



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

Journal:	<i>International Journal of Prison Health</i>
Manuscript ID	IJOPH-10-2023-0064.R1
Manuscript Type:	Research Paper
Keywords:	Prison, Smoking, smokefree policy, cessation interventions, marginalised populations, inequalities

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Title

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

Keywords

prisons, smoking, smokefree policy, cessation interventions, marginalised populations, inequalities, vaping

Author List

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Abstract

Purpose: Smokefree prison policies ~~are increasing globally~~ have been introduced in some countries, in part to address very high levels of tobacco use in people in custody ~~prison~~. However, relapse rates post-release ~~remain significantly~~ remain high. Improved understanding of post-release smoking and/or vaping behaviour is necessary to inform support for ~~an underserved~~ a priority population.

Design: We searched health, social science, and criminal justice databases for studies about smoking/vaping behaviours among people released from smokefree prisons. Studies were included if: they reported primary data and were published between January 2017 and ~~December 2022~~ March 2024 in English; the population was adults / young people (16yr+) imprisoned, or formerly imprisoned, in prisons with comprehensive smokefree policies; and at least one of the following was reported: (1) pre-release intention to smoke, vape or remain abstinent post-release; (2) smoking/vaping behaviour post-release and factors influencing smoking/vaping behaviour; (3) attempts to quit again following post-release smoking/vaping relapse. ~~Studies were excluded if they reported on smoking or vaping behaviours during imprisonment only.~~

Findings: ~~Seven~~ Nine studies met our criteria. The evidence base is small and ~~exclusively~~ mainly from the USA or Australia. Evidence continues to suggest that most people ~~return to~~ resume smoking after leaving a smokefree prison. No new interventions have been successful in reducing relapse rates. No studies report on vaping ~~following release from a smokefree prison~~ post-release, although two UK studies report on and perceived factors affecting smoking/~~vaping~~ relapse post-release from prisons ~~where vaping is allowed~~ allowing vaping.

Originality: This review updates the limited evidence on ~~the~~ smoking behaviours ~~of people~~ after leaving a smokefree prison.

Research implications: Given very high rates of relapse, there remains a significant need to better understand what approaches are feasible and acceptable for reducing return to smoking post-release.

equip those vulnerable to poor health outcomes following release from prison with the skills, motivation, and appropriate support, to remain smokefree post-release.

Introduction

Smoking-Tobacco use continues to be one of the biggest-most serious public health threats internationally, killing-accounting for more than 8- 7.69 million (7.16-8.20) deaths and 200 million (185-241) disability-adjusted life-years in 2019, and is still the leading risk factor for death in men people-a-year (GBD 2019 Tobacco Collaborators, 2021). While smoking rates have fallen in many resource-rich countries, smoking prevalence remains high among 'marginalised' groups (Potter et al., 2021). A systematic review of smoking prevalence in prisons across 36 countries where smoking was and/or is still permitted reported that the rates of smoking were up to five times higher than in the general population in Europe, up to 6.4 times higher in the Americas and up to 16 times higher in Asia (Spaulding et al., 2018). For example, in Scotland, in 2017 prior to the 2018 smokefree prison policy in-2018, 68% of people in prison were-smokers used tobacco compared with 18% of adults outside prison (Carnie et al., 2017, SHeS, 2017) and levels of second-hand smoke (SHS) in prisons were comparable to those within a typical smoking home (Semple et al., 2017). Thus, people who are or have been in prison may-beare at greater risk of smoking-related health conditions than the general population (Binswanger et al., 2014).

Several countries have introduced total smokefree prison policies to tackle the high levels of smoking in-prisonsamongst people in custodyprison, exposure to SHS and tobacco-related mortality and morbidity for smokers-and-non-smokerstobacco users and non-users (Sweeting and Hunt, 2015).

New Zealand was the first country to implement a comprehensive country-level smokefree prison policy (Collinson et al., 2012). Smokefree prison policies have also been implemented in most jurisdictions in Australia (Office of the Inspector of Custodial Services, 2021), and in the USA (Binswanger et al., 2014) and Canada (Collier, 2013). All prisons in England and Wales had become smokefree by July 2018 (ASH, 2018). Scotland implemented its smokefree prison policy in November 2018 (Hunt et al., 2022). UK jurisdictions elected to allow vaping in smokefree prisons, as have some USA prisons (Young-Wolff et al., 2015).

Evidence shows environmental improvements following smokefree prison policy. For example, ~~M~~measurements in Scottish prisons, during the week of smokefree prison policy implementation, demonstrated an immediate impact (81% reduction in SHS) (Semple et al., 2020); levels were further reduced six months later (Demou et al., 2020). Other studies have reported reductions in SHS markers of 77% in North Carolina (Proescholdbell et al., 2008), 50% in New Zealand (Collinson et al., 2012), and 66% in four pilot prisons in England (Jayes et al., 2019).

Some studies have reported Eevidence of ~~the~~ health benefits of smokefree prison policies ~~is~~ emerging. AFor example, a USA study reported a 9% reduction in smoking-related deaths, particularly from heart and lung disease, in prisons where a smokefree policy had been in place for nine or more years. There was also a reduction in cancer-related deaths (Binswanger et al., 2014). In England, a reduction in risk of a cardiovascular event across all ages groups has been evidenced (Perrett et al., 2022). In Scotland, a time-series analysis of prison pharmacy data ~~conducted as part of the Tobacco in Prisons Study (TIPs) (Hunt et al., 2022)~~ suggested health benefits evidenced by ~~showed~~ a 9% reduction in the rate of dispensing medication for smoking-related illnesses, ~~an increase (44%) in dispensing of nicotine gum and patches, and no changes in dispensing medication for mental health conditions after the introduction smokefree prison policy~~ (Tweed et al., 2021). Health economic analyses demonstrated cost-effectiveness of the Scottish smokefree prison policy over the short- and long-term, but uncertainty remained in the long-term modelling due to the

paucity of evidence internationally about smoking following release from smokefree prisons (McMeekin et al., 2022).

A systematic review of prison-based smoking cessation interventions concluded that “prisoners who experience a complete smoking ban typically resume smoking shortly after release” suggesting that, on their own, smokefree policies are insufficient to maintain smoking abstinence after release (de Andrade and Kinner, 2017). Another systematic review identified 15 studies published to July 2017 with data on pre-release intentions around smoking, smoking relapse or abstinence post-release or quit attempts following post-release smoking relapse and noted that the evidence base was “small, almost exclusively US-based” and “methodologically weak” (Puljević and Segan, 2019). Their review highlighted “that more than 60% of participants relapsed to smoking following release from smokefree prisons” (p1015). Both of these reviews were conducted before e-cigarette use was permitted in smokefree prisons in the UK, and neither considered whether the use of e-cigarettes whilst in a smokefree prison affects intention to or return to smoking rates post-release. Spaulding et al. (2018) have estimated that in-prison prison policy programmes could potentially result in 2 million fewer smokers’ smokers’ resettling in communities globally. However, high rates of relapse to smoking are a particular concern suggest that opportunities to improve the health of people who have been incarcerated in smokefree prisons are being missed, particularly where the use of e-cigarettes is not permitted and the period of imprisonment extends beyond 2-3 months. Symptoms of nicotine withdrawal peak in the first week of abstinence, with some studies suggesting they return to baseline levels by 2-4 weeks, and others that they persist for several months (Hatsukami et al., 2008). because the health of people released from prison is complex due to co-occurring physical (Ismail et al., 2021) and mental health conditions (Fazel and Seewald, 2018), entrenched and intergenerational social disadvantage, (Enggist et al., 2014) and entrenched persistent inequalities in the use and effects of tobacco smoking (Hiscock et al., 2011). For example, recent Australian research reports that despite very high levels of mental illness and complex

multimorbidity, continuity of care post-release is inadequate (Calais-Ferreira et al., 2022) and people released from prison with mental health and substances use issues are have a high risk of morbidity, mortality and reincarceration (Thomas et al., 2022, Borschmann et al., 2024)

With recent evidence of high rates of relapse to smoking post-release, up to date understanding of post-release smoking/vaping behaviour is necessary to increase understanding of appropriate support strategies. This scoping review builds on and expands earlier reviews (Puljević and Segan, 2019, de Andrade and Kinner, 2017) by updating evidence on relapse rates and factors influencing smoking behaviours post-release, and explicitly searching for relevant research on e-cigarettes.

Methods

The paper was informed by the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) (Tricco et al., 2018) (see Supplementary file 1).

Search Strategy

Relevant search terms were identified, informed by the previous systematic review and the research team's expertise in tobacco use in prisons, and used to construct a detailed search strategy for five databases according to the PICO model (Population, Intervention, Context, Outcome) (Supplementary file 2) to update and broaden earlier reviews (de Andrade and Kinner, 2017, Puljević and Segan, 2019). We tested the search terms to ensure they identified papers in the previous review. We searched Web of Science Citation Indices, PsycInfo (EBSCOHost), Criminal Justice Abstracts (EBSCOHost) and Medline (Ovid) databases, and the Bielefeld Academic Search Engine (BASE), on April 6th, 2022; the search was updated on March 26th 2024. The database search was limited to English language records ~~published from 2004~~, and included journal articles, dissertations, and grey literature, such as third sector reports and government documents. To identify further relevant studies, we used backward snowballing and forward plus emailed autoalerts of new records from the academic databases.

Inclusion and Exclusion Criteria

Our examination of studies included vaping because some jurisdictions (e.g. Scotland, and England and Wales, [some prisons in the USA](#)) opted to allow use of e-cigarettes in smokefree prisons. Our earlier work suggests that uptake has been high in Scotland (see Brown et al., 2021, Brown et al., 2020, Brown et al., 2019, Hunt et al., 2022). In England it has also been reported that the majority of 'smokers' living in closed prison environments vape to manage without tobacco (Jayes et al., 2023). Studies were included if: they [reported primary data and](#) were published between January 2017 and [December 2022](#)[March 2024](#); they were published in English; the population was adults/[young people](#) (16yr+) imprisoned, or formerly imprisoned, in prisons with [comprehensive](#) smokefree policies; and the study reported at least one of the following: (1) pre-release intention to smoke or vape or remain abstinent post-release; (2) smoking/vaping behaviour post-release and factors influencing smoking/vaping behaviour; (3) attempts to quit again following post-release smoking/vaping relapse. Studies were excluded if they reported on smoking or vaping behaviours during imprisonment only.

Data Charting

A data extraction table to record characteristics of the studies and the outcomes of interest for our synthesis was co-created by two reviewers, tested using pilot studies by three reviewers, and the final data extraction was sense-checked by a fourth with reference to all included studies.

Results

Search Results

The database search identified [578-7023](#) records which were imported into a reference manager (EndNoteX9). After eliminating duplicates, [333-44039](#) records remained and were imported into an online systematic review tool (www.rayyan.ai). Titles and abstracts were independently screened for eligibility by two reviewers, with any disagreements resolved by a third. [274-372-69](#) were

excluded and ~~59-68~~ were retrieved for full text screening. Studies pre-2017 included in either of the previous reviews (de Andrade and Kinner, 2017, Puljević and Segan, 2019) and the reviews themselves were then excluded (n=29). Further studies were excluded on the basis of intervention (n=13), publication type (n=~~223~~), population (n=6), or outcome (n=~~771~~). A protocol paper ~~and a review paper werewas~~ also excluded. Thus, ~~seven-nine~~ studies (all peer reviewed journal articles reporting primary data) met the inclusion criteria after full-text review. Figure 1 details the search and retrieval process (Page et al., 2021).

[Figure 1]

Overview of Included Studies

Table 1 describes the characteristics of nine included studies. Four of the studies reported studies in Australia (Jin et al., 2021, Albany et al., 2020, Puljević et al., 2018, Puljević et al., 2019), ~~(in states where smokefree policies were in place in prisons)~~, ~~and~~ three were based on studies conducted in the USA (Ives et al., 2022, Martin et al., 2022, Winkelman et al., 2021) ~~(in states with smokefree prisons)~~, ~~and two were from the UK. None of the~~ The two qualitative studies based in the UK made explicit reference to whether the permitted use of vaping use was permitted in any of the settings in smokefree prisons; Australia has strict regulations on vaping in wider society, while the USA has fewer restrictions on vaping. One reports on interviews with people working in three all male prisons, or people tasked with implementing smokefree prison policies within Public Health England or the headquarters for the prison services, which included questions on the management of nicotine addiction in prison and after release (Jayes et al., 2023). The other also mainly focused on the implementation of smokefree policy in prisons, but included some data on which factors were perceived to hinder or facilitate remaining smokefree on release from interviews with prison staff and 18 men and 5 women in custody (Brown et al., 2022).

All ~~seven-nine~~ studies reported on adults, ~~six-seven~~ measured outcomes for mixed sex, although predominantly male samples (Albany et al., 2020, Jin et al., 2021, Martin et al., 2022, Puljević et al.,

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2018, Winkelman et al., 2021, Puljević et al., 2019, Brown et al., 2022); one study only included men (Ives et al., 2022). ~~One~~ Three studies used qualitative methods only, reporting on data from semi-structured interviews (Brown et al., 2022, Jayes et al., 2023, Puljević et al., 2019) (Puljević et al., 2019, Brown et al., 2022, Jayes et al., 2023), and three reported on cross-sectional surveys (Albany et al., 2020, Ives et al., 2022, Puljević et al., 2018).

Three studies reported data from evaluations of interventions aimed at reducing return to smoking post-release. All three studies involved provision of (relapse prevention) behavioural support for smoking cessation (Jin et al., 2021, Martin et al., 2022, Winkelman et al., 2021). In one study the intervention group received behavioural support (~~M~~ motivational interviewing) pre-release (Jin et al., 2021). In another study the intervention involved provision of smoking cessation counselling in-person for one hour pre-release, and up to 4 telephone sessions in the 3 weeks post-release (Winkelman et al., 2021). Participants were also provided with nicotine lozenges in addition to behavioural support (Winkelman et al., 2021). The third intervention (known as the Working Inside for Smoking Elimination (WISE) intervention), ~~(Clarke et al., 2013))~~ involved receipt of ~~6~~ six motivational interviewing or cognitive behaviour therapy sessions in the ~6 weeks pre-release, and brief telephone sessions around one day and one-week post-release (Martin et al., 2022). ~~:- Martin et al. (2022) report on a sub-set of participants from the WISE project. More details about the broader WISE study from which Martin et al's subsample derives are reported elsewhere (Clarke et al., 2013).~~

[Table 1]

This scoping review considered four smoking outcomes: 1) pre-release intentions to smoke or vape or remain abstinent following release; 2) the prevalence of smoking or vaping after release; 3) quit attempts following post-release relapse; 4) factors facilitating or hindering staying smokefree or reducing levels of tobacco consumption post-release including the use of e-cigarettes. Given the

heterogeneity in the focus and methodologies employed in the included studies ~~we~~ it is only possible provide a narrative summary of outcomes.

Reported Outcomes of Included Studies

~~None of the~~ Only two of the nine ~~seven~~ studies included in our review reported on any aspect of vaping. ~~That is to say, w~~ We found no studies reporting on intention to vape post-release (as a way to remain smokefree) or on prevalence of vaping post-release. Hence, there is currently 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 smoking, after release from smokefree prisons.

Similarly, none of the studies reported on quit attempts following return to smoking after leaving a smokefree prison.

Pre-release intentions to smoke or remain abstinent following release from a smokefree prison

Six studies included information on participants' pre-release intentions/expectations to smoke/remain abstinent on release (Ives et al., 2022, Jin et al., 2021, Martin et al., 2022, Puljević et al., 2019, Puljević et al., 2018, Winkelman et al., 2021). The percentage who expressed pre-release intentions/expectations to smoke/remain abstinent varied across studies, with four studies reporting that at least one in three participants expected, intended or hoped to remain smokefree. Only two studies, with different designs, recorded pre-release intentions to remain abstinent after release prospectively, while participants were still in prison. -The first, a survey conducted across a release preparation program in the USA within 20 weeks of release, reported 33% of respondents, in the 2020 survey wave, selected 'definitely not' when asked if they expected to resume smoking on release (Ives et al., 2022). The second, an RCT of a motivational interview intervention conducted with 557 participants within 4-6 weeks of release from an Australian prison reported that at baseline 51% of participants who were allocated to the intervention group 'hoped to remain smokefree after

release' compared to 43% of the control group (Jin et al., 2021). However, one inclusion criterion assessed for participation in the trial was that potential participants "express an interest in remaining abstinent after release ..." (p464).

Four studies measured pre-release intentions to smoke/remain abstinent retrospectively. One, a cross-sectional survey of 114 participants released from smokefree prisons in Queensland, Australia (Puljević et al., 2018) reported that 66% of participants expressed an intention to remain smokefree. In a qualitative study, which subsampled from participants in this survey who had relapsed to smoking, 12 of the 21 participants were reported to have expressed a "pre-release intention to remain abstinent after release" (Puljević et al., 2019). A secondary analysis of a subsample (n=190) from the WISE project (Clarke et al., 2013), reported that 52% planned to return to smoking on release (Martin et al., 2022).

Smoking after release

Five studies included information on the prevalence of smoking after release from a smokefree prison (Albany et al., 2020, Jin et al., 2021, Martin et al., 2022, Puljević et al., 2018, Winkelman et al., 2021). All Timepoints at which smoking prevalence data were collected, and outcome measures varied across the studies, preventing detailed comparisons being made across studies. All studies found that at least ~65% returned to smoking. Amongst 424 participants followed up (for an average of ~145 days) in an Australian RCT of a MI-motivational interviewing intervention, most participants had returned to smoking according to several measures (Jin et al., 2021). Continuous smoking absence was self-reported by 16% (n=31) in the interventionMI group and 12% (n=27) of the control group and 7-day point prevalence for self-reported abstinence was 31% in both groups. Rates of abstinence were lower for the primary outcome (continuous absence [not having smoked more than 5 cigarettes during follow-up period] confirmed by exhaled carbon monoxide); after multiple imputations to account for missing data, continuous abstinence was estimated to be 9% in the interventionMI group and 7% in the control group. Cumulative self-reported relapse at 3 months

was 87% for the ~~MI~~ intervention group and 92% for the control group; while 62% and 74% respectively reported relapse on the day of release. ~~The m~~ Median number of cigarettes smoked daily was 5 and 6 respectively (Jin et al., 2021). Another Australian study reported that 72% of self-identifying 'smokers' (n=114) released from prison in Queensland relapsed to smoking within 24 hours and 94% within two months of release (Puljević et al., 2018) (although 62% of those who relapsed to smoking post release reported smoking fewer cigarettes smoked post-release than pre-incarceration), whereas a third Australian study reported that 86% of people re-entering prison after being in a smoke-free prison in the last 12 months were daily 'smokers' (Albany et al., 2020).

Of the 190 participants from the WISE study in the USA, 50% relapsed to smoking within 24 hours and 65% within 7 days (Martin et al., 2022). The adjusted biologically verified 7-day point prevalence abstinence (primary outcome) in a pilot RCT in the USA was 12% in a group who received 1 hour of smoking cessation counselling in jail plus a supply of NRT on release, compared to 11% for the group who received 30 minutes of general health education only; equivalent figures at 12 weeks were 11% and 14% respectively (Winkelman et al., 2021).

One study suggested that there may be a reduction in numbers of cigarettes smoked (Puljević et al., 2018), comparing the number of cigarettes smoked before and after time spent in a smokefree prison. Two studies (Jin et al., 2021, Winkelman et al., 2021) found a potential reduction in the number of cigarettes smoked post-release following participation in a relapse prevention intervention.

~~One study (Jin et al., 2021) suggested that a single session of an MI intervention delivered prior to release may potentially delay relapse to smoking post-release.~~

Factors facilitating or hindering staying smokefree or reducing levels of tobacco consumption post-release

Four studies using quantitative methods (Albany et al., 2020, Martin et al., 2022, Puljević et al., 2018, Ives et al., 2022) and ~~one~~ three study studies using qualitative methods (Puljević et al., 2019, Brown et al., 2022, Jayes et al., 2023), described factors that hindered remaining abstinent from smoking.

Factors identified in studies using quantitative methods included: ~~Indigenous~~ Indigenous status (Albany et al., 2020) and use of drugs (“any drug use” in the past 4 weeks (Albany et al., 2020), “injectable drug use since release” (Puljević et al., 2018)) ~~(as predictors for daily smoking) (Albany et al., 2020, Puljević et al., 2018)~~; sex (women at higher risk of smoking in first hour, day and week of release) (Martin et al., 2022); and planning to smoke following release (Martin et al., 2022). A 9-year survey of people in prison identified factors related to individual beliefs and expectations about smoking that may hinder abstinence; ~~these~~ these included no longer viewing themselves as addicted to nicotine and believing it would be ‘fairly easy’ not to return to smoking post-release (Ives et al., 2022).

Another study (Martin et al., 2022) which examined the antecedents of return to smoking post-release identified several circumstances commonly associated with smoking after someone leaves prison: being with other ~~smokers~~ people who smoke or with friends and family; being given tobacco by someone else; feeling positive emotions (e.g. being happy or excited); and using drugs or alcohol.

~~A~~ The qualitative study conducted in Australia identified pre-release intention, normalisation of smoking in home or social environments, perception of smoking as a symbolic act of freedom or resistance or as providing a means to relieve stress associated with resettlement or coping with craving for illicit substances, as barriers to continued abstinence after leaving a smokefree prison (Puljević et al., 2019). Some similar factors were also cited in two qualitative studies which explored anticipated barriers to remaining smokefree post-release (Brown et al., 2022, Jayes et al., 2023). In addition, staff associated with the implementation of smokefree prisons in England discussed felt that an additional potential reason for smoking relapse post-release was high levels of nicotine use in the prison population due to vaping (Jayes et al., 2023). Staff described the high prevalence of return to smoking when people moved from smokefree closed prisons to the open estate (which were not smokefree) (Jayes et al., 2023). They suggested that the stress of moving between closed

and open prison conditions, the provision of a 'smoking pack' and the fact that people were once again surrounded by people smoking, made it more difficult for people to remain smokefree. Jayes et al noted that around 30% of people in the open prison context were using e-cigarettes, but "most of these" were dual users of cigarettes and e-cigarettes.

~~In contrast, the~~ The most cited facilitators mentioned by 72 survey participants (Martin et al., 2022) who managed to remain smoking abstinent post-release were: not having cravings to smoke, being with family, lack of finances, engaging in alternative activities, having willpower and thinking about the health benefits of not returning to smoking. Living with a partner, expressing support for smokefree prison policy, pre-release intention to remain abstinent, and future intention to quit smoking were associated with reduced daily smoking in one another survey study (Puljević et al., 2018).

~~Some similar facilitators were also cited in the three qualitative studies. (e.g. awareness of benefits of not smoking, diversionary activities, social support from family and peers, intrinsic motivation) were also cited by participants, in a PP~~ Participants in the Australian qualitative study of 21 people who had managed to remain abstinent for a time post release (Puljević et al., 2019) ~~(e.g. mentioned awareness of health and financial benefits of not smoking, diversionary activities, social support from family and peers, and intrinsic motivation) were also cited by participants, in a.~~ Living with a partner, expressing support for smokefree prison policy, pre-release intention to remain abstinent, and future intention to quit smoking were associated with reduced daily smoking in one study (Puljević et al., 2018). People in prison in Scotland thought the experience of health and financial benefits of not smoking whilst in prison may increase motivations to give up in the longer term, but that associations of smoking with pleasure, comfort and relaxation, and the common co-use of tobacco and cannabis, would hinder efforts to remain smokefree post release (Brown et al., 2022), and that use of smoking alternatives during the transition period may help some people to avoid

relapse (Brown et al., 2022). ~~Staff associated with the implementation of smokefree prisons in England discussed the high prevalence of return to smoking when people moved from smokefree closed prisons to the open estate (which were not smokefree) (Jayes et al., 2023). They suggested that the stress of moving between closed and open prison conditions, the provision of a smoking pack and the fact that people were once again surrounded by people smoking, made it more difficult for people to remain smokefree. Jayes et al noted that around 30% of people in the open prison context were using e-cigarettes, but “most of these” were dual users of cigarettes and e-cigarettes.~~

One study (Jin et al., 2021) suggested that a single session of a motivational interviewing intervention delivered prior to release may potentially delay relapse to smoking post-release.

Discussion

This scoping review builds on the systematic review by Puljevic and Segan (2019) of studies reporting on factors influencing smoking following release from smokefree prisons. Their review identified 15 eligible studies and concluded that “the evidence base in this area is small ... [and] mostly methodologically weak” (p1011) and dominated by studies from the USA. Our review (of studies published from 2017 to ~~January 2023~~ March 2024) demonstrates that the evidence base remains “sparse” and identified only an additional ~~seven~~ nine studies, of varying methodological design and quality. ~~Most~~ All were conducted in the USA or Australia. A systematic review (of studies published from Jan 2000-Feb 2022) which examined the impact of smoking ‘bans’ and other smoking cessation interventions in smokefree prisons, mental health and substance use treatment settings, similarly reported a dearth of evidence on post-release/post-discharge smoking behaviours. (Sourry et al., 2022).

Consistent with existing evidence, our review found that most people return to smoking after leaving a smokefree prison, despite many people hoping or intending to remain smokefree. This is a missed opportunity to improve the health of a priority group, and to reduce health inequalities.

~~This review suggests there are no~~None of the new interventions (first published after 2017) reported in the studies included in this review ~~which~~ have been successful in preventing high rates of relapse to smoking, often within 24 hours, following release from a smokefree prison. ~~To our knowledge,~~ the WISE intervention remains the only intervention which has shown effectiveness in increasing smoking abstinence post-release (Clarke et al., 2013). Nonetheless, one study in our review reports that a single session of ~~MI~~motivational interviewing delivered pre-release (Jin et al., 2021) may have the potential to delay return to smoking. This finding could be exploited in the future through the inclusion of greater support, including in the post-release period, which may help to maintain smoking abstinence for a longer period of time, and/or facilitate further quit attempts in the event of a smoking lapse. Our review also found evidence that smoking levels may reduce following time spent in a smokefree prison (Puljević et al., 2018), and following participation in a pre-release ~~MI~~motivational interviewing intervention (Jin et al., 2021) or a pre-post intervention combining behavioural support and NRT (Winkelman et al., 2021). As noted elsewhere (Winkelman et al 2021), the significance of results suggesting that some interventions may potentially reduce the amount smoked post-release is less clear given uncertainties about the implications for health and long-term smoking abstinence (Chang et al., 2020, Lindson et al., 2019). Taken together, evidence from this review, and from previous reviews by Puljević and Segan (2019) ~~(ADD-REF)~~ and Sourry et al. (2022) ~~(ADD-REF)~~highlight the potential of multi-component interventions which are delivered both before and after release to change smoking behaviour.

Puljević and Segan (2019) noted the need for evidence on the potential for NRT to help reduce return to smoking post-release. We identified one intervention study in which participants received a supply of nicotine lozenges upon release from prison in combination with behaviour support.

While the intervention did not increase smoking abstinence, participants were positive about the behavioural support provided and suggested that the provision of NRT could be expanded to in prison use, particularly in the lead up to release. Given that a systematic review of effective behaviour change techniques for preventing relapse following a stay in a smokefree setting identified pharmacological support as effective in reducing return to smoking (Shoosmith et al., 2021), further research on the use of NRT during and following time spent in a smokefree prison would be beneficial. [Specifically, it would be helpful to understand more about a\) the optimum timing of providing NRT, b\) the most feasible and acceptable mechanisms for giving people access to NRT and c\) how to maximise uptake and adherence.-](#)

Crucially, our review demonstrated a complete lack of evidence worldwide on [rates of](#) relapse to [smoking tobacco use](#) following release from smokefree prisons where the sale and use of e-cigarettes has been allowed (as has been the case in England and Wales and in Scotland over the last 5 years, [and in some prisons in the USA](#)). While evidence shows that e-cigarettes can help people to cope with smokefree rules while living in prison (Brown et al., 2020, O'Donnell et al., 2022), research is required to understand whether [and for whom](#) vaping is a risk or protective factor for smoking relapse after leaving a smokefree setting. To date, evidence from the general population is mixed. For example, a representative sample of USA recent former 'smokers' did not find an association between daily vaping and remaining abstinent. However, it was found that those using e-cigarettes appeared more likely to quit again following a relapse and to be abstinent for 3 months at follow up (Pierce et al., 2021).

[-Given that vaping is not risk-free \(Glantz et al., 2024, McNeill et al., 2022\), it will be important to also assess levels and patterns of dual use of tobacco and e-cigarettes among prison leavers, and to tailor support to try to encourage complete tobacco cessation in this group.](#)

This review demonstrates that more research is needed on the most feasible and effective means to support people leaving smokefree prisons to remain smokefree. It strengthens understanding of factors potentially facilitating or hindering smoking abstinence post-release, and which may help optimise support with smoking behaviour among people leaving smokefree prisons. First, strengthening intentions and plans to remain smokefree post-release should continue to be an important goal for interventions (Martin et al., 2022, Puljević et al., 2019, Puljević et al., 2018). Second, interventions could target incomplete understandings that people in prison may have about the nature of smoking addiction and about the (very high) risks of returning to smoking post-release (Ives et al., 2022). Third, interventions could support people to prepare coping strategies for when they are likely to be faced with smoking triggers almost immediately after leaving prison (e.g. feeling buoyant about release, returning to the company of smokers-people who smoke and being offered tobacco) (Martin et al., 2022). Developing coping strategies for ongoing social and environmental smoking triggers associated with resettlement from prison (Puljević et al., 2019) is also likely to be beneficial and could be addressed as part of providing wraparound services for people exiting prison. Co-use of tobacco and alcohol/illicit drugs among people leaving prison (Albany et al., 2020, Martin et al., 2022) (Puljević et al., 2019) continues to be an important risk factor for smoking behaviour interventions. Interventions need to be cognisant of polysubstance use in order to improve outcomes (McKelvey et al., 2017). Finally, family-based interventions could be developed given continued evidence of the positive/negative influence which social networks have on smoking behaviours (Puljević et al., 2019, Martin et al., 2022) .

This review suggests several areas to potentially target to try to address very high rates of smoking relapse following release from smokefree prison. However, despite there being clear public health benefits to people remaining smokefree post-release, there remains uncertainty about how best to intervene in this population due to the limited evidence-base. Further research to better understand what approaches are both feasible and effective for maintaining smoking abstinence following release from prison is needed. This could include studies to support tailoring of existing

interventions for smoking cessation/abstinence to reflect the complex needs of people in prison, the challenges they face as they return to the community, and to overcome constraints for delivering health promotion activities in specific prison settings. Studies to help maximise the potential of novel interventions which look promising would also be beneficial. Difficulties in implementing and researching new health initiatives in prisons may help to explain the current limited evidence available to help those seeking to maximise the health gains of smokefree prison and other similar settings (Sourry et al., 2022). Such difficulties include competing priorities and values (e.g. security), considerable constraints on access and resources, and features in prison of the setting or the population which can make randomisation and follow-up post-release challenging and costly.

A strength of our review is that we searched databases that cover health, justice and criminology.

We have updated previous reviews at a time when further jurisdictions (England, Wales and Scotland) have introduced smokefree prison policies; it is noteworthy that these UK jurisdictions elected to allow vaping in smokefree prisons. However, our review is limited by the sparse evidence base, which limits our ability to draw firm conclusions. As in the earlier systematic review (Puljević and Segan, 2019), our searches were restricted to studies published in English and the evidence base remains dominated by studies from Australia and the USA. A notable finding is that there is currently no evidence internationally on whether, or how, vaping whilst in a smokefree prison or following release affects intentions to remain smoke-free, or rates of relapse to smoking, after release from smoke-free prisons.

Conclusion

All evidence to date shows that relapse rates post-release remain high, thus diminishing the public health potential of smokefree prison policy and limiting the extent to which such policies may help to reduce health inequalities attributable to smoking. This highlights a significant need to continue

to try to develop the evidence base to support stakeholders to better equip those leaving prison with the skills, motivation and support to remain smokefree post-release.

Acknowledgments

[Redacted]

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Figure 1: PRISMA (Page et al., 2021) flow diagram of identification of studies

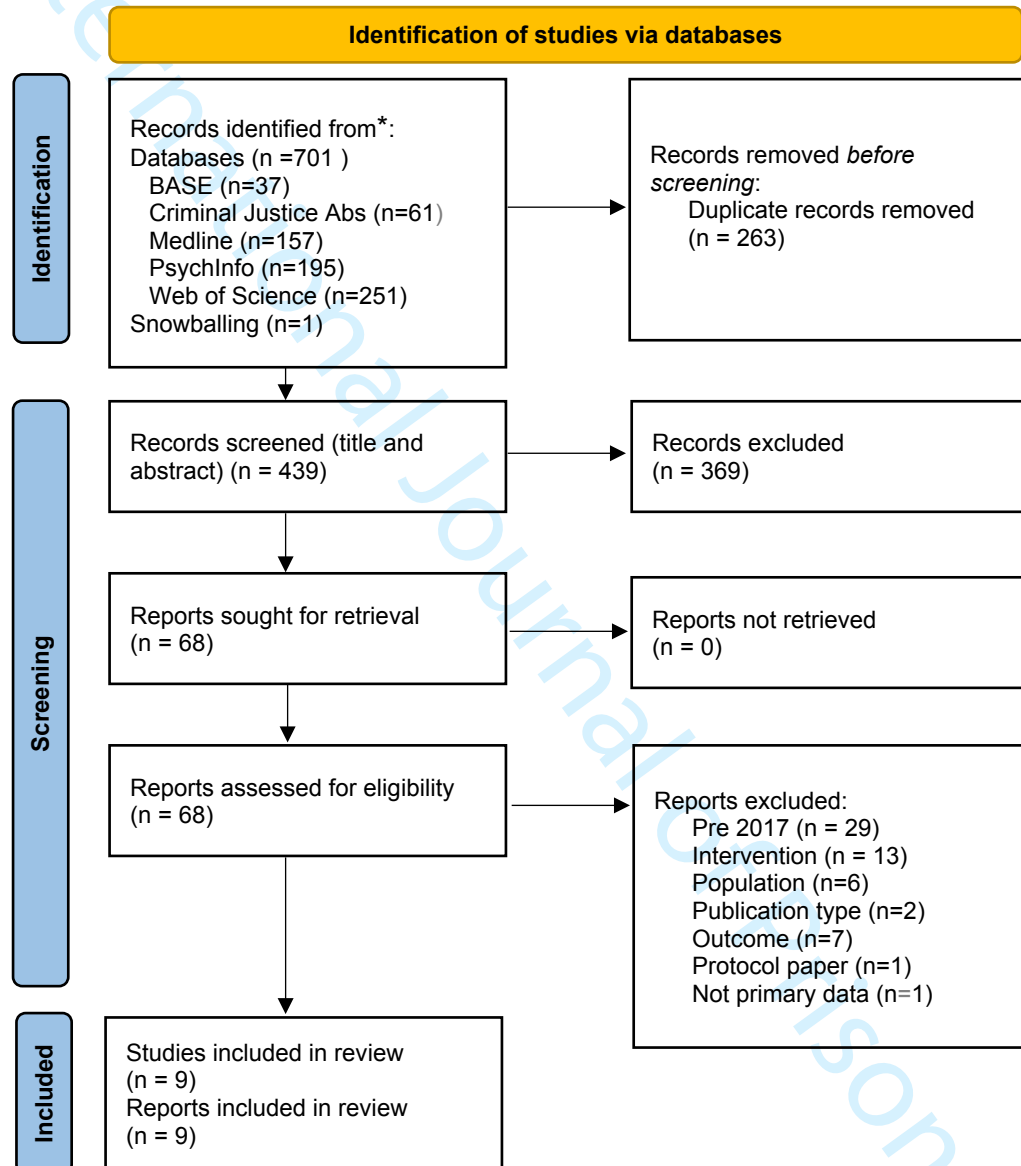


Table 1: Characteristics of the Included [Studies/Publications] and Smoking Outcomes Measured

Authors	Country	Sample (size and gender)	Study design	Outcomes included	Timepoints of measures
Albany et al., 2021	Australia	389 prison entrants (18+) participated (85 % male). 152/389 were imprisoned in previous 12 months in jurisdictions with total smoking ban ['exposed']; 'nonexposed' were in jurisdictions without total smoking bans/not in prison in previous 12 months; missing data on exposure for n=23.	Sample derived from 2016 wave of National Prisoner Entrants' Blood Bourne Virus Survey of prison entrants at 19 sites across six Australian jurisdictions. Cross-sectional survey included 4 questions on tobacco use	Self-reported daily tobacco smoking immediately prior to reimprisonment	Survey conducted immediately after routine health and welfare assessments as individuals enter prison
Brown et al., 2022	Scotland	99 prison staff; 23 people in custody (18 men, 5 women)	Focus group discussions (FGDs) with staff (1 group in each of 14 closed prisons, 95 staff in total), one to one interviews (23 people in custody)	Topics covered included: opinions of smokefree prison policy; perspectives on living/working in a smokefree prison; compliance and enforcement of smokefree prison policy; lessons learned	FGDs and interviews conducted 6-9 months after implementation of smokefree prison policy in all Scottish prisons in November 2018
Ives et al., 2022	USA	5,289 men admitted to a release preparation program in prisons admitting people with substance use disorders	5-10 min survey completed by admissions between 2012 and 2020. Questions were modified periodically so answers for some questions only available for subset	Pre-release intention to remain abstinent	~20 weeks pre-release
Jeyes et al. 2023	England	28 stakeholders with key strategic and/or operational roles in delivering smoke-free prison policy. Purposive sampling to identify those involved in smoke-free prison policy within HMPPS Headquarters and regionally, and with HMPPS and Healthcare staff at 3 male prison	Semi-structured in-person/ telephone one-to-one interviews	Stakeholder views on the implementation and delivery of complete and partial smoke-free policies, specifically in relation to the management of nicotine addiction whilst in prisons and after release	Conducted August-November 2019, i.e. 4 years after open estate introduced partial smoke-free policy and ~4 years after last closed prison implemented a complete smoke-free policy
Jin et al., 2021	Australia	557 individuals expected to be within 4-6 weeks of release randomised to either motivational interview intervention (n=226; 93% male) or control (n=291, 91% male) group. 424 were followed up post-release	RCT of Smoking, Nutrition, Alcohol, and Physical (SNAP) inactivity intervention Self-report survey Smoking abstinence verified by exhaled carbon monoxide test	Pre-release intention to remain abstinent; self-reported continuous smoking abstinence and 7-day point prevalence abstinence, verified by exhaled carbon monoxide test for a subsample, [Also self-reported number of cigarettes after release].	4-6 weeks pre-release; 3-months post-release
Martin et al., 2022 (WISE)	USA	190 participants (67% male) eligible for participation if within 8 weeks of release	RCT of Working Inside for Smoking Elimination (WISE) intervention;	Pre-release intention to remain smokefree post release. Self-reported smoking status post-	8 weeks pre-release, 24-hours and 7-days post-release

			Computer assisted survey and telephone follow-up	release, time to relapse post-release. Antecedents of relapse.	
Puljević et al., 2018b	Australia	114 (former) smokers released from smokefree prison in the previous 2 months (86% male)	Cross-sectional survey	Pre-release intention to remain abstinent; time to relapse post-release; rate of self-reported smoking post release	Within 2-months post-release
Puljević et al., 2019	Australia	21 people who had relapsed to smoking following release (76% male); subsample from Puljevic et al 2018b	Semi-structured interviews	Barriers and facilitators to maintaining smokefree after release	Within 2 months of release
Winkelman et al., 2021	USA	46 [former] smokers expected to be within 90 days of release and to have regular telephone access post-release (91% male)	Pilot RCT - Counselling and NRT v. brief health education. Self-report baseline and follow-up survey.	Self-reported smoking status post-release verified by exhaled carbon monoxide test	Baseline measures (pre-release), and 1, 3 and 12 weeks post release

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	4-6
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	Abstract (pg 2) & 4
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	NA
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	7-8
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	7
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Table S1 Supplementary Material
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	7-8
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	8
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Table 1
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	NA
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	8 & 10

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Figure 1 * Page 8
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Table 1
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	NA
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Table 1
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	10-14
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	15
Limitations	20	Discuss the limitations of the scoping review process.	18-19
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	19
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	19

JB I = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med*. 2018;169:467–473. doi: 10.7326/M18-0850.

Table S1: Example of Search Terms Used in Database Searches

PICO heading	Search terms used to construct search strategies in each database
Population/Setting: Prison	carceral*, convict*, correctional, corrections, custodial, custody, detain*, detention, felon*, gaol*, imprison*, incarcerat*, inmate*, jail*, offend*, penal, penitentiary*, prison*, remand*
Intervention/Context: Release from Smokefree Prison	community supervis*, ex-convict*, ex-felon*, ex-inmate*, ex-offender*, ex-prisoner*, former*, freed, leav*, left, liberat*, parole*, postrelease, post-release, probation*, reenter*, re-enter*, reentries, re-entries, reentry, re-entry, reintegrat*, re-integrat*, releas*
Outcome: Tobacco/Vaping abstinence, intentions, behaviours	cig*like*, cig-a-like*, cigar*, e-cig*, e-liquid, nicotine, non-nicotine, nonnicotine, *smoking, smok*, tobacco*, vape*, vaping, vaporiser/vaporizer

Table S2: Example of the Full Electronic Search Strategy for APA PsycInfo, Including Limits Used.

Database: APA PsycInfo Interface - EBSCOhost Research Databases Searched: 6 th April 2022 Search Screen - Advanced Search. 'Apply equivalent subjects' deselected. Search modes - Boolean/Phrase.	
S1	TI (carceral* OR convict* OR correctional OR corrections OR custodial OR custody OR detain* OR detention OR felon* OR gaol* OR imprison* OR incarcerat* OR inmate* OR jail* OR offend* OR penal OR penitentiary* OR prison* OR remand*) OR AB (carceral* OR convict* OR correctional OR corrections OR custodial OR custody OR detain* OR detention OR felon* OR gaol* OR imprison* OR incarcerat* OR inmate* OR jail* OR offend* OR penal OR penitentiary* OR prison* OR remand*)
S2	DE "Correctional Institutions" OR DE "Criminal Offenders" OR DE "Female Criminal Offenders" OR DE "Incarceration" OR DE "Legal Detention" OR DE "Male Criminal Offenders" OR DE "Prisoners" OR DE "Prisons"
S3	S1 OR S2
S4	TI ((community N2 supervis*) OR exconvict* OR ex-convict* OR exfelon* OR ex-felon* OR exinmate* OR ex-inmate* OR exoffender* OR ex-offender* OR exprisoner* OR ex-prisoner* OR former* OR freed OR leav* OR left OR liberat* OR parole* OR postrelease OR post-release OR probation* OR reenter* OR re-enter* OR reentries OR re-entries OR reentry OR re-entry OR reintegrat* OR re-integrat* OR releas*) OR AB ((community N2 supervis*) OR exconvict* OR ex-convict* OR exfelon* OR ex-felon* OR exinmate* OR ex-inmate* OR exoffender* OR ex-offender* OR exprisoner* OR ex-prisoner* OR former* OR freed OR leav* OR left OR liberat* OR parole* OR postrelease OR post-release OR probation* OR reenter* OR re-enter* OR reentries OR re-entries OR reentry OR re-entry OR reintegrat* OR re-integrat* OR releas*)
S5	DE "Criminal Rehabilitation" OR DE "Institutional Release" OR DE "Parole" OR DE "Probation" OR DE "Reintegration"
S6	S4 OR S5
S7	TI (antismok* OR anti-smok* OR cig*like* OR cig-a-like* OR cigar* OR ecig* OR e-cig* OR eliquid* OR e-liquid* OR nicotine OR non-nicotine OR nonnicotine OR smok* OR tobacco* OR vape* OR vaping OR vaporizer*) OR AB (antismok* OR anti-smok* OR cig*like* OR cig-a-like* OR cigar* OR ecig* OR e-cig* OR eliquid* OR e-liquid* OR nicotine OR non-nicotine OR nonnicotine OR smok* OR tobacco* OR vape* OR vaping OR vaporizer*)
S8	DE "Electronic Cigarettes" OR DE "Nicotine Withdrawal" OR DE "Nicotine" OR DE "Smoking Cessation" OR DE "Tobacco Smoking" OR DE "Tobacco Use Disorder" OR DE "Vaping"
S9	S7 OR S8
S10	S3 AND S6 AND S9
S11	S10 Limiters - Language: English
S12	S11 Limiters - Published Date: 20040101-