Protecting children from tobacco-related harm in private vehicles

Published Online
July 15, 2021
https://doi.org/10.1016/
S2468-2667(21)00166-3

See Articles page e579

Restricting tobacco smoking in public places is a key part of WHO recommendations to reduce tobacco-related harm.[1] The population health benefits of this intervention are well established and include reductions in preterm birth and hospital admissions for respiratory disorders both in children and adults.[2] Although smoke-free legislation is most often considered as applying to bars, restaurants, and workplaces, WHO specifies eight separate locations, including government facilities and public transport.[1] Some jurisdictions have also applied legislation to restrict smoking inside private vehicles where children are present. Such policies are justified by both trying to denormalise tobacco smoking near children, and by the very high air concentration of toxins upon smoking within cars, even when windows are open.[3] The proportion of school-aged children being regularly exposed to tobacco smoke in cars ranges from 6–43% across seven European cities.[4] Although public support for smoke-free car regulations is generally high,[5] they are currently in place in only around 15 countries worldwide, with some of these regulations being at a subnational level.

Following England and Wales, in December, 2016, Scotland was the third UK country to implement a ban on smoking inside private vehicles carrying children. In *The Lancet Public Health*, Daniel Mackay and colleagues[6] report the findings from their quasi-experimental study examining the effects of this measure on emergency hospital admissions for respiratory disorders among children. The authors used the same dataset from a previous paper that examined the effects of a 2014 national campaign to protect children from second-hand smoke in the home environment, called Take it Right Outside (TiRO).[7] They applied an interrupted time series approach using data on all unplanned hospital admissions for asthma and respiratory infections among children over a 19-year period, included gastroenteritis as a control condition, and did stratified analyses by age group and area deprivation.

In keeping with smoke-free car policies being relatively uncommon, there have been few previous examinations of the impacts of such regulations. Márta Radó and colleagues' systematic review identified five quasi-experimental studies on the links between smoke-free car policies and children's tobacco smoke exposure, with only one study reporting health outcomes.[8] Meta-analysis of ten estimates from four of these studies found an immediate 31% (95% CI 13–45) reduction in children's tobacco smoke exposure inside vehicles, but the low number of studies precluded examination of subgroup effects, and there was little consideration of links with hard clinical outcomes in individual studies. Mackay and colleagues[6] address these gaps in the evidence base. The results of their study linked the Scottish smoke-free car legislation to a 1·49% (95% CI 0·27–2·69) monthly decline in emergency asthma admissions among children younger than 5 years, over and above the underlying trend. No significant impact on asthma admissions among older children, or on admissions for gastroenteritis or respiratory infections was seen. This reduction in asthma admissions among preschool children is a positive finding, but the absolute effects might be considered moderate at around six avoided admissions to hospital per year. Given that most asthma exacerbations do not require admission to hospital, the paucity of data on less serious cases managed in the community indicates the positive effects identified are probably an underestimate.

The authors used a robust design to attempt to control for a range of competing factors, including other interventions to drive down smoke exposure over this period. These interventions include the TiRO campaign, which was the focus of a previous paper by the same group,[7] and this updated analysis now concludes that the campaign might not have resulted in demonstrable health benefits. This study represents an advance but lacks data on changes in tobacco smoke exposure—the presumed intermediate exposure variable—which would be a useful avenue for more research. However, analyses in England using slightly different designs and datasets identified that introduction of the measure in England reduced tobacco smoke exposure, and one of these studies used Scottish data as a control group before they implemented the intervention.[9,10]

Protecting children from the harmful effects of tobacco smoke exposure is essential and regulating

smoking in cars is important given the extremely high levels of toxins. Alongside existing studies showing that these measures can reduce tobacco smoke exposure inside cars,[8] the Scottish study provides further impetus to accelerate implementation of similar policies across the globe. Such policies should be part of a comprehensive approach to tobacco control, which includes smoke-free policies covering public places and workplaces if not already in place. Importantly, evidence indicates that specific smoke-free car legislation can produce additional health benefits over and above existing smoke-free laws, despite compliance being incomplete and known challenges in enforcement.[10] Additional evaluations might strengthen the evidence base by assessing the effect of similar policies in other countries and identifying effective approaches for increasing compliance and facilitating enforcement of smoke-free car policies.

We declare no competing interests.

Copyright © 2021 The Author(s). Published by Elsevier Ltd. This is an Open Access article under the CC BY 4.0 license.

*Anthony A Laverty, *Jasper V Been*
j.been@erasmusmc.nl

Public Health Policy Evaluation Unit, School of Public Health, Imperial College London, London, UK (AAL); Division of Neonatology, Department of Paediatrics, Erasmus MC Sophia Children's Hospital, University Medical Centre Rotterdam, Rotterdam 3000 CB, Netherlands (JVB); Department of Public Health, Erasmus MC, University Medical Centre Rotterdam, Rotterdam, Netherlands (JVB)

1 WHO. WHO report on the global tobacco epidemic: offer help to quit tobacco use: executive summary. Geneva: World Health Organization, 2019.
2 Faber T, Kumar A, Mackenbach JP, et al. Effect of tobacco control policies on perinatal and child health: a systematic review and meta-analysis. *Lancet Public Health* 2017; **2:** e420–37.
3 Raoof SA, Agaku IT, Vardavas CI. A systematic review of secondhand smoke exposure in a car: attributable changes in atmospheric and biological markers. *Chron Respir Dis* 2015; **12:** 120–31.
4 Mlinarić M, Schreuders M, Mons U, Kunst AE. Exposure to car smoking among youth in seven cities across the European Union. *Drug Alcohol Depend* 2019; **204:** 107561.
5 Fu M, Castellano Y, Tigova O, et al. Correlates of the support for smoke-free policies among smokers: a cross-sectional study in six European countries of the EUREST-PLUS ITC EUROPE SURVEYS. *Tob Induc Dis* 2019; **16:** A17.
6 Mackay DF, Turner SW, Semple SE, Dick S, Pell JP. Associations between smoke-free vehicle legislation and childhood admissions to hospital for asthma in Scotland: an interrupted time-series analysis of whole-population data. *Lancet Public Health* 2021; published online July 15. https://doi.org/10.1016/S2468-2667(21)00129-8.
7 Turner S, Mackay D, Dick S, Semple S, Pell JP. Associations between a smoke-free homes intervention and childhood admissions to hospital in Scotland: an interrupted time-series analysis of whole-population data. *Lancet Public Health* 2020; **5:** e493–500.
8 Radó MK, Mölenberg FJM, Westerberg LEH, et al. Effect of smoke-free policies in outdoor areas and private places on children's tobacco smoke exposure and respiratory health: a systematic review and meta-analysis. *Lancet Public Health* 2021; published online July 15. https://doi.org/10.1016/S2468-2667(21)00097-9.
9 Laverty AA, Hone T, Vamos EP, et al. Impact of banning smoking in cars with children on exposure to second-hand smoke: a natural experiment in England and Scotland. *Thorax* 2020; **75:** 345–47.
10 Faber T, Mizani MA, Sheikh A, Mackenbach JP, Reiss IK, Been JV. Investigating the effect of England's smoke-free private vehicle regulation on changes in tobacco smoke exposure and respiratory disease in children: a quasi-experimental study. *Lancet Public Health* 2019; **4:** e607–17.