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Synopsis

Maximising the public health benefits of smokefree prisons: a synopsis from a mixed-methods study

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Abstract

Background: High levels of smoking among people who experience imprisonment contribute to their high mortality and morbidity rates and to inequalities. Scotland's prisons became smokefree in 2018. However, questions remain about how to prevent high relapse to smoking post release.

Objectives:

- Summarise evidence on supporting people to reduce tobacco-related harms post release.
- Understand experiences, opportunities and challenges for reducing tobacco-related harms for people leaving smokefree prisons and for families.
- Feasibility test a household-targeted intervention to support people released from smokefree prisons to reduce tobacco-related harms.
- Update cost-effectiveness of smokefree prison policy.
- Partnership-working with key stakeholders.

Design and methods: Scoping reviews; qualitative; health economic modelling.

Setting/participants: Prisons in Scotland; staff, people in prison, family members.

Results: Our scoping reviews show that evidence on interventions to support people leaving smokefree prisons to remain tobacco-free is weak. There is no evidence on smoking rates among people released from smokefree prisons allowing vaping. Significant barriers remain for people from underserved communities to create smokefree homes. Our modelling highlights that offering effective smoking cessation support to people leaving smokefree prisons would be cost saving at both the personal and societal levels.

The challenges people face on release from prison and variability in throughcare support often render smoking relapse prevention a low priority for them, their families and service providers. However, in terms of long-term prevention of ill health and premature death, the high rates of relapse to smoking (~50–80%) continue to fuel inequalities. Supporting people leaving smokefree prisons to remain abstinent will help governments to achieve ambitions to

create smokefree societies. Progress may be achieved by greater integration of support for tobacco-harm reduction with services addressing interconnected needs, such as harmful use of other substances and underlying mental ill health.

Limitations: The extensive impact of coronavirus disease discovered in 2019 in prisons into 2023, alongside challenges due to overcrowding and staffing pressures, limited the opportunities for partnership working and the number of interviews we could conduct. This meant that we were unable to test the feasibility of delivering a household-based intervention to reduce tobacco-related harms in this population.

Conclusions: Progress in developing suitable interventions to prevent very high relapse-to-smoking rates following release from smokefree prisons is required. Helping people released from smokefree prisons to remain abstinent from tobacco post release could deliver considerable benefits. However, in the face of substantial challenges, preventing relapse to smoking has become entrenched as a low priority – for many service providers, people leaving smokefree prisons and their families. Greater success in reducing tobacco-related harms among this often-overlooked population may be achieved through more holistic models of service delivery. Aspirations for countries to become tobacco-free may require a rethink of what is needed to support underserved populations in whom smoking remains entrenched.

Future work: Further research is required to better understand what approaches are feasible and effective for maintaining smoking abstinence following release from prison, including development and evaluation of integrated/holistic approaches which tackle smoking/vaping behaviours in the context of use of other substances and needs.

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A plain language summary of this synopsis is available on the NIHR Journals Library Website https://doi.org/10.3310/GJKH1015.

Introduction

Rationale for research and background

Smoking continues to be a leading cause of preventable death, morbidity and disability. In 2019, smoking accounted for around 8 million deaths and 200 million disability-adjusted life-years globally.[1] Smoking is also harmful to those exposed to second-hand smoke (SHS), resulting in 1.3 million deaths and 37 million disability-adjusted life-years in 2019.[2] In the UK, in 2018, nearly one in three children had salivary cotinine levels indicating SHS exposure.[3] Around this time (2019), 14% of adults in the UK smoked, with half saying they wanted to quit.[4]

The UK governments have had long-standing ambitions to become tobacco-free[5,6] (e.g. by 2034 in Scotland), but, by 2023, still around 6 million people in the UK smoked tobacco and the prevalence of smoking had only reduced slightly (to 12%).[7] At the same time, there has been a rise in vaping, with over 5 million adults (aged 16+ years) vaping daily or occasionally, with a higher percentage in the 16- to 24-year age group (15.8%) than in adult population as a whole (9.8%). Thus, the use of tobacco and of other nicotine-related products – and exposures to SHS – continue to be a focus of interest in public health.[8–10]

Smoking is a well-documented contributor to inequalities in morbidity and mortality in the UK and globally. Smokefree legislation in public places reduced exposures to SHS in the community, with direct health benefit,[11] but people in disadvantaged circumstances remain much more likely to smoke and to be exposed to SHS at home.[12–14] Despite government ambitions, the gradient of inequalities in smoking in the UK improved little between 2014 and 2023. For example, smoking prevalence is estimated to have decreased from around 10% to 5% of people with a university degree or equivalent qualifications and from around 35% to 28% in those with no educational qualifications.[7] Thus, the challenge of how to support people who still smoke to quit (and so to reduce exposures to SHS), particularly among those in less advantaged circumstances, is undiminished and remains a public health priority.

One population in which smoking has been extremely high historically is among people in prison. A 2008 review[15] reported that, in Europe, between 64% and 88% of people living in prison smoked, and another review,[16] in 2018, reported similar rates. Research has demonstrated that these high levels of smoking among people in prison contribute to their disproportionately high mortality rates.[17] As in the general population, there is evidence that around 50% of people in prison who smoke are interested in stopping,[18] and the authors of a review of smoking in correctional settings worldwide[19] concluded that 'because smoking prevalence is heightened in prisons, offering evidence-based interventions to nearly 15 million smokers passing through [prisons] yearly would improve global health'.

When legislation prohibiting smoking in public places and almost all workplaces was introduced in the UK in 2006–7, prisons had partial exemption from the regulations.[20] Welsh prisons and some pilot prisons in England became smokefree in 2015,[21] with all English prisons becoming

smokefree by 2018 (following the lead of New Zealand[22] and other jurisdictions). Scotland's prisons all became smokefree, at the same time, at the end of November 2018; the introduction of the smokefree prison policy was evaluated through the National Institute for Health and Care Research (NIHR)-funded Tobacco in Prisons (TIPs) study.[23] TIPs is unique internationally in its pre–post, multimethod, natural experimental evaluation of the process and outcomes of smokefree policy implementation and in its comprehensiveness. Over three phases, TIPs researchers collected over 350,000 minutes of SHS exposure data,[24–26] across all of Scotland's prisons, survey data from over 3500 staff and ~6000 people in prison,[27,28] 34 staff focus groups, and one-to-one interviews with ~140 prison staff and smoking cessation service providers and over 100 people in prison.[29–32] These were supplemented by further interviews with an additional 32 staff and 59 people in prison[33,34] in a related Cancer Research UK (CRUK)-funded study of vaping in prisons, reflecting the decision to allow the sale and use of vapes through the prison shop system ('canteen') shortly before the smokefree policy came into effect. We also analysed anonymised routinely collected data (e.g. 'canteen' spend,[35] deaths in custody, medications dispensed for people in prison[36] and sickness absence for staff) to further evaluate potential benefits and adverse outcomes. Results from the various elements of the TIPs study and the CRUK-funded study on vaping in prisons are available elsewhere.[23–37]

The introduction of smokefree prison policy constituted a major organisational change, which was achieved in Scotland despite challenges inherent in removing tobacco from a context in which its use was normative and culturally embedded.[29] TIPs findings demonstrated the cost-effectiveness of smokefree prison policy over the short (within-study) and long term (life-time model) and also substantial uncertainties about the overall long-term benefits due to the effects of varying smoking relapse rates after release.[37] A systematic review of studies to July 2017 of relapse following release from smokefree prisons described the evidence base as 'small, almost exclusively US-based' and 'mostly methodologically weak' and noted 'an urgent need for high-quality research to inform interventions to reduce high smoking relapse rates upon release from smokefree prisons, to extend the multiple benefits of continued smoking abstinence into the community'.[38]

This review included no data on relapse following release from smokefree prisons in which vaping was allowed.

While some contention around vaping persists (e.g. around health risks of vaping[39]), research suggests that it is less harmful than smoking[40] and may help with smoking cessation.[41,42] However, patterns and intensity of vaping among people in prison (and therefore associated potential benefits and harms) may differ from vaping in home and community settings. Firstly, the prevalence of use is much higher among people in prison (> 80% buy vaping products[35]) than in the general population (~12% vaping prevalence in deprived communities[43]). Second, all evidence to date suggests that people in prison tend to vape intensively (in relation to the number of 'puffs' and 'sessions' per day) and many have expressed interest in reducing or stopping vaping while in a (mandated) smokefree context.[44,45] There is currently limited evidence on which strategies help people who want to stop vaping without compromising smoking abstinence.[46]

Recognising that people in prison disproportionately come from, and return on release to, more disadvantaged sectors of society, the current project was designed to understand whether, and how, wider public health benefits might be gained from the recent introduction of smokefree prisons in the UK through support to people leaving prison and the households they return to. Although primarily intended to protect people in prison and prison staff from SHS while living and working in prisons, smokefree prison policy could deliver higher public health gain if tobacco-related harms could be eliminated or reduced after people leave a smokefree prison. Furthermore, to date, research on smoking in those imprisoned and on smokefree prison policies has taken little or no account of wider family circumstances in the community.

Objectives

Figure 1 provides an overview of the study. The study's original objectives, research questions (RQs) and proposed methods are described in the study protocol (https://fundingawards.nihr.ac.uk/award/NIHR131613). The objectives were to:

- *Objective I*: work in close partnership with prison and health services and policy-makers to build and share understandings of opportunities and challenges in reducing tobacco-related harms among people (soon to be) released from smokefree prisons and their families [work package 1 (WP1)].
- *Objective II*: conduct scoping reviews to update evidence on (1) supporting people to remain tobacco-free (or reduce smoking) after leaving prison and (2) supporting people living in disadvantaged communities to establish smokefree lifestyles and/or homes (WP2).
- *Objective III*: understand experiences, opportunities and challenges for people as they (prepare to) leave or

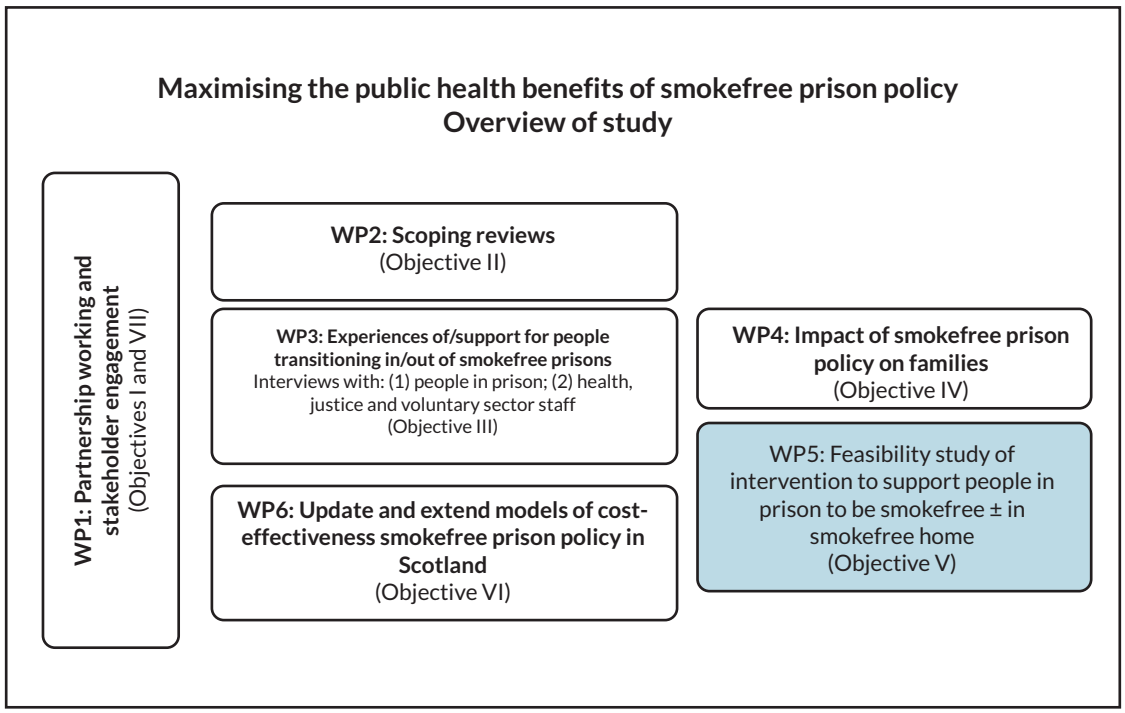


FIGURE 1 Overview of study.

return to smokefree prisons to help reduce tobacco-related harms (WP3).
- *Objective IV*: explore perceived impacts of prison smokefree policy on families affected by imprisonment and opportunities and challenges for supporting reductions in tobacco-related harms in those released from prison and their families (WP4).
- *Objective V*: adapt and feasibility test a household-targeted intervention to assist people recently released from a smokefree prison, and their household, to cut down/quit smoking and/or create a smokefree home (or reduce SHS in the home) to reduce tobacco-related harms in the wider community (WP5).
- *Objective VI*: update estimated cost-effectiveness of smokefree prison policy and investigate (if feasible) spillover effects of smokefree prison policy on family or household members (WP6).
- *Objective VII*: feed findings back into policy and practice in Scotland and other jurisdictions with smokefree prison policies (WP1).

However, as explained in more detail in the *Discussion*, the extended and extensive impact of coronavirus disease discovered in 2019 (COVID-19) in prisons into 2023[47] (in Scotland at least), alongside increased challenges due to overcrowding, staffing and other issues (related in part to consequences of the COVID-19 pandemic), meant that we were only partially able to address Objective IV and unable to address Objective V (which was contingent on successful completion of Objectives II–IV).

Methods for data collection and analysis

Detailed information on the study methods is reported in the study protocol and in the papers synthesised in the synopsis. The four main components of the study are summarised below.

Partnership working

Over the period of the study, we made numerous visits to prisons in Scotland, once this was possible following the lifting of COVID-19 restrictions on external visitors to prisons. During these visits, we discussed the aims, fieldwork plans and emerging findings with key staff [e.g. NHS staff, Scottish Prison Service (SPS) staff with a health and well-being or family remit, Heads of Offender Outcomes], principally in two prisons. To minimise staff burden, we often combined discussions about this project with those on another ongoing NIHR-funded project. Prisons were one of the settings that were particularly affected by restrictions and lockdowns to curtail the spread of COVID-19. Prisons in Scotland had not all returned to pre-pandemic regimes in 2022–3, after > 18 months of very restricted regimes, including when the Omicron variant of COVID-19 was prevalent. The additional pressures on prisons (see *Challenges of undertaking research in prisons in the study period in light of competing pressures and priorities within the prison system*) during most of the period of study

meant that we sought to minimise burden on SPS staff wherever possible.

Scoping reviews

We conducted scoping reviews to update recent literature published in English on: evidence on rates and factors influencing smoking behaviours after release from a smokefree prison and facilitators and barriers to creating a smokefree home. The published review[48] was informed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews.[49]

Qualitative interviews

We interviewed people in prison (N = 27) and staff (N = 8) working for the SPS, NHS and third-sector organisations to explore perspectives and experiences of living and working in smokefree prisons several years after their implementation and to understand barriers and enablers to people remaining smoking abstinent after leaving a smokefree prison. Interviews took place between 2022 and 2024 and were conducted with assistance of prison service and NHS staff, who helped with recruitment and arranging interviews and provided the required escorting of research staff through the prisons. With informed consent, interviews were audio-recorded and transcribed to facilitate analysis. Deidentified transcripts were coded against the Capability, Opportunity and Motivation behaviour change model,[50] and against other relevant themes, in NVivo (QSR International, Warrington, UK). In stark contrast to our previous study on smokefree prisons,[23] we experienced very substantial delays and challenges in interviewing people in prison and staff for this study, largely consequent on the aftermath of COVID-19 (see *Challenges of undertaking research in prisons in the study period in light of competing pressures and priorities within the prison system*). These difficulties necessitated changes to the study protocol so that we could minimise any burden on very overstretched prison and health services. They also meant that we were unable to conduct some follow-up interviews with people post release to explore smoking behaviour/abstinence.

We also aimed to interview families affected by imprisonment to explore their perspectives on smokefree prison policy and to understand opportunities and challenges for reducing tobacco-related harms in the households to which people return following release from prison. The challenges we faced in doing this are discussed below. Despite very substantial time and effort over ~2 years and a multistrategy approach, we were only able to secure seven interviews (three were the partners of people in prison and four had adult children in prison) that we judged to be with 'genuine' family members (see *Challenges faced in attempts to interview family members of people in prison*).

Health economics

A Markov model was developed for three populations: people previously in prison, partners and children. Model states were based on smoking/vaping status. Four scenarios were modelled, depending on whether vaping is permitted in prison and whether a hypothetical intervention to support people to be tobacco abstinent was applied. The analysis was from a healthcare payer and personal perspectives over a lifetime. Costs included healthcare, personal (vaping and smoking) and the intervention. Outcomes included quality-adjusted life-years (QALYs). Several plausible scenarios were conducted due to uncertainty in parameters.

Principal findings

The protocol for the study is available at https://fundingawards.nihr.ac.uk/award/NIHR131613. *Table 1* provides details of academic outputs from the study and these are summarised below.

Scoping reviews (Objective II)

This section summarises the reviews which were conducted to answer *RQ1 [What evidence is available on relapse to smoking (and effective interventions/intervention components to prevent this) in people leaving (smokefree) prisons?] and RQ2 [What evidence is there on supporting people (from disadvantaged backgrounds) to reduce tobacco-related harms in their home environment (through reducing/eliminating tobacco use and/or establishing smokefree homes)?]*. Details on methods are available in the study protocol and, where relevant, in the published paper.

Recent evidence on rates and factors influencing smoking behaviours after release from smokefree prisons: a scoping review

This review[48] was designed to extend earlier reviews[38,51] by updating evidence on relapse rates and factors influencing smoking behaviours post release from prisons with comprehensive smokefree policies. It utilised explicit search terms for relevant research on vaping because some jurisdictions (e.g. Scotland, England and Wales, and some prisons in the USA) now allow this in smokefree prisons, and there is evidence that uptake of vaping has been high in Scotland.[23,33,35]

Within the defined search period (papers published in English from January 2017 to March 2024), only 9 eligible studies were identified (out of 439 potentially relevant

TABLE 1 Tobacco in Prisons 2 study papers and status

Paper no.	Title	Obj.	Authors	Year	Journal	DOI
P1	Recent evidence on rates and factors influencing smoking behaviours after release from smokefree prisons: a scoping review	Objective II	Brown A, Woods-Brown C, Angus K, McMeekin N, Hunt K, Demou E	2024	*Int J Prison Health*	https://doi.org/10.1108/IJOPH-10-2023-0064
P2	How can we maximise the benefits of smokefree prisons? Decision analytic model to predict potential impacts on public health	Objective VI	McMeekin N, Brown A, Best C, Demou E, Leyland AH, Bauld L, *et al*.	2026	*BMC Public Health* (special issue on 'Improving the health of incarcerated people')	https://doi.org/10.1186/s12889-026-26714-9
P3	Identifying barriers and enablers to smoking abstinence after leaving a smokefree prison using the Capabilities, Opportunities, Motivations –Behaviour (COM-B) model: a qualitative interview study	Objective IV	Brown A, Woods-Brown C, Hunt K	2025	*BMC Public Health* (special issue on 'Improving the health of incarcerated people')	https://doi.org/10.1186/s12889-025-23249-3

records identified through the search strategy). The review's conclusion was that the evidence base remains dominated by studies from Australia and the USA and is still inadequate in demonstrating effective approaches to counter the very high relapse to smoking in people leaving smokefree prisons, although it did highlight some factors which could potentially facilitate or hinder smoking abstinence post release. A notable finding is that there is no evidence to date internationally on whether, or how, vaping while in a smokefree prison or following release affects intentions to remain smokefree, or rates of relapse to smoking after release from smokefree prisons. Further research to better understand what approaches are both feasible and effective for maintaining smoking abstinence following release from prison is needed.

Evidence on supporting people to reduce tobacco-related harms in their home environment

A summary of interventions to reduce children's SHS exposures at home is available in *Appendix 1*. We also synthesised findings from qualitative studies on facilitators and barriers to creating a smokefree home following the approach proposed by Noblit and Hare.[52] We screened 1956 articles identified by our searches and identified 22 eligible studies.

This review highlighted that barriers to establishing a smokefree home included: limited understanding of (or denial, or scepticism, of) SHS exposure risks; favourable beliefs about/experiences of smoking; addiction to nicotine and ingrained smoking habits; practical limitations (e.g. living in a multistorey building; childcare responsibilities; lack of safe access to outdoor space and unstable/fluid living circumstances); and embedded, normalised and valued cultures of smoking within household, family and wider social networks.

Motivators or facilitators included: understanding SHS exposures and harms; wanting to protect the health of others in the home (particularly children); a desire to be a 'good' parent; seeing smokefree rules at home as a means to move towards cutting down or quitting smoking; easy access to designated outdoor space; support for establishing a smokefree home from other household members; having access to alternative forms of nicotine [e.g. nicotine replacement therapy (NRT), vapes]; and experience of living in a smokefree home.

Health economic modelling (Objective VI)

The health economic modelling addressed RQ9 *(How does inclusion of (1) new evidence from scoping reviews and (2) potential impacts on family members of people in custody in or released from smokefree prisons, change the cost-effectiveness of smokefree prison policy?)* Our previous TIPs study included an economic evaluation of the introduction of comprehensive smokefree prison rules in Scotland. This found that the policy was cost-effective for people in prison and staff over a lifetime, but a noted limitation was the lack of reliable data to inform some estimates (e.g., post-release relapse rates).[37] In this project, we updated the economic modelling to consider family members, not just people in prison.

A Markov model was thus developed for three populations: people previously in prison, partners and children (*Figure 2*). Model states were based on smoking/vaping status. Four scenarios were modelled (*Table 2*). The analysis was from healthcare payer and personal perspectives, over a lifetime, and included health care, personal (vaping and smoking) and hypothetical intervention costs. Outcomes included QALYs. Several plausible scenarios were conducted due to uncertainty in parameters.

This updated modelling again highlighted the importance of the gap in evidence on the rates of post-release smoking relapse among people who have been able to vape while living in a smokefree prison. Scenarios in which a person leaving a smokefree prison was offered a smoking cessation intervention showed that this would be clearly cost saving (for personal and healthcare costs) and more effective, both in scenarios where people had, and had not, been permitted to vape while in a smokefree prison. This finding did not change in any of the sensitivity analyses. Varying the effectiveness of such an intervention had the biggest positive impact on results from all sensitivity analyses.

In both the partner and child models, the costliest scenario was living with a person who returns to smoking after leaving a smokefree prison. There was little variation in life-year and QALY outcomes between scenarios, but sensitivity analyses again showed that outcomes for partners and children living with a person released from a smokefree prison were better when a more effective hypothetical smoking cessation intervention was included in the modelling.

The results emphasise the importance of developing effective interventions to support people to avoid relapse to smoking after leaving a smokefree prison and the urgency of developing an evidence base on whether and how relapse-to-smoking rates after leaving a smokefree prison are affected by whether (and how) people vape while living in a smokefree prison.

Barriers and enablers to smoking abstinence after leaving a smokefree prison (Objective III)

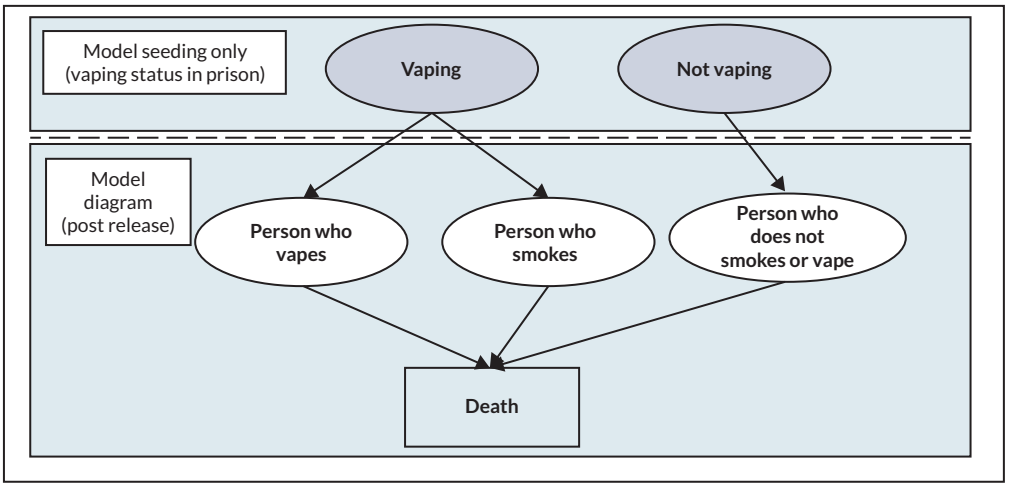
The analysis of qualitative interviews conducted with people in prison and staff supporting them addressed RQ3 (How do people serving long-term prison sentences, or preparing for release from a smokefree prison, experience mandated tobacco abstinence?); RQ4 [What are people's goals, needs, expectations and experiences as they transition in and out of prison in relation to tobacco and nicotine use? (How) does cannabis use impact on tobacco use among people released from smokefree prisons?]; and RQ5 [What do prison/healthcare staff think are the main opportunities and challenges for supporting people transitioning in and out of smokefree prisons (and families), particularly in relation to tobacco/nicotine use?].

As described in more detail in the *Discussion* section on challenges faced during the course of the study, the COVID-19 pandemic and its aftermath had a major impact on the operation of prisons and sometimes made it particularly difficult for prisons to prioritise research and the movement of non-essential visitors within the prisons. Through considerable effort and numerous prison visits, we did succeed in conducting qualitative interviews between 2022 and 2024 with people in prison in Scotland (n = 27) and with some prison service, health service and third-sector/voluntary organisation staff (n = 8) who were supporting people living in Scottish prisons and/or their families. The interview data were thematically analysed using the Capability, Opportunity, Motivation – Behaviour model (COM-B) of behaviour change[50] as a framework to map facilitators and barriers to smoking cessation post release.

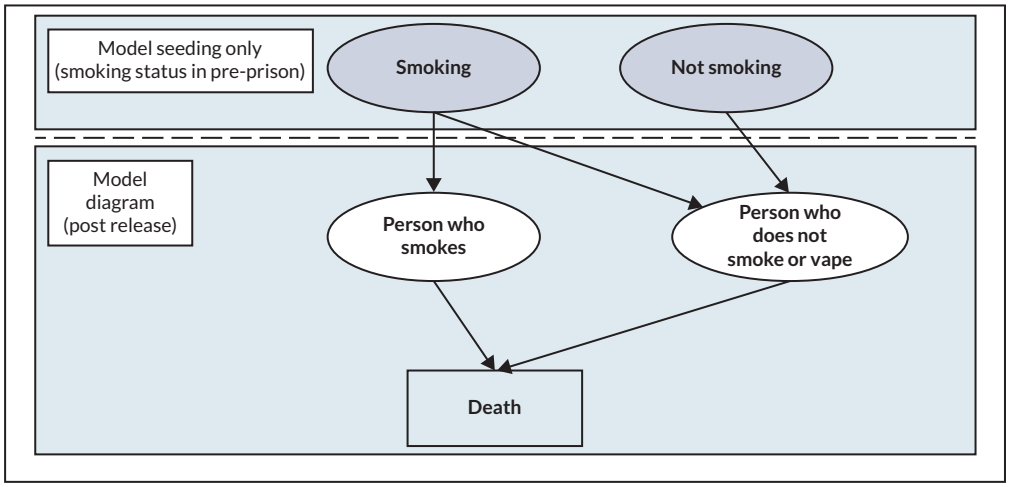
The interviews highlighted substantial barriers to reducing tobacco-related harms among people leaving prison (see *Table 3* for illustrative interview extracts). Interactions between people's rationalisations for returning to tobacco smoking post release ('capability'), widespread availability of tobacco and smoking norms in the environments that most return to, service limitations ('opportunity'), multiple competing social and health needs and priorities, and concomitant drug and alcohol use ('motivation') were identified as barriers.

Some opportunities for increasing smoking abstinence rates among people leaving smokefree prisons were also identified. Many people in prison expressed a desire to quit smoking for good and recognised the health harms and rising price of tobacco. Some people in prison also expressed a desire to break free of patterns of addictive behaviour which they felt had caused substantial damage in their own and others' lives. Delivery of 'Quit Your Way' services in Scottish prisons post implementation of smokefree policies was identified as a potentially significant opportunity for reducing tobacco harms among people leaving prison. However, people in prison and staff were all too aware that the delivery of services had been seriously affected by the aftermath of the COVID-19 pandemic and other pressures in the prison system. Interviewees also recognised that there were opportunities to capitalise on and strengthen bonds between people in prison and those in their networks who could encourage and support positive behaviour change.

(a) Person released from '**vaping permitted**' prison



(b) Person released from '**vaping not permitted**' prison



(c) Partner/child of person released from prison

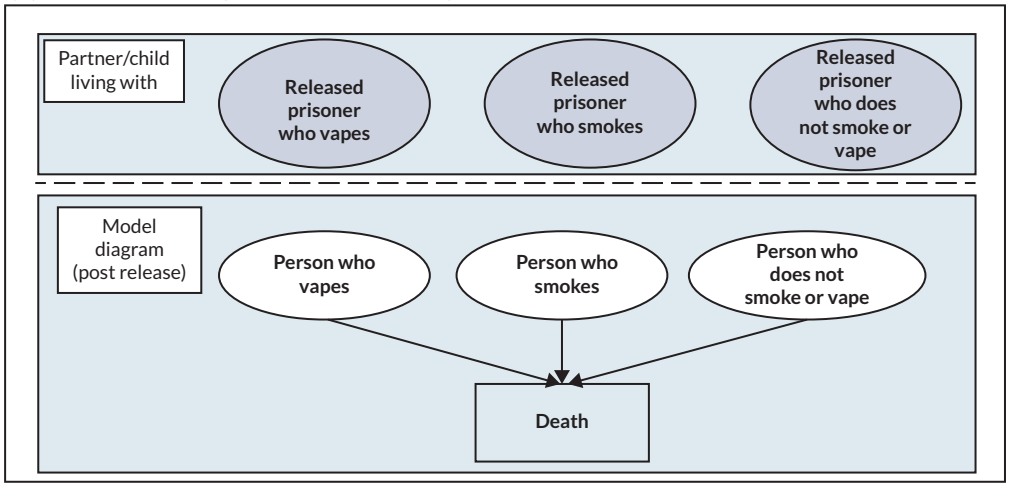


FIGURE 2 Populations included in models: people released from a smokefree prison where vaping is/is not permitted and partners/children of those released from a smokefree prison.

TABLE 2 Model scenarios

Scenario 1 Person has been released from a smokefree prison where *vaping is permitted* *No smoking cessation intervention offered* around the time of release	**Scenario 3** Person has been released from a smokefree prison where *vaping is permitted* *(Hypothetical) smoking cessation intervention offered* around the time of release
Scenario 2 Person has been released from a smokefree prison where *vaping is not permitted* *No smoking cessation intervention offered* around the time of release	**Scenario 4** Person has been released from a smokefree prison where *vaping is not permitted* *(Hypothetical) smoking cessation intervention offered* around the time of release

TABLE 3 Illustrative extracts from interview with people in prison and staff

COM-B	Interviews with people in prison	Interviews with staff
Capability		
Beliefs about smoking harms	*I will probably … continue to smoke and vape. I know it is crazy … nobody lives forever anyway.* PiP02-06	
Self-efficacy	*I've been in this position before and the minute I walked out the gates, the first thing I did is [go] to the shop and [buy] 20 fags [cigarettes]. So I think this is what will happen this time as well.* PiP02-02	
Opportunity		
Vaping	*I'm considering [being smokefree post-release] … but having a choice is hard … because a vape doesn't really do it … it's not [tobacco].* PiP01-15	*… smoking is … the preferred method of getting your nicotine, just make do with a vape when [they're] in here.* Staff-01, prison *[some people in prison say] 'I … didn't go back to smoking [post-release], stayed vaping' … not huge numbers, but again I'm not seeing a huge amount of the population.* Staff-04, other
Social influence and availability of tobacco	*… you've got all good intentions of, 'Right, I'm not going to smoke'. Go and have a pint, go to walk out and you see somebody with a fag 'You got a fag on you?' Right back on it … it's hard.* PiP01-15 *… that smell of smoke. That could be a trigger … they [parents] smoke, so if I was going … to visit them … it would give you an urge to smoke.* PiP02-09 *… my partner doesn't smoke, and I'm not allowed to smoke in the house.* PiP02-5 *… you've got it in your head, 'No, I'm not going to do that' … then you get out, and the shop's just down the bottom of the road.* PiP01-02	
Support services	*No reply back [after submitting self-referral to cessation service] …. thought, 'Oh, what's the point?. I'm trying and you just get a blank!'.* PiP01-11	*… funding is not sufficient to provide the service we need. we are continually asked to do more with less staff and less funding.* Staff-08, other
Motivation		
Motives for smoking or abstaining	*I do enjoy [smoking] … when my mum was told she had cancer [she] just couldn't [stop smoking] … She enjoyed it too much … I used to hear my mum saying that for years and years, 'Oh I enjoy smoking, I couldn't give up!'.* PiP02-02 *I've got to stop it now. Before I end up with chronic health problems and breathing problems.* PiP01-11	

continued

TABLE 3 Illustrative extracts from interview with people in prison and staff (*continued*)

COM-B	Interviews with people in prison	Interviews with staff
Smoking cessation among multiple social/health needs	*I was outside [prison] not that long ago and when I went out I felt over-whelmed. It was difficult. I didn't have any phone to phone the Job Centre, to do the online benefits system. I was left in the streets with no money, no place to go, no house and no family.* PiP02-10 *[In prisons] a lot of people's stuff [problems] stem from drug taking, through stealing … [Not smoking after release is] probably last on their list.* PiP02-07	*… most of the chaps we tend to get have experienced a lot of trauma … some of the stories are quite harrowing.* Staff-06, prison *[Not smoking] is very low down the list of things [for families to] … worry about … [when they're] trying to get food for that person, or their medication sorted …. not knowing about housing, all these things ….* Staff-05, other
Other substance use/ addition	*… there are a lot worse things I could be doing.* PiP01-12 *I used to … [take] cocaine … [when I did] I used to smoke non-stop, like a chain ….* PiP01-04 *I have smoked since I [was] young, so it is an addiction … always when I get money I go to the shop and get tobacco.* PiP02-10 *I've took a lot of positives out of prison … now, I'm a non-smoker and I have been for four years.* PiP02-07	

PiP, person in prison (as part of identifier for interview extracts).

Family perceptions of smokefree policy (Objective IV)

The interviews that we were able to conduct with a relatively small number of family members of people in prison partially addressed RQ6 [*What are families' attitudes towards tobacco/e-cigarettes (including tobacco/e-cigarette abstinence/cessation) and smokefree prison policies? What are the perceived impacts of smokefree prison policies on families (if any)*?] We are aware that the accounts provided by the small number of family members we were able to interview is unlikely to fully reflect the diversity of perspectives and experiences of families affected by imprisonment, but we include them here for transparency of reporting. Family members identified similar benefits and harms of smokefree prisons to those identified by the people in prison and staff who participated in our original TIPs study.[23,30,31] Health benefits consequent on people in prison and staff no longer being exposed to SHS and other tobacco-related harms were seen as a major benefit of smokefree prison rules, while restrictions on individual freedom and difficulties in coping in prison without tobacco were discussed as challenges.

We were struck by the similarity of the challenges to smoking cessation that family members raised to those discussed in interviews with people in prison and staff (*Box 1*). These included ambivalent attitudes to smoking cessation, negative social influence, use of tobacco and other drugs (e.g. cannabis), addiction issues and habitual use of smoking as a means to cope with negative emotions and numerous stresses. Interviews with these family members confirmed that smoking cessation is often seen as a low priority compared to the myriad of other immediate challenges that people leaving prisons and their families may face (e.g. securing suitable housing, avoiding illegal drugs and harmful drinking). In this context, the recognised harms of smoking were perceived to be a lesser, and less imminent, threat or danger in comparison with the substantial perceived and more immediate harms posed by other problems. Significant difficulties in people being able to access adequate rehabilitation and resettlement support while in prison and on release furthered the need for people to make difficult decisions about which issues to prioritise, as they struggled to cope with a plethora of challenges.

Opportunities for increasing smoking cessation were also identified in interviews with family members, and these were again consistent with data from interviews with people in prison and staff. Recognised health harms and the high financial costs of smoking (especially in the face of increasing problems caused by the ongoing cost of living crisis) were important motivators for people in prison and their family members wanting to give up smoking. Interviews also confirmed the significant potential benefit to supporting people in prison to maintain reliable, positive external networks which include people who can encourage and support successful resettlement, desistence and health improvement.

BOX1 Illustrative extracts from family interviews about barriers to smoking cessation

I've just been so stressed and so worried [while my partner is in prison], it's the last thing on my mind to stop smoking. Family 01

I've got quite an addictive nature. If I enjoy something, I take it to excess. Family 01

[Smoking cessation is] not massively a priority [for my partner], no, no, no. I think there would be other things would really take priority at the moment. just getting him settled [post-release] and something to do with his time and keeping away from the people that sort of ended up [putting him] in this mess in the first place. Family 02

How do they expect a prisoner to rehabilitate locked up 23 hours a day…. Family 03

I *had stopped [smoking] for years and the day that I found out [partner was going to prison] I said to my friend, 'Give me a cigarette!'. She said, 'Please don't!. I said, 'Give me a cigarette!', and I started again.* Family 03

I've been having sleepless nights really worrying about it [son's upcoming release] and because he's going to, he has had houses and he's lost them. And so he's coming back out homeless again. Family 04

I'd be quite happy if he just smoked [tobacco] and nothing else. Family 04

He would have a [cannabis] joint [before going to prison], and that was what kept him calm … when he went into prison, of course he didn't get that … I'm saying to him now … 'You've had [several] years without it', I said, 'Please don't come out and start doing that again!' …. And he's like, 'No, no, I'm not going to!' … I don't know, I just think once he gets with his friends and that, he'll end up smoking it again, and drinking again. Family 06

Discussion

Contribution to existing knowledge

Notable findings from the scoping reviews are that:

- Evidence on which types of interventions may effectively support people leaving a smokefree prison to remain tobacco abstinent is still very weak.
- Papers reporting on the few interventions that have been studied to date are largely from the USA and Australia.
- There is no evidence internationally on whether, or how, vaping while in a smokefree prison or following release affects intentions to remain smokefree, or rates of relapse to tobacco smoking after release from smokefree prisons.
- A number of significant barriers remain for people from more disadvantaged circumstances to create a smokefree home.

Our updated health economic modelling again highlighted:

- the continuing and crucial gap in evidence on the rates of postrelease smoking relapse among people who have been able to vape while living in a smokefree prison
- incomplete understanding of any harms of vaping and whether these differ between people in the general population who vape and those who vape while living in a smokefree prison.

To our knowledge, our updated health economic modelling is the first to model impacts (1) of permitting the use of vaping in smokefree prisons and (2) of a person returning to smoking on release from a smokefree prison on family members in the households they return to. Models in which a person leaving a smokefree prison was offered a smoking cessation intervention showed that this would be clearly cost saving (for personal and healthcare costs) and more effective, both in scenarios where people had, and had not, been permitted to vape while in a smokefree prison. Varying the effectiveness of such an intervention had the biggest positive impact on results from all sensitivity analyses. The results re-emphasise the importance of developing effective interventions to support people to avoid relapsing to smoking after leaving a smokefree prison. There is an urgent need to develop evidence about whether and how relapse to smoking rates after leaving a smokefree prison vary by whether (and how) people vape while living in a smokefree prison.

Analysis of our interviews with people in prison and with health, prison and third-sector staff (and the interviews we conducted with family members) highlighted:

- *The plethora of challenges that people face on release from prison*. The lack of (adequate funding for) throughcare support was striking, the accounts of some who were anticipating their release from prison were poignant and highlighted the void in support that some faced to meet even their most basic needs (including for accommodation). In the face of this, avoiding a relapse to smoking was seldom a realistic priority for them.
- *The seemingly insurmountable challenges currently to raising the priority of service provision to adequately address the prevention of long-term tobacco-related harms among people who have been imprisoned*. The success of the implementation of smokefree prison policy in 2018, alongside the extreme resource pressures within the prison and healthcare systems due to budgetary constraints, perhaps partially explain this lack of priority. However, in terms of long-term prevention of ill health and premature death, the remaining high rates of relapse to smoking (likely in the region or 50–80%) continue to fuel inequalities.
- *The lack of suitable interventions and services to support people who have been imprisoned to remain tobacco-free or to minimise SHS exposures in the homes that some return to*. Given people's accounts of their interwoven use of tobacco with other substances (including alcohol and illegal drugs), this may best be achieved by greater integration of support for those who wish to remain abstinent from tobacco, and/or to cut down or quit vaping, with services addressing harmful use of other substances.

Others have suggested that 'overlooking tobacco as a substance of addiction when considering polysubstance use and disorder is a historical artefact rather than an evidence-based decision'.[53] Government aspirations for countries to become tobacco-free, and to eliminate tobacco-related harms and the inequalities they fuel, may require a major rethink of what is needed to support the subsections of the population with complex health and social needs in whom smoking remains entrenched.

Take-home messages

- Despite the successful introduction of smokefree policy in prisons in Scotland (and other countries) in recent years, evidence suggests that little progress has been made internationally in developing suitable interventions to prevent very high relapse-to-smoking rates on release from a smokefree prison.
- A substantial proportion of people living in smokefree prisons wish to remain tobacco-free in the long term. Helping people released from smokefree prisons to remain abstinent from tobacco post release could deliver considerable additional social, health and public health benefits.
- While people living/working in prisons have been substantially protected from the harms of smoking and exposure to SHS within prisons, people who leave prison and people in the homes they return to are still disproportionately exposed to tobacco-related harms. This continues to fuel inequalities, reducing the health, well-being and lifespan of people who have been imprisoned and the household members they live with on release.
- There is no evidence on the effects of allowing vaping in smokefree prisons on relapse to smoking rates post release. Several scenarios remain untested and unevidenced, including whether people who have vaped while in smokefree prisons will continue to vape on release, with or without returning to smoking tobacco. The very high prevalence of vaping in prisons, and patterns of use in prison, raise questions about the generalisability of existing evidence on potential benefits and harms of vaping for this very specific population.
- The period leading up to release from a smokefree prison offers a window of opportunity for promoting and supporting tobacco-harm reduction and other positive behaviour change as people prepare to return to the community. However, substantial and growing pressures on the justice system, combined with pressures and resources issues in the health service, are having a deleterious impact on rehabilitation and resettlement support, compromising health, social justice and community safety.[47,54] If these pressures cannot be addressed, it will be increasingly challenging for the SPS and its partners to help realise the Government's vision[55] for a 'just, safe and resilient Scotland' and progress towards Scotland's national missions of equality, opportunity and community.[8]
- There remain substantial barriers to avoiding relapse to smoking after leaving a smokefree prison. As a general rule, current resources and service provision are not adequate to provide the support that people leaving prison require. In the face of challenges related to basic needs (such as suitable housing and legitimate access to finances to support daily living), prevention of relapse to smoking has become entrenched as a lower priority – for many service providers, as well as for people leaving smokefree prisons and their families.
- Greater success in reducing tobacco-related harms among people leaving smokefree prisons and the households they return to may be achieved through improved service integration. People in prison often have complex, inter-related needs, including poor mental health, as a consequence of difficult lives. Their return to smoking after leaving prison is often intertwined with the use of alcohol and other substances, sometimes as a way of trying to manage negative emotions and poor mental health. Yet, as a rule, substance use services focus on alcohol and drug use separately from services to support smoking cessation and the use of other nicotine products. There is considerable scope for a more holistic model of service delivery,[53,56] including to improve outcomes for the many people in prison who use more than one substance, including tobacco or other nicotine products.
- Despite all the challenges we encountered (many of which were directly related to the COVID-19 pandemic combined with broader challenges facing the justice system), we have cause for optimism about future prison research. Access to prisons has improved again and there are many working within the prison system who continue to have enthusiasm and some capacity to take forward initiatives and innovations with potential to improve the health and well-being of people in prison and their families in the future.

Challenges faced

Challenges of undertaking research in prisons in the study period in light of competing pressures and priorities within the prison system

We experienced considerable challenges in undertaking this research. This was despite high levels of support for

our previous 'TIPs study'[23] and enthusiasm (when we discussed the research pre-COVID) within prison and health services to explore whether additional benefits could be achieved by reducing tobacco-related harms among (1) people leaving smokefree prisons and (2) the households they return to.

We conducted the current study in a very challenging period during which prison, health and third-sector services were trying to recover from the COVID-19 pandemic.[57] Our access to prisons, particularly in 2022 and parts of 2023, was very limited as not all prisons had been able to resume full regimes post pandemic.[47,57] Our study also coincided with a period in which prisons in Scotland (and elsewhere) have been facing substantial challenges. Notably, the SPS and partners providing support to people in prison or their families are under significant pressure due to caring for a large and rising prison population with increasingly complex health and social needs.[47,58] Overcrowding in prisons (exacerbated by delays in the courts system during the height of the COVID-19 pandemic), outdated facilities, staff shortages, difficulties delivering core services and rehabilitative work, financial pressures and serious problems with 'prisoner' transport have contributed to these pressures.[47,54,59]

We invested very considerable time and effort to (re) build effective research partnerships in the aftermath of the disruption caused by COVID-19. We understood that we would need to be as flexible as possible about when we went into prisons for fieldwork, informal visits and meetings with stakeholders. However, understandably given the acute operational pressures described above, it was sometimes difficult or impossible for prison and health services to take on the additional burden of having researchers within the prison (e.g. needing to divert a member of staff from other duties to escort an external visitor through the prison), as their first priority has to be fulfilling core responsibilities to staff, people in prison and their families. The considerable pressures on the prison system during the study period led to unavoidable but substantial delays to data collection, cancellation of interviews at very short notice on several occasions (including after research staff had been through prison security on entry to the prison), fewer interviews being conducted than planned with people in prison and staff, and a consequent widening of some of the eligibility criteria for interviews. In some stages of the fieldwork, people in prison had more restricted access to communal facilities and diversionary activities following COVID-19 restrictions on movement. When this eased in 2023–4, we were able to arrange opportunities for more informal contact with people in prison to discuss the research. We had most success in securing interviews with people in prison when we were able to approach people directly to explain the purpose and aims of the study when they were in communal facilities away from residential areas. Direct contact between the researchers and people in prison gave people in prison the opportunity to ask any questions they wished to ask and gave the researchers an opportunity to establish credibility and rapport with potential interviewees. Discussing the project face to face with a wide range of people in prison in this context was particularly successful when a person in prison could decide there and then that they were interested in taking part in an interview. In such circumstances, we were able to interview people in private in the side rooms within the communal areas without delay and without additional burden on SPS staff time. By contrast, many earlier visits for fieldwork had been unproductive, particularly if key members of health or prison staff were required elsewhere at short notice or were absent from work due to sickness or other reasons. In these instances, approaches to people in prison about whether they would like to consider taking part in the study were handled by staff members with limited knowledge about the study and very seldom translated into interviews.

Widespread perceptions that smoking cessation is of lower immediate importance than treatment of drug, alcohol and other problems (as discussed elsewhere in this report) may have compounded the difficulties faced in recruiting people in prison and staff to the current study.

Challenges faced in attempts to interview family members of people in prison

During 2022–4, we made extensive efforts to work with representatives from SPS and third-sector organisations who might be able to help us to access and recruit families to the study.

In November 2022, we attended the national conference of a major organisation supporting the families of those who are in prison in Scotland, Families Outside (www.familiesoutside.org.uk/). The conference (entitled 'Hidden in Plain Sight') was their first public-facing in-person event post-COVID. It enabled the co-principal investigator and research fellow to (re)establish contact and discuss the project with a wide range of stakeholders within and outside the prison service and make what appeared to be a number of promising leads for recruitment channels.

Several organisations, including Families Outside, Early Years Scotland (EYS) and Prison Visitor Centres (independently run support services for people visiting someone in prison) attached to various prisons in Scotland,

agreed to share information about the study with families, for example, via flyers or social media channels, and these channels were pursued on numerous occasions. We also attended existing family-based projects which were ongoing in major prisons, which included: an early years support initiative for families with pre-school-aged children facilitated by SPS Family Contact Officers and EYS; and multiple sessions of another NIHR-funded family-based intervention which was being tested for feasibility of delivery in Scotland (see NIHR129791). With gatekeeper support, we were also able to visit prisons and Prison Visitor Centres in person on several occasions to speak directly with front-line staff/volunteers and some family members about the project.

Through these varied potential recruitment channels, prison staff, third-sector staff and volunteers, and people who had a family member in prison, were asked to share information about the study with others who they thought may be willing to take part, and we discussed and handed recruitment materials directly to some family members while they were waiting within designated areas of the prison for a visit with a family member. Targeted recruitment materials were also placed on social media, and this raised concern about 'bogus' volunteers which we discuss below. Despite very substantial time and effort over ~2 years, this multistrategy approach yielded only seven 'genuine' interviews (three were the partners of people in prison and four who had an adult child in prison).

During the course of 2023–4, we encountered substantial issues with people volunteering to take part in interviews as 'family members of people in prison' who we had strong cause to believe were not providing genuine information. We first became concerned about data integrity after interviewing four individuals who all contacted us at roughly the same time, following the posting of targeted recruitment for the study on social media. These people provided responses which raised a number of 'red flags', which we subsequently found to be consistent with the 'scam indicators' identified by Sansfaçon *et al.*[60] These included: receiving a large volume of e-mails in a short amount of time; e-mails arriving within minutes of each other; senders using a similar address format (e.g. name–surname–number); e-mails containing brief and non-specific information; particular language patterns in replies, such as being overly formal or verbose; not being willing to turn the camera on at any point during the screening calls and interview; giving curt and/or vague/generic responses to most or all screening/interview questions; and being unwilling to provide basic information on pertinent details (e.g. geographical location of the prison that their putative family member was in) that justice-involved or justice-affected people would very likely know and, in our experience, be generally willing to share. Following discussion within the research team, we agreed that it was necessary to implement additional participant screening, and we took an iterative approach to identifying potential 'red flags' which may indicate that someone volunteering for the interview may not be genuine but be purely motivated by receiving the £20 thank you voucher offered to participants. The accounts from the four interviews which initially highlighted this problem were excluded from the analysis.

As others have reported,[60] the burden of this additional layer of screening to negotiate issues of potential dishonesty was stressful, very time-consuming and ethically complex as we weighed alternative, reasonable explanations for some behaviours which could appear suspicious. However, our confidence in being able to identify non-genuine participants grew with experience, particularly once we were able to identify patterns. We found that we were easily able to reach consensus as a team about whether someone was likely to be genuine. We are aware that so-called 'bogus' participants are an increasing challenge for researchers[60–63] and the risks that 'bogus' participants pose to data integrity will need to be carefully considered and mitigated when designing and conducting future studies, especially those conducted online and recruiting through 'open' social media.

As noted above, the substantial challenges which the SPS and third-sector organisations faced in recovering from the COVID-19 pandemic were other reasons for the difficulties we encountered in engaging family members. Additionally, families affected by imprisonment are often negotiating a morass of complex, competing issues which may limit their capacity and/or motivation to participate in research. The steep increase in the cost of living which coincided with the current study is likely to have heightened financial pressures on many families affected by imprisonment who often experience significant negative financial impacts[64] which continue after release.

Major operational issues impacting on the care, welfare, safety, rehabilitation and progression of people in prison are also likely to have been salient concerns for families at the time of fieldwork. This included the curtailment of in-person family visits during COVID-19 restrictions.

Challenges of the ethical review processes for research within the prison system

Undergoing careful and appropriate ethical review is essential for all research, and arguably, particularly important in research on populations that could be

considered systematically disadvantaged, such as people in prison or their family members. Most of our prison-based research has undergone at least dual review, first through the SPS Research Access and Ethics Committee and then through University Ethics Committee review and/or review from an NHS Ethics Committee (Research Ethics Committee) and host NHS research and development (R&D) department.

When invited to attend the ethics review meeting of the North of Scotland Research Ethics Service, which provided ethical scrutiny for elements of our study on behalf of the NHS, we were able to feedback information on the very time-consuming, costly and frustrating challenges and impasses that we encountered when working within existing NHS ethics and R&D processes. An example is the near impossibility of completing electronic forms with drop-down menus which are designed for very different types of research, such as clinical trials of treatments, when we were seeking permission to recruit a relatively small number of people in prison who may be interested in remaining tobacco abstinent, including through NHS staff who provide 'smoking cessation' services to people in prison. The electronic application forms and processes were poorly aligned with or wholly unsuited to this type of study. Indeed, no obviously suitable response was available for some questions, yet a response from one of the options on the drop-down menu for the question was required to progress to the next stages of the form and submission of the ethics application. The aftermath of the disruption of COVID-19, when many people were still working from home, made it difficult and time-consuming to find and contact anyone who was able to advise on the appropriate way forward in such circumstances. Further through the NHS ethics approval process, we encountered additional substantial delays caused by an ongoing review of one of the host NHS R&D departments, which included the catchment for one of our prison sites. Similar challenges in relation to overly complex, bureaucratic, lengthy and inflexible systems for UK health research have been identified by other researchers.[65] We would welcome discussion with the SPS, NHS, the wider research community and others on the harms and benefits of current processes for reviewing non-invasive and lower-risk prison health studies as we believe there is potential to improve efficiency while retaining an appropriate level of oversight. Unnecessary delays caused by these processes can threaten the conduct and completion of studies, and arguably, make it difficult for the views and experiences of an often overlooked population to be given the attention they deserve.

Strengths and weakness of the study in relation to other studies

Despite the very significant challenges, it is a strength that we were able to rebuild relationships post pandemic and gain good access to the prisons, which allowed us to conduct interviews with people in prison during such a difficult period for the prisons, in general, and in relation to the aftermath of the COVID-19 pandemic specifically. As noted in our paper reporting the experiences and views of people in prison and staff (see *Table 1*, P3), we have a good degree of confidence that we had reached data saturation on the most pertinent issues. This conclusion was supported by analysis of the interviews alongside more informal conversation, discussion and patient and public involvement (PPI) engagement with a wider range of staff and people in prison. The completion and thoroughness of the health economic analysis is another strength of the study. The explicit focus on the role that the sanctioned purchase and use of vapes in smokefree prisons is a further strength. Our published scoping review[48] is, as far as we are aware, the first to explicitly search for evidence on the impact that allowing vaping in prisons may have on relapse to smoking rates after leaving a smokefree prison, and whether or not vaping is permitted in smokefree prisons was a major factor, which we considered in our health economic modelling.

The limited number of interviews that we were able to secure with family members despite considerable effort over 2 years is a weakness. We, however, have noted above the strong resonance of accounts provided by family members with themes raised in interviews with people in prison and staff and more informal conversations and PPI engagement with family members. Because of the difficulty of engaging families at this time and the substantial pressure on prison and health services, we were unable to proceed with the WP (WP5, see *Figure 1*), in which we had planned to adapt an existing intervention[66] designed to support families (predominantly from more disadvantaged areas) who wish to create a smokefree home. Looking back over the course of the project, it is hard to imagine what we could have done differently to overcome the significant obstacles we met, to make the development of a suitable intervention feasible at this time.

Patient and public involvement

On our previous TIPs study, we were able to have very extensive and regular dialogue with prison and health services, staff and people in prison to shape all stages of

the study and study materials and to provide feedback on learning on an ongoing basis so that it could be implemented in (as close as possible to) real time.

We invested a large amount of time and energy with these stakeholders throughout the current study to try to replicate our previous success. However, changes in staffing since the original TIPs study, restrictions on access to Scottish prisons following the onset of the COVID-19 pandemic, which persisted through 2022, and ongoing operational challenges and competing priorities (which were exacerbated in part by the COVID-19 pandemic) made opportunities for close partnership working much more limited and unpredictable. These factors necessitated a more opportunistic approach to PPI than we had taken previously. At the outset of the study and at other key points, we tried to work closely with relevant personnel in the SPS, NHS and third-sector organisations to discuss and shape the project design and study materials and to identify feasible options for recruiting participants and conducting PPI work and interviews. We attended virtual meetings of Families Outside and attended the Families Outside national conference ('Hidden in Plain Sight') in person in November 2022. We also visited prisons, prison visitor centres and existing family-based prison projects on many occasions to share information about the study and hear the perspectives of front-line staff/volunteers, people in prison and families.

Through our visits and interactions with key stakeholders, we received valuable suggestions and insights which informed our recruitment approach and interview topic guides. These also helped to shape our views on adaptations that we needed to make to aspects of the study design. We were able to gain a deeper understanding of the multiple and perhaps increasingly complex challenges facing people in prison, their families, staff and organisations which offer support. These helped to shape our thinking and analysis plans and confirmed that trialling the household intervention was not feasible within the grant period. Discussions with family members, family contact officers and third-sector organisations working in prisons, and with a wide range of people attending the Families Outside conference in November 2022, developed our understandings of the increasing difficulties faced by families during the COVID-19 period and the cost-of-living crisis.

In 2023–4, we were able to engage in numerous more informal, ad hoc conversations with people in prison about barriers and enablers to remaining smokefree post release. This valuable PPI input gave us confidence that we had likely reached data saturation with our interview data.

Equality, diversity and inclusion

Around 8 million deaths are caused by smoking annually.[1] Rates of smoking are highest among people living in areas of deprivation:[12] smoking is the leading cause of the gap in life expectancy between the poorest and richest in England.[67] Tobacco is the most widely used substance among people in prison,[68] partially reflecting the fact that people in prison are disproportionately drawn from more deprived or socially excluded communities which have high smoking rates.[69] Smoking prevalence is estimated to be up to 62 times higher in prisons permitting tobacco use, compared to the general population,[19] and smoking has been shown to contribute to 'substantial excess mortality in prisons'.[70] As recently as 2022, the World Health Organization has described smoking in prisons as a 'neglected public health issue'[68] compared to use of other substances. The current study aimed to increase attention in the public health community and public policy to such 'hidden' settings and populations, among whom tobacco-related harms continue to be significant, and so as to support efforts to highlight and tackle (smoking-related) health disparities in this population.[68] Our study shows that even within countries which have introduced smokefree prison policies, there is still more to be done to prevent tobacco-related harms among people who have been imprisoned.

In the qualitative interviews, we aimed to recruit people in prison who had ever smoked, seeking to achieve diversity with respect to demographics, sentence length and vaping status in prison. While we tried to monitor sample diversity and address gaps, this was difficult to achieve in practice, particularly when we needed to rely on prison/health staff (who were balancing competing operational pressures) to make initial approaches to potential participants. A gap in the sample is ethnic diversity, which partly reflects the relative lack of ethnic diversity in the Scottish prison population, which is ~95% White.[71] We did not target women in prison for this study for several reasons: they make up a small percentage of the prison population (4% in September 2023[71]) and tend to have a different constellation of health and social issues preceding their imprisonment; the research burden on the women's estate is disproportionately heavy; and our view is that an intervention to support people to be tobacco-free or to have a smokefree home after release would need to be specifically tailored to the needs of different genders.[72]

As noted, our sample of family members is limited due to recruitment challenges and does not fully reflect the diversity of family relationships among people in prison.

While we initially planned to assess the feasibility of delivering a household intervention, aiming to reduce tobacco-related harms among people leaving prison, we recognise that such an intervention could only ever be relevant to a subset of the prison population. Evidence suggests that many people in prison will not reside with family after release and many struggle to access suitable accommodation.

We have endeavoured to use person-first language in conducting this study, for example, using the term 'person in prison' rather than 'prisoner' or 'offender'. Careful consideration was given to literacy when developing participation information sheets and consent forms for people in prison and family members. The current work to simplify and improve participant information sheets for studies requiring NHS ethics review is welcome as we have found that current templates are not well suited to the needs of people, in and affected by the justice system, and may obscure rather than promote true informed consent.

Impact and learning

Dissemination activities for the current study are ongoing. Findings are of relevance to current work in Scotland and elsewhere to identify and implement actions to achieve government aspirations to create tobacco-free generations (this target has been set for 2034 in Scotland). The relationships and ideas which have come from this project are informing ongoing tobacco control work in the Institute for Social Marketing and Health, University of Stirling, and are informing ideas for new projects in relation to smoking/vaping in priority groups.

The current study confirms the importance of establishing and maintaining effective research partnerships when conducting prison health research. Our work highlights the benefits, or even necessity, of seeking to establish shared values and goals with prison managers and of adopting a pragmatic, flexible research design, which can adapt to dynamic changes in the justice system. With pressures on prisons continuing to grow, it remains essential for researchers to carefully consider and take advice on research burden and whether this is proportionate in light of the many competing challenges and priorities faced by people in prison, their families and prison and health service staff. Our experiences on the current study and our other prison-based work confirm the importance of factoring in time and costs within research grants for stakeholder engagement and for repeat visits to prisons for data collection, given the often high rates of 'non-productive' visits (e.g. in terms of numbers of interviews completed) due to events in the prisons which were not predictable in advance. We also think there is a need for provision of support (e.g. funding to cover debriefing with a suitable professional, if needed) for researchers who are directly exposed to difficult accounts of past and anticipated future trauma.

Findings of the study highlight the substantial potential to improve the health of a priority group if barriers to remaining tobacco-free after leaving smokefree prisons could be reduced. Further research to understand the feasibility and potential benefits of expanding lower-cost, lower-burden support options for reducing post-release smoking relapse would be beneficial in the short-to-medium term, given pressures on the prison and health systems. In the longer term, however, a different approach which reduces service fragmentation is likely to be needed to help reverse persistent smoking-related and other inequalities. Prioritising greater integration of services to support people in/leaving prison to prioritise and address complex, interrelated health and social needs, including those related to smoking, could help the Scottish Government to achieve its goals to deliver a 'transformed justice system' and safer, fairer communities. This may be a vital step towards ambitions to have a smokefree society, as the higher rates of smoking in increasingly small sections of society may only be amenable to fresh approaches. Improved communication on tobacco-related harms in prisons could also help to shift perceptions that smoking cessation is of lower importance than, or a threat to successful, treatment of drug, alcohol and other problems.

Implications for decision-makers

Historically, smoking rates were substantially higher among people in prison compared to the general population and led to high levels of SHS exposures among people living and working in this setting. Evidence shows that smokefree prison policies, such as those introduced in 2018, in Scotland, and elsewhere in the UK, reduce these smoking-related harms. *Our updated Health Economic modelling shows that helping people released from smokefree prisons to not relapse to smoking tobacco post-release could deliver considerable additional benefits, given the very high rates of relapse and the substantial burden of smoking on health.*

Our research, however, suggests that it is unlikely that levels of smoking and SHS exposures in homes will substantially decline among people leaving prisons unless several interconnected challenges are addressed.

- First, interviews with people in prison, family members and staff confirmed how challenging it is for people leaving prisons to stay tobacco-free in the face of multiple, often pressing and complex health and social needs, such as harmful drug and alcohol use, and mental health problems.
- Second, there is a lack of suitable and effective interventions and services, spanning the period before and after release, to support people who have been imprisoned to remain tobacco-free or to minimise SHS exposures in the homes some return to. Variability in the provision and suitability of wider throughcare support for people leaving prison can result in people facing difficulties in meeting even their most basic needs. In the face of this, avoiding relapse to smoking is seldom considered a realistic priority for them.
- Third, the broader context is that the SPS, NHS and their partners are facing substantial structural barriers to delivering environments and services, which align with aspirations to protect and improve health and well-being, and to support people to build better lives. This is despite the dedication and hard work of many staff and some excellent services in prisons.

Without investment in targeted measures to address the considerable tobacco-related harms experienced by underserved groups, such as people leaving prisons and the households they return to, substantial progress in addressing smoking-related inequalities is unlikely to be achieved. Some challenges which may be amendable to change in the short-to-medium term, for which there is a promising evidence base, include developing and assessing the feasibility of options for delivering services which identify and address people's needs (especially those related to alcohol, drugs, tobacco and mental health) more holistically. Greater service integration may support post-release smoking abstinence, as well as reduce some of the underlying social determinants of poor health and involvement in crime. Expanded use of appropriately supported peer mentors and digital health interventions in prisons may also be both helpful and feasible, in the current climate, for reducing tobacco-related harms in this priority group.

Research recommendations

Further research is needed to:

- better understand what approaches are feasible and effective for maintaining smoking abstinence following release from prison, including development and evaluation of integrated services which tackle smoking behaviours and nicotine use in the context of other substance use and needs
- develop and evaluate feasibility and effectiveness of delivering support for people who want to cut down or stop vaping while living in smokefree prisons without compromising post-release tobacco abstinence
- better understand how vaping while in a smokefree prison impacts post-release tobacco abstinence and to understand what helps or hinders those released from smokefree prisons from vaping for smoking cessation
- develop or adapt and evaluate interventions to support those who return to a family setting on release from a smokefree prison to remain tobacco-abstinent and/or to make steps towards creating a smokefree home
- find ways to better support people in/leaving prison to prioritise and address complex, inter-related health and social needs, including those related to smoking and vaping.

Conclusions

Findings reaffirm that helping people released from smokefree prisons to remain abstinent from tobacco post release could deliver considerable benefits. However, in the face of substantial challenges, preventing relapse to smoking has become entrenched as a lower priority for many service providers, people leaving smokefree prisons and their families. Limited evidence on which strategies are feasible and effective in reducing tobacco-related harms among people leaving smokefree prison and the households they return to is a barrier to reducing smoking-related inequalities. Aspirations for countries to become tobacco-free, and to eliminate tobacco-related harms and the inequalities they fuel, may require a rethink of what is needed to support underserved sections of the populations in whom smoking remains entrenched. Reducing variability and fragmentation of prison and throughcare support for people with complex health and social needs, and expanding the use of digital health interventions and peer support models, could help more people to achieve their goals to quit smoking for good or protect others from SHS. Reductions in tobacco use and SHS exposures in this population may support other positive changes, for example related to harmful drug and alcohol use, and poor mental health, and ultimately help people to build better lives.

Additional information

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Data-sharing statement

All data requests should be submitted to the corresponding author for consideration. Access to anonymised data may be granted following review.

Ethics statement

This study was approved by the Scottish Prison Service Research Access and Ethics Committee on 4 March 2022. Access to the anonymised prison canteen data was given by the Scottish Prison Service. The University of Stirling General University Ethics Panel approved the interviews with families (GUEP 7308). The North of Scotland NHS Research Ethics Committee approved the interviews with people in prison and staff (22/NS/0046).

Information governance statement

The Universities of Stirling and Glasgow are committed to handling all personal information in line with the UK Data Protection Act (2018) and the General Data Protection Regulation (EU GDPR) 2016/679. Under the Data Protection legislation, Universities of Stirling and Glasgow are the Data Controllers, and you can find out more about how we handle personal data, including how to exercise your individual rights and the contact details for our Data Protection Officer here: www.stir.ac.uk/about/professional-services/student-academic-and-corporate-services/policy-and-planning/legal-compliance/data-protectiongdpr/privacy-notices/ and www.gla.ac.uk/myglasgow/dpfoioffice/.

Disclosure of interests

Full disclosure of interests: Completed ICMJE forms for all authors, including all related interests, are available in the toolkit on the NIHR Journals Library report publication page at https://doi.org/10.3310/GJKH1015.

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Award publications

This synopsis provided an overview of the research award *Staying smokefree: Maximising the public health benefits of smokefree prisons (19/57 Continuing priority research topics of interest to PHR: Health Improvement interventions of offenders or ex-offenders).*

Other articles published as part of this thread are:

Brown A, Woods-Brown C, Hunt K. Identifying potential barriers and enablers to smoking abstinence after leaving a smokefree prison using the capabilities, opportunities, motivations -behaviour (COM-B) model: a qualitative interview study. *BMC Public Health* 2025;**25**:2100. https://doi.org/10.1186/s12889-025-23249-3

McMeekin N, Brown A, Best C, Demou E, Leyland AH, Bauld L, *et al*. How can we maximise the benefits of smoke-free prisons? Decision analytic model to predict potential impacts on public health. *BMC Public Health* 2026;**26**:994. https://doi.org/10.1186/s12889-026-26714-9

For more information about this research please view the award page (www.fundingawards.nihr.ac.uk/award/NIHR131613).

Additional outputs

Brown A, Woods-Brown C, Angus K, McMeekin N, Hunt K, Demou E. Recent evidence on rates and factors influencing smoking behaviours after release from smokefree prisons: a scoping review. *Int J Prison Health* 2024;**20**:450–65. https://doi.org/10.1108/IJOPH-10-2023-0064

Brown A, Woods-Brown C, O'Donell R, Hunt K. *Challenges in Remaining Abstinent from Smoking Following Release from a Smokefree Prison*. 2024 Annual SRNT Conference, Edinburgh, 2024.

Brown A, Woods-Brown C, Hunt K. *Challenges in Maximising the Benefits of Smokefree Prison Policy for People Leaving Prison*. SSM Annual Scientific Meeting 2024, Glasgow, 2024.

Brown A, Hunt K. *Reducing Tobacco Harms in People Leaving Prison and the Households They Return to*. Prison Visitors' Steering Group: 2024.

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List of abbreviations

COM-B	Capability, Opportunity, Motivation — Behaviour model
COVID-19	coronavirus disease discovered in 2019
CRUK	Cancer Research UK
EYS	Early Years Scotland
FRESH	Family Rules for Establishing Smokefree Homes
NIHR	National Institute for Health and Care Research
NRT	nicotine replacement therapy
PPI	patient and public involvement
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
QALY	quality-adjusted life-year
RCT	randomised controlled trial
R&D	research and development
RQ	research question
SHS	second-hand smoke
SPS	Scottish Prison Service
TIPS	Tobacco in Prisons study
WP	work package

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Appendix 1 Interventions to reduce children's second-hand smoke exposures at home

Objectives and methods

To improve knowledge and inform future interventions, we aimed to review interventions to reduce children's (≤ aged 18 years) SHS exposure at home. We searched databases for studies published between January 2017 and September 2022. This scoping review updates and expands on earlier reviews by Behbod *et al.*[73] and Brown *et al.*[74] by (1) updating search strategies and dates, (2) searching for a greater diversity of study types, (3) using a wider definition of 'children' and (4) including studies with shorter follow-up periods.

Search terms were related to: SHS exposure, smoking behaviours, children and families, homes and study type. We included studies of interventions to reduce children's SHS exposure in the home. We included a broad range of types of studies, including pilot and feasibility studies, qualitative studies and trials. We excluded studies where the intervention was targeted at children or where interventions aimed to improve clinical practice only. All interventions for reducing children's SHS exposure at home were eligible. We included studies that reported on the following primary or secondary outcomes: (1) exposure to, or concentrations of, SHS in the home; (2) parental/caregiver smoking behaviour and/or (3) restrictions on smoking within the home. Our search period was from January 2017 to September 2022. Only studies published in English were included.

Figure 3 details the search and retrieval process.[49] Information about study publication, characteristics, outcomes and limitations were extracted by one author, and the extracted data were checked by another author.

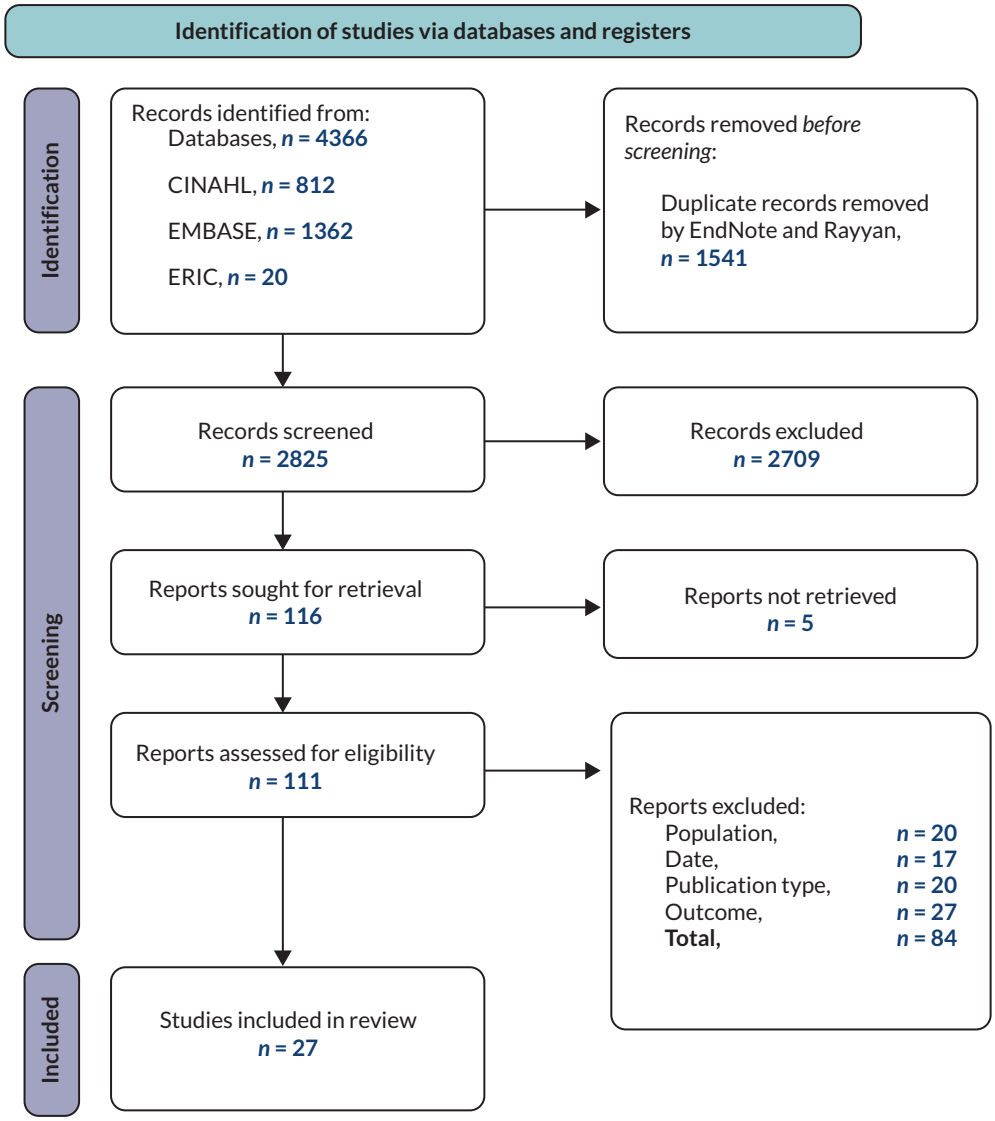

FIGURE 3 Details of search and retrieval process using PRISMA CINAHL, Cumulative Index to Nursing and Allied Health Literature; ERIC, Education Resources Information Center. EndNote [Clarivate Analytics (formerly Thomson Reuters), Philadelphia, PA, USA]; Rayyan [Doha, Qatar; https://rayyan.qcri.org/].

Results

Study characteristics

Most studies took place in high-income countries: USA (*n* = 14), UK (*n* = 3),[75–77] Israel (*n* = 2),[78,79] Canada (*n* = 1),[80] Australia (*n* = 1)[81] and Poland (*n* = 1).[82] Five were conducted in middle-income countries: China (*n* = 3),[83–85] Thailand (*n* = 1)[86] and Malaysia (*n* = 1).[87] Eighteen are randomised controlled trials (RCTs),[79,81,82,84–86,88–99] one is a quasi-experimental study,[83] seven are non-comparative, pre-post studies[75,76,78,80,87,100,101] and one is a qualitative study which collected interview data post intervention.[77]

Intervention components

Consistent with the previous review by Brown *et al.*,[74] interventions to reduce children's SHS exposure in homes were often multicomponent and often included counselling and educational elements. Examples of other intervention components included: giving feedback on indoor air quality[75,78,79,87,88,93,94] and/or on child SHS exposure (using child hair or urine samples);[78,79,81] providing financial incentives;[95,99] sending text messages[86,89] and giving access to a mobile app.[89] Participants were able to access free NRT in six studies.[77,84,85,89,96,98] In the O'Donnell *et al.*[77] study, NRT use was encouraged to support temporary abstinence while being indoors at home. One study reported on a gender-sensitised intervention for fathers, which included a physical activity component.[80] Several studies used system-level components (e.g. staff training and modifying clinical forms/procedures/electronic systems) to try to increase screening and intervention for tobacco use in routine clinical practice.[76,81,83,89,90,97,100,101]

Trial outcomes

This section reports on outcomes of RCT studies only. Ten RCTs reported on biological markers (urine or saliva cotinine or hair nicotine samples) of SHS exposure in children.[79,81,82,84,85,89,90,92,95,99] Of the 10, only 1 RCT reported success in lowering biological markers of exposure to SHS, with a significant difference between the intervention and control groups. Children of mothers who smoke who participated in the Family Rules for Establishing Smokefree Homes' (FRESH) behavioural intervention (comprising 16 weeks of counselling plus educational materials and resources) had significantly lower urinary cotinine levels at 12 months than children in the control group.[92] Additionally, one RCT of a counselling plus a financial incentive, hospital-initiated intervention reported success in lowering infant cotinine among two subsets of participants: mothers who reported high readiness/ability to protect their child at baseline and mothers who completed the study within 6 months of hospital discharge.[99] In some RCTs,[79,84,85,90] biological markers of SHS exposure reduced over time in both intervention and control groups, possibly reflecting measurement difficulties and/or due to some parents changing smoking behaviour in response to control conditions or assessment of child cotinine levels.[79,84,90]

Four RCT studies reported on air quality in homes, as measured by air nicotine levels and/or airborne fine particle concentrations.[88,93,94,99] Data from the 'Project Fresh Air' study were reported in three of the four papers.[88,93,94] 'Project Fresh Air' is an intervention providing immediate feedback (lights and noise on a small device within the home) on household air quality alongside brief coaching, which includes showing participants graphs of household indoor air quality in the past 7 days. The intervention was found to be effective in reducing airborne fine particle concentrations in homes.[88,93,94] Fine particle concentrations in intervention homes reduced immediately after the intervention was initiated[93] and declined by 18.8% compared to pre-intervention levels. A smaller reduction in concentrations of 6.5% was found in control homes during the study period.[94] Findings showing that air particle concentration measurements were correlated with air nicotine concentration measurements, and self-reported data on smoking and other behaviours in homes, provide confidence that the intervention successfully decreased smoking and other 'particle-generating behaviours'[93] in homes.

Fifteen RCTs reported on parental/caregiver smoking behaviour.[79,81,84–86,89–93,95–99] Of these, six studies reported success with (individual-level) validated parental/caregiver smoking cessation.[89,92,96,99] Analysis of a community-based counselling intervention aiming to reduce tobacco smoke exposure in children under age 4 years found that mothers in the intervention group were 11 times more likely to have validated smoking abstinence compared to those in the control group at end-of-treatment.[91] Effects were maintained 12 months later.[92] An intervention delivered in paediatric clinics to increase staff adherence to clinical guidelines for reducing children's tobacco exposures ('Ask, Advice and Refer') and provide counselling for smoking parents increased validated abstinence in the intervention group (15.2% vs 6.7% in the control group). Mediation analysis suggests that such interventions have the potential to reduce verified child tobacco exposures.[90] A similar multilevel intervention delivered through a US program targeting low-income women and children also showed success in achieving higher 12-month validated smoking abstinence in intervention participants compared those in the control [odds ratio (OR) = 9.55, 95% confidence interval (CI) 1.54 to 59.30].[89] In a study evaluating a hospital-based intervention combining motivational interviewing and financial incentives, the intervention reduced the risk of exhaled carbon monoxide confirmed maternal smoking (relative risk/risk ratio 0.75 at 4-month follow-up, 95% CI 0.58 to 0.97).[99] A novel intervention providing behavioural support to smoking caregivers found that saliva cotinine levels among the parents who smoked decreased from baseline to end of treatment in the intervention group, whereas levels rose in the control group.[96]

Five RCTs assessed self-reported home smoking 'bans'.[81,89,91,98,99] Of these, only two studies found an effect of the intervention.[89,91] Mothers who smoke who were not intending to quit smoking and who received a counselling intervention were nearly two times as likely as control participants to increase home smoking restrictions at end of treatment (OR = 1.9, 95% CI 1.1 to 3.4).[91] Mediation analysis suggests that increases in home smoking restriction partially explain greater rates of maternal smoking cessation in the intervention group.[91] Low-income mothers who had received a multilevel intervention combining routine enquiry and counselling were also more likely to adopt home smoking bans.[89]

Six RCT studies assessed participant reported exposure to tobacco smoke in the home. Reductions in reported indoor smoking in homes and in other 'particle generating behaviours') were almost 25% greater in the intervention group compared to the control group in an RCT combining real time feedback on air quality and brief behavioural support.[93] Another trial combining feedback on child tobacco smoke exposure and home air quality with motivational interviewing also found an effect of the intervention on reported indoor smoking in

homes.[79] Providing behavioural support to low-income mothers was shown to be effective in reducing reported child tobacco exposures in the home 12 months post intervention,[92] as was delivering behavioural support to parents of children with perennial asthma.[82] Trials of combined text messaging and self-educational intervention[86] and a multilevel brief intervention combined with behavioural support[89] were also effective in reducing reported child exposure to second-hand tobacco smoke.

Learning from non-randomised studies

Three non-comparative studies explored the feasibility of delivering personalised feedback on home indoor air quality/child tobacco smoke exposures combined with education and/or behavioural support.[75,78,87] While the interventions were judged to be acceptable to target groups, the authors reported challenges conducting the studies. Dobson *et al.*[75] experienced 'substantial difficulties' in delivery of their intervention by third-sector organisations working with low socioeconomic groups, and Rosen *et al.*[78] reported challenges with the objective measurement of tobacco smoke exposures. Despite challenges, the study authors concluded that interventions incorporating personalised feedback on indoor air quality/child tobacco smoke exposures may help to protect children from tobacco harms based on overall findings.[75,78] Rosen *et al.*,[78] for example, used a complex intervention, consisting of motivational interviews, child biomarker and home air quality feedback, a website, a video and self-help materials, and found significant reductions in child hair nicotine concentrations, the number of cigarettes smoked by parents and parental report of child exposure to second-hand tobacco smoke post intervention.

Two non-comparative pilot studies delivered screening and brief interventions on household smoking/child tobacco smoke exposure and other health topics in paediatric settings.[76,100] Isba and Edge[76] found that a public health screening and brief intervention is feasible and acceptable to deliver in a paediatric emergency department. However, the pilot highlighted the limited potential of the intervention to influence home smoking behaviours, given that at least one smoking member of the household was often not in attendance at the hospital to receive the intervention.[76] Gittelman *et al.*[100] found that after implementation of a quality improvement program, over 90% families with children under the age of 1 years visiting primary care were screened for child tobacco smoke exposure, and over 94% of caregivers who reported smoking received counselling from their primary care provider.[100]

Mahabee-Gittens and Merianos[101] found it was feasible for nurses in paediatric emergency health care to use a clinical decision support system tool for tobacco smoke exposure reduction in their work. Findings showing that almost 60% of caregivers attempted to stop smoking after visiting emergency health care, which indicates the potential of the intervention to reduce tobacco harms.[101–103] Similarly, a quasi-experimental trial of a multicomponent intervention, including development and use of tools for screening and assessment of caregiver smoking by clinicians, and creation of a smoking cessation clinic showed that the intervention was feasible and can improve delivery of 'tobacco control assistance' in paediatric inpatient settings.[83]

Findings from a non-comparative study indicate that recruitment to a gender-sensitised smoking cessation programme for fathers is feasible and has potential to increase abstinence, fathering self-efficacy and physical activity levels.[80] The study, however, also revealed recruitment and resourcing challenges, which would need to be considered during any future deliveries.[80]

A qualitative study found that while parents found an intervention offering access to NRT for temporary abstinence in the home acceptable, only 20 out of 54 people obtained NRT due to the unwieldy process involved in accessing an NRT prescription. Interviews with those who obtained NRT, however, suggest the potential for NRT use for temporary abstinence from smoking in the home to protect against SHS, and, even, to help parents to abstain from smoking altogether.[77]

Discussion

Our review of interventions to reduce children's exposure to SHS in homes identified one RCT which was effective in improving objectively measured air quality in homes. Reductions in fine particle concentrations in homes were greater among participants in 'Project Fresh Air' who had received personalised feedback on indoor air quality and behavioural support, compared to those in the control group.[88,93,94] Intervention participants were nearly 3.5 times more likely to achieve a smoke-free home compared to control participants.[88]

Only one trial in the review found an effect on lowering biological markers of tobacco smoke exposures in children.[91,92] Children whose parents received the 'FRESH' intervention had significantly lower cotinine at 12 months than control children.[92] Four trials found declines in child cotinine or hair nicotine in both intervention and control group[79,84,85,90] Rosen and Zucker[79] suggest that inconsistent

results, small and null effects may be partly explained by 'concurrent behaviour changes' in both intervention and control participants.

Several trials reported success with increasing biochemically validated parental/caregiver smoking abstinence and so may have potential to reduce or eliminate child SHS exposure.[79,81,82,84,85,89,90,92,95,99] Interventions which were effective in increasing smoking abstinence used a range of different approaches, including practice change, behavioural support and providing concurrent support to smoking parents and their children engaged in a tobacco prevention program.

Evidence from non-trial studies confirmed that practice-level approaches (e.g. screening and behavioural support) and providing personalised air quality feedback to parents/caregivers can be acceptable and have potential for reducing child SHS. Our review also suggests that novel approaches to reducing SHS exposure in children such as delivering a gender-sensitive smoking cessation programme to fathers and offering free NRT to parents for temporary abstinence in the home may be acceptable to caregivers and shows promise.

Our review illuminates potential feasibility issues, which may be helpful to consider when delivering and evaluating interventions to reduce child SHS exposure. Challenges relating to the measurement of biological markers of child SHS exposure are reflected in our review. Other issues relate to potential challenges of delivering community-based interventions in a context where third-sector organisations are increasingly managing heavy workloads with inadequate resources. Given the substantial harms of SHS to children and the evidence gaps in how to tackle exposure to SHS within the home setting, further development work and evaluation is required to continue to develop understanding of which approaches are feasible and effective, for whom and in what circumstances.

This synopsis should be referenced as follows:
Brown A, McMeekin N, Boyd K, Demou E, Woods-Brown C, Angus K, *et al*. Maximising the public health benefits of smokefree prisons: a synopsis from a mixed-methods study. *Public Health Res* 2026;**14**(12). https://doi.org/10.3310/GJKH1015