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Does risk recognition affect workers' hearing protection utilisation rate?

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Abstract

In industrial environments, it is very likely to find several workers sharing the same workplaces and being exposed to the same noise pressure levels, who have different perceptions of the risks they are exposed to. These different perceptions could lead to different workers' attitudes and behaviours. The present study was carried out with a sample of 434 industrial workers exposed to noise pressure levels greater than the action level defined in Portuguese legislation (85 dB(A)). The study aims to analyse the role of individual risk recognitions in hearing protection devices' (HPD) utilisation rates. A questionnaire was developed to assess workers' risk perception of high-noise exposure and their utilisation of HPD. The multivariate data analysis of the several variables considered revealed that risk recognition in general and self-efficacy in particular, plays a significant role as a predictor of workers' behaviour with respect to the use of HPD. Furthermore, these results do suggest that risk recognition should be considered as an essential issue in the design and implementation of any Hearing Conservation Program, in particular in what concerns workers' training.

Relevance to industry

Results obtained do suggest that workers' risk recognition could have an important impact on noise exposure protective behaviours and these could be used to design and conceive successful industrial Hearing Conservation Programs.
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Keywords: Hearing protection; Recognition; Risk; Noise

1. Introduction

In Portugal, as in many other countries, employers must accomplish legal requirements concerning noise exposure, which include the implementation of a hearing conservation program (HCP). These structured programs aim at the definition of all the actions that employers should carry out in order to preserve the hearing condition of the noise-exposed workers. However, these programs are typically oriented to the workers hearing testing and hearing monitoring and not particularly to motivation and training issues. Concerning the adoption of measures to minimise noise exposure, these programs preview the implementation of technical and organisational measures and, as the last resource, the use of hearing protection devices (HPD). The implementation of HPD use is theoretically defined as a temporary solution, but due to some economics restrictions and applicability issues, they are widely employed as the only measure against noise exposure (Morata et al., 2001).

Beyond the fact that HPD should have appropriate attenuation characteristics to the specific noise environment in which it will be used, it is also known that some ergonomic aspects of the HPD, such as the comfort, play an important role in the HPD efficiency. HPD efficiency depends largely on the use duration when exposed to noise and, consequently, on its comfort. According to Arezes and Miguel (2002) HPD's attenuation could be computed using Eq. (1), considering R as the "real" attenuation of a hearing protector with a nominal attenuation N and used during p (%) of the total shift time.

$$R = 10 \times \log \frac{100}{100 - p(1 - 10^{-N/10})}. \quad (1)$$

As an example of the influence of the time of use, we can imagine a worker who just wears his HPD during 90% of his 8 hr shift, and consequently does not wear it only for

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48 min. In this case, the attenuation afforded by the HPD, with nominal attenuation of 30 dB, is less than 10 dB.

Using Eq. (1) it is possible to verify that, unless workers wear HPD continuously, its efficacy will be very low. Therefore, it is important that HPD should be available in high-noise workplaces, but it is also essential that workers should be aware of the need to use them all the time.

As mentioned in other studies on risk recognition, individual risk perception is a critical antecedent of risk behaviour (Glendon and McKenna, 1995). Therefore, the way by which workers perceive the risks they are exposed to can be an important input for a better understanding of risk management, and at an individual level, to their own safety (Rundmo, 1996). Accordingly, some studies involving noise exposure workers (Brady, 1999; Arezes and Miguel, 2005) have shown that the way workers perceive the risk of noise exposure can play an important role in their safety behaviour, namely in the use of HPD.

Although risk perception has been studied for several decades, the majority of the studies are related to environmental risks and at a society level, such as the risk of building a nuclear plant. Studying risk perception and risk exposure is an attempt to explain the extent to which risk perception influences workers' behaviour and attitudes, namely, those regarding noise exposure and ways of preventing it, either by avoiding it (whenever possible), or by using personal protective equipment. It seems reasonable to assume that risk perception in workplaces can, at least to a certain extent, influence workers' behaviour and thus their exposure to these risks (Stewart-Taylor and Cherrie, 1998). Only a few references in the literature pointed out the relationship between risk perception and occupational noise exposure, some of them relating risk perception and the use of HPD (Nelson et al., 1999; Lusk et al., 1995).

The study of risk perception or recognition, is somehow dependent on the risk nature, which is an important item that affects the workers' behaviour towards the risk itself, as is the case of noise or chemical exposure. These risks are "invisible" and not explicitly dangerous: the damage process is chronic and does not show a clear indication of its magnitude. It is, therefore, important to study the different forms by which workers recognise the risk, specifically the noise exposure risk, and to identify the reasons for such variability.

This study, carried out in an industrial context, aims at analysing the role that risk recognition regarding noise exposure can have in the decision of use, or not, of HPD, as well as, gathering empirical data which will allow the identification of the main factors influencing individuals' risk perception of noise exposure. This identification will permit a better understanding about the existent relationship between risk recognition and HPD use, which ultimately will help in the definition of accurate strategies for promoting risk recognition.

2. Methodology

Considering the main goals of this study, as well as some bibliographic references, two questionnaires for risk perception assessment and HPD use characterisation were developed. From the administration of the first questionnaire and the assessment of noise exposure levels several variables were considered and are described in subsequent sections. At the same time, a second questionnaire was administered with the aim of characterising occupational noise exposure profiles, as well as the use of HPD.

2.1. Sample description

As mentioned previously, the present study was carried out among industrial workers and included a sample of 434 workers from 5 different companies (Table 1), including textile, apparel, printing, wood and beverage industries.

The selection was based on noise exposure levels (Fig. 1), which should be higher than the action level for daily

Table 1
Sample's demographics characteristics ($N = 434$)

Company sector	N	HPD use (%) m (sd)	Age (years) m (sd)	Professional experience (years) m (sd)
Textile	158	51 (46)	39.3 (9.9)	18.1 (10.4)
Textile and apparel	156	35 (45)	43.0 (9.3)	25.6 (10.7)
Printing and labels production	18	25 (41)	38.9 (9.3)	9.7 (5.8)
Laminates production	58	47 (43)	41.1 (8.1)	15.6 (8.9)
Beverage production	44	70 (37)	48.3 (8.7)	24.9 (8.3)
Total	434		41.8 (9.7)	20.8 (11.0)

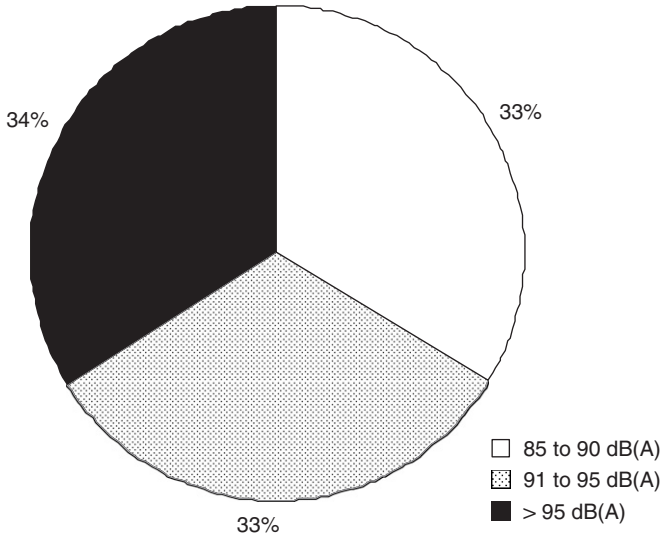

Fig. 1. Sample's subject distribution according the workplace daily noise exposure level.

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