyon, 2014). There is no combustion as with tobacco smoking. Although there is agreement that this results in reduced risk, the magnitude of this reduction is debated. Some argue for caution or bans of their use given that the long-term risks are unknown (e.g. Grana, Glantz & Ling, 2011; Kalkhoran & Glantz, 2016; WHO, 2016). Others stress the potential benefits of switching from tobacco smoking to vaping, estimating the risk reduction at 95% or more (e.g. Lancet, 2015; Public Health England, 2015). Though scientific evidence concerning e-cigarettes is growing (e.g. Malas et al. 2016; Pisinger & Døssing 2014; Rahman et al. 2015; Brown, Michie, et al. 2014; Hartmann-Boyce et al. 2016; O 'Leary et al. 2017) this has not changed polarised public health positions to a large extent. Bell & Keane argue this is because public health positions on e-cigarettes are essentially moral stances: *'it is not clear that further research into e-cigarettes will substantially alter opinion. This is because the dangers stem not merely from the constituents of the products themselves, but the ideological challenge they pose…'* (Bell & Keane, 2012: 245). As the body of scientific

evidence continues to build, the assertion that e-cigarette science and regulation is driven by ideology seems more pertinent than ever (Hajek, 2014; Kosmider & Anastasi, 2016).

This conceptual confusion about the nature of e-cigarettes is mirrored in their regulation. E-cigarettes have been regulated as a medical product, a consumer product, both or neither. In the EU, a 'twin-track' approach (both commercial and medical) is possible, although few manufacturers have taken the medical route. In the US, the Federal Drug Administration has controversially brought e-cigarettes under its tobacco regulatory control[1]. Correspondingly regulatory responses are polarized (Caponnetto, Saitta, Sweanor, & Polosa, 2015). In some countries (e.g. Norway), selling e-cigarettes is banned. In others, such as the UK, 'e-cigarette friendly' smoking cessation services are emerging within a harm-reduction framework. This raises, then, the question of how e-cigarettes are understood by their users, within the maelstrom of conflicting voices and evidence. What is it that users think they are doing when they are using e-cigarettes? How do they characterize their own practice?

In general, users do not tend to refer to their devices as ENDS or even e-cigarettes, but call themselves 'vapers' and their practices 'vaping' (Barbeau, Burda, & Siegel, 2013). As such, this serves to distance the user from cigarette smoking discourses, just as classifying e-cigarettes as 'tobacco products' aligns them with it. Studying understandings of their use is also complicated by the quickly changing nature of the commercial technology, with newer 'second' and 'third' generation devices using 'tanks' preferred by many users (Etter, 2016; Hitchman, Brose, Brown, Robson, & McNeill, 2015), overtaking the 'first generation' of e-cigarettes which largely mimicked smoking. Nevertheless, there is a burgeoning literature on the attitudes, motivations and practices of e-cigarette users.

[1] http://www.fda.gov/TobaccoProducts/Labeling/ProductsIngredientsComponents/ucm456610.htm, accessed 04/11/2016

Perceptions of risk and health

Reducing the risk or harm levels of smoking is a key motivator for many vapers, whether or not they quit smoking entirely (Berg, Haardoerfer, Escoffery, Zheng, & Kegler, 2015; Dawkins, Turner, Roberts, & Soar, 2013; Goniewicz, Lingas, & Hajek, 2013; Pepper & Brewer, 2013). One quote from a qualitative focus group study in the US summarised this as *'It's not smoke, it's not tar. It's not 4000 chemicals. Case closed'* (Coleman et al., 2016). The perceived or actual health benefits of e-cigarettes are also a strong motivating factor for use (Dawkins et al., 2013; Finney Rutten et al., 2015), as is reducing stress, particularly for women (Pineiro et al., 2016). However, there is confusion about just how less risky e-cigarettes are in comparison to tobacco smoking. Only 40-60% of lay people agree they are less risky (Xu, Guo, Liu, Liu, & Wang, 2016) and a quarter of UK smokers are unsure if e-cigarettes are less harmful (Brown et al., 2014).

Perceptions that e-cigarettes are safer than smoking may also be declining over time (Huerta, Walker, Mullen, Johnson, & Ford, 2016). The reasons for this change in risk perceptions are not known. From a sociological perspective, this debate can be understood in terms of the tension between harm reduction and abstinence approaches. Harm reduction, where moral judgement on drug use is avoided and treatment aims to reduce risk, has gained widespread traction within the field of drug policy (Marlatt, Larimer & Witkiewitz, 2012). However, as Stimson (2016) has argued, unlike the co-ordinated public health response to the HIV/AIDS threat, harm reduction has been positively discouraged from within tobacco control. Berridge (2014, 2016) suggests that this may be because many past 'harm reduction' products, such as filters and 'light cigarettes', turned out to be as harmful as their comparators. The consequence of this 'difficult history' was that tobacco control turned its back on harm reduction, moving to an abstention model with opposition to working with industry. The suspicion (or even taboo) of working with industry to develop better products remains (Berridge, 2016), as do the arguments over policy. It is likely that the public's

ongoing uncertainty about the safety of e-cigarettes is amplified by the very public 'public health' debates about risk and the contradictory stories they engender in the media[2].

Pleasure and the medicalization of addiction

Another emerging feature of vapers' understandings of e-cigarettes is their enjoyment of them. The absence or marginalization of the 'pleasure' discourse in public accounts of drugs has been noted (Bunton & Coveney, 2011; Duff, 2008; Moore, 2008). Moore argues that this marginalization is primarily due to the dominance of the medical model of risk to assess the health harms of drugs, with no place for accounts of pleasure, emotion or desire (Moore, 2008). E-cigarettes, however, place the issue of 'pleasure' centre-stage. Initially developed outside the medical sphere as a consumer product, they offer an almost infinite set of possibilities for consumption. There is a huge variety of models, liquid flavours and venues in which they can be enjoyed (e.g. vaping cafes), with opportunities for customization and segmentation of the market and with high-end products as well as discount bargains. As such, vaping draws on connotations of 'hedonistic practices' (e.g. Miles 2000) similar to contemporary alcohol culture.

Research is starting to unpack the importance of vaping enjoyment, both to achieve smoking cessation goals and/or as a hobby in its own right (Barbeau et al., 2013; McQueen, Tower, & Sumner, 2011). College students in the US reported enjoyment being their main motivation over quitting smoking (Saddleson et al., 2016). However, the role of flavours in particular has proved controversial. Critics have suggested that flavours such as fruit, alcohol or sweet flavours are designed to encourage vaping in under-age or young people (Bonhomme et al., 2016; McKee, 2014) in a parallel way to alco-pops in the alcohol market. There are also concerns about the safety of specific flavours (Sundar, Javed, Romanos, & Rahman, 2016).

[2]E.g. This article manages to report two studies in which 'experts' conclude e-cigarettes are more dangerous, and much safer than e-cigarettes (http://www.dailymail.co.uk/health/article-4255696/Do-use-e-cigarettes-risk-STROKE.html, accessed 24/02/2017)

Some regulatory regimes, therefore, have sought to bring e-cigarettes in line with tobacco products by restricting flavours (e.g. to menthol or tobacco e-cigarette flavours). However, research with vapers shows it is precisely the ability to enjoy e-cigarettes, including customising flavours and types of liquid (e.g. to create 'clouds'), that has made it more popular than other types of replacements such as gum/patches (Kim, Davis, Dohack, & Clark, 2016; Simmons et al., 2016).

This debate about enjoyment is situated within a wider discourse concerning the medicalization (or not) of e-cigarettes. Smoking as a behaviour has arguably become medicalized (understood through a medical model) in the past few decades (Morphett, Carter, Hall, & Gartner, 2016), encapsulated in the notion of 'nicotine addiction' (e.g. US Surgeon General's Report 1998; Royal College of Physicians, 2000). The dominance of the medical model in smoking has also been solidified by the development of medical treatments, namely Nicotine Replacement Therapies and medications (e.g. bupropion and varenicline). Research suggests many smokers have accepted a medical model of their smoking (Bancroft, Wiltshire, Parry, & Amos, 2003; Farrimond, Joffe, & Stenner, 2010; Gillies & Willig, 1997). It is unclear, however, where e-cigarettes fit within this schema. Stimson and Costall (2014) have argued that it is precisely the origination of e-cigarettes outside the medical/pharmaceutical sphere that has led to their controversy within public health. Others suggest that e-cigarettes might provide a 'recreational' nicotine option for those who reject medical treatment for smoking, although they could also be incorporated into medical regulation or treatment pathways (Morphett et al., 2016). This paper therefore explores how vapers themselves represent their e-cigarette use in relation to the medical model and e-cigarettes as therapeutic devices, particularly given ongoing uncertainty within the medical profession itself (Cummins et al., 2016; Hiscock et al., 2014).

Identity

A final aspect of understandings of e-cigarettes relates to identity. Smoking has shifted in terms of social meaning in recent decades from a glamorous alluring habit to a polluting addictive behaviour that harms others. Correspondingly, the identity of 'being a smoker' has become a matter for moral judgement (Rozin, 1999) and stigmatization (Farrimond & Joffe, 2006; Ritchie, Amos, & Martin, 2010). Moving from seeing oneself as a smoker to an 'ex' or 'non-smoker' has been argued to be a key transition supporting successful quitting (McEwen & West, 2010; Vangeli & West, 2012).

Some qualitative research has suggested that vaper identity is also important (Barbeau et al., 2013). As a commercial technology, the networks of promotion were customer-driven. This led to the development of a distinct 'vaping culture', online through chatrooms and forums, as well as in person, in vaping shops, conferences and events (Bell & Keane, 2012). E-cigarettes are both a technically complex technology (where 'newbies' find it difficult to spontaneously start) and a non-medical one, meaning that millions have looked to other users/sellers to be their experts, generating a vast and international social network of shared knowledge and identity. Using e-cigarettes to enhance one's image as 'cool' has been identified as a feature of young people's use (Hardcastle et al., 2014). In adult users, qualitative research has shown many vapers value the 'group experience' afforded by e-cigarettes (Barbeau et al., 2013) as well as social opportunities to vape (Wadsworth, Neale, Mcneill, & Hitchman, 2016). McQueen et al.,(2011), in a small qualitative study of attendees at a vaper convention, found that participants were immersed in the language and culture of vaping and had a strong interest in e-cigarette research and policy issues. Given that, by definition, these vapers were 'keen' enough to attend a convention, their immersion and identity around vaping is perhaps not surprising. However, it is unclear whether this strong identity is shared by other vapers; differences are therefore examined in this study.

In summary, the social science literature has started to delineate many features of vapers' understandings of their practices. However, gaps remain, and it is not clear how different

aspects of vapers' thinking, such as beliefs about risk, medicine, identity and politics in relation to e-cigarettes, intersect or 'make sense' (Radley, 1995) as coherent viewpoints. Q-methodology is therefore used to identify these viewpoints or 'accounts' and the key themes within them.

Methods

Design

Q-methodology is a method which uses both quantitative and qualitative data to identify and distinguish patterns of shared thinking or 'accounts' of a given topic. It has been used previously in relation to addiction to examine accounts of smoker identity (Farrimond et al., 2010), combustible smoking (Collins, Maguire, & O-Dell, 2002; Moss & Bould, 2009) and alcohol (Scott, Baker, Shucksmith, & Kaner, 2014). it is also particularly useful where accounts are divergent and contentious (Stenner, Watts, & Worrell, 2008), as here.

There are several key steps within a Q-methodology study. Participants are asked to sort a set of statements on a topic into a pattern which represents their views, usually from agree to disagree. This sorting task requires participants to consider one statement in relation to another so that their 'holistic' overall viewpoint is identified (Stenner et al., 2008). Furthermore, sorting does not have to be completely logical or corresponding to a worked out position- sometimes participants sort in ways that may appear inconsistent or reveal ambiguities (Stainton Rogers, 1995). Participants are also asked to comment on the statements to explain further their position and the thinking behind it, generating qualitative data. Analysis of the sorts is done through creating a by-person correlation between sorts which reveals how similar they are at above chance levels of probability. The correlational matrix is then factor analysed to identify a number of statistically distinct factors, each representing a shared viewpoint or account. The advantage of Q-methodology is the depth and holistic nature of the accounts produced. Q-methodology is not designed to test

hypotheses or establish the prevalence of these viewpoints in the wider population (Brown, 1986). More on the statistical operationalization of Q is available (e.g. Baker, Thompson, & Mannion, 2006; Brown, 1986; Dziopa & Ahern, 2011; Shinebourne, 2009; Watts & Stenner, 2012b).

Measures

Research questions in Q can focus on a) representations or typical ideas about a topic b) personal understandings and c) behavioural responses (Curt, 1994). The research question here was 'to investigate the understandings of e-cigarettes' from the perspective of users. It was therefore important to gain a wide and comprehensive set of statements on that topic so that participants would feel they had been given the means to express their understandings through the sorting task (Watts & Stenner, 2012). A set of 70 statements (known as the Q-set) was created. The Q-set of statements should *broadly represent* so far as is possible the gamut of perspectives at that time point (Watts & Stenner, 2012, p 58). This requires the vast quantity of literature and discussion on the topic (known as the 'concourse') to be reduced to a smaller quantity contained within the statements; the selection and reduction therefore needs to be systematic. There is also a danger with controversial or polarized topics of producing a set which is value-laden or biased (Watts & Stenner, 2012, p. 58). For this reason, two researchers (HF and GS) worked independently in the initial stages, reading as much of the public, academic and social media (e.g. vapers' blogs, comments on articles, vaping forum entries) content on e-cigarettes as possible. They then independently created a set of statements, totalling 180 between them. They did so under broad categories of themes already identified from the literature (e.g. health, pleasure), adding new ones if they emerged (e.g. hobby). Relevant statements were also adapted from a previous Q study on smoking and social identity (Farrimond et al., 2010). The two sets were then used to create one set of 70, selecting the clearest statements from the two sets and removing duplication in line with the principles of Stainton Rogers (Stainton Rogers, 1995). Although there is no required size for a Q-set, between 40-80 statements has become standard (Stainton Rogers, 1995). Several statements were included in each of the major categories to ensure

representativeness. The final set was then piloted with two vapers who were asked to comment on whether they were easily understood and 'felt authentic', with further minor changes made. The final set of statements is shown in Table 1.

The statement set was created in Sept/Oct 2014. Material that related to the specific UK/EU regulatory issues at this time, particularly the Tobacco Products Directive (TPD) was not included in the statements as they would date. Participants answered separate questions on this, published before the TPD was implemented (Farrimond, 2016).

The statements were printed on card and participants provided with a grid to record their answers (see Figure 1 for the grid configuration). They were asked to sort the 70 statements into a pattern which reflected their understandings of vaping by placing them in rank order (-6 strongly disagree to +6 strongly agree), with fewer statements at the polar ends and more in the middle. Participants then completed the following written sentences (each asked three times): 'I strongly agreed with statement ___. The reason was…'; 'I strongly disagreed with statement ___. The reason was…' and finally; 'These statements were also interesting to me ___. The reason was…'. These questions were asked to gain insight into their reasoning and thinking concerning the placement of key statements.

Subjects and setting

Participants were sought from two main sources a) adverts in real-life venues such as libraries, community centres and vaping shops (n=31, 56%) and b) online vaping forums (n=24, 44%). A purposive sampling approach was used to obtain a diversity of experience including age (16 with no upper age limit), gender and socio-economic status. Demographic information and smoking/e-cigarette status was gathered in a questionnaire.

Participants were 55 current e-cigarette users/vapers from the UK. Thirty were male (55%) and 25 female (45%), 96% self-described their ethnicity as 'white', with two 'mixed' and 'mixed white/black Caribbean'. The mean age was 46 (range 19-69). In terms of socio-economic status (SES), 27 held professional employment, 23 non-professional employment,

one unemployed, two people having disabilities and two students. In terms of their vaping, 46 (84%) had quit smoking tobacco cigarettes at the time of the study (in the past two weeks), with 9 (16%) reporting both use of e-cigarettes and tobacco cigarettes. Fifty-two participants (95%) reported using their e-cigarettes daily.

The study was conducted by post, with a £10 voucher given on return of the pack. The study had ethical approval from the University of Exeter's Social Sciences and International Studies Ethics Committee.

Analysis

The software PQMethod was used to analyze the data (http://schmolck.userweb.mwn.de/qmethod/ accessed 10/03/2017). Initially, a by-person correlational matrix was created on the 55 sorts (in which each sort is correlated with each other sort), then analysed using centroid factor analysis, and rotated using the varimax procedure. This produced a set of statistically differentiated factors, each one representing a 'viewpoint' or 'account' of e-cigarettes. A three-factor solution was chosen. In deciding how many factors to retain, several models were tried, namely a two, three and four factor model. The three-factor model was judged the best as it offered both parsimony (simplicity) with the most amount of explained variance (50%) which is one of the criteria when considering how many factors to retain (Watts & Stenner, 2012). Individual sorts loaded significantly onto one of the factors at 0.4 ($p<0.01$). Factor One had 19 sorts which exemplified that factor (called 'exemplars') (26% of the variance), Factor Two had 14 (17%) and Factor Three had 6 (7%). Eleven 'confounding' sorts which loaded onto more than one factor were excluded, as were five non-loading sorts. The other solutions either produced more confounding sorts and/or less explained variance.

The correlation between Factor One and Two in the chosen model was quite high (0.54) (between Two and Three it is 0.3, and between Three and One only 0.04). As Watts and

Stenner (2012, p.141) suggest, a high correlation may indicate that the factors represent alternative manifestations within one viewpoint rather than separate accounts. Reducing the number of viewpoints to two would have considerably reduced the explained variance, and, crucially, there was a plausible interpretation of the separate factors. However, it does highlight that there may be considerable overlap between some aspects of them.

To aid interpretation, a 'factor array' was created for each factor. This is essentially a summary form of the factor; *'a single Q-sort configured to represent the viewpoint of a particular factor'* (Watts & Stenner, 2012, p. 140). They were created by combining the sorts of all the participants which significantly loaded onto that factor using a weighted averages method (Brown, 1980; Stenner et al., 2008). Figure 1 shows the factor array for Factor One and visually allows you to see at a glance which are the strongest ranked items. Table 1 shows the factor arrays for all three factors which makes it easier to compare how each statement is ranked differently (or similarly) between factors.

Interpretation of the Q-study data is a holistic task in which several sources of data are drawn on to produce a plausible analysis. I looked at a) the ranking of statements shown in the 'factor arrays' in Table 1. Of particular interest were statements which were ranked at the extremes (e.g. for statement 8, -6 means strongly disagree, +6 strongly agree) or statements which were ranked differently (by three or more ranking positions) compared with others. These were considered the key statements for that factor. I then included b) the qualitative comments on the statements from participants statistically associated with that factor to provide further reasoning about the key statements. I additionally considered c) demographic information about the nature of the participants whose views that factor represents, such as their age or vaping status. In the presentation of findings, the term (8:-6) means that statement 8 was ranked at -6 (i.e. strongly disagree) in this factor. The comments of participants are included in quotation marks and italics.

Findings

FACTOR ONE: Vaping as Pleasure, or 'Having your Cake and Eating It'

19 participants loaded significantly onto this factor.

In this account, e-cigarettes were characterized not only an effective substitute for tobacco cigarettes (39: +5; 28: -6), but an enjoyable one. E-cigarettes were superior to NRT or other cessation treatments (65:+4), with few side-effects (40: -4). Numerous stories of successful quitting were recounted: *'I smoked for 53 years and gave up almost immediately after trying an e-cigarette'* (P52, female, aged 69). Vaping, therefore, was not a hardship, but a source of enjoyment (53:-5) and pleasure (25:+5): *'I loved the smoking experience, now the vaping experience'* (P27, male, aged 37). For some, vaping had become a leisure activity in its own right, centred on discussing and modifying devices: *'Vaping is a hobby now. Rebuilding mods, coils, drip tip carving and mixing your own juices, there are no 'NRT' forums and only a few 'smokers' forums!'* (P33, male, aged 41).

A core feature of vaping pleasure in this account was experimenting with new flavours (4: +3). As one participant explained, *'Flavours are a big part of the e-cig experience. I vape sweet flavours. Once your taste buds come back, tobacco flavours are not nice!'* (P33, male, aged 41). Flavours also functioned to distance vaping practices from smoking: *'Flavours are essential for disassociation from smoking'* (P27, male, aged 37). Correspondingly, the idea that flavours like banana or toffee are more designed for children than adults was strongly rejected (63: -6) (as in other Factors).

Pleasure was not only derived from the sensory experience of vaping, but from the satisfaction of 'being healthier'. Vaping was like 'having your cake and eating it', being both pleasurable and healthier (10:+4). Improved health was the prime motivation for quitting: *'I absolutely love vaping! My health has improved, no more coughing'* (P49, female, aged 62).

Many participants had had long smoking careers, and multiple health problems, such as difficulty breathing (P39, male, aged 60) or COPD (P35, male, aged 59): *'[I vape] to prevent early death as I have nodules on my lungs'* (P37, male, aged 33). There was thus general agreement that vaping had improved their quality of life (38:+4) in a less risky form (34:+5).

However, despite enjoying the health benefits of vaping, Factor One participants actively rejected a medicalized model of smoking as an illness. Being addicted to nicotine was not necessarily a bad thing (31: -3) and they disagreed nicotine addiction should be seen as a medical addiction (69:-5). One participant commented indignantly about Statement 69: *'Medicine? I assume medicine is intended to treat an ILLNESS- I am not ill!!!'* (P49, female, aged 62). Another stated *'I do not smoke anymore. I am not taking medicine. There is no doubt e-cigs offered a viable alternative to smoking but in themselves they are not a medicine. I also dispute describing smoking as an illness'* (P39, male, aged 60). Nicotine addiction was understood to be at the more trivial end of addictions: *'Part of why vaping works is that it doesn't medicalize smokers or frame nicotine consumption as a problem. I think it's more like caffeine'* (P26, female, aged 45). Given they had no problem with ongoing nicotine use and found vaping pleasurable**,** lowering nicotine levels was not a priority (49:-3) and they were open to long-term e-cigarette use (70:-3; 11:-4).

Given the positivity Factor One vapers felt about e-cigarettes, it is not surprising they had a strong sense of identity in relation to vaping, characterizing themselves as proud to be labelled a 'vaper' (47:+3) and quite evangelical about e-cigarettes (9:+3). For them, to be a vaper was to be part of '*a community who are supportive of one another and I'm proud to be one of them'* (P44, female, aged 49). As such they were the only Factor to (moderately) agree that they liked to spend time discussing vaping online (37: +2). This strong identity also manifested itself in terms of high political interest and activism, amidst concerns that regulation would stifle their current vaping practices: *'For clarity, I never try to convert smokers, I'm evangelical in the general fight to keep e-cigs available as they are now'* (P40,

female, aged 36). Participants drew on a rights-based discourse of freedom for adults, with their most strongly ranked statements concerning the right to vape (13:+6), seeing vaping as 'up to adults' (+6), and rejecting the 'gateway' hypothesis that e-cigarette use leads young people to smoke (45:-5). Participant 32 (male, aged 41) summarised these concerns: *'We have been labelled as shills of the tobacco companies, as abusive, of being an organized resistance movement. We are simply people who have had their lives changed for the better, pleading with those who could help change policy to listen and acknowledge the truth that vaping can and does save lives.'*

FACTOR TWO: Vaping as Medical Treatment

Fourteen participants loaded significantly onto this factor.

Like Factor One participants, Factor Two participants had quit tobacco cigarettes through vaping (28: -6, 39:+6) and thought it superior to NRT products (65:+5). Health was their number one reason for taking up e-cigarettes (42:+6), which had improved through vaping (38:+4):*'I was getting 2-3 chest infections every year due to tobacco smoking. Since vaping I've had none. My health has took a turn for the better'* (P46, male, aged 47). There were also additional motivations: cost (6:+3) and not smelling of smoke (29:+3). Given the starting point of poor health, participants' journey to becoming smoke-free had felt almost too easy for them (58:+5). It felt like a magic solution for stopping: *'I call it my miracle cure!'* (P43, female, aged 51).

Unlike Factor One, however, this account is centred on a medical model of e-cigarette use. Vaping was seen as a medicine used to address their smoking addiction (15:+4). One participant commented *'I don't think I get pleasure from vaping, it just stops me craving nicotine…it's more a means to an end'* (P43, female, aged 51). Indeed, statements which denoted positive connotations of vaping (e.g. that vaping could look quite sexy sometimes

21: -5) were strongly rejected. However, the addictiveness of nicotine as a drug was a cause for concern *'I feel that nicotine is addictive and has some detriment to health' (*P31, male, aged 52). There was strong agreement (with Factor Three) there should be age restrictions on e-cigarettes for this reason (67: +6): *'nicotine is addictive so shouldn't be sold to children'* (P24, female, aged 39). It made sense to aim to lower the levels of nicotine once you have quit smoking (49:+4; 31: +2): *'it offers the option of weaning yourself off nicotine'* (P22, male, aged 59) or even quit nicotine altogether (11: +2):*'I want to cut down on my nicotine intake with a view to giving up vaping- not sure how long this will take?' (P34, female, aged 49).*

Finally, in Factor Two there was no strong identity around being a vaper. Participants neutrally ranked statements concerning being proud to be a vaper (47: -1) or part of vaping culture (60: 0). One participant commented *'I am not proud to be a vaper, but I am proud to now be a non-smoker?'* (P 43, female, aged 51). Vaping was seen as a pragmatic tool for quitting smoking, not a way of life: *'No, I don't care about labels, just giving up smoking…the vaping culture is nerdy and I do not want to be associated with it'* (P20, male, aged 47).

FACTOR THREE: Ambivalent E-cigarette Use

There were 6 participants who loaded significantly onto this Factor.

The Factor Three account represented a more ambivalent attitude towards e-cigarette use. On the one hand, there was a strong assertion of vaping rights; that it is the right of adults to decide to vape (17:+5; 13: +6), including in public as they are not causing harm to anyone (64:+5).

On the other hand, participants were ambivalent about their own use of e-cigarettes. They reported both vaping and smoking (39: -4, 27: +6), switching between the two for a variety of reasons; to reduce cigarette use, when they fancied vaping ('*I vape when I want them, and I*

can easily go 2 weeks without vape/cigs…' P19, female, aged 19) and, commonly, in situations where tobacco smoking was banned: *'I use vaping as a way to smoke in places fags aren't allowed'* (P9, male, aged 33). They rejected the idea that smoking is disgusting (54:-4) with one participant commenting: *'Vaping has not led me to dislike cigarettes at all. It just minimises my smoking'* (P2, female, aged 44). To some extent, participants appeared to like challenging or ignoring boundaries about where to vape (23:+3), for example, using their e-cigarettes in places they weren't sure they should be used (52:+3). This 'stealth vaping' (using an e-cigarette in places where it may be restricted) can be understood as *'a form of discreet rebellion'* (P2, female, aged 44). However, participants didn't care if they got disapproving looks whilst vaping in public (44:-5): *'I have never cared about what others think'* (P9, male, aged 33).

In this account, participants weren't clear that e-cigarettes had personal benefits for them. They were neutral about whether e-cigarettes had increased their quality of life (38: 0) or had side effects (40: 0) with several mentioning their throat hurting or a 'tight-chest'. They did not dispute that nicotine should be seen as a medical addiction (69: +3). However for them, vaping was not a magic solution for stopping smoking (55:+4). In particular, they were concerned about getting more nicotine now than they used to (46:+4), leading to more entrenched dependence: *'I suspect e-cigs of extending rather than reducing my addiction'* (P2, female, aged 44). Another concern was the unknown risks of this relatively new technology: *'we don't know if e-cigs are better, worse, or the same'* (P9, male, aged 33).

Perhaps because of the less tangible benefits and concerns about risks, participants loading onto this factor were the keenest to stop using e-cigarettes. They saw their e-cigarette use as temporary rather than long-term (70: +4) and intended to eventually quit using them altogether (11: +5). The idea of finding vaping enjoyable through experimenting with flavours was rejected (13: +4) with one participant stating *'the different flavours piss me off, too gimmicky'* (P8, male, aged 35) and another *'I have no interest in experimenting, I just want*

the nicotine hit!!' (P2, female, aged 44). They agreed they weren't as high-tech as other e-cig users (22:+2) although whether this was because they were using older generation devices and/or had no interest in sharing knowledge as part of vaping culture wasn't clear.

Finally, the Factor Three account distinctively rejected a vaper identity. Using e-cigarettes wasn't participants' only luxury (35:-5) or indeed a central part of their self-identity, and they strongly rejected the idea that to stop vaping would be to lose part of themselves (28:+6). They did not like the term 'vaper' to describe themselves (59: +4): *'It [vaping] is a terrible term. I just use 'e-cigs' I don't vape'* (P9, male, aged 33). They also did not feel part of any vaping culture (60:+3), were not evangelical about using e-cigarettes (9:-3) and rejected the notion of discussing vaping online (37:-6): *'I loathe online conversations and I cannot see why I'd want to talk about something I'd rather not be doing!'* (P2, female, aged 44); another summed it up: *'Got better things to do'* (P5, female, aged 67).

Discussion

The results suggest that a typology of accounts of vaping can be identified which varies on key dimensions, namely the role of pleasure/enjoyment, the acceptance of a medical model of nicotine addiction, the acceptability of long-term use, identifying as a 'vaper' and political interest in vaping rights. Understanding how e-cigarette users 'make sense' of their health practices (Radley, 1995) is important, given the need to incorporate user views and design health promotion/regulation that resonates with its target audience (Joffe, 2002). The implications of such heterogeneity for tobacco control is now explored.

The reassertion of a pleasure discourse in relation to e-cigarettes, central to Factor One, is notable given its almost complete absence in accounts of smoking in recent years (Bancroft et al., 2003; Farrimond et al., 2010; Gillies & Willig, 1997; also see Thirlway, 2016). This study adds weight to research showing the centrality of pleasure and enjoyment to vapers' practices (Barbeau et al., 2013; McQueen et al., 2011). More than one aspect to the

'pleasure' dimension was identified; it appeared not just to be the sensory or hedonistic aspect of e-cigarettes, coupled with the choice of flavour, that gave pleasure but also a less experientially based but nevertheless tangible sense of satisfaction of feeling healthier and having an improved quality of life. This notion of vaping as 'life improvement' draws on moral connotations of bodily transformation (Shilling, 2003); from a sick (and stigmatized) body, to a healthier one. Factor One vapers were also vocally opposed to the medicalization of nicotine consumption ('*I am not ill!!!!*'). This opposition opens up the possibility of (enjoying) long-term nicotine use. Nicotine is considered 'good' in public health if it is positioned as a therapeutic drug to 'treat' smoking, with subsequent weaning from the drug itself (Bell & Keane, 2012; Keane, 2013). Factor One vapers actively challenged this treatment model, drawing on a rights-based argument to defend long-term nicotine use. In doing so, they highlight the discomfort concerning recreational nicotine use within tobacco control which directly contradicts the abstention model.

The medical model of smoking as nicotine addiction, however, underlay the understandings in other Factors (Two, and to some extent Three). From this perspective, e-cigarettes were a functional vehicle to deliver nicotine and quit smoking, greatly superior to other nicotine replacement products such as NRT, but medicines nevertheless. This suggests that although the incorporation of e-cigarettes into the regulatory medical spheres may be seen as regressive (and costly) by some, it may have value for other users in terms of providing medical legitimacy. Offering e-cigarettes as a treatment mode for quitting similar to NRT might appeal to this group, for example through 'e-cigarette friendly' quit services which have been suggested in the UK (McEwen & McRobbie, 2016). However, research with smokers/ex-smokers in cessation services shows that some service users perceive the narrative of continued nicotine use as a threat to their own quitting goals, namely to become nicotine as well as smoke-free (Rooke, Cunningham-Burley, & Amos, 2015). The tension within public health over the nature of nicotine as a drug is reflected in these diverging accounts.

The identity of ‘being a vaper’ as part of a wider vaping culture was another dimension on which accounts differed. Factor One vapers saw their membership of this lay community as a positive source of support, both on and off line, in line with other research (e.g. McQueen et al., 2011). Moreover, vaping was a valued part of their social identity; in other words it was central to how they saw themselves (as ‘proud’) and how they behaved as part of this group, for example, being ‘evangelical’ with others about vaping. For some vapers, this evangelism takes the form of political interest, as part of a ‘a new social movement [that] has emerged around vaping activism’ (Stimson et al., 2014, p.654). In this sample, this manifested around challenging the (now implemented) Tobacco Products Directive. However, given that tobacco control organizations have long been suspicious of consumer group involvement (Stimson et al., 2014), this vaping activism may come at a price in terms of social identity. As one participant in this study noted, the risk is of being identified as ‘shills’ of the tobacco industry (who are now buying up e-cigarette companies), a stigmatizing attribution designed to derogate their position.

This study also adds complexity to the social identity of vaping by identifying accounts in which this identity is either unimportant (Factor Two) or actively rejected (Factor Three). This echoes research that shows that stigmatized smokers, such as pregnant women, either reject the stigma or accept and internalise it (Wigginton & Lee, 2013). Given that identity transition is theorized to be important in quitting smoking (Vangeli & West, 2012), this raises the challenge of how to understand how and why some vapers don’t identify strongly with vaping culture. Within Factor Two, participants’ neutral stance can arguably be tied to their medicalized view of e-cigarettes as a medical treatment for nicotine, where the enjoyment and culture around it plays no great part. Not being oriented around vaping culture may not be problematic for this group. Vaping shops or online marketplaces are able to offer a purely product buying service without further obligation for social or political interaction.

For Factor Three users, their more active rejection of vaping identity may be problematic. This group are already dubious about the risk of e-cigarettes and concerned about their nicotine levels, which is the greatest predictor of ongoing use of tobacco cigarettes (Farsalinos, Romagna, & Voudris, 2015). For those who still identify as 'smokers' and only use e-cigarettes on certain occasions, the thought of becoming automatically aligned with an immersive 'vaping culture' with which they don't personally identify may be off-putting and deter e-cigarette use. It is not surprising that some e-cigarette users, such as those in Factor Three, reject any association with vaping. Smoking is, in developed countries, heavily stigmatized as an unhealthy behaviour harmful to others (e.g. Bayer & Stuber, 2006; Bell, Salmon, Bowers, Bell, & McCullough, 2010; Farrimond & Joffe, 2006). Vaping, by association, has not shaken off this stigmatization and may well have been exacerbated by negative or derogatory public health representations of vapers that appear in the media. For example, one health campaign in the US has designated vapers 'stupid sheep'[3]. This result may also reflect dislike of something specific about vaping culture/s (e.g. one participant described it as 'geeky') or being defined by a behaviour. Future research should consider why some e-cigarette users reject a 'vaper' label.

There are several implications of this 'typology of vaping' for health promotion and regulatory regimes. The results support Morphett and colleagues' claim that providing both 'recreational' (consumer) and medical pathways may maximise harm reduction (Morphett et al., 2016). For example, the Factor One account supports the notion that many e-cigarette users see long-term nicotine use (via vaping) as a method for maintaining tobacco cessation. Information on the role of long-term use has already been incorporated into guidance for stop smoking services in the UK (McEwen & McRobbie, 2016). Similarly, the Factor One account provides information on the perceived role of flavour variety and the

[3] http://www.pasadenastarnews.com/health/20161116/pasadena-will-spend-15m-to-combat-smoking-among-teens-african-americans (see Farrimond & Joffe, 2006 for similar derogating tobacco control campaigns which stigmatize smokers).

motivation of pleasure in sustaining adult cessation behaviour via vaping. For vapers holding a more medicalized understanding of e-cigarettes (Factor Two), a medical mode of treatment would resonate, for example, with products regulated and provided through pharmaceutical pathways. Ambivalent users who do not identify as vapers may prefer to avoid specialized vaping outlets, in real-life or online, and purchase their products through similar pathways to tobacco, such as supermarkets. This suggests that if harm reduction is to be achieved in the adult smoking population via e-cigarettes, then multiple outlet types are preferable and restricting these (e.g. only to pharmacies or specialist vape stores) may hinder uptake.

There are several limitations to this study. Firstly, it must be noted that the accounts identified are not considered to be immutably fixed to individuals (Stenner, 2007). E-cigarette users may draw on more than one account in different contexts, or their 'sense-making' of their practices may change over time (e.g. see Thirlway, 2016). Secondly, Q-methodology studies reflect the characteristics of the sample and are not representative of the wider population. In this study, Factor One is likely to be dominant as those who are the most 'evangelical' about vaping may also be the most motivated to take part in vaping research. Those who are ambivalent and/or still smoke are likely to be under-represented. The sample was also limited in terms of ethnicity (being predominantly white) and approximately 50% from higher socio-economic groups. The patterning of e-cigarette use and experience by socio-demographic factors is complex (Hartwell, Thomas, Egan, Gilmore, & Petticrew, 2016) and warrants further investigation. Finally, the statements sorted within the Q-study reflect the social context and time-point from which they were derived. Material was collected in Sept/Oct 2014; this may raise concerns about its datedness given the fast changing nature of the technology. However, I would argue that the framing contained in the Q statement set, in terms of risk, medicalization and pleasure has not substantially changed. Q-methodology is alert to the socially shared nature and time-bound nature of public discourses (Watts & Stenner, 2012). As a 'disruptive innovation' (Stimson et al., 2014), the social meanings of e-

cigarettes will continue to evolve. Future research into understandings of e-cigarettes could usefully draw on the Q-set presented here, adapting to local discourse and practice.

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Most Disagree Most Agree

-6	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6
28	45	11	15	2	1	5	3	25	4	10	24	13
63	53	18	19	7	8	35	6	26	9	38	34	17
	69	40	31	14	22	41	12	27	36	64	39	
		46	49	21	23	44	16	32	42	65		
			70	48	33	51	20	37	47			
				59	57	52	29	58				
				67	60	54	30	68				
					61	55	43					
					62	56	50					
						66						

Table 1: Numbered list of Q-sort statements and their ranking across the four factors.

No.	Statement	Factor 1 Array	Factor 2 Array	Factor 3 Array
1	Celebrities vaping is just a cynical marketing ploy	-1	-2	-4
2	Cravings for my e-cigarette are as strong as my cravings for tobacco cigarettes	-2	0	+1
3	Vaping makes me feel more in control	+1	0	-1
4	I love to experiment with new flavours	+3	-1	-3
5	I don't think too much about why I vape	0	0	+1
6	Reducing cost is one of the most important reasons that I use e-cigs	+1	+3	+1
7	I vape because it improves my appearance	-2	-5	-4
8	I sometimes feel embarrassed to use an e-cigarette in front of others	-1	-1	-3
9	I am quite evangelical about e-cigarettes	+3	+1	-3
10	Vaping is like having my cake and eating it; it's both healthier and pleasurable	+4	+1	+2
11	I intend to eventually quit using e-cigarettes altogether	-4	+1	+5
12	I feel more included as a vaper than I did as a smoker	+1	-2	-2
13	People have the right to vape	+6	+2	+6
14	I don't see the point of vaping if you continue to smoke	-2	+1	0
15	Vaping is a medicine that I use in order to address my smoking addiction	-3	+4	-1
16	I found e-cigarettes confusing when I first started out	+1	+1	-1
17	It's up to adults to decide whether to vape	+6	+4	+5
18	I just buy whatever e-cigarette I can find	-4	-5	-4
19	Using e-cigs looks a bit down-market, if I'm honest	-3	-3	-1
20	I like the opportunity for a bit of time-out that vaping gives me	+1	-1	0
21	Vaping can look quite sexy sometimes	-2	-5	-2
22	I think vaping is more of a middle-class trend	-1	-3	-3
23	I take pleasure from using my e-cigarette in places where vaping is not allowed	-1	-3	+3
24	I get a great deal of pleasure out of vaping	+5	+1	0
25	There are many things I do to enjoy myself, and vaping is one of them	+2	-1	+2
26	Vapers are still looked down upon by non-smokers	+2	+1	0
27	I control my vaping, my vaping doesn't control me	+2	+2	+1
28	I still smoke as well as vape	-6	-6	6
29	Not smelling of smoke is a key reasons I vape	+1	+3	-1
30	To stop vaping would be to lose part of myself	+1	-4	-6
31	I dislike the fact that I'm still addicted to nicotine	-3	+2	+1
32	Vapers need to consider others around them when vaping	+2	+2	-1

33	I'm not as 'high tech' as other e-cig users	-1	0	+2
34	With e-cigarettes I get all of the things I want from smoking, with less of the risk	+5	+3	+1
35	Vaping is my only luxury	0	-3	-5
36	If I couldn't use e-cigarettes, I would just start smoking again	+3	+3	+2
37	I like to spend time discussing vaping online	+2	-1	-6
38	E-cigarettes have improved my quality of life	+4	+4	0
39	I haven't regularly smoked normal cigarettes since I started using e-cigs	+5	+6	-4
40	E-cigarettes irritate my airways and make me cough	-4	-2	0
41	Vapers and smokers have addictive personalities	0	0	+2
42	Health is my number one reason for taking up e-cigarettes	+3	+6	+1
43	The appearance of my vaporizer/e-cig is important	+1	-1	-2
44	I care if I get disapproving looks when I vape in public	0	-1	-5
45	I worry that vaping may act as a gateway for young people to normal cigarettes	-5	-3	-2
46	I am worried that I'm getting more nicotine now than I used to now that I use an e-cig	-4	-4	+4
47	I'm proud to be labelled a 'vaper'	+3	-1	-2
48	Celebrities vaping makes it all seem a bit more glamorous	-2	-2	0
49	Lowering the levels of nicotine I consume through vaping is a priority for me	-3	+4	+2
50	Vaping helps me cope with stress	+1	+1	+1
51	Vaping is clean; smoking is dirty	0	+3	+1
52	I use my e-cigarette in places I'm not sure they should be used	0	-1	+3
53	I don't really enjoy vaping	-5	-2	-1
54	I find smoking disgusting now	0	+1	-3
55	Vaping is not a magic solution for stopping smoking	0	-4	+4
56	My e-cig/vaporizer expresses my personal style	0	-2	-1
57	Vaping is just another habit for me, something I do	-1	0	0
58	It feels almost too easy to quit smoking by vaping	+2	+5	0
59	I'm not a 'vaper', I'm just someone who happens to use e-cigarettes	-2	0	+4
60	I am not really part of any vaping culture	-1	0	+3
61	I could easily stop using e-cigs, I just don't want to	-1	-2	-1
62	I don't gain weight using e-cigs which is a big motivation for me	-1	0	-2
63	Flavours like banana or toffee are more designed for children than adults	-6	-4	-2
64	We shouldn't have to stop using e-cigs in public; we're not causing harm to anyone	+4	+2	+5
65	Vaping is much better than any other type of nicotine replacement	+4	+5	+2

66	If I feel I am vaping too much, I tend to do something about it	0	0	0
67	There should be no age restrictions on using e-cigs	-2	-6	-5
68	I fear that e-cigarettes will be banned	+2	+5	+3
69	Nicotine addiction should be seen as a medical addiction	-5	+2	+3
70	I see using e-cigs as something temporary rather than long-term	-3	+2	+4