

ATTITUDES AND BELIEFS CONCERNING HEARING PROTECTORS AND NOISE EXPOSURE

Annelies Bockstaël¹, Lieve De Bruyne², Bart Vinck², and Dick Botteldooren¹

¹Acoustics Research Group, Ghent University, Sint-Pietersnieuwstraat 41, 9000 Gent, Belgium,
annelies.bockstael@intec.ugent.be

²Department of Oto-rhino-laryngology and logopaedic-audiologic sciences, Ghent University, De Pintelaan 185, 9000 Gent, Belgium

1. INTRODUCTION

Ongoing research aims at identifying the variables that influence or even determine the actual use of personal protectors at the work floor (Arezes, 2006). In this regard, risk perception, perceived self-efficacy and normative influences have been cited as critical issues. The current study investigates influential factors from a practical hearing-conservation point of view trying to answer the question what should be focused on to promote effective implementation of personal hearing protectors at the work floor? The parameters under study are related to three major categories (1) knowledge about the risk of noise exposure in general and possible harmfulness of exposure levels at the work floor, (2) attitudes, beliefs and feelings with respect to personal hearing protectors and (3) perceived safety climate. Within and across these groups, a certain hierarchy will be established and the mutual relationship between independent variables will be assessed.

2. MATERIALS AND METHODS

A written questionnaire has been distributed among the work force of four different Belgian companies engaged in various industrial activities. The majority of the questions are a Dutch translation of the Noise at Work Questionnaire drawn up by Purdy et al. (2002) and are to be answered on a 5-point Likert-scale. The whole survey has been thoroughly analysed beforehand to establish a valid, comprehensible and consistent tool, suitable for the study at hand.

Within the participating companies, the use of hearing protection is either obligatory or – in few cases – at least recommended by the European Directive 2003/10/EC and the applicable Belgian legislation. Noise measurements by the researchers themselves confirm exposure levels of at least 80 dB(A) and mostly higher than 87 dB(A).

After excluding incorrectly completed questionnaires, 106 usable versions could be retained. All participants appear to be male and are on average 38.8 years old (standard deviation 11.1) with 12.1 year of working experience (standard deviation 10.4) in the company.

The use of hearing protectors is assessed by comparing the self-reported daily noise exposure (in hours) with the reported daily use of hearing protectors (in hours). These numbers are converted to a dichotomous variable, i.e. continuous use of protectors while exposed to noise or not. This means that people reporting wearing protectors only

part of the time, are also considered as non-users, an approach justified by the finding that even temporal removal of a hearing protector largely compromises its actual attenuation (Arezes, 2006).

Based on this outcome, logistic regression is carried out to assess the probability that people will use their hearing protectors consistently while exposed to noise. The attitudes and beliefs addressed through the survey are selected as candidate independent variables. Conclusions on a variable's contribution to the model are based on the statistical significance of their coefficients ($\alpha=0.05$) and changes in model deviance and AIC (Akaike information criterion) – measures of a model's goodness-of-fit – when this variable is added.

3. RESULTS

Although all participants work in companies where hearing conservation measures are obligatory (or in the odd case advised), only half of them (55.7%) report consistently wearing hearing protectors while exposed to noise. In contrast, most people are aware of the relationship between excessive noise exposure and hearing loss (90.6%). This discrepancy has been reported worldwide (Ologe, 2005). Now the obvious question is why people do not translate their general knowledge into preventive actions and what can be done to improve the situation.

A first issue here seems applying general 'rules' to one's personal situation. Despite the fact that all participants work in noisy places, 26% of them claim not to be exposed to harmful sound. Although low, this percentage is satisfying since it is quite low compared to what Arezes found in 2006, possibly due to cultural differences or general increase in awareness of noise-induced hearing loss over time. Nevertheless it also shows that one-fourth of the employees potentially underestimates their noise exposure, which is all the worse because the probability of consistent hearing protection use increases with increasing risk perception, both in this study ($p=0.04$) and previous work (Arezes, 2006).

Acknowledging the risk of noise exposure is one thing, people should probably also be convinced about their protectors' benefits before they will actually wear them. In this regard, Quick (2008) has found that a general positive attitude towards hearing protection largely determines the intention to use them. In this study, the group of participants opining that hearing protectors prevent hearing loss is not

overwhelming (65%), but then again this item appears to be less relevant for consistent use ($p>0.05$). A possible explanation for the difference with Quick's work is that the latter has investigated the relationship between attitude and intention to wear hearing protectors, whereas the current analysis has reported behaviour as the outcome variable.

Another aspect with respect to hearing protectors is perceived self-efficacy. Narrowing down this concept to reported knowledge shows that in this study 85% feels confident about how to use hearing protectors correctly, but this statement is not statistically related to actual consistent use ($p>0.05$). However, if self-efficacy is interpreted in a broader sense of perceived behavioural control, i.e. balancing pros and cons of hearing protectors against each other to decide on final use, this parameter is shown to influence clearly consistent use (Arezes, 2006; Quick, 2008). Rather than general beliefs about hearing protectors (cf. *supra*), concrete everyday experiences are clearly important, namely comfort ($p<0.001$), ease to use ($p<0.01$), communication with colleagues ($p<0.01$) and perception of warning signals ($0.1>p>0.05$).

Finally, as always, human behaviour has an important social component, which also plays its role in hearing protection. For instance, in Quick's research (2008), subjective norm is the only parameter that influences both the intention to wear protectors and directly the final behaviour, additionally Arezes (2008) names perceived safety climate as an important predictor. In this study, subjective norm related to consistent hearing protection use appears limited to the workplace ($0.1>p>0.05$) and the behaviour of co-workers ($p<0.05$), meaning that other employees like clerks or family members have no significant influence on reported behaviour ($p>0.05$). In accordance to Arezes (2006), reported control at the workplace also ($p<0.01$) positively influences the actual use of protectors. By contrast, individual guidance has no clear influence.

The analyses described above have allowed identifying the most influential parameters, but since hearing conservation programs cannot handle everything at the same time, building a hierarchy might help to establish priorities. Statistical modelling reveals that for the current dataset reported wearing most strongly depends on practical, down-to-earth considerations like (in order of statistical significance) comfort, control and ease to use.

The importance of control as an exponent of the perceived safety climate is expected from Quick (2008). However, Arezes (2006) argues that although control does help to improve the use of hearing protectors, it does not lead to increased risk perception and hence the desired behaviour is only established when people know themselves to be supervised, which is in the long run not a sustainable approach. Our study indeed confirms that more control or individual guidance do not seem to increase risk perception.

By contrast, these results do not suggest that individual guidance is pointless in terms of hearing conservation because it appears to influence the reported comfort. For the participants who report no individual guidance, almost half of them (46%) find their protectors more or less uncomfortable. Conversely, this number drops down to 17% in the group where individual guidance is given, those trends are in accordance with work done by Tsukada (2008). Moreover, control as such seems not capable to realise the positive effects of an individualized approach since feelings of discomfort are reported independently of this variable.

4. DISCUSSION AND CONCLUSION

The study presented in this paper suggests that reported use of hearing protectors depends more on practical constraints than general beliefs and attitudes. This contests by no means the importance of concepts like risk perception, rather it suggests that principles are relatively easily put aside by practical considerations. Control appears an influential factor, but relying on this parameter only is an unsustainable approach. Control mechanisms are only one link in the network of hearing conservation, though definitely a vital one. The importance of comfort and ease of use is already well-known and confirmed by the current study. Apparently people behave quite pragmatically when respecting general (health) rules causes discomfort. In this regard, individual guidance in selection and use of suitable hearing protection might be a real boon.

REFERENCES

- Arezes, P.M., Miguel, A. S. (2006). "Does risk recognition affect workers' hearing protection utilisation rate?" *International Journal of Industrial Ergonomics* 36, 1037-1043.
- Arezes, P.M., Miguel, A. S. (2008). "Risk perception and safety behaviour: A study in an occupational environment," *Safety Science* 46, 900-907.
- Ologe, F. E., Akande, T.M., Olajide, T. G. (2005). "Noise exposure, awareness, attitudes and the use of hearing protection in a steel rolling mill in Nigeria," *Occupational Medicine* 55, 487-489.
- Purdy, S.C., Williams, W. (2002). "Development of the Noise at Work Questionnaire to assess perceptions of noise in the workplace," *Journal of Occupational Health Safety – Australia and New Zealand* 18, 77-83.
- Quick, B. L., Stephenson, M.T., Witte, K., Vaught, C., Booth-Butterfiel, S., Patel, D. (2008). "An examination of antecedents to coal miners' hearing protection behaviours: A test of the theory of planned behaviour," *Journal of Safety Research* 39, 329-338.
- Tsukada, T., Sakakibara, H. (2008). "A trail of individual education for hearing protection with an instrument that measures the noise attenuation effect of wearing earplugs," *Industrial Health* 46, 393-396.

ACKNOWLEDGEMENTS

Annelies Bockstael is a postdoctoral fellow of the Research Foundation-Flanders; the support of this organization is gratefully acknowledged.