NOISE AND HEALTH: A COMPARISON OF OCCUPATIONAL AND COMMUNITY NOISE

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1. INTRODUCTION

There is still considerable debate about the effects of noise on health. Studies have examined this topic both in the work place and in community samples. The major interest in the work place has usually been hearing loss but there have also been studies of the non-auditory effects of noise on health (1) and safety (2). A major problem with this research has been distinguishing between effects of noise and those of confounding factors. Noisy working environments often have other negative features and it is possible that it is these correlated attributes, not noise, that influence health and safety.

There have also been numerous community surveys of the effects of noise and these have often focused on annoyance or sleep. Less is known about health effects of community noise and it is unclear whether health effects relate to noise per se or to the annoyance or sleep disturbance produced by the noise. The aim of the present paper is to compare and contrast health effects of noise at work and outside work. This will be done by describing studies in the two contexts and by examining effects in a sample where data on both work and non-work exposure was available.

The present account is based on studies that have used subjective reports of noise exposure and health. It has been shown that results from such studies may differ from those where objective measures of exposure and health are recorded (3). Unfortunately, it is difficult to incorporate objective measures into large scale epidemiological surveys. Those studies that have done so have often failed to measure noise exposure throughout the day and the estimates of exposure may be inaccurate for this reason. Personal dosimetry is one way forward and it will be interesting to see whether future studies using such techniques provide the same or a different picture to the one present here.

2. STUDIES OF NOSIE IN THE WORK PLACE.

Two recent studies have investigated whether exposure to noise at work is associated with health and safety problems. The first, the Bristol Stress and Health at Work Study (4), collected information from a sample of 4,086 workers. The second, the Cardiff Health, Work and Safety Study, collected data from 4,600 workers. Noise exposure was measured using two questions:

"Do you ever have tasks that leave you with a ringing in your ears or a temporary feeling of deafness?" (responses on a 4-point scale from often to never/almost never).

"Do you work in an environment where the level of background noise disturbs your concentration?" (responses on a 4-point scale from often to never/almost never).

Approximately 6% of the samples reported that they were often or sometimes exposed to a level of noise that left a ringing in their ears. Between 20 and 25% reported that they were often or sometimes exposed to noise levels which disturbed their concentration. As mentioned in the introduction, noise exposure is often correlated with demographic or occupational variables. These were, therefore, covaried to remove such effects. Reporting of noise exposure and health is also correlated with negative affectivity. A measure of this was taken in the Cardiff study and was entered as a covariate in the analyses. The surveys recorded a large number of aspects of health and safety. Only results that were significant in both the Bristol and Cardiff studies are reported here (this eliminates finding which may reflect chance effects produced by the large number of analyses conducted).

The results showed that those who were more frequently exposed to noise reported greater stress at work, higher levels of depression, poorer health over the last 12 months, less job satisfaction and more accidents, minor injuries and cognitive failures (problems of memory, attention and action). Noise had no significant effect on chronic disease or many aspects of physical health. These results are important because they have been found in two large scale studies and do not reflect confounding demographic, occupational or psychological factors.

3. COMMUNITY SURVEYS

These studies were conducted to assess associations between reported noise exposure, noise sensitivity, noise disturbed sleep and reports of health. Two samples were investigated. The first was a random community sample from the Bristol area (5). The second sample consisted of those living near to major airports, half of whom were regularly exposed to aircraft noise and half of whom were not (6).

The noise exposure data showed that exposure during the day differed from evening/night/weekend exposure. Factor analyses identified several sources of noise, namely music/neighbours, traffic noise, aircraft noise, trains, machinery/domestic appliance noise and children. This suggests that further research must consider these separate types of noise source. The analyses reported here looked at reports of general noise exposure (both frequency of exposure and intensity). The results showed that noise exposure outside of work was much lower than in the work place. Associations between noise, noise sensitivity and health were found but these were largely accounted for by negative affectivity. However, noise disturbed sleep was associated with poorer health and this effect still remained when negative affectivity was covaried. A problem with these cross-sectional studies is that it is impossible to determine the direction of causality. Does noise disturbed sleep lead to poor health or are those with poor health likely to be more sensitive to noise disturbed sleep?

4. NOISE AT WORK AND OUTSIDE WORK

The previous studies suggest that noise at work had more detrimental direct effects on health than does noise outside work. This could reflect the type of exposure (e.g. louder and more frequent noise at work) but it could also be due to the different methods and samples used in the two types of study.

To address the last issue, a single sample was investigated. All of this sample (N=1892) were working and they answered questions about noise exposure both at and outside work. The results showed that 32% reported that they were quite/very frequently exposed to noise at work whereas 17% reported noise exposure outside work. The two ratings were correlated (0.33) which may reflect underlying psychological biases in the reporting of noise or genuine associations between noise exposure in work and home environments. Correlations were computed to assess associations between reported noise exposure and health. Noise at and outside work showed similar profiles of effects but the associations were stronger for noise outside work. This variable was correlated with difficulty sleeping, fatigue, headache, depression and anxiety, and also minor injuries and cognitive failures outside of work. Noise at work had similar effects but these were weaker. The only specificity related to outcomes that were relevant in only one context (e.g. noise at work was correlated 0.34 with minor injuries at work but noise outside of work was not correlated with safety at work). The noise at work question was significantly correlated with the two noise questions used in the previous study.

The effects of noise outside work were obtained for both those with and without high noise exposure at work. Similarly, they were observed for both high and low noise sensitive individuals. In addition, they did not reflect noise disturbed sleep in that effects were still observed when those with noise disturbed sleep were excluded.

The major impact of noise outside of work is surprising given the results from the previous community studies. Several possible explanations can be put

forward. First, the effects could be due to the failure to control for negative affectivity. This needs to be examined in future research but does not seem to be the total explanation (effects were still present even when noise sensitivity, which is highly correlated with negative affectivity, was covaried.

The second possibility is that it is the combination of noise at work and outside that is crucial. Again, this is unlikely as effects were still observed when the high noise at work group was excluded. In addition, a sub-sample of the survey were not working and this group (N=150) also showed significant associations between noise outside of work and health.

5. CONCLUDING REMARKS

Recent studies of occupational and community noise showed that noise at work was associated with poor health and reduced safety. In contrast, noise outside of work had few direct associations with health although noise disturbed sleep was associated with more health problems. Our latest study comparing occupational and community exposure in a working sample suggested a different pattern of effects. Noise outside of work had greater detrimental effects than the occupational noise. This may reflect differences in perceptions of control over the noise or in the extent to which the noise was perceived as unnecessary (noise at work may be viewed as an inevitable feature of the job). Alternatively, the last result may reflect the methodology and specific questions used in the study. Further research is needed to clarify these points. However, it is apparent that we should pay greater attention to a person's overall noise exposure and examine the combined effects of noise in different contexts. The studies reported here represent a first step towards this goal.

6. ACKNOWLEDGEMENTS

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