THE EFFECTS OF NOISE ON THE ATTAINMENTS AND COGNITIVE PERFORMANCE OF PRIMARY SCHOOL CHILDREN
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EXECUTIVE SUMMARY

Classroom noise levels

Measures of external and internal noise were taken in three London Boroughs. Boroughs were chosen to be representative of locations, demographic information and the results of Standard Assessment Tests across London.

- Average noise levels outside primary schools in all boroughs exceeded the World Health Organisation (WHO) guideline value for school playgrounds of 55 dB(A) $L_{Aeq}$
- The predominant environmental noise sources noted were road traffic although air traffic was also common
- A noise measurement protocol was established for determining noise levels in primary schools
- Noise levels in unoccupied classrooms were 7 dB(A) above the level recommended by DfES Building Bulletin 87 and 12 dB(A) above WHO recommendations
- Average daily exposure for a child at school was 72 dB(A) $L_{Aeq}$
- The major factor in determining classroom noise level was the activity in which the children were engaged
- When children are engaged in quiet activities in the classroom the ambient level is closely related to the background and underlying levels outside

Noise levels and attainments

To investigate the effect of chronic noise on children's academic attainments the external and internal noise levels of the schools in two boroughs were correlated with children's performance on Standard Assessment Tests at Key Stage 1 and Key Stage 2.

- There were differences between boroughs in the ways in which noise levels are related to SATS attainments
- In general there was a negative correlation between objective noise levels and attainments when controlling for free school meals, English as an additional language and special educational needs
- This negative relationship was stronger for Key Stage 2 than Key Stage 1 tests and for tests that assess English
- Correlations between SATS and internal noise levels were stronger that those with external levels
- Background noise levels in occupied classrooms were related to SATs results

Children’s and Teachers’ perceptions of noise

To explore children’s and teachers’ perceptions of their school noise environments, questionnaires were administered to Year 2 and Year 6 children and their respective teachers in one London
Borough. The results indicated that

- Children were sensitive to noise sources
- External noise levels accounted for a significant proportion of the variance in the children’s responses to the questions asking about the sound sources heard from their classrooms
- Children were annoyed by specific sound sources
- Children differentiated between good’ and poor’ listening conditions in their classrooms
- Teachers reported awareness of environmental noise sources in the classroom was similar to that of their pupils
- Teachers reported that children are disturbed and distracted by external noise sources
- Teachers did not report many strategies to deal with high noise levels in their classrooms

**The effects of acute noise exposure on children’s test performance**

An experimental study was designed to assess the effect of acute noise exposure on children’s ability to complete a series of verbal and non-verbal academic tasks. Experimental conditions were developed from the objective acoustic measurements and the children’s reports. One experimental condition simulated exposure to classroom babble, a further condition simulated exposure to classroom babble with additional environmental noise. Both noise exposures were compared with performance in the typical classroom environment (base).

- The two noise conditions had differential effects on the children’s performance
- Performance on the verbal tasks (reading and spelling) was significantly reduced in the babble condition
- Children with special educational needs were differentially negatively affected for reading and spelling in the babble condition
- Performance on speed tasks was negatively affected by the babble condition but the performance on these tasks was worst in the simulated babble and environmental noise condition

**Summary**

The present series of studies indicate that

- Children in London primary schools are exposed to higher levels of noise at school than recommended by current guidelines
- External and internal noise levels show negative associations with results of standard assessment tests
- Children judgements of their own noise exposure proved to be a valid indicator
- Children were aware of external noise and annoyed by specific sound sources, although for many activities classroom noise levels are dominated by the noise of these classroom activities
- Children’s reported levels of noise occurrences are related to objective external noise measures
- Acute exposure to noise affected performance on academic tasks
- The noise levels most closely related to SATS results were the maximum level $L_{A\text{max}}$ in the case of external noise and background level $L_{A90}$ for internal noise.

**Conclusion**

Data from noise surveys, analysis of SATs results, children’s reports and experimental studies provide converging evidence that noise levels influence children’s performance and can negatively impact on their attainments.