

**SUMMARY, CONCLUSIONS AND RECOMMENDATIONS FROM HSE
RESEARCH REPORT 28 BEHAVIOURAL STUDIES OF PEOPLE'S
ATTITUDES TO WEARING HEARING PROTECTION AND HOW THESE
MIGHT BE CHANGED**

SUMMARY

This report describes a study in which the various factors influencing workers' attitudes and behaviours towards hearing protection were examined. Subsequently, workplace intervention programmes were designed and carried out to improve the acceptance and overall use of hearing protection. The results of these interventions are discussed in detail. This work was carried out in two distinct phases. In Phase 1, a range of companies with noisy processes was surveyed and information was collected from employers and employees by means of self-administered questionnaires. These identified various organisational and personal factors that play a major part in worker behaviour.

The questionnaire surveys were supplemented by independent observations on working practices and conditions to minimise any potential biases, whereby individuals respond in a manner they believe to be accurate but are unaware that in practice they behave differently. The confidentiality of the surveys was also emphasised to prevent employees giving misleading responses where they thought that reporting the truth might have implications for their relationship with their employer or work colleagues.

The companies surveyed were from a range of industries and covered large, medium, small and very small employers (see table 4.1). There was a range of different management approaches to noise control and generally the larger companies had effective or partly effective hearing protection programmes in place. The smaller companies had very limited noise control procedures and relied heavily on personal protective equipment. In general, the employees that responded to the questionnaires had a high level of risk awareness and medium to high levels of knowledge about noise. Nonetheless, there were a number of negative attitudes identified during the surveys, together with various myths and misunderstandings.

The report describes the limitations in the organisational approaches to the companies' hearing conservation programmes and also identifies key worker attitudes. These were evaluated and interventions were designed for implementation in Phase 2 of the project. The interventions carried out in Phase 2 were designed to address the specific needs of four separate workplaces, previously surveyed in Phase 1. These interventions included basic noise awareness training, provision of alternative types of hearing protection, and coaching of management in basic feedback and communication techniques for encouraging workers to modify their behaviour. The interventions were designed to be participative and involving. The results of the interventions were assessed by comparing the observed behaviour with that previously noted in Phase 1 and also by administering a post-intervention questionnaire during a follow-up survey eight weeks after the workplace interventions were carried out.

In all cases, the interventions showed positive results with increased hazard awareness amongst the workers and increased use of the hearing protection. The most basic types

of intervention such as noise awareness training and provision of the most suitable hearing protection for the job showed the greatest improvement. The feedback from the behavioural safety training that was carried out was encouraging but the improvements were subtle and difficult to detect.

The survey shows that workers and management in the sites visited were generally receptive to hazard awareness training, but these findings are partly to be expected given the nature of the workplace selection process. Although there were positive indicators from the behavioural safety intervention, we gained an impression that management were unconvinced that this could be used as a practical tool and some workers also reported that they would have preferred more formal training. This is perhaps unsurprising when considering the safety culture that predominates in the traditionally noisy industries visited. Many of the companies appeared to have authoritarian cultures and it is expected that given such conditions considerable effort would be required to refine a behavioural safety programme that fitted the culture, needs and expectations of such a traditional type of organisation and did not alienate workers and line management. It is also recognised that where senior management show commitment to a safety programme there is an increased likelihood that employees will also commit to it. This was anecdotally evidenced by employees' comments during the Phase 1 study where some indicated that the management did not wear hearing protection so why should they.

It is concluded that there are many simple and practical measures that companies can take to improve the use of hearing protection and the attitudes of workers towards it. These are not novel actions, but simply what an enthusiastic safety professional/manager would recommend in the course of his or her work, adhering to the principles of good training practice and participative, active learning models.

This study illustrates that industry needs a high level of motivation to commit to a programme of improvements in hearing protection usage, which of course may well be true for the management of other types of workplace hazard controls. Management was somewhat uncertain about behavioural safety training, which suggests that for such organisations more understanding and education about the potential benefits of such a programme may need to be provided. However one organisation which had implemented a very detailed and successful safety programme based upon behavioural observation, feedback, reinforcement, monitoring and revision was clearly committed to the approach and could demonstrate its benefits. It is certainly clear that considerable time and effort would be required to put a full behavioural safety training programme in place. It is felt that management commitment to its implementation and development as a long-term change tool would be critical to its chances of success in an organisation. In the current reality it is likely to be large organisations that use a behavioural safety approach or would be receptive to its use as an intervention. Small and medium sized organisations probably want interventions that are practically oriented and have minimal impact upon time and money resources. Perhaps basic principles taken from behavioural safety, communication, learning and training models could be distilled and put into everyday language and contexts that could help managers and safety professionals to increase the use of hearing protection in workplaces.

The concept of roving safety representatives, currently being investigated as part of HSE mainstream research, would appear to have potential benefit in improving attitudes towards hearing protection, especially for small and medium sized organisations. These

representatives could have the opportunity and authority to visit workplaces, provide the necessary advice about PPE and other control options, carry out hazard awareness training and perhaps recommend behavioural programmes where these might be appropriate. It is important to realise however, that this would require the safety representative to have an unusually high level of training, skill and experience to be effective.

Table 4.1
Profile of companies/factories included for study

Company Code	Status	Company activity	Total No. of employees	Employees at site ¹	Category of employer	Number of questionnaires collected ²
APP	Pilot	Compressed gas supply depot	17,000	25	Large	7
BAP	Pilot	Ship building (blacksmith shop)	100,000	1,500	Large	15
HSC	Main	Joiner's workshop	800	6	Large	4
PNR	Main	Road stone quarry	11,000	30	Large	11
BLH	Main	Light engineering (machine shop)	8,000	31	Large	13
QOL	Main	Food processing	4,000	107	Large	9
AVD	Main	Printing/ paper processing	15,000	200	Large	14
SPL	Main	Coal fired power station	850	268	Large	19
RRL	Main	Light engineering (fabrication)	40,000	500	Large	42
BAY	Main	Ship building (fabrication)	100,000	1,500	Large	32
LDC	Main	Textiles (twisting and winding)	960	94	Medium	17
RPG	Main	Light engineering (fabrication)	215	100	Medium	9
HSW	Main	Bottling	150	130	Medium	24
LPE	Main	Light engineering (fabrication)	230	230	Medium	38
SAB	Main	Stone masonry	15	15	Small	3
BCL	Main	Ferrous foundry	15	15	Small	8
CDS	Main	Construction services (core drilling)	25	25	Small	7
HTG	Main	Light engineering (fabrication)	30	30	Small	11
BLT	Main	Light engineering (machine shop)	8	8	Very small	6
GLL	Main	Road stone quarry	10	10	Very small	9
NWS	Main	Construction (road maintenance)	5	4	Very small	4
TOTAL employee questionnaires						302
TOTAL (Less pilot surveys)						280

CONCLUSIONS

Phase 1 of this project highlighted discrepancies between what individuals and organisations say they do and how they behave in reality. It was apparent that although companies had implemented hearing protection programmes, these were not always entirely successful and this was attributed to a lack of commitment by senior staff. However, this is an important (but not the sole) factor in the understanding of the attitudes and behaviour of individual workers towards hearing protection since human factors such as culture, gender stereotypes and peer pressure may counteract management influence (either to the detriment or the benefit of safety).

OBSERVATIONS ABOUT MANAGEMENT PRACTICES

There was a clear distinction between management practice in large companies and that of medium sized and smaller companies. Large companies were aware of their legal duties and were more likely to possess formal systems for managing health and safety. This demonstrated a high level of management commitment to hearing protection and generally this filtered down to the shop-

floor level of the factory, supporting the findings of previous research (Marsh *et al*, 1998; Berger, 2001; Pilkington *et al*/2001, and Fleming & Lardner, 1999).

There were many examples of confusion about when and where hearing protection should be worn. In large-scale operations like power stations, where the noise levels are generally constant and unchanging, implementation of the hearing protection programme is reasonably simple. However, the frequently changing nature of the work in many of the smaller sites visited meant that it was difficult for management to keep up to date with their noise assessments and workers often received inadequate or inappropriate instructions. In their efforts to comply with the statutory duty to designate hearing protection zones, management had assigned entire work areas as such. Workers often ignored the warning signs, since they were clearly inappropriate in certain areas or at certain times of the day. In these cases management reinforced the workers behaviour by failing to enforce their own rules.

IMPACT OF HEALTH AND SAFETY REGULATIONS

It was clear that the Noise at Work Regulations 1989 were often misunderstood and viewed as being complicated, particularly with setting of two action levels, but the most obvious misunderstanding was that the Action Levels referred to daily average exposures. It may be concluded from these observations that the Noise at Work Regulations (and supporting guidance) need to be as simple as possible if they are to be properly implemented by companies with limited resources.

The provisions of the CDM Regulations were an important influence in improving the health and safety performance of small and medium sized companies within the construction sector. All three of the construction services companies included in this study reported external pressures by planning supervisors and principal contractors. This has apparently had a major impact on the use of hearing protection within this industry sector, albeit indirectly.

SELECTION AND USE OF HEARING PROTECTION

Generally, larger companies had made a careful selection of a range of hearing protection to offer their employees, taking into account the level of protection and compatibility with other PPE. While the small and medium sized companies tended to select hearing protection less rigorously, our independent assessment found that the devices were capable of protecting the wearers adequately if worn correctly.

It is recognised that manufacturers of hearing protection are conscious of the limitations of these products and have taken steps to make their equipment more attractive and comfortable to wear. A range of brightly coloured devices is now available, which make them more attractive, particularly to younger workers.

Also, a range of passive noise filtering muffs offer the wearer greater opportunity to hear speech sounds. However, out of a number of hard hat and earmuff combinations available only one type was found to offer a high quality of fit. In fact some of the types tested were very poor and offered limited added benefit. The main reasons that workers gave for failing to wear hearing protection was loss of comfort and impediment of communication. However it was clear from observation that this related to their overall acceptance of the hearing protection rather than the probability that they would wear the protection when required. Workers are subject to a number of conflicting demands on their attention and factors such as ease of use and availability of the hearing protection play a major role in influencing whether they are worn at any particular time.

Workers were most likely to be found wearing hearing protection if they had developed a strong association between it and the task being performed. The strength of this association was highest for jobs where routine behaviour was required and also where the noise levels were constant and unchanging. Workers that moved from this type of environment to a different workplace were more likely to continue to wear the hearing protection, regardless of whether or not it was actually required.

EFFECTIVENESS OF THE INTERVENTIONS

The interventions in Phase 2 were designed after considering the findings of Phase 1 and were designed to meet the needs of the four different organisations included. The content of the courses covered a variety of topics including, basic noise awareness, practical demonstrations of the effects of noise induced hearing loss, discussions about noise levels, the legal duties of employer and employee and general issues relating to the subject matter. The courses also offered workers the chance to become involved in trying different types of hearing protection and deciding what types they preferred for their particular work situations. In one organisation some staff were coached in the use of basic behavioural modification techniques as methods to encourage and promote the use of hearing protection in the workplace.

The results indicated that the attitudes and behaviour of staff in relation to the use of hearing protection could be positively influenced and changed by developing tailored practical intervention programmes. The results also suggested that even basic knowledge and skills in feedback and reinforcement can assist management in the promotion of a hearing conservation programme. However, it is clear that management of small and medium sized companies find these techniques difficult to master. Therefore, if these are to be more effective, there probably needs to be an increased emphasis placed on management training and coaching with lots of opportunity to practice, review and understand the different aspects that underline the behavioural safety programme. The results are encouraging on a number of fronts as they suggest that improving the

use of hearing protection in workplaces is achievable where various good practice principles are followed.

A key to the success in increasing the use of hearing protection was the fact that the interventions were tailored to meet the needs of each organisation following the Phase 1 assessment of needs (in real terms what had been carried out was a training needs assessment). This meant that the content was designed to address the circumstances of each organisation, although in most instances many topics were common to all organisations. In conjunction with this was the fact that management had allowed the interventions to take place, showing a level of commitment to the health and safety of their employees. Where these two conditions are not present it is likely that programmes will not be as effective as the interventions carried out in the present study.

This study reveals that many companies that have noise problems do not always recognise the significance of the problem, and those that do could certainly do more to provide adequate protection for their employees and ensure that it is worn. It is evident that a great deal of effort is required to encourage both employers and employees to fulfil their statutory obligations. It would be interesting to re-visit the companies included in this survey at some future date to determine whether the changes noted post intervention are long standing changes or whether they revert back to the old working practices. It is certainly evident that companies do need to be actively encouraged to improve general health and safety performance. This is most likely to be achieved by an enthusiastic manager, health and safety adviser or occupational hygienist, employee safety representatives, or HSE inspector. It is interesting to note that HSE are currently funding research into the feasibility of using roving safety representatives who are able to enter companies and provide assistance and advice on a range of hazards in the workplace. This scheme could potentially meet the needs of small and medium sized enterprises that do not normally have access to this type of service except when purposely engaging a consultant. However, the results from this work would suggest that the impact that such a roving safety representatives could have might be limited if there was insufficient time given to each company visited and special training would probably be required to meet the high skill requirements needed. A key feature of such assistance should include actively engaging management and employees to reduce and control health and safety risks identified as opposed to providing information alone.

RECOMMENDATIONS

Workers are often required to wear hearing protection while working in noisy areas when carrying out noisy tasks. Although workers may have access to hearing protection, it may not always be worn. There are a number of practical solutions that can be applied in the workplace to encourage the use of hearing protection. Some of which have been identified during this study and some of

which should already be well known. In this section, we present a list of actions or strategies that are designed to help employers and managers increase the acceptance and use of hearing protection in the workplace.

SELECTION OF HEARING PROTECTION

Hearing protection must be capable of reducing the noise at the ear to a safe level. However, they must also be reasonably comfortable if they are going to be accepted by the worker. This means that they must be compatible with whatever else the worker is wearing or doing. The following guidance can be used when selecting a device that will be accepted by the wearer.

- i) Firstly, make sure that the required level of protection is established by having a competent person measure the noise levels and determine what level of attenuation the ear protectors should provide.
- ii) Review the available types of hearing protection. Generally, this will involve choosing between earplugs, earmuffs and semi-aural inserts. At this stage an assessment of their compatibility with the task and environment will need to be made.
- iii) Do not select high efficiency ear protection unless it is really needed. It is a mistake to assume that the highest level of protection must be the best. Devices with a high level of noise attenuation may be heavy, bulky and generally more uncomfortable to wear than more basic types.
- iv) The choice of hearing protection is best done in consultation with the workers who are going to wear the devices. An informal session, away from the shop floor often works best. Discuss the pros and cons of using each type of device. Involve the workers and let them try out a selection of devices so that they can choose something they are comfortable with. This might mean supplying a wide range of different devices, but this is better if the workers actually use them when they should.
- v) Earmuffs can be unpleasant to wear when the work areas are hot or if a lot of manual work is involved. If the workers are required to crawl or work in narrow and confined spaces, earmuffs are probably going to be too bulky for this application so earplugs might be a better choice.
- vi) If the worker needs to wear a hard hat, consider using hat-mounted earmuffs. There are many hard-hat and earmuff combinations available, but some are difficult to use and do not fit well. Look for a hard hat that has been specially designed to accept earmuffs. These will have a profiled edge, which allows the earmuffs to cover the ears without fouling on the hat itself.
- vii) If the work area is very dirty and the workers' hands get badly soiled, earplugs may not be a suitable choice. This is because conventional earplugs need to be rolled up and placed into the ear canal using the fingers. It is natural for people to be resistant to introducing dirty earplugs into the ear. In these cases earmuffs would probably be the best choice.
- viii) There are modern alternatives, which bridge the gap between traditional earplugs and earmuffs. There is a range of mushroom-shaped earplugs, which

do not need to be compressed and which have a small plastic stub handle which enables them to be handled with dirty fingers.

ix) Semi-aural ear inserts, i.e. earplugs on flexible plastic neckbands are also a good choice as they can be easily removed and replaced in dirty environments. They are also far less bulky than earmuffs.

x) Earmuffs and earplugs are often forgotten by workers that are always on the move, e.g. factory maintenance workers, or people working from vehicles such as field service engineers or site construction workers. It is probably best in these cases to opt for semiaural ear inserts. These can be worn around the neck when not in use. These devices are light and unobtrusive and once placed around the neck are less likely to be laid down and forgotten.

xi) The semi-aural ear inserts are a good choice for supervisors and managers who frequently need to move from quiet to noisy areas and back again.

xii) Try to choose brightly coloured ear plugs and semi-aural ear inserts as these tend to be more readily accepted by younger workers.

xiii) Custom moulded earplugs may be an option to consider. They can be more comfortable to wear because the plugs are pre-moulded according to the exact shape of the wearer's ear canal. The disadvantage is that they are more expensive than standard earplugs so the initial purchase costs can be high.

xiv) Timely replacement of lost or damaged custom moulded plugs may also be an issue to consider. However, it is understood that the companies supplying these products include maintenance contracts to cover these problems. These devices are unlikely to be suitable replacements for conventional ear protection in situations where there is a high turnover of staff because the replacement costs would be too high.

xv) Where workers need to hear each other talking in noisy work areas, ear muffs or ear plugs which have been designed to make the speech frequencies more audible, should be selected.

xvi) For more reliable communication, it would be better to obtain earmuffs, which incorporate radio communication equipment. These devices are particularly good for safety critical applications, e.g. airport ground crew and for training workers in the use of noisy and dangerous machinery.

xvii) It is important to ensure that whatever device is selected, it will provide the necessary degree of protection. This is always going to be the most important consideration, so it must be properly checked out by a competent person.

INFORMATION, INSTRUCTION AND TRAINING

Workers need to be trained to use hearing protection properly and they must know when and where the hearing protection is to be worn. They should clearly understand that they have moral and legal obligations to wear the hearing protection and to comply with the health and safety rules that are provided. Often these can be difficult to communicate because time pressures and also because of cultural factors in the workplace. The following guidance is provided to assist in making the information, instruction and training more relevant, and therefore more likely to be retained.

- i) While workers need to have an understanding of the hazard, health effects and legal responsibilities, this is best explained in simple terms. Using basic noise concepts such as decibel scale and quoting the relevant health and safety regulations are unlikely to stimulate much interest.
- ii) It is no use issuing hearing protection and then expecting the workers to use it correctly. In particular, workers need to be shown how to insert earplugs correctly so that they get the maximum benefit. This should be demonstrated by a trained and experienced user.
- iii) Do not just rely on the instructions provided by the hearing protection manufacturer. While these are a useful reference, workers do not always have the time or the inclination to study these.
- iv) Workers also need to understand the limitations of hearing protection and how the efficiency is decreased if they are damaged or used inappropriately. Again this is best explained in practical demonstrations.
- v) Management needs to determine the specific training needs of their workers in relation to hearing protection and then design a training programme that meets their needs. This should take into account the time available, content, style of delivery, resources required and venue, all of which may be specific to the site in question.
- vi) The best results may be achieved by delivering short, focused training courses. These could be incorporated into a toolbox training session for example, where other practical issues are covered. This however should be done in a structured manner allowing time for discussion of issues and participation of workers. The training session could be enhanced by delivering it away from the shop floor if possible.
- vii) It is important, also to back up the toolbox talks with refresher courses from time to time. This provides an opportunity to bring in new or more advanced concepts and to answer any questions that have arisen since the previous training session. By introducing new ideas or topics, the workers are less likely to become bored by hearing the same thing time and again.
- viii) Workers need to understand that hearing loss is a seriously disabling condition, but that they **can** do something about reducing the likelihood of it ever affecting them. The effects of hearing loss are best illustrated by an audio demonstration of what normal speech would sound like with varying degrees of hearing loss. There is a range of audiocassette tapes and multi-media presentations available, which can be used to illustrate the effect.
- ix) It might be possible to involve existing staff that have suffered hearing loss and allow them to talk about their experiences to other workers. If workers volunteer such information in a training session, these experiences can help to reinforce and illustrate the learning points. However, this needs to be handled sensitively to avoid embarrassment or breaches of trust. It is important to ensure that staff are not prompted or pressed into providing this kind of input, since this can be counterproductive.
- x) Written material such as case studies, which describe how people are affected by hearing loss are a valuable resource for training purposes. However, they are

not very effective when used on their own. Experience has shown that written material is far less effective than audio or visual presentations.

xi) Written information about legal duties e.g., contained in HSE leaflets and warning posters are again, of limited use in themselves. Employers must consider these materials as a backup to more immediate methods of communicating information, described above.

xii) As with any system it is important that evaluation and feedback information is sought from workers to determine how the training session has achieved its objectives. This can allow scope for further improvement in content and delivery and can be achieved by filling out a simple questionnaire or comments sheet on completion of the course.

MANAGEMENT OF THE HEARING PROTECTION PROGRAMME

Once implemented, the hearing protection programme needs to be kept up to date with changing processes and work practices. Hearing protection needs to be maintained and replacements purchased, and certain classes of workers should receive audiometric tests on a regular basis. In particular, hearing protection zones need to be designated appropriately so that workers have a clear understanding of when and where hearing protection is to be worn. The following guidance is provided to assist with this:

i) Hearing protection, once introduced into the workplace must be maintained. There needs to be a sufficient stock of earplugs, or replacements for worn out or damaged earmuffs etc.

ii) Where it is necessary for hearing protection to be worn for particular tasks, it is best if the hearing protection is stored in a clean area nearby. The earmuffs should not be left hanging over a dirty machine or they are not likely to be worn.

iii) Where earplugs can be used, these are best kept in dispensers located at the access doors to the noisy area. These should be regularly inspected and replenished when necessary.

iv) Hearing protection zones need to be properly thought out. Do not designate entire work areas as a hearing protection zone if there are only some noisy areas in the space. This will cause confusion amongst the workers and will make it difficult for management to enforce. It is always better to segregate or enclose noisy processes and have them inside clearly defined hearing protection zones.

v) It is important for management to lead by example. This is important when communicating company policy and procedures. It is no use instructing workers to wear hearing protection and then allowing senior people to act differently. It may not be absolutely necessary for managers to wear hearing protection while in a noisy area, e.g. if their exposure is very short, but it sends a clear message that management is committed to the hearing protection programme if they do.

vi) Audiometric testing of exposed workers, is an important way of monitoring the effectiveness of the hearing protection programme. However, these tests are also useful in raising the awareness in the individual to the noise hazard. If there

is a measurable hearing loss, this can be used to emphasise the need for improvements in the workplace, both by the individual and by management.

vii) The audiometric programme must be supervised by qualified occupational health personnel and they must ensure that the results are communicated to workers sensitively. It is important that a worker knows that if they do have measurable hearing loss, they can do something to prevent further significant losses. This sort of information, delivered at the time of consultation, can be used to prevent workers developing a fatalistic attitude to the problem.

viii) Companies should incorporate hearing protection and other safety programmes into formal management systems such as that described by HSG65 (HSE, 1998). If this is done, the companies will have the framework to allow continuing improvement in health and safety performance by means of standard setting, monitoring and reviewing performance. However, it is again important that sufficient resources are directed towards these systems and that senior management has an active role in them.