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Road traffic noise and cognitive function among older adults[1]

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INTRODUCTION

Road traffic noise is a widespread feature of daily life, particularly in urban areas and cities. Population exposure to road traffic noise is increasing in Europe, and previous research has found that exposure to noise can have negative effects on many aspects of health. The objective of this study was to investigate whether exposure to road traffic noise might be associated with reduced cognitive functioning in a sample of older adults in Ireland. Cognitive functioning refers to an individual's mental abilities, including memory, decision making and attention.

DATA AND METHODS

We estimated exposure to noise originating from road traffic during 2013 for residences in Dublin and Cork according to the new common noise assessment methodology for the European Union (CNOSSOS-EU). This involved estimating noise exposure values for each residential address and linking these data to health, socio-demographic and behavioural information for 1,706 individuals aged 54 and over from the Irish Longitudinal Study on Ageing (TILDA) who lived in the two cities.

Using this combined dataset, we tested whether levels of cognitive function were lower among older persons whose addresses were exposed to higher levels of road traffic noise. The main outcomes of interest were individuals' scores on eight standardised cognitive tests covering various aspects of cognitive function including overall cognition, executive function, memory and processing speed. For each of these outcomes, we estimated statistical models that tested whether persons living in residences exposed to more noise scored differently on these

[1] This Bulletin summaries the findings from: Mac Domhnaill, C., Douglas, O., Lyons, S., Murphy, E. and Nolan, A., "Road traffic noise and cognitive function in older adults: A cross-sectional investigation of The Irish Longitudinal Study on Ageing", *BMC Public Health*. Available online: https://doi.org/10.1186/s12889-021-11853-y. This research is funded under the Environmental Protection Agency (EPA) Research Programme 2014-2020. The EPA Research Programme is a Government of Ireland initiative funded by the Department of Communications, Climate Action and Environment.

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cognitive tests, taking into account individuals' sociodemographic, behavioural and environmental characteristics.

RESULTS

We found some evidence that road traffic noise exposure was negatively associated with executive function, as measured by the Animal Naming Test. Executive function is a cognitive process that organises thoughts, decision-making and behaviour. The Animal Naming Test involves respondents naming as many animals as they can in one minute, which tests executive function as a high score requires efficient organisation of verbal retrieval and word recall.

Respondents whose residences had the highest levels of noise exposure achieved lower scores on the Animal Naming Test than other respondents. The size of this relationship was considerable. To put it in context, respondents with a primary education scored significantly lower on this test than those with a secondary education, and the gap related to education was only slightly larger than the one between respondents exposed to the most noise compared to the least.

However, in a further analysis of a smaller sample for whom we also had data on air pollution, the relationship between noise and executive function became non-significant. This means that we cannot rule out the possibility that some other aspect of the urban environment such as exposure to higher levels of air pollution might have explained the relationship we saw in the data.

We did not find any evidence of an association between noise exposure and the other seven outcomes we tested.

CONCLUSIONS

The level of road traffic noise exposure depends upon many things that can be affected by public policy, including elements of urban planning and traffic management. When making such policy choices, it is useful for planners and transport policymakers to know more about how exposure to noise is related to different aspects of public health. This research focused on whether older adults whose residences were exposed to more road traffic noise scored differently on a range of cognitive tests than their counterparts in quieter areas. While there was no statistically significant relationship between road traffic noise and several types of cognition, results on a test of executive function were lower by a large and statistically significant amount. It will take further research to learn whether this type of cognition is more affected by road noise for older adults than other cognitive domains, or whether more complex processes are at play.

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