Chronic Aircraft Noise Exposure

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Abstract

The purpose of this epidemiological study was to investigate the long-term effects of exposure to aircraft noise on reading comprehension on a sample of South African children. Given the impairment of reading comprehension found within the noised-exposed group before the relocation of the airport, it was the intention of this study to determine whether the effects of aircraft noise on reading comprehension remained after the relocation of the airport or whether they disappeared. A cohort of 732 learners with a mean age of 11.1 participated at baseline measurements in 2009 and 650 (mean age = 12.3) and 178 (mean age = 13.1) learners were reassessed after the relocation of the airport in 2010 and 2011, respectively. The results revealed no significant effect of the groups on reading comprehension across the testing periods, but significant effects of home language were demonstrated on reading comprehension. These findings suggest that exposure to chronic aircraft noise may have a lasting impact on children's reading comprehension functioning.

Introduction

Although several studies (8-10, 11, 12) paint a consistent pattern of association between reading comprehension and exposure to chronic noise, other studies (13-14) demonstrated no significant effect of noise on reading comprehension. However, when separate analyses of the 15 most difficult items of the reading comprehension test were conducted, a significant difference between the Low Noise and High Noise groups was demonstrated, and this remained after adjustment for age, socio-economic deprivation and home language (14). This suggests that chronic exposure to aircraft noise impairs learners' performance only on difficult items of the reading comprehension test. In addition, this result supports the postulation that simple cognitive tasks that require less attentional processing are not affected by noise and may account for the non-significant results obtained in some studies (13-14).

Of interest in the current study was whether the effects of exposure to chronic noise are reversible, and if they are, how long it takes for cognitive performance to improve.

Equipment

Noise Measurements. In order to measure the external noise surrounding the five schools, a SVAN 955 Type 1 sound lever meter was utilised.

Procedure

The measurement of the noise was taken between 08:00 a.m. and 10:30 a.m., which was during the period when testing took place. The baseline Leq noise measurements for the High Noise group at the noise exposed schools near the flight path in 2009 varied from 63.5 to 69.9 Leq. Maximum noise levels varied from 89.8 to 96.5dBA Lamax. In the case of the Low Noise group at schools in relatively quieter areas, noise measurements in 2009 yielded results of 54.4 to 55.3 Leq and 73.2-74.3 Lamax. Noise measurements in 2010 and 2011 when aircraft were gone produced results at the formerly noise exposed schools of 55.2 Leq and maximum noise levels of 60.8 to 71.2 Lamax. Levels at the quieter schools were averages of 50.5 to 57.9 Leq and 60.6 to 70.5.

Timing

Administration of questionnaires lasted approximately two hours and the study was conducted over a three-year period.

Anticipated Results

The results revealed no significant effect of the groups on reading comprehension across the testing periods, but significant effects of home language were demonstrated on reading comprehension.

Supplementary Files

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Protocol.pdf

The impact of aircraft noise exposure on South African children´s reading comprehension: The moderating effect of home language

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