

URBAN TRAFFIC NOISE AND SELF-REPORTED HEALTH¹

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Summary.—This paper analyzed urban traffic noise effects on health at two different levels: intense noise and moderate noise. 42 residents of the area responded to questions on perceived noise and psychological and behavior disturbance before and after acoustic insulation was constructed. Analysis of self-reports indicated that perceived noise was associated with lower health. Also these perceived effects on health did not decrease after the acoustic isolation work was finished.

Noise is one of the most important factors in producing deterioration of both well-being and the quality of life of people living in urban areas (López-Barrio & Moral-Toranzo, 1997). Nonauditory effects of noise are not so well established as auditory ones. Nonetheless, noise, like any other stressor, provokes a series of physiological, psychological, and behavioral changes in responses (Evans & Cohen, 1987). Several studies (e.g., Crook & Langdon, 1974) highlight the relationship between exposure to noise and certain physical and mental symptoms such as headache, distress, and insomnia. Other authors (e.g., Stansfeld, 1992) have shown that exposure to traffic noise is closely linked to annoyance but is weakly correlated with other psychological symptoms. In addition, variables such as social class, profession, and marital status tend to interact with the exposure to noise and distort the effects of noise on health indicators, highlighting the difficulties in establishing causal or interdependent relationships between exposure to noise and health.

The researchers took advantage of an environmental policy for reducing traffic noise in a large urban area to analyze the relationship between noise and health when an objective reduction in amount of noise occurred. The research was carried out in an urban area stretching along 400 metres of the West Málaga ringroad where approximately 400 people live. The road is only nine metres below the houses and intense noise from the motorway's six lanes is amplified by resonance. After a great number of demonstrations and formal complaints by the residents, measures for acoustic isolation were taken three years after the opening of the ringroad by means of an acoustically soundproof roof covering the pertinent stretch. These circumstances allowed us to evaluate the effects of perceived noise on health at two differ-

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ent levels, with intense noise and then moderate noise. As shown in Fig. 1, we assumed that perceived noise reduces people's health. It was also assumed that the effects on health would decrease after the acoustic isolation work was finished, that is, once the noise had been reduced. To measure traffic noise in the area a dBA sound-level meter was used. The type of noise studied was nonperiodic or discontinuous but is expressed by its equivalent continuous index (Leq). Noise values were measured in the second week of April 1994, before the ringroad section was acoustically isolated, and then in the third week of January 1996, 3 months after the insulation work had been finished. During the pretest, the recorded sound levels ranged from 67.3 to 74.93 decibels. Posttest measurements ranged from 57.3 to 62.0 dBA. With this reduction the soundlevel remained above the maximum levels recommended by Malaga council regulations (45 dBA).

A total of 42 people, 25 men and 17 women whose ages ranged from 16 to 68 years, participated. During the noise recording, a questionnaire assessing the effect of traffic noise on subjects' health was completed with the help of an interviewer who visited the participants at their homes. To evaluate perceived noise, three questionnaires were used (Moral-Toranzo & Gómez-Jacinto, 1996). The first one focussed on arousal provoked by traffic noise; the second one referred to its disturbing effect on daily life; and the third, the perceived unpleasantness of noise. Two scales were given, a questionnaire about the number of health problems experienced during the current year, visits to the family doctor or specialists, and the use of tranquilizers and analgesics. The second indicator, a shortened Spanish version of the General Well-being Schedule (Fazio, 1977) developed for the National Center for Health Statistics, was a structured inventory for assessing subjective well-being.

Data were analyzed in terms of the model in Fig. 1 using structural equation modeling with the program LISREL 7 (Jöreskog & Sörbom, 1989) and estimations with Unweighted Least Squares. Fig. 1 represents structural coefficients and the goodness-of-fit indexes. These indicate a well-fitted model. As predicted, the perceived effects of noise on health is strong. After the construction of the acoustic covering, noise still was associated with lower health, but less so. To verify whether the difference found in the comparison of pre- and posttest was significant, Jaccard and Wan's (1996) procedure was followed. According to this approach, the model is reestimated with the constraint that the parameters linking health and noise have the same value before and after insulating the ringroad with the 'soundproof' cover. The difference between the models was not significant [$\chi_1^2(N=42)=1.4, p>.10$], so the parameters are basically identical. The global fit indexes of this model suggest a good fit [$R^2=.98, GFI=.94, \chi_1^2(N=42)=33.82, ns$]. Regarding the measurement model, it can also be seen in Fig. 1 that arousal and distur-

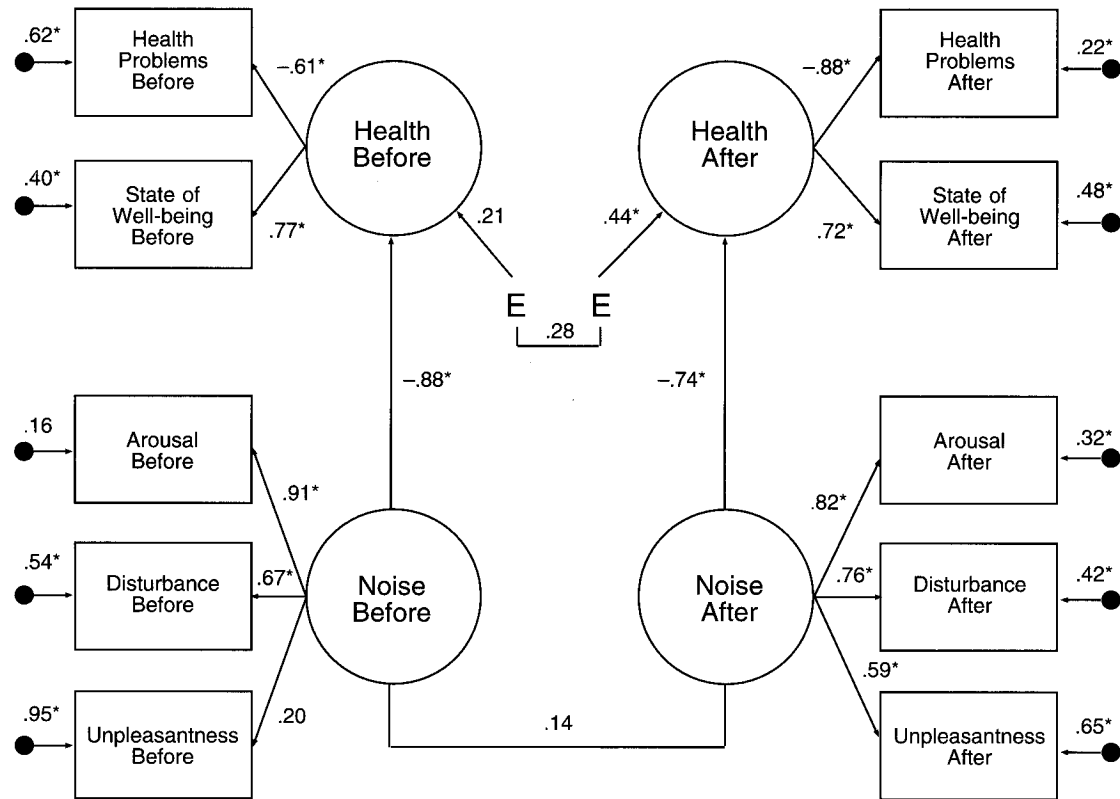


FIG. 1. Structural model: correlations among scores on health before and after the acoustic insulation from traffic noise (N=42). * $p < .05$.

bance due to noise were good indicators of the perceived noise. The perceived unpleasantness was not such a good indicator, especially during the first period, as measurement error is very high. In both instances, the two health indicators have shown acceptable measurement errors.

Basically, the results support the two proposed hypotheses. Exposure to noise has a negative effect on people's health and this remains the case, although less, even when objective noise conditions have improved. As shown in Fig. 1 the amount of perceived noise before insulation is associated with lower perceived health ($\gamma = -.88$). This is similar after insulation: perceived noise is associated with lower health ($\gamma = -.74$), although the objective value of noise is less. The relationship between perceived noise before and after insulation is low ($r = .14$). Thus, we see that the negative evaluation the person makes of the external stressor and not only its objective value is crucial to the report of negative effects on the person's health. This work provides evidence as to the difficulties of establishing an accurate point of reference for nonauditory effects of noise on people. Our suggestion for further work is to target those subjects who display more sensitivity than average to noise and then, using a longitudinal approach, more clearly establish directly the effects of noise as an environmental stressor on physical and psychological health.

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Accepted May 17, 1999.