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SUBJECTIVE RESPONSE TO NOISE EXPOSURE IN VALENCIA

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INTRODUCTION

During the last 15-20 years, since the noise was recognised as an environmental pollulant, many noise surveys in various cities throughout the world have been reported. Some of these studies include a social survey of the community reaction to traffic noise in order to asses the magnitude of the problem and to develop suitable noise ratings (1). An important purpose of such investigations is to stablish a basis for planning and to develop forecasts on expected reactions when the exposure is altered.

The present paper summarizes the results found out in three social surveys carried out in the city of Valencia (Spain). The first survey (400 respondents) covered all the city and was performed in order to investigate the individual's attitudes towards the noise problem. The second survey (430 respondents) was related to some selected sites (exposed to different levels of traffic noise) and was carried out mainly to determine the relationship between the different noise indices and the average annoyance scores. The third survey (200 respondents) was designed to investigate specifically the effect of socio-economic and demographic factors on the subjective responses to traffic noise.

FIRST SOCIAL SURVEY

The questionnaire used in our first survey contained basically 8 questions (a preliminar investigation showed that the use of a short questionnaire with a minimum of questions was preferable).

Attitudes to traffic noise were elicited by means of a five step semantic scale running from "not at all annoyed" to "very much annoyed".

About 35% of the respondents to our survey stated that are "very much annoyed" by the noise, 38% "quite annoyed", 19% "moderately annoyed", 7% "little annoyed" and 1% "not at all annoyed". Considering the diurnal mean noise level of Valencia (L_{eq} = 69.4 dBA), we can conclude that our results are comparable with those found in other surveys (1).

The levels of diurnal and nocturnal disturbance are quite similar (54% and 46%, respectively). On the other hand, the annoyance seems to be higher in the summer that in the winter (63% and 37%, respectively). This result could be explained in basis to the generalized opening of the windows in Valencia during the summer which produces a significant increase of the noise levels inside the homes.

Our survey shows that the road traffic is the most important source of noise annoyance in Valencia (45%), followed by building and public works (16%), radio and TV (10%), neighbours and children (9%), industries (7%), public houses and recreation places (6%) and aircraft (5%). The low incidence of aircraft noise in comparison with other surveys is a consequence of the characteristics of Valencia airport: there are only about 20 flights per day and, in general, the planes overfly the city only at landing. Of course, most of the respondents bothered by the aircraft noise live in areas close to the airport.

The responses to our questionnaires revealed also that the most annoying vehicles in our city are the lorries (37%), followed by the motorcycles (28%), cars (26%) and buses (9%). The motorcycles without exhaust are the subject of many complaints.

The sleep disturbance due to traffic noise has been also investigated in this general survey. An 11% of the interviewed people reported to be awakened "often" by the noise, the 64% "sometimes" and the 25% "never".

SECOND SOCIAL SURVEY

Even in the earliest surveys, it was observed that for the same noise exposure, some people were nearly oblivious to the noise, so-

me experienced various amounts of annoyance and some were extremely disturbed. Consequently, the correlation between the noise exposure and the individual subjective reactions was poor, with correlation coefficients around 0.3 to 0.4. However, when the responses of a given community (exposed to a more or less uniform noise) were pooled, the correlation between the noise level and the median response of the inhabitants of such community was much better, with correlation coefficients of the order of 0.6 to 0.8.

Our second survey (14 questions) was related to five selected sites of the city. The average traffic volume of these sites ranges from 5000 to 60000 vehicles per day. Our study contained two parts: firstly, the noise levels in these sites were measured continuously over a period of 24 hours (working days) and secondly, an enquiry was made to the residents of such selected places in order to establish a correlation between the mean annoyance and the measured physical noise level.

The mean annoyance ratings correlates quite well with the various noise indices; for the diurnal Leq the value of correlation coefficient was 0.56. Most probably, the reason because the correlation between noise and annoyance is not higher resides in the lack of homogeneity in the social composition of the communities considered in our survey (in variables such as age, social status, etc). This point has been further investigated in our third social survey.

The sleep disturbance correlates very well with the nocturnal noise indices; the correlation coefficients were particularly high in the case of L10, Leq and NPL (0.88, 0.89 and 0.95, respectively). On the other hand, the results of our survey show that the sleep disturbance contributes significantly to the general annoyance.

THIRD SOCIAL SURVEY

Most of the surveys on the subjective responses of residents in urban areas to traffic noise did not really attempt to relate the annoyance responses to social characteristics of respondents. An exception was the research carried out by Langdon (2) in which it was observed that the sensitivity to noise was systematically related to a number of demographic and socio-economic variables. More recently, this problem has been studied by Ko and Wong (3).

Our third survey was carried out to investigate specifically the-

se effects. The questionnaire of this survey contained 16 questions. All the respondents are residents of a large road (with an average traffic volume of 55000 vehicles per day) and in a first approximation we could assume that they are exposed to a same noise level.

Although an attempt to relate the average annoyance to the sex of the respondents has been made, no significant differences have been obtained between the responses of the male and female. On the other hand, the young people seem to be more annoyed by the noise than the older people: the 46% of the people under 20 years old declares to be "very much annoyed" by the noise and the 6% of these people declares to be "not at all annoyed", in comparison respectively with the 27% and 13% of the people over 60 years old. However, the old people are more sensitive to the nocturnal noise: the 18% of the people over 60 years old declare to be awakened "often" by the noise, in comparison with only 7% of the people under 20 years old. The difficulties for falling asleep due to noise follow a similar trend.

The average annoyance scores has been also compared with the education level of the respondents. Our data show that better educated people are more sensitive to road traffic noise than the less educated: the 60% of the people with an university education declares to be "very much annoyed" by the noise, in comparison with only the 18% of the people with none education.

REFERENCES

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