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Title: Young people's perspectives of e-cigarette use in the home.

Abstract: There is concern that the emergence of e-cigarettes could result in an increase in young people's intake of, and exposure to, nicotine. This UK study used friendship group interviews to elicit the perspectives of young people from socioeconomically contrasting backgrounds regarding e-cigarettes. Young people from both advantaged and disadvantaged backgrounds described similar e-cigarette practices in the home environment, and, for both health and sensory reasons, viewed these as preferable to tobacco smoking. Space-related practices of adult e-cigarette use in the home were revealed to be more malleable than those of tobacco use. Results also highlighted that e-cigarettes offered young people new opportunities for nicotine consumption in the home. Methods of storing e-cigarettes in domestic spaces posed safety risks to younger children and easy access to e-cigarettes for others.

Keywords: e-cigarettes; vaping; nicotine; young people; home

1. Introduction

Since their introduction to the global marketplace in 2006 (Rahman *et al.*, 2014), the global popularity of e-cigarette use (vaping) has rapidly increased (Dawkins and Corcoran, 2014; Taub and Matarasso, 2016). More than 9 million adults in the United States (US) (Schoenborn and Gindi, 2015), 7.5 million people across the European Union (EU) (Lavery, Filippidis and Vardavas, 2018) and around 2.9 million adults in Great Britain (GB) (Action on Smoking and Health (ASH), 2017) are estimated to vape on a regular basis. E-cigarettes are now the most popular tobacco cessation aid for smokers in both England (McNeill *et al.*, 2018) and the United States (Michael Cummings, Morris and Benowitz, 2018).

Although evidence suggests that the use of e-cigarettes is likely to be less harmful than smoking tobacco cigarettes (Farsalinos and Polosa, 2014), further research is needed into its potential effects on both users (Ioakeimidis, Vlachopoulos and Tousoulis, 2016) and non-users (Hess, Lachireddy and Capon, 2016; Byrne *et al.*, 2018). Recent reviews suggest that there is no firm evidence to suggest that vaping poses any health risk to "bystanders" (O'Leary *et al.*, 2017; Byrne *et al.*, 2018; McNeill *et al.*, 2018, p. 19). Non-users do, however, absorb nicotine as a result of exposure to e-cigarettes (Ballbè *et al.*, 2014),

including third-hand contact (via “deposits on surfaces, such as walls, tables, floors, and even clothes”) (Goniewicz and Lee, 2015, p. 256), and children are more susceptible than adults to the risks of this type of exposure (Giroud *et al.*, 2015). Moreover, it has been suggested that proximity to e-cigarette use may increase the likelihood of children and young people wishing to use such products themselves (Giroud *et al.*, 2015). This has caused concern because nicotine exposure can adversely affect the development of the brain in young people (Goriounova and Mansvelder, 2012; England *et al.*, 2015; Schraufnagel, 2015). Furthermore, the idea that e-cigarettes might act as a starting point from which tobacco use follows (Bell and Keane, 2014), and consequently lead to a reversal of the downward trend in tobacco smoking amongst youth (Patrick *et al.*, 2016; Soneji *et al.*, 2017; Chapman, Bareham and Maziak, 2018), has been subject to considerable debate internationally (Hitchman, McNeill and Brose, 2014; Green, Bayer and Fairchild, 2016). E-cigarette use amongst young people in the UK translates into tobacco smoking extremely rarely (Bauld *et al.*, 2017) and Canadian and US-based work reports only small numbers of never-smoking young people using e-cigarettes (Hamilton *et al.*, 2014; Polosa *et al.*, 2017). In both the UK and the US, however, quantitative work has reported associations between young people’s e-cigarette use, an increased likelihood of tobacco use (Dutra and Glantz, 2014; Primack *et al.*, 2015; Wills *et al.*, 2016; Conner *et al.*, 2017; Best *et al.*, 2018; East *et al.*, 2018) and a decreased likelihood of stopping tobacco smoking (Dutra and Glantz, 2014; Moore *et al.*, 2014).

Qualitative studies in both the US and Europe have demonstrated that young people’s e-cigarette use can be distinct from that of adults and motivated by reasons (the performance of tricks, social status, curiosity, technological and aesthetic appeal) other than nicotine intake and smoking cessation (Hardcastle *et al.*, 2014; Kong *et al.*, 2015; Measham, O’Brien and Turnbull, 2016; McKeganey and Barnard, 2018). The ability to use e-cigarettes in indoor spaces (Breslin *et al.*, 2017) with only a low risk of detection (Peters *et al.*, 2013; Hardcastle *et al.*, 2014; Griesbach and Platts, 2016; Hilton *et al.*, 2016) has also been highlighted as appealing to some young people. Qualitative work further reveals that the home environment - the setting in which nicotine exposure (via tobacco smoking) most frequently takes place (U.S. Department of Health and Human Services (HHS), 2006; ASH, 2014) - is a location in which the e-cigarette use of both young people (Peters *et al.*, 2013; Alexander, Williams and Lee, 2019) and adults (Pokhrel *et al.*, 2015; Griesbach and Platts, 2016; Wadsworth *et al.*, 2016;

Rowa-Dewar, Rooke and Amos, 2017; Lucherini, Rooke and Amos, 2018; Porcellato *et al.*, 2018; Robertson *et al.*, 2018) occurs. Yet even in the light of these findings, and widespread calls for research in this area to utilise qualitative methods (Roditis and Halpern-Felsher, 2015; Greenhill *et al.*, 2016; Hilton *et al.*, 2016; de Lacy *et al.*, 2017), there is still a relative paucity of qualitative research that explores how young people experience e-cigarettes (Hilton *et al.*, 2016) and no in-depth qualitative study investigating young people's experiences of vaping within domestic spaces. This latter omission is particularly surprising given that young people have previously reported a dislike of tobacco smoking in the home (Rowa-Dewar, Amos and Cunningham-Burley, 2014) and unsupervised exposure to e-cigarettes and related products poses serious risks to younger children (Chatham-Stephens *et al.*, 2014; Gupta, Gandhi and Manikonda, 2014; Kamboj *et al.*, 2016; Seo *et al.*, 2016). In exploring the perspectives of young people who report using or being around e-cigarette use (in either their own or others' homes) this article aims to address this shortfall, and, more broadly, respond to recent calls for further research into young people's experiences of e-cigarette use (Bold *et al.*, 2016; Choi and Bernat, 2016; Weishaar, Trevisan and Hilton, 2016; Goldstone, Macey and Cass, 2016; Greenhill *et al.*, 2016; Park, Seo and Lin, 2016; Villanti *et al.*, 2016; Warner, 2016; Kozlowski and Warner, 2017; Kristjansson *et al.*, 2017; Perikleous *et al.*, 2018).

2. Methods

The study reported in this article aimed to explore how young people viewed and experienced e-cigarette use (e.g. personal use, within peer groups, amongst family, in the broader community) and to understand factors that influenced those views and experiences. Addressing this aim required the exploration of contextualised experience (Morrow, 2011) and the generation of "rich . . . and detailed data" (Mason, 1996, p. 4). Data were therefore generated through semi-structured friendship group interviews. Ethical approval for the study was granted by the [removed for anonymisation].

The study's sampling strategy directly responded to recommendations for qualitative research into e-cigarette use to take place with diverse populations and consider a range of demographic variables (Hilton *et al.*, 2016; Huang *et al.*, 2016). Accordingly, sampling sought to ensure variation in age, gender, and Socio-economic status (SES), which have all been linked to differences in perceptions and

experiences of e-cigarette use (Hardcastle *et al.*, 2014; Hitchman *et al.*, 2015; Cooper, Harrell and Perry, 2016; Hartwell *et al.*, 2016; Huang *et al.*, 2016; Thirlway, 2016).

In September 2017 invitation emails were sent out to 22 state schools in Liverpool, UK, all of whom had met the inclusion criteria for participation in the study (to be run by the Local Education Authority (LEA); to teach both male and female pupils; and, as a proxy for SES, to have either an above- or a below-average proportion of pupils eligible for Free School Meals (FSMs)). Invitation emails outlined the purpose of the study and an overview of what participation would mean for any schools or pupils who chose to take part. Following several expressions of interest, recruitment began in two schools. Proportions of pupils eligible for FSMs in each school (>60% in one school, <10% in the other) differed markedly from the national average of 29.3% (Gov.UK, 2017) and provided a rough indication of the SES of participants (Hobbs and Vignoles, 2010). To allow data to be generated with participants who could be anticipated to have had varied experiences of e-cigarette use (de Lacy *et al.*, 2017), participation was sought from pupils from two school years - Year 7 (aged 11-12 years) and Year 12 (16-17 years).

An information sheet covering the aims and purposes of the study, along with details of what participation would involve for each pupil, was distributed in each school. A further information sheet was provided for parents and guardians, together with a reply form which enabled parents to indicate they were happy for their child to participate in the study. Only pupils who had indicated their interest in taking part in the study and had forwarded written parental consent to respective headteachers could participate. Groupings for interviews were self-selected by young people, enabling their participation in the research alongside people they already knew. This approach, commonly known as friendship group interviewing, enabled participants to make their own decisions about whom they would be interviewed with in advance of their participation (Highet, 2003). The intention of using this method of data generation was to counter the uneasiness that can be experienced by young people when interacting with adults in research encounters on a one-to-one basis (Kellett, 2011) and enhance the likelihood of participants feeling comfortable during the research process (Alderson and Morrow, 2011).

Twenty friendship group interviews (average length: 40 minutes) were held on school premises between February and April 2018 and were conducted within a single school learning period to minimise disruption to pupils. Between 2 and 5 pupils took part in each interview and written consent was recorded. Each interview followed a semi-structured interview schedule and explored participants' views and experiences of e-cigarette use by both adults and young people (including their own, where applicable). Sources of knowledge on the topic of e-cigarettes and opinions regarding the accessibility of e-cigarettes were also sought. All interviews were digitally audio-recorded. A short mini-questionnaire that recorded demographic information was also administered and participants were given a £5 shopping voucher to thank them for taking part in the study. Anonymised transcripts of interviews were imported into NVivo 11 for Windows (QSR International Pty Ltd.) for thematic analysis (Braun and Clarke, 2006). This involved a process of familiarisation with the data via the process of transcription and multiple readings of each transcript (Braun & Clarke 2006) and was followed by the generation of codes across all data and the subsequent search for themes using these codes. The identification of themes was informed by Ryan and Bernard's (2003) recommendation that "repetitions", "indigenous typologies or categories", "metaphors and analogies", "similarities and differences"; "linguistic connectors"; "and missing data"; should be considered during the analytic process (Ryan and Bernard, 2003, pp. 89–92). Themes relating to e-cigarette use in the home environment are reported here.

3. Results

Interviews were conducted with a total of 64 participants from two schools of contrasting socio-economic backgrounds. Twenty-eight participants attended the school with a low proportion of pupils eligible for FSMs (henceforth indicated by the term 'advantaged'); 36 participants attended the school with a high proportion of pupils eligible for FSMs (indicated by the term 'disadvantaged'). In accordance with their respective school years, all participants were aged either 11 or 12 years (57.8%) or 16 and 17 years (42.2%) (Table 1). Across the total sample, the gender split of participants was broadly even, and ethnicity was predominantly 'White' (81.3%). In both schools ever-use of e-cigarettes (any personal use of e-cigarettes) was only reported by those aged 16-17 years, with roughly twice the proportion of ever-users found in the advantaged school. The only participant who reported being a

current user of e-cigarettes, however, attended the disadvantaged school, where participants were approximately ten times more likely than in the advantaged school to have reported living in the same house as an e-cigarette user. Twenty-four participants (11 advantaged; 13 disadvantaged) had also witnessed e-cigarette use in the homes of others, such as relatives, friends, acquaintances and employers (e-cigarette use in the home environment was witnessed by at least one participant in all but two interviews - both at the advantaged school; 6 pupils in total - and data from these two interviews are excluded from our qualitative results). Ever tobacco use and current tobacco use was reported by a very small proportion of our sample (4.7%) and only amongst those aged 16-17 years. Witnessing tobacco use in others' homes was common across both schools, but those from the disadvantaged school were far more likely to report living with a tobacco smoker (38.9%) than those from the advantaged school (7.1%).

Table 1. Demographic characteristics of participants and selected information on e-cigarette use and tobacco use.

	School One: Advantaged socio- economic background (% within school)	School Two: Disadvantaged Socio- economic background (% within school)	Total (% of total sample)
Age			
11-12 years (Year 7)	15 (53.6%)	22 (61.1%)	37 (57.8%)
16-17 years (Year 12)	13 (46.4%)	14 (38.9%)	27 (42.2%)
Gender			
Male	15 (53.6%)	16 (44.4%)	31 (48.4%)
Female	13 (46.4%)	20 (55.6%)	33 (51.6%)
Ethnicity			
Asian / Asian British	2 (7.1%)	3 (8.3%)	5 (7.8%)
Black African / Caribbean / Black British	1 (3.6%)	1 (2.8%)	2 (3.1%)
Mixed / Multiple Ethnic groups	3 (10.7%)	2 (5.6%)	5 (7.8%)
White	22 (78.6%)	30 (83.3%)	52 (81.3%)
E-cigarette use			
Ever e-cigarette user	9 (32.4%)	6 (16.6%)	15 (23.4%)
Current e-cigarette user	-	1 (2.8%)	1 (1.6%)

Living in same house as an e-cigarette user	1 (3.6%)	13 (36.1%)	14 (21.9%)
Witnessed e-cigarette use in others' home(s)	11 (39.6%)	13 (36.1%)	24 (37.5%)
Tobacco use			
Ever tobacco smoker	1 (3.6%)	2 (5.6%)	3 (4.7%)
Current tobacco smoker	1(3.6%)	2 (5.6%)	3 (4.7%)
Living in same house as a tobacco smoker	2 (7.1%)	14 (38.9%)	16 (25%)
Witnessed tobacco smoking in others' home(s)	17 (60.7%)	26 (72.2%)	43 (67.1%)

We discuss three themes: 'Patterns of e-cigarette use in domestic spaces: place, space and context', 'Sensory aspects of e-cigarette use in the home', and 'Perceived benefits and risks of e-cigarette use in the home'.

3.1 Patterns of e-cigarette use in domestic spaces: place, space and context

Descriptions of e-cigarette and tobacco use practices were markedly similar across advantaged and disadvantaged backgrounds. Tobacco use, both that of adults and young people, was described as taking place outdoors (e.g. in the garden, yard or other outside space) and indoors (either in, or away from, a particular room). Tobacco smoking was typically introduced into these specific domestic spaces to reduce the effects of second-hand smoke exposure (SHSe). Adult e-cigarette use was reported as predominantly taking place in these same physical locations, though in some cases, did occur inside the home whilst tobacco use was restricted to outdoor spaces:

[My Auntie] didn't used to smoke in the house, but then, now she's got [an e-cigarette], she does do that in the house. **Lee, Y12, advantaged**

In some families, adults were described as using e-cigarette use indoors because e-cigarette vapour was perceived as less harmful to others than SHSe:

[My Auntie] has her e-cig in the front room 'cause me little nephew's in there with her. She still has her normal ciggies, but only out the back 'cause she knows they're worse for him. **Anita, Y12, disadvantaged**

I just see [my Grandparents] with the vapes . . . when they have visitors they use the e-cigarettes and then when there's no one visiting they just have a normal cigarette. I think the main thing is the health thing, that it won't be harmful to us all . . . me Grandad especially, he always felt a bit bad about smoking around other people, 'cause of it being bad for your health. **Lloyd, Y12, advantaged**

Accounts of adult e-cigarette use, however, more commonly suggested that e-cigarette vapour was perceived similarly to tobacco smoke, and young people frequently recounted adults' attempts to minimise possible harm or irritation that might be experienced by exposure to vapour from e-cigarettes. Sometimes this meant e-cigarette use only took place outdoors: Billy (Y7, advantaged), for example, recounted that his mother would always go outside and stand at the end of the garden when vaping. When adults did use e-cigarettes in indoor spaces they often employed particular strategies, i.e. opening a window or door, or turning on a cooker fan, to allow vapour to dissipate. This typically mirrored strategies that had been place for tobacco use:

Ben: She puts the fan on the cooker . . . to keep it from getting too much

Interviewer (I): And is that the same place she used to smoke tobacco cigarettes?

Ben: Yeah, she used to smoke in the house but only in the kitchen with the fan on . . . It's all the same habits but just with the e-cigarette instead.

Protecting younger people was frequently cited as adults' rationale for e-cigarette practices within the home environment. Some adults would move away from places occupied by young people when using e-cigarettes, whilst others would refrain from using them when young people were present:

[My Uncle] didn't smoke in the house because of me cousins. The, like, harm normal cigarettes do . . . it's, like, the same for the e-cigarette, just in case the e-cigarette might not be good as well. He doesn't want to take the risk of, like, making them unwell. **Bobby, Y12, advantaged**

She won't [use e-cigarettes] when we're all around, 'cause she's got loads of grandkids and she wouldn't smoke around us and she won't do that around us. **Tracy, Y12, disadvantaged**

In another example of a strategy that directly mirrored patterns of tobacco smoking, Chris (Y7, disadvantaged) described how his father would blow vapour to part of the living room where others

were not present to lessen any possible negative impact from his e-cigarette use. For the same reason, other young people reported having been asked to leave a room while an adult was either smoking or using e-cigarettes:

At my Dad's he says, just to, er, for me, just to go outside for a little bit . . . I don't mind it. It's best if I can just carry on watching TV and I don't have to move but, erm, I don't mind going outside or to another room. **Sean, Y7, disadvantaged**

In contrast with tobacco use, however, strategies to reduce harm were more malleable when e-cigarettes were used, with age, stress and weather conditions all revealed as modifiers of space-related practices. Sean (Year 7, disadvantaged) remarked that his mother would use her e-cigarette when sitting next to him but would not do this with his 2-year-old sister, suggesting that very young children were perceived by some as more vulnerable than older children to any possible harms from vapour. Lauren (Y7, disadvantaged) reported that her grandmother would use e-cigarettes in indoor home spaces but only for an extremely short amount of time. Stressful periods, which required a lengthier periods of e-cigarette use, however, took place outdoors:

Me Nan, whenever she smokes them, she does sometimes smoke them around me but whenever she smokes them she normally only takes, like, one puff of them . . . [if] she's really stressed then she'll go outside. **Lauren, Y7, disadvantaged**

Conversely, Clare (Y7, disadvantaged) discussed how her older adult siblings' e-cigarette use was not normally accepted inside the home, but that, during periods of stress, vaping was temporarily allowed to take place in indoor spaces:

My, like, Mum and Dad . . . they've taken away my brothers' e-cigarettes because they are pretty against it but whenever my brothers get stressed because of work they always give it back to them . . . if they're stressed they can have them. **Clare, Y7, disadvantaged**

Changes in weather conditions could also prompt parental e-cigarette use to atypically take place indoors:

[It's] nearly always in the garden and if it's really bad rain, she'll, like, go to the kitchen and do it there. **Anna, Y7, disadvantaged**

In a further interview, Danny (Y7, disadvantaged) initially emphasised that his father would not use e-cigarettes near him for health reasons, but later recalled that while that was the norm, there were exceptions to this. Danny's father would never commence e-cigarette use in his presence, but would, on occasion, use it around him:

If I'm in the room he won't come in and then start using it but he's sometimes already using it and I walk in . . . He won't use it for long when I'm around. Like, for a few minutes more and then he stops. **Danny, Y7, disadvantaged**

As was the case with adults, young people's e-cigarette use in the home took place in specific rooms or away from certain spaces. Unlike adults, however, young people predominantly used e-cigarettes in their bedrooms when in the home environment, where tobacco use was usually prohibited by parents. In some cases, e-cigarette use took place in young people's bedrooms with the full knowledge of parents (this was reluctantly tolerated by some, but permitted by others). Victoria (Y12, advantaged) spoke of a friend, a dual user of both tobacco cigarettes and e-cigarettes, who was not supposed to use e-cigarettes at home but regularly did so:

I've got one friend that, like, she does it [in her bedroom] . . . she's not allowed but she, kind of, is 'cause they don't do anything about it. **Victoria, Y12, advantaged**

Here, the perception that e-cigarette use was less harmful than tobacco use, in conjunction with the less powerful odour of vapour, had led to parental leniency and a degree of acceptance of vaping that was not present with regards to tobacco use. Young people's e-cigarette use within the home, then, like adult e-cigarette use, was sometimes viewed differently from tobacco use. This was further illustrated by Lee (Y12, advantaged) who recounted that a friend's parent had bought her an e-cigarette to use in the home:

Lee: Somebody I know, their Mum bought them [an e-cigarette] . . . because she was smoking all the time . . . And 'cause she was starting to smoke in her room and she's got asthma they didn't want

her to smoke. And 'cause they thought if they took them off her she'll just buy more [cigarettes], they bought her [an e-cigarette] to use instead

I: And does she use that in her room? The e-cigarette?

Lee: Yeah, it's for her room. They didn't want her smoking in her room, especially, 'cause of the all the smoke being in there.

Karen, (Y12, disadvantaged), a dual user of tobacco cigarettes and e-cigarettes, described being prohibited by her parents from smoking indoors at home because of her age (17 years) but allowed to use e-cigarettes in her bedroom. Because she did not have to go outside to use them when at home, e-cigarettes offered a more convenient option for nicotine consumption than tobacco cigarettes and an option to consume nicotine indoors that would not have existed otherwise. This was also the case with covert e-cigarette use reported by young people i.e. vaping which took place without the knowledge or approval of parents. In stark contrast to tobacco use, both regular use and experimentation in bedrooms was reported as easily achievable because the smell of vapour was less noticeable than tobacco smoke and thus unlikely to be detected by other family members: *'an e-cigarette's a bit more discreet, you can't, like, smell it'* (Erica, Y12, advantaged). Irrespective of parental approval or disapproval, e-cigarettes presented a means of nicotine consumption within the home that was previously unavailable to young people.

3.2 Sensory aspects of e-cigarette use in the home

Those young people who had encountered e-cigarette use in home environments frequently discussed their experiences in sensory terms. They described the visual appearance of the vapour emitted from others' e-cigarettes unfavourably because it interfered with their enjoyment of particular activities, such as watching television:

It's like a bit of a smog in the room . . . when we're watching the match or whatever. It sorts of sits in the air . . . It doesn't, like, make me cough or anything but it's a bit much if it's too much . . . if I'm waving me arm to clear it away. **Tony, Y12, disadvantaged**

Such sentiments were compounded by the apparently large volume of vapour that was exhaled by adult e-cigarette users (thought by young people to either be the result of using particular models of e-

cigarette or because some individuals were prone to use e-cigarettes more frequently than they had smoked tobacco). Chris (Y7, disadvantaged) compared the vapour from his father's tank model e-cigarette to fumes emitted by the exhaust of a motor vehicle:

The amount of vape coming out his tank is so much. It's really, it's more, like, the amount of it, like, is more like what comes out of the car exhaust than a normal cigarette. It's a cloud, it's coming out all at once. **Chris, Y7, disadvantaged**

Young people reported this visual aspect of e-cigarette use as an annoyance:

It's just a bit annoying to have it all, sort of, hanging in the air. It drifts over the room, like, if the sun comes in you can see it just hanging there. It's really noticeable 'cause of the, like, angle the sun comes in at. **Erica, Y12, advantaged**

It's not, like, it makes me feel bad or anything. It's not, like, harming me. It's more, it's just there and it's a bit annoying. **Tony, Y12, disadvantaged**

In contrast to the reported dislike of e-cigarette vapour in purely aesthetic terms, odour emitted by e-cigarette use in the home was generally discussed more favourably by young people. Indeed, it was noticeable that it was the visual, rather than olfactory aspects of e-cigarette use in the home, that tended to cause most unease. Although some participants did not like the smell of e-cigarettes whatsoever, others noted that the range of different e-liquid flavourings meant the smells of some (such as fruit flavourings) were more agreeable than others (tobacco flavourings). For some, the smell of vapour was likened to food and drink flavourings and the scent of candles and was described as having relaxing and calming qualities. It was suggested that this more pleasant aroma might indicate a reduced toxicity of vapour in comparison with that of tobacco smoke, and comparisons between these respective odours underpinned a more positive attitude towards vapour in the home. Whilst tobacco smoke in the home was unanimously disliked by non-smokers, the (reportedly) less objectionable smell from e-cigarette vapour resulted in it being perceived as less bothersome or noticeable (both during and after use) in domestic spaces:

We're used to it people smoking around us so it's nothing really, an e-cigarette . . . it's less, it's less strong, the smell. It's not as bad to be around. **Marcus, Y12, disadvantaged**

It smells nicer [than tobacco cigarettes]. [My Mum] has a strawberry one . . . with these there's no smell afterwards . . . I can't tell if she's been out with her e-cigarette. I could always tell if she'd just been out properly smoking. **Billy, Y7, advantaged**

3.3 Perceived benefits and risks of e-cigarette use in the home

There was a consensus across age-groups and schools that tobacco smoking in shared indoor domestic spaces led to negative health outcomes, including for people who did not smoke. Opinions on whether e-cigarette use in these same spaces would cause similar harms were more mixed. For some, the perception that e-cigarette use in the home was less harmful (to both users and others) than the equivalent tobacco consumption meant that it was viewed more favourably:

They're better for [my Dad]. They're better for me an' all. **Tony, Y12, disadvantaged**

It's much better in the house, isn't it? And it doesn't, like, kill ya! **Anita, Y12, disadvantaged**

Young people with health conditions such as asthma, however, expressed more concern about possible negative health effects. Chris (Y7, disadvantaged) described how vapour had made him cough, whilst Sean (Y7, disadvantaged) recounted that being around e-cigarette use had required him to use his inhaler. Unrelated to ideas of passive vaping, other young people saw adults using e-cigarettes in front of younger children as setting a bad example:

I think it's good if people are using these but it's not good for children to see them doing it. 'Cause it's still a bad habit, even if it's not as bad as smoking. **Katie, Y12, disadvantaged**

The people I babysit for have really young children and the only thing that I think's bad about that is it's still got, like, the association with smoking. So young people seeing that, I know it's not, like, directly, a cigarette, but it's still gonna have that negative effect of bringing smoking into the mind.

Hailey, Y12, advantaged

This conception of younger children as vulnerable and impressionable was also present in discussions of how e-cigarettes and related paraphernalia (e.g. e-liquids, cartridge refills) were stored in the home. Several young people expressed concern at younger siblings picking up such products and placing them near their mouths, and noted that approaches to storing e-cigarettes either were, or had previously been, ineffective in preventing access to e-cigarettes by younger family members. Older children and young

people were also reported as being able to easily access e-cigarettes in the home environment. Catherine (Y7, disadvantaged) reported that her 16-year-old brother had obtained an e-cigarette by simply taking one that belonged to a grandparent:

He took them off me Nan . . . we have this, like, drawer thing in the back room. They were in one of the drawers, so he went through all the drawers looking for them and got one. **Catherine, Y7, disadvantaged**

Others remarked that although they had not done so, they would be able to access e-cigarettes from family members with similar ease:

I'd just grab one off my Nan or Grandad . . . just if I wanted to. It'd be easy to get one . . . they wouldn't notice. **Lloyd, Y12, advantaged**

The pens, I could easily go and get one of them, go and grab an oil and just put it in and smoke it. 'Cause there's about 4 or 5 in the house, all over. I know where 3 or 4 of them are . . . and the oils are, like, there in the drawer. **Chris, Y7, disadvantaged**

Though some remarked that obtaining e-cigarettes within the home environment would be simple, the relative accessibility of e-cigarettes to young people did vary from home to home, being largely dependent on the individual habits and routines of users in each respective household. In some cases, for example, e-cigarettes were kept locked away in cupboards or drawers when not in use, or when stored in unlocked places these were located out-of-reach of younger children. Additionally, some family members were reported to use a single refillable e-cigarette which would be difficult to take or use without detection. Nonetheless, e-cigarettes left unattended in the home environment presented some young people with ready opportunities to access vaping technologies.

4. Discussion

The findings reported in this article offer insight into how young people experience e-cigarettes in home spaces. Discussions highlighted young people's understandings of the different strategies put in place by adult e-cigarette users to reduce others' exposure to e-cigarette vapour, and the differing uses of space described (e.g. restricted indoor use and outdoor use) indicate that notions of harm or risk associated with tobacco smoke might be transferred to perceptions of e-cigarette vapour. That practices

of e-cigarette use often mirrored those of tobacco smoking hints that many e-cigarette users, and/or family members of e-cigarette users, may also feel that e-cigarette use should be restricted in places where tobacco smoking is proscribed. This is a dominant viewpoint amongst respondents from a US study into e-cigarette use in the home (McMillen *et al.*, 2018). Contrastingly, however, we also found evidence of e-cigarette use being employed in domestic spaces to limit the exposure of younger family members to tobacco smoke. This matches recent accounts provided by adult smokers in other UK-based work (Rowa-Dewar, Rooke and Amos, 2017) but has not, to our knowledge, been reported on elsewhere. Participants themselves spoke both positively and negatively about the sensory aspects of vapour in the home, and, as has been the case in other studies with young people (Hilton *et al.*, 2016; Weishaar, Trevisan and Hilton, 2016), revealed uncertainty about the potential harm that might result from exposure to e-cigarette vapour. There was, however, certainty that exposure to second-hand smoke was harmful, alongside a broadly held belief that e-cigarette vapour was likely to be less so. Consequently, a near-consensual position was that proximity to e-cigarette use was preferable to proximity to tobacco use, in both indoor and outdoor domestic spaces. Utilising e-cigarettes to reduce the risks of second-hand smoke exposure, then, had notable support amongst young people who lived with either e-cigarette users (over a fifth of our sample) or current tobacco smokers (a quarter of our sample).

Although far more common than ever or current tobacco use, ever and current e-cigarette use not widespread amongst members of our sample, and regular vaping was reported by only one participant (a dual user of both tobacco and e-cigarettes). Data on participants' and peers' e-cigarette use was therefore scarcer than was data on adults' use. Almost a quarter of older participants had used e-cigarettes on at least one occasion (a near identical proportion to ever-use figures in other work (NHS Digital, 2017)). This, however, had primarily taken place away from the home and is therefore not reported here. Nevertheless, several important insights into young peoples' use of e-cigarettes in the home are noteworthy. That, in some cases, home-use of e-cigarettes was accepted (sometimes openly, sometimes tacitly) by parents is an important finding: this may indicate that parents are practising harm reduction strategies intended to counter their children's tobacco use. However, whether these strategies facilitate a reduction in young people's tobacco consumption in practice requires further exploration.

Indeed, it is possible that young people's use of e-cigarettes within domestic spaces permitted them to maintain or, indeed, increase their nicotine intake. Such practices warrant additional investigation and the perspectives of different family members would help to more fully understand how e-cigarette use in the home plays out in everyday life.

Our study has also demonstrated that vapour from e-cigarettes dispersed quickly in indoor spaces in comparison with tobacco smoke, which was stronger smelling and had a more persistent presence. This enabled e-cigarette use within domestic spaces with minimal risk of detection and is in line with findings of other studies with young people in the UK (Hardcastle *et al.*, 2014; Griesbach and Platts, 2016; Hilton *et al.*, 2016). It is also analogous to findings from a US study where the lack of noticeable odour from e-cigarettes meant they could easily be used by young people in places where tobacco use was prohibited (Peters *et al.*, 2013). Our data revealed there was little difficulty in realising covert e-cigarette use in bedrooms, and some young people appeared emboldened to use vaping to subvert usual restrictions on nicotine consumption. In addition, this article has drawn attention to the varying ways in which e-cigarettes were stored in the home, the examples of which may again indicate variable views on the safety of e-cigarettes amongst users. The more cautious approaches to storing e-cigarettes could be a response to very young children living in households. However, reports that such children were said to have played with e-cigarettes and placed them near their mouths (albeit on rare occasions) implies that there may not be a straightforward relationship between the age-structure of a household and the storage strategies that are used. When considering the extreme toxicity of e-liquids when ingested orally (Palazzolo, 2013), leaving e-cigarettes and related materials unsupervised or easily accessible to younger children is particularly concerning, but not, as work in the US has shown (Garbutt *et al.*, 2015) unique to some of the families in this study. This issue should be covered in any guidance or advice given to those using, or considering using, e-cigarettes in or around the home. Instructions on how to appropriately store e-cigarettes are already provided with e-cigarette products sold in EU member states, and requirements for child proof-packaging are also in place (European Commission, 2014). Globally, however, a recent study found that less than a fifth of countries that regulated e-cigarettes implemented such child-safety packaging standards (Kennedy *et al.*, 2017) and further highlights the risks posed to younger children via unsupervised access to e-cigarettes. Our findings also

indicate that inappropriate storage within domestic spaces is not just an issue for younger children but can also provide easy access to e-cigarettes for older children and teenagers. The account of a teenage sibling taking an e-cigarette from a relative without the latter's knowledge mirrors the findings of work exploring access to tobacco amongst youth in the UK (Woods *et al.*, 2008), the US (DiFranza, 2002; Kegler, 2002) and New Zealand (Marsh, Dawson and McGee, 2013).

Overall, the characteristics of e-cigarette use described by young people from advantaged and disadvantaged backgrounds were markedly similar. Whilst a roughly equal proportion of advantaged and disadvantaged young people reported being around e-cigarette use in others' homes, however, those from disadvantaged backgrounds were far more likely to live in the same household as an e-cigarette user and found themselves in proximity to e-cigarette use more frequently. This does suggest that those from disadvantaged backgrounds may well be most affected by any risks or benefits of home e-cigarette use. However, to substantiate this finding requires further research. With e-cigarette vapour having reportedly triggered asthmatic symptoms in one disadvantaged participant, further inquiry into how young people with respiratory conditions experience e-cigarette use in the home is also worthy of investigation; the increased prevalence of asthma amongst lower SES populations (Basagaña *et al.*, 2004), coupled with our finding that that disadvantaged young people were more frequently in proximity to e-cigarette use, highlights the necessity of undertaking any such work with a diverse sample. Generating data with older and younger family members would also be of use in any future research in this area as it would allow a more holistic picture of e-cigarette use in home environments to be garnered. Finally, a targeted attempt to specifically recruit more regular e-cigarette users (both adults and young people) would be invaluable in generating further reflections of personal e-cigarette use in home spaces.

5. Conclusions

The findings of this qualitative study provide the first example of an in-depth exploration into young people's understandings of e-cigarettes use in the home environment and add to a small but growing evidence-base reporting on how e-cigarettes are perceived and experienced by young people. The majority of young people in this study had not used e-cigarettes and were not exposed to e-cigarette use in domestic spaces. Accounts provided by those who had experienced being around e-cigarette use in

such spaces (either their own or others' homes), however, revealed several important findings. E-cigarette use was easily achievable for young people within the home and did provide a new opportunity for nicotine use in domestic spaces. In some cases, young people's e-cigarette use in the home was accepted or tolerated by parents because it was perceived as less harmful than tobacco smoking. Adult understandings of e-cigarette use were reportedly variable: some used them to reduce younger family members' exposure to second-hand smoke in the home, whilst others were warier of possible negative health impacts to others from their use. These contrasting views underline the need for health promotion to incorporate up-to-date information on the risks of e-cigarettes to allow people to make informed choices about their use in the home environment. Evidence of haphazard methods of storing e-cigarettes within the home, which pose safety risks to younger children and easy access to e-cigarettes for others, also underline the need for guidance in this area.

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