

# ADVERSE EFFECTS OF ROAD TRAFFIC NOISE COMPARISON BETWEEN YOUNG CHILDREN AND ADULTS

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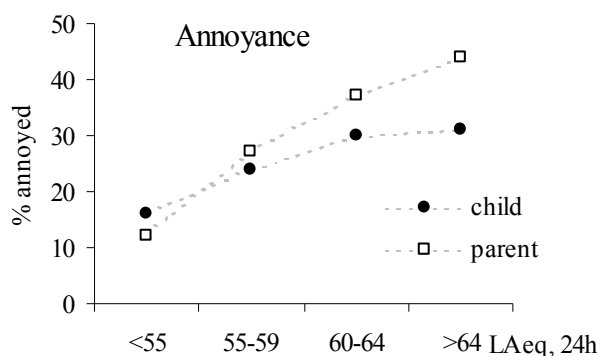
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**Introduction** Many children are exposed to high levels of road traffic noise in their home environment and may also attend schools and other places/activities exposed to high levels of noise. Existing exposure-effect relationships do not take into account that people are exposed to varying sound levels during the 24 hours when staying in different parts of their dwellings, schools and adjacent outdoor areas. Adverse effects of noise exposure at school and other places may be moderated by noise exposure at home, especially due to opportunities for relaxation and sleep in quiet environments and provision of social support by adult carers. Very little comparative research exists between adverse effects on children and adults. The objective of this Swedish project within the RANCH-program was to (1) To provide knowledge on exposure-effect relationships between road traffic noise in the home and the effects on health and well being including sleep comparatively for young children and adults (2) To provide knowledge on exposure-effect relationships in children for road traffic noise in the home and the effects on cognitive function (working memory test “Letter Detective”) for young children. This paper presents a few preliminary results.

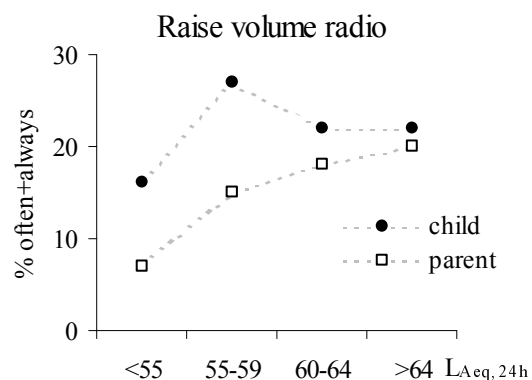
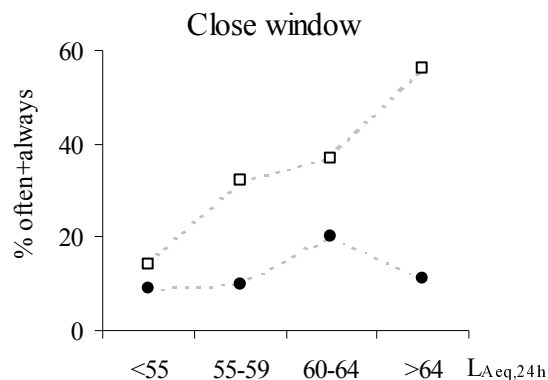
**Method** As part of the EU 5 funded RANCH-project (Contract No: QLRT-2000-00197), children (9-12 years old) and one of their parents (usually the mother) living in residential areas in Swedish cities were selected for studies on adverse health effects of road traffic noise. Four road traffic noise areas in Stockholm, Gothenburg and Örebro were defined based on  $L_{Aeq,24h}$  levels: <55 dB, 55-59 dB, 60-64 dB and >64dB. For evaluation of the impact of noise on health previously used questionnaires were developed in cooperation with the partners within the RANCH-program. The questionnaire includes questions on children’s and parents’ perceived health, activities at home, sleep quality, annoyance (for children both at home and in school) and socio-demographic factors. Perception of the safety and pleasantness of outdoor environment and the use of different indoor and outdoor spaces and location of different spaces (e.g. sleeping quarters, living room) were assessed. In total 160 children were interviewed in their home while the 160 adults filled in a parent questionnaire on their own. The children also performed a short test on working memory (The Letter Detective) after the interview. A sub sample of 80 children and their parents also took part in an in-depth sleep study presented in a separate paper.

**Results and comments** Annoyance for road traffic noise increased at higher noise levels both for children and adults. The figure below shows percentage rather, very and very much annoyed.

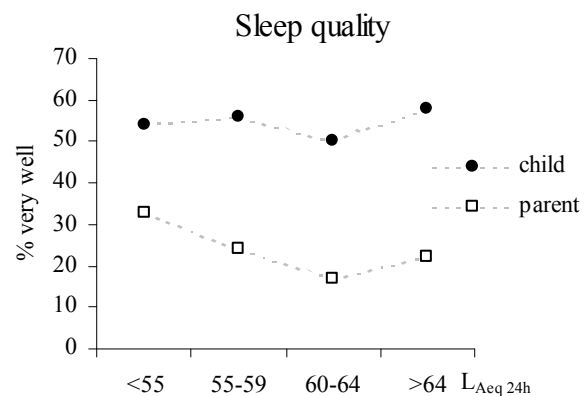
The difference between adults and children’s annoyance increases at higher noise level and the children are significantly less annoyed at noise levels above 64 dBA ( $p=0.04$ ).



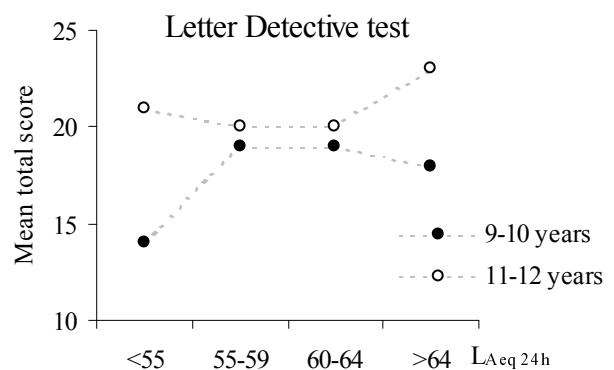
The parents considered the outdoor environment in the most noise exposed area as being less secure and nice from their children's point of view and the children also liked being outdoors in their neighbourhood less than adults in the two most noise exposed areas ( $p=0.03$ ). This difference was not found in the areas with lower noise levels. The children enjoyed their indoor environment more than the outdoor environment and they also enjoyed their indoor environment to a significantly greater extent than the adults ( $p<0.0001$ ). When asked about "*The importance of making it quieter in your home*" the adults found this significantly more important than the children ( $p<0.0001$ ) irrespective of noise exposure levels from road traffic. Adults and children had different ways to avoid noise. Children more frequently raised the volume of radio/walkman while adults closed the windows to avoid noise (see figures below).



Sleep quality for children and adults, "*How well do you usually sleep*" (scale 1-5), is shown in the right figure. The sleep quality of the adults was lower than for children ( $p<0.0001$ ) and decreased at higher noise levels while there was no change in sleep for children. When the position of bedroom windows was considered, the adult who had windows facing the street reported significantly more sleep disturbances due to road traffic noise in the 60 - 64 dBA area.



The last figure shows the average result on the working memory test "Letter Detective" as mean total scores for two different age groups. The differences seen in the figure for the two age groups are larger in the lowest and the highest noise exposure area. Further analyses are needed for the clarification of these results.



The preliminary results reported here will be further evaluated considering other studied moderating factors such as socio-economic, demographic and health variables. Analyses will also be performed in relation to individual noise levels ( $L_{Aeq,24h}$ ,  $L_{night}$ ).

**Keywords:** noise, children, annoyance, sleep, performance