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It's Just Steam: a qualitative analysis of New Zealand ENDS users' perceptions of secondhand aerosol

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ABSTRACT

Introduction Many smokers who begin using electronic nicotine delivery systems (ENDS) report vaping in settings where they would not have smoked and believe secondhand aerosol (SHA) is simply steam. However, current understanding of how ENDS users differentiate between secondhand smoke and SHA, or how vaping norms develop, is limited.

Methods We conducted in-depth, semi-structured interviews with 39 current ENDS users (dual users and former smokers, now exclusive ENDS users) from New Zealand to explore participants' perceptions of SHA. We probed how these perceptions arose and examined implications for vaping practices and policy. We managed the data using NVivo V.11 and used a thematic analysis approach to interpret the transcripts.

Results Participants had limited understanding of SHA, its constituents or its possible effects on others. They drew on the absence of harm information, and their sensory experiences and perceptions of others' views of vaping, to support the conclusion that SHA posed few, if any, risks to bystanders. Yet despite this perception, some felt they should recognise others' rights to clean air and most would not vape around children to avoid setting an example.

Conclusions In the absence of trusted information, participants used sensory heuristics to rationalise their ENDS practices. Policy-makers face the challenge of correcting misperceptions about SHA without deterring full transition from smoking to ENDS use. They could consider including vaping in current smoke-free area policies; this measure would signal that SHA is not harmless, and could protect clean-air settings and reduce potential normalisation of vaping among non-smokers.

INTRODUCTION

Knowledge of harms caused by exposure to secondhand smoke (SHS) has informed campaigns promoting smoke-free homes and policies mandating smoke-free cars when children are present, which in turn shape norms, the informal rules that guide social practices.[1–3] Smoke-free home norms reduce non-smokers' exposure to SHS, increase the likelihood that smokers will make a quit attempt, and foster the success of those attempts.[4 5] However, while norms regarding SHS are becoming established,[6] it is not clear whether smokers who start vaping apply those norms to the secondhand aerosol (SHA) created by electronic nicotine delivery systems (ENDS). As ENDS use grows, exposure to SHA also increases,[7] with a recent analysis of 2015–2018 National Youth Tobacco Survey data showing around a quarter of US youth had been exposed to SHA.[8]

While smokers who transition completely from smoking to ENDS use may decrease their exposure to toxins created by combusting tobacco, ENDS use is not risk-free.[9] Recent studies suggest daily ENDS users may face increased cardiovascular and respiratory risks,[10] with dual users (DUs) of combustible cigarettes and ENDS facing even greater risks than combustible-only users.[11] Analyses of e-liquid flavourings and SHA report these contain particulate matter and nicotine,[12] as well as cytotoxic organic compounds that may cause mutations and future health problems.[13–15] Systematic reviews have found that passive exposure to SHA may pose a risk to those exposed, although a lower risk than exposure to SHS.[16 17] However, others regard the evidence as unclear.[18] For example, while the National Academics of Science, Engineering and Medicine found conclusive evidence that most ENDS 'emit numerous toxic substances' it also found conclusive evidence that 'these emissions vary substantially, depending on the device and how it is used.'[19]

There is thus considerable debate over where vaping should be permitted,[20 21] with members of the public holding varied and sometimes contradictory perceptions of SHA, and often knowing little about its constituents. A study of Californian adolescents (76% neither used ENDS nor smoked tobacco) found nearly 20% regarded SHA as water vapour, though two-thirds thought it could harm children and babies.[22] A similar study of American adults (88% never tried ENDS) found 58% did not know whether SHA comprised only water vapour; 63% and 75%, respectively, did not know whether SHA contained tar or formaldehyde.[23] Surveys exploring perceived risk and regulatory measures also report mixed findings, which typically differ according to ENDS use status.[24–28]

Overall, the difficulty of finding information on vaping's effects or the contents of SHA, and diverging interpretations of existing research, raise questions about how ENDS users view SHA .[29] Few studies have examined this question or explored how perceptions of SHA arise and influence norms regarding ENDS use.[30 31] Probing how ENDS users negotiate norms with respect to SHA could inform more nuanced education campaigns and help policy-makers balance the potential benefits of harm reduction against the public's right to breathe clean air. We therefore explored how ENDS users perceived SHA and the factors shaping these perceptions.

METHODS

Setting, sample and recruitment

We undertook the study in New Zealand (NZ) where, at the time of data collection, ENDS and e-liquids containing nicotine could not legally be sold. Nonetheless, several stores sold nicotine-delivering devices and e-liquids, which consumers could also purchase online. Online supplementary file 1 contains further information on ENDS regulation in NZ.

As part of a larger project examining ENDS use in NZ, we recruited 39 current ENDS users (used ENDS at least once a month) aged 18 and over who had smoked at least 100 cigarettes in their lifetime and were either exclusive ENDS users (n=19) or DUs (ie, also smoked tobacco at least once a month; n=20). Our sample comprised Māori (NZ's indigenous peoples), Pacific peoples and NZ Europeans, and was recruited from three NZ urban centres. We used social media and community advertising, and whanaungatanga (kinship) and professional networks to recruit a demographically diverse sample. Participants received a NZ$40 gift voucher to offset any costs they incurred from participating in the study.

Interview guide

Our semistructured interview guide explored participants' perceptions of ENDS' aerosol, particularly its components and effects on others (see online supplementary file 2). We retained flexibility in question wording and sequencing to maintain conversational interviews and allow detailed probing. The interview guide followed a general-to-specific question sequence to minimise priming effects. Following each interview, participants completed a brief background questionnaire that collected information on their smoking and ENDS use, and demographics. Interviews lasted approximately 60–70 min (range: 45–75 min). All participants provided written consent before the interview commenced.

Data analysis

With participants' consent, we recorded the interviews, which an online service subsequently transcribed verbatim. We analysed the transcripts using a thematic analysis approach, which involves frequent reading and re-reading of the transcripts, abstraction of themes, and identification of sub-themes.[32] Two authors (KH and JH) each read the transcripts and used a line-by-line approach to code two of these; we then reviewed these codes and prepared an initial coding structure that KH used to code the remaining transcripts. We met regularly to review and discuss the codes, compare participants' accounts and ensure themes reflected divergent views. We used NVivo V.11 to manage the data; all participants have been assigned a pseudonym. online supplementary file 3 contains a codebook containing quotes associated with the themes presented below.

FINDINGS

Participants' characteristics

The sample comprised 16 women and 23 men aged 19–65 years (median age 34 years). Table 1 contains details of participants' demographics, and their smoking and ENDS use. Most participants used ENDS daily (n=32) and were relatively recent ENDS users, reporting at least weekly ENDS use for between 1 month and a year. Among DUs, 14 smoked daily; four smoked at least weekly and two smoked less than weekly. Most participants owned either a second-generation (vape pen) or third-generation (tank) device. Nine participants identified as Māori, five as Pacific, two as Māori and Pacific, three as 'Other', and the remainder as NZ European. We describe participants using pseudonyms and according to whether they were DU or former smokers and now exclusive ENDS users (EUFS).

Thematic analysis

Participants knew little about SHA's constituents and few could explain how SHA affected bystanders. When probed, most drew on comparative heuristics, sensory experiences, or perceptions of others' views to conclude that SHA posed few, if any, risks to bystanders, and that vaping should be allowed in areas where smoking is not permitted. Yet at the same time as asserting this opinion, some participants felt reluctant to impose their choices on others, particularly children, and subordinated their views to an overarching courtesy norm that privileged others' rights to clean air. The following sections outline these themes.

Uncertainty about SHA's health effects

Participants found it difficult to locate independent information about ENDS' long-term health effects or the constituents of SHA, and most felt unsure what 'vape clouds' comprised. Mike's (EUFS) uncertainty was clear as he slowly outlined his view: 'Some people think … that there's chemicals coming out of them, I'm not 100% sure on that… um, my information is it's just water vapour and yeah … I'm not sure if there's nicotine in it coming out but um, yeah, other than that.' High uncertainty reflected the difficulty of locating information; as Russell (DU) noted: 'I don't know if it [SHA] sort've gets passed on, there's bugger all information on it about anything like that yeah, so it's sorta hard to find.'

Nor did participants know how the aerosol inhaled affected them. Oliver's (EUFS) struggle to articulate what he has heard illustrates a pervasive uncertainty: 'Um, yeah. I don't have too much understanding of what—what it is. Um, yeah. I don't know. I've heard it's something that is some sort of … One of the, uh, I'm not too sure what it's called, but some of the—the liquid in it is also used on, like, I think it's called on the butter and popcorn sort of thing… There's a bit of … Yeah. There's a bit of, um, questioning about, like, whether, you know, it being vaporised, it's still harmful sort of thing.'

Most also puzzled over SHA's potential effects on others. Patrick (DU) asked: 'It's not going to harm that person next to you, but is that proven? I don't know', while Henry (DU) posed more direct questions: 'how much of the nicotine is going into me and is there any going into the air? You know, is there a second-hand effect from the steam?' Despite searching online and talking with friends and family, participants found it hard to answer these questions. They managed this uncertainty by using SHA's pleasant taste and smell, and its tendency to disappear quickly, as signals it was less harmful than SHS. The following sections explore this reasoning.

Comparative logic

Several participants compared the lack of official information available on SHA to the well-established, widely promoted, information on harms caused by SHS. Tilly (EUFS) noted: 'They know a lot about cigarettes and that they're bad, but I don't think there's enough education out there about e-cigarette smoking' and Kate (DU) commented: '…like a normal cigarette, second-hand smoke, it can cause, um, cancers and stuff, but there's nothing…to say what the vapour from these [ENDS] do.' Participants recalled receiving information about the risks SHS posed—sometimes over many years—yet none had seen information about the potential risks SHA presented.

Table 1 Participant characteristics

Pseudonym	Gender	Age	Ethnicity	Vaping frequency	Length of time vaping weekly	Smoking frequency (CPD)
Amy	F	35	Pacific	Daily	4 months	Exclusive ENDS user
Angie	F	40	NZE	Daily	4 months	Daily (30)
Anthony	M	21	NZE	Weekly	3 months	Weekly (0–2)
Brett	M		NZE	Daily	3 months	Exclusive ENDS user
Caro	F	57	NZE	Daily	4 years	Exclusive ENDS user
Charlie	M	19	NZE	Daily	5 months	Weekly (2)*
Cindy	F	26	Māori	Daily	3 months	Exclusive ENDS user
Damian	M	23	NZE	Daily	3 months	Daily (3)
David	M	25	Māori	Daily	5 months	Exclusive ENDS user
Dean	M	45	Māori	Daily	5 months	Exclusive ENDS user
Ewan	M	27	NZE	Daily	6 months	Exclusive ENDS user
Fiona	F	37	NZE	Daily	1 year	Daily (10–12)
Gina	F	49	Other	Daily	1 year	Exclusive ENDS user
Hannah	F	48	NZE	Daily	1 year	Daily (25)
Hayley	F	34	NZE	Daily	1 month	Exclusive ENDS user
Hector	M		NZE	Weekly	4 months	Exclusive ENDS user
Henry	M	63	Māori	Daily	3 months	Weekly (1–2)*
James	M	43	NZE	Daily	7 months	Daily (5–8)
Jamie	M	20	Māori	Daily	1 year	Daily (3)
Jane	F	52	NZE	Daily	1 month†	Daily (16)
Jayden	M	20	Māori/Pacific	Daily	1 year	Weekly (1)*
Kate	F	56	NZE	Weekly	6 months	Daily (24–30)
Kelvin	M	22	NZE	Daily	4 months	<Weekly (4)*
Kurt	M	32	NZE	Daily	1 year	Exclusive ENDS user
Marie	F	45	Māori	Daily	15 months	Exclusive ENDS user
Matt	M	26	Other	<Weekly	n/a	<Weekly (1)*
Meg	F	65	Māori	Daily	8 months	Daily (10–14)
Mike	M	44	NZE	Daily	4 years	Exclusive ENDS user
Neal	M	19	NZE	Weekly	4 months	Daily (4–5)
Oliver	M		NZE	Weekly	4 months	Exclusive ENDS user
Paikia	F	31	Māori	Daily	1 month	Daily (>20)
Patrick	M	42	Pacific	Daily	9 months	Daily (8)
Penelope	F	60	Māori	Daily	7 months	Exclusive ENDS user
Pete	M	43	Pacific	Daily	8 months	Exclusive ENDS user
Russell	M	28	NZE	Daily	1 year	Daily (3–4)
Steve	M	39	Māori/Pacific	Daily	2 years	Exclusive ENDS user
Tilly	F	20	Māori	Daily	4 months	Exclusive ENDS user
Toby	M	20	NZE	Weekly	3 months	Daily (10)
Val	F	33	Pacific	Daily	6 months	Exclusive ENDS user
Range and mean					Range 1–24 months	13.5 cpd (among dual users)

*Cigarettes per day on smoking days for non-daily smokers.
†Had been using a vape intermittently for 1 year.
CPD, cigarettes per day; ENDS, electronic nicotine delivery systems.

Some saw the lack of risk information about SHA as akin to a declaration of safety; Kelvin (DU) summarised this reasoning: 'it's fine until proven otherwise' and believed that SHA did not pose any risks. Overall, participants saw the lack of formal evidence about SHA's effects on bystanders as a sign the aerosol they inhaled and exhaled posed little or no risk to others. They also relied on their own sensory experiences of SHS and SHA to establish the relative risks each presented.

Sensory perceptions

Many participants interpreted exhaled clouds as 'steam' rather than an aerosol containing nicotine, flavourings, carrier products and, potentially, heavy metals, in addition to water. Russell (DU) concluded: 'At the end of the day it's not smoke, um, it's just, vapour, it's just steam, that's all it is.' To manage the lack of information, participants relied on perceptions of what SHA was not (ie, *not* SHS), rather than knowledge of what it actually contained. Jayden (DU) epitomised this approach: 'To be honest, I don't see what's the big harm with it aye? It's, it's not a cigarette. Uh, actually you won't even probably get any nicotine out of it, when they blow it out because it's not even effective, eh, I don't reckon.' Asserting 'it's not a cigarette', created a fundamental distinction that enabled him to believe it posed no 'big harm'.

Beliefs that SHA comprised only water rested on visual and olfactory heuristics. The speed at which SHA dispersed reinforced perceptions it was simply 'steam'; Damian (DU) commented: '[it was]…just like water. So it just… all evaporates into nothing'. Pete (EUFS) reiterated this reasoning: 'I mean like,

vape is…it's like water, isn't it? It's like steam, so it pretty much evaporates quite quickly.' SHA's rapid disappearance supported perceptions it was safe, particularly when compared with SHS and other pollutants, such as car exhaust and industrial smoke, which lingered. Participants observed these latter pollutants in the air and contrasted them to SHA, as Jane (DU) explained: 'It's vapour and it's disappearing. You're getting more from that car that's going past out of its exhaust so, you know…You go through town and you see those big chimneys that are supposed to be… really good for the air, but it sits there for ages, it doesn't just suddenly disappear. Well, that's probably worse…you know, at least the vapour it's there for a second, but then it's gone.' Beliefs that harmful elements would remain visually discernible allowed participants to interpret impermanence as a lack of harm. Participants' frequent use of words such as 'evaporate', 'dissipate' and 'disappear' to describe SHA reinforce their reliance on visual heuristics.

SHA's lack of a persisting smell led participants to consider it more acceptable to others than SHS. Pete (EUFS) compared the tainting smell of smoking with the discretion vaping afforded: 'a cigarette… it lingers around. [SHA] doesn't stink… it wouldn't stick to your clothes…you can't really tell when someone's been vaping or not… whereas cigarettes, if you smoke next to somebody, then that's going to be all over their clothes and that's probably half the reason why they hate it.' Unlike SHS, which attaches itself to people and pollutes them, SHA appeared lighter, less pungent and persistent, and more pleasant than SHS. Toby (DU) commented: 'when someone's near me and they use an e-cigarette, it's a nicer smell than someone smoking a cigarette or something'. These sensory experiences supported perceptions that SHA was less harmful than smoke; Paikia (DU) explained: '…cigarettes have that foul smell, the foul taste… But the e-cigarette is pleasant, it smells good, it tastes good… there's no nasty, you know, side effects to it, it's actually really nice.' The absence of an objectionable smell supported beliefs that SHA did not pose serious health risks.

Third-party reinforcement

Others' apparent indifference to SHA confirmed perceptions of SHA as (at most) a trivial inconvenience, particularly when compared with SHS. Steve (EUFS) explained: 'Um, people, aren't actually uh … they're not offended or afraid of it. Unlike cigarettes, they literally walk around you, like, in the distance (laughs). With vape they'll just walk straight through.' Fiona (DU) expanded on this experience; while strangers had actively disapproved of her smoking, no one had displayed similar reactions to her vaping. 'Nobody's ever kind of come up to me and said, 'Ooh that's disgusting' or 'That smells gross'. Like you get people that will come up to you on the street when you're smoking a cigarette and say 'oh can you put that thing out, it's disgusting'… you don't get that with e-cigarettes really.' Just as the absence of information about SHA's health risks became a sign of safety, so the absence of complaints confirmed SHA as benign.

However, while many participants' saw SHA as acceptable to others, a small group reported being challenged. Jayden (DU) described assertively defending vaping by contrasting it to smoking: '… (sighs) I really, um it really sucks like that, 'cause I know, there's people that like don't want you to vape around them but it is better than smoking eh? Vapour, I will … If I had a [e-] cigarette and they told me to stop vaping, I will pull out my cigarette and puff it in front of them, blow it in front of them, just to change it around. Which one would you prefer, the vape or the cigarette?' His comments illustrate one approach to how participants navigated where and around whom they vaped. Although reports of challenges were infrequent and participants did not believe SHA troubled others, they nonetheless navigated where and around whom they vaped.

Courtesy, choice and protection

Despite their widely held view that SHA was substantially less harmful, and therefore more acceptable than SHS, some participants acknowledged that others may not distinguish between SHS and SHA, and so may wish to avoid SHA exposure. Pete (EUFS) explained: 'Just out of respect of others, pretty much… it still blows bloody a lot of smoke and um, you know… there still is a lot of people that don't know what e-cigarettes are. They'll, they, they all you know, get paranoid and you don't want to … You know, just out of respect of others you know, pretty much. You don't want to blow bloody clouds and just smoke bomb them or something you know, like that (chuckles).' Russell (DU) also explained why he privileged respect for others over his own convenience. 'Um, I think they should be allowed to use them anywhere but um … you know, it's um, sorta gotta use your own sort've discretion like you know, you can't go to a restaurant and use it although you probably could but um, you know, um, just having respect for other people I guess.' While he clearly saw SHA as benign and openly debated his own view as he articulated it, he nonetheless accepted that others had a right to choose what they were exposed to in their immediate environment. Cindy (EUFS) explained this reasoning further: 'partly because I'm being courteous of other people. But also, I don't enjoy that'; Gina (EUFS) argued 'the same etiquette holds; you know, you don't vape when people are eating or ask if they mind you vaping, um, that includes in the home as well.' Courtesy and respect were common metaphors, though participants varied in how they balanced reduced harm arguments against reciprocity principles.

Many also privileged children's rights to freedom from exposure to SHA. The uncertainty that led them to see vaping as less harmful than smoking with respect to themselves became problematic when considering children, where doubt about SHA's components necessitated a more cautious approach. Paikia (DU) explained: 'Uh, well, cos you know, I actually really don't know what's inside these vapours. I actually don't know what's inside these liquids. And I—I don't feel like our pepi [babies] or our children should be around any of it.'

Several participants took a similar cautious stance and felt it inappropriate to role-model vaping (or smoking) around children. Fiona (DU) commented: 'I don't think that's acceptable in any form because I, well I smoke, I want to give up smoking because I don't want people younger than me to see it as something that they should be proud or something that's cool, so whether it's a vape or a cigarette, I don't think it should be smoked around children'. Gina (EUFS) re-iterated these views: 'especially if there is children around and stuff, you really don't want children thinking anything like cigarette smoking or vaping is a good idea, because it is better not to start'.

Amy (EUFS) differed slightly and felt children would have to make their own choice 1 day, but should be protected to that point: 'You know, they'll find out, like, if … When they get to that stage, when they're going out clubbing or, you know, or through other influences. But not, like, showcasing it, like, in a family environmental place, kind of thing.' A small group differed further, arguing that role-modelling vaping could provide children with alternatives to smoking. Ewan (EUFS) commented: 'I

think it's better off that they um, saw vaping as an option rather than just solely seeing people smoking cigarettes outside … if they saw people vaping as well they may be like 'hey, that's an option as well'. And that's probably better for them to see.'

For many participants, the balance between courtesy, choice and protection depended not only on the space itself but also on who else was in that space. Even those who saw SHA as unlikely to pose risks to others, felt vaping should not be allowed in confined public spaces, including buildings and transport vehicles, or around children. For these participants, vaping's social acceptance depended as much on vapers' courtesy as it did on asserting their perceived rights.

DISCUSSION

Our finding that participants lacked information on SHA's constituents and effects reflects earlier research documenting the paucity of reliable information about SHA.[29 33] Participants drew on their wider environment, redolent with warnings about SHS and conspicuously devoid of cautions regarding SHA, to fill this information lacuna. Heuristics based on sensory perceptions, and interpretations of others' reactions, informed beliefs about SHA and shaped norms that guided vaping practices. The absence of information documenting SHA's potential risks led participants to extrapolate that it was not only safer than SHS, but carried few, if any, risks and was therefore safe to bystanders.[34] While many scientists treat inadequate information conservatively and call for cautious and protective regulation, our participants interpreted the information vacuum as a sign of SHA's safety. Instead, sensory heuristics guided belief that SHA was simply 'steam', a view largely reinforced by the social reactions they had received when vaping.

Some participants outlined vaping etiquette norms that limited where they would vape; they reported feeling hesitant about exposing others, particularly children, to SHA and were eager to position themselves as mindful and polite vapers. This tension between vapers' and non-vapers' rights has appeared in earlier studies,[31] including surveys that have reported weaker support for externally imposed vaping area restrictions among vapers relative to non-vapers.[24–27]

However, reliance on 'vaping etiquette' is reminiscent of tobacco companies' tactics to avoid smoke-free space restrictions, and their calls on smokers to be 'considerate' and 'courteous'.[35 36] These tactics delayed comprehensive policies creating smoke-free spaces and relied instead on individual smokers respecting others' preferences.[36] Relics of this discourse were evident in participants' comments, which focused less on the potential risks SHA may pose and bystanders' right to breathe clean air, and more on social conventions, such as respecting others' preferences. Because perceptions of SHA as harmless, quick to disappear and pleasant to smell, diminished the perceived need to recognise others' preferences, 'vaping etiquette' may be as unlikely as tobacco companies' 'considerate smoker' logic to ensure clean-air spaces.

Our findings have several policy implications. First, because information deficits foster misperceptions, governments have a responsibility to communicate the knowledge that does exist and reduce doubt over SHA. Correcting misperceptions about SHA without deterring full transition from smoking to ENDS use will require nuanced communications that balance encouragement and uncertainty. Recent findings suggest relative risk messages that compare smoking and vaping may foster more cautious beliefs, though these require testing with more diverse samples.[24–26 37]

Second, given the challenge of communicating this complex messaging, policy-makers should also consider how other measures could reflect ongoing uncertainty about ENDS' impact and effects. NZ's current approach of allowing individual business and local authorities to develop their own rules has led to diverse practice. A more consistent approach, such as maintaining smoke-free indoor areas as vape-free and, cautiously allowing ENDS use in outdoor smoke-free areas, could reinforce the message that SHA is not merely 'steam'.[38] For example, some UK hospitals disallow both smoking and vaping inside buildings, but allow vaping within hospital grounds and smoking only outside these. Graduated responses such as these may also recognise public opinion surveys, which show large majority support for vape-free indoor spaces.[24 25 27]

Future research could examine whether the benefits following introduction of smoke-free outdoor policies support extending these spaces to include vaping and what the impact on ENDS users would be. Smoke-free outdoor policies are associated with reductions in youth smoking initiation.[39 40] Vape-free areas could reduce exposure to ENDS and decrease perceptions of vaping as 'normal'. Given concerns about vaping uptake among young non-smokers, studies must also examine associations between exposure to vaping and ENDS use among adolescents and young adults who have neither smoked nor vaped.[41 42]

Our study has some limitations. Because we used a small non-probability sample to probe how perceptions of SHA arose, we cannot estimate what proportion of the population holds these perceptions. Our sample did not allow us to compare whether former smokers who are now exclusive ENDS users and DUs vary in how they perceive SHA; future studies could use survey-based approaches to address these questions. Future work could also explore whether people who smoke and vape in different spaces vary in their perceptions of SHS and SHA, and their support for vaping restrictions. Longitudinal approaches, such as ecological momentary assessments, could also extend our findings by examining the speed at which perceptions of SHS and SHA evolve.[43]

Despite these limitations, our study explains how ENDS users develop beliefs about SHA when they cannot access trusted health information. Beliefs arising from sensory perceptions guide ENDS use and support new practices, which may deviate from norms that shape smoking practices. Our findings also suggest how policy-makers could correct and manage these beliefs, and highlight how misperceptions arise when norms are based not on knowledge but on sensory heuristics alone.

What this paper adds

- While several studies have outlined how smokers develop smoke-free norms, including smoke-free homes and cars, we know little about how norms regarding secondhand aerosol (SHA) arise.
- We found that electronic nicotine delivery systems users relied strongly on the absence of harm information and sensory heuristics to interpret SHA as inert and posing no harm to bystanders.
- Information campaigns and public knowledge repositories may dispel misbeliefs about SHA; however, measures differentiating between smoke-free, vape-free, and smoke-and-vape-free areas, could clarify that SHA is neither inert nor benign.

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