A nice evening out... some thoughts on entertainment noise

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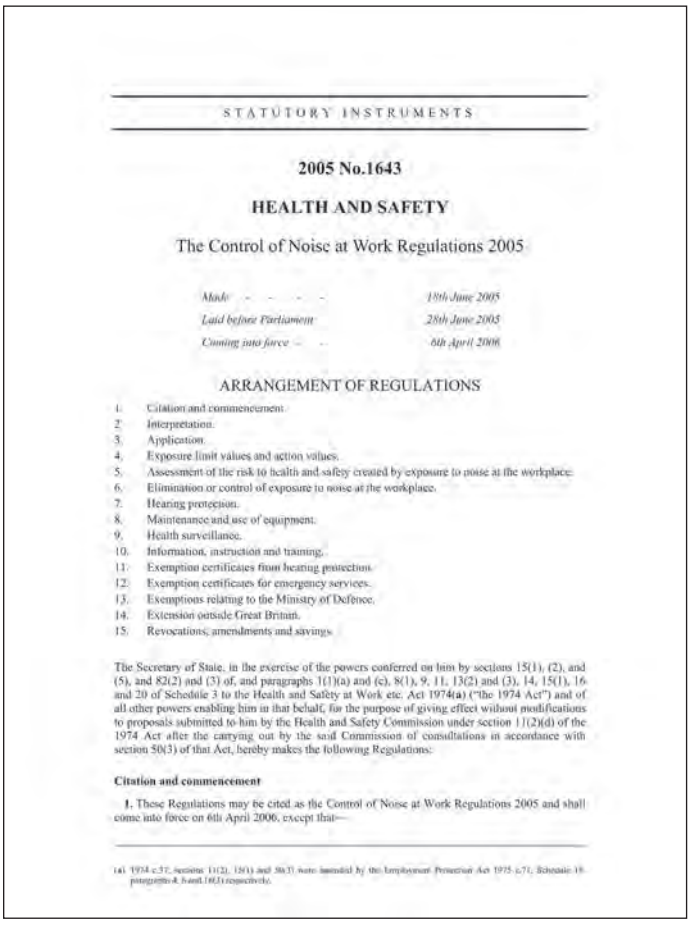
Many consider that at the end of a hard-working week, the reward is an evening out with friends. A few drinks and a club to finish. Our 'reward' may be putting our health at risk. Research carried out by students from the University of Wolverhampton has provided some interesting evidence to quantify what we already know. An evening out is bad for our health! I refer not to the alcohol (we are regularly advised by Public Health England that we should not binge drink and that we should stick to fewer than 14 units a week to avoid the chronic effects of alcohol in later life). I refer instead to damage to our hearing. Unlike alcohol, noise already has a framework for legal exposure levels to protect employees' health from unwanted noise in the workplace. These well-established limits offer an opportunity for evaluating noise exposure for recreational activities that generate noise and a way of assessing the unintended impact of noise, particularly on patrons of entertainment venues.

Legislation

Occupational exposure to noise is regulated under the Control of Noise at Work Regulations 2005. This sets limits on noise exposure designed to protect health and prevent hearing damage. The limits are stated in Regulation 4 and set exposure action levels (EAL) based on daily or sometimes weekly exposure to noise. The lower EAL, is broadly a trigger for investigation and risk assessment, the upper EAL requires action to be taken to reduce noise to a level that is as low as reasonably practicable. The levels stipulated in Regulation 4 are shown in the table below (echoed in the World Health Organisation Guidelines[3] (issued in 2015):



STATUTORY INSTRUMENTS

2005 No.1643

HEALTH AND SAFETY

The Control of Noise at Work Regulations 2005

Made - - - - *18th June 2005*
Laid before Parliament *28th June 2005*
Coming into force - - *6th April 2006*

ARRANGEMENT OF REGULATIONS

1. Citation and commencement
2. Interpretation
3. Application
4. Exposure limit values and action values
5. Assessment of the risk to health and safety created by exposure to noise at the workplace
6. Elimination or control of exposure to noise at the workplace
7. Hearing protection
8. Maintenance and use of equipment
9. Health surveillance
10. Information, instruction and training
11. Exemption certificates from hearing protection
12. Exemption certificates for emergency services
13. Exemptions relating to the Ministry of Defence
14. Extension outside Great Britain
15. Revocations, amendments and savings

The Secretary of State, in the exercise of the powers conferred on him by sections 15(1), (2), and (5), and 82(2) and (3) of, and paragraphs 1(1)(a) and (c), 8(1), 9, 11, 13(2) and (3), 14, 15(1), 16 and 20 of Schedule 3 to the Health and Safety at Work etc. Act 1974(a) ("the 1974 Act") and of all other powers enabling him in that behalf, for the purpose of giving effect without modifications to proposals submitted to him by the Health and Safety Commission under section 11(2)(d) of the 1974 Act after the carrying out by the said Commission of consultations in accordance with section 50(3) of that Act, hereby makes the following Regulations:

Citation and commencement

1. These Regulations may be cited as the Control of Noise at Work Regulations 2005 and shall come into force on 6th April 2006, except that—

(a) 1974 c.37; sections 11(2), 15(1) and 50(3) were amended by the Employment Protection Act 1975 c.71, Schedule 15 paragraphs 8, 8 and 10(1) respectively.

Exposure Limit/Action Value	Lep,d limit	LCpeak Limit
Lower Action Value	80	135
Upper Action Value	85	137
Exposure Limit Value	87	140

(HM Government, 2005)

The legislation only expressly applies to employees exposed to noise or to others at work (e.g. contractors) who may be affected by the acoustic climate. Strangely, it does not apply directly to other persons at the same site who are exposed to the same acoustic environment, as they are not at work. However, the levels noted for occupational exposure are directly applicable health-related standards and must surely be considered reasonable for evaluation of the effects of noise on all people exposed.

With the exception of the general requirement under s.3 Health and Safety at Work etc. Act 1974, there is no specific legislative control to protect the public from the effects of site-generated noise to which they intentionally expose themselves. Arguably for entertainment venues, the Licensing Act 2003 provisions could be used to limit noise exposure on the grounds of public safety. I am not aware that this has been attempted yet, and it would be a brave Licensing Authority that would be the first! It is therefore a matter of individual choice of the people attending these music venues to take actions to protect themselves, although to exercise a true choice, individuals will need to be informed.

It has been identified through research that many patrons of pubs and clubs do not properly understand the hazard and therefore are not taking precautions to prevent risks to their hearing. Sadhra et al (2002)[1] reported 69% of participants within the study did not perceive noise within bars as a risk to their hearing. Beach, Gilliver and Williams (2013)[2] stated that those who attended one site of high noise exposure were likely to further attend others. Most did so without concerns over the potential health implications for their hearing or perhaps recognising that any additional exposure to noise would have a cumulative impact with any occupational noise already experienced. The concept of 'noise dose' appears not to be understood.

Noise dose

Compliance with occupational noise standards is often expressed as a noise exposure dose (a percentage of the maximum noise exposure over eight hours) (ref: **http://www.hse.gov.uk/noise/calculator.htm**), or as a exposure level vs time, to help provide context in understanding the extent of adverse impacts in the workplace. An example of exposure levels vs time and conversion of noise levels to noise dose is included in the tables below:

Average noise level	Time taken to receive a dose equivalent to the upper exposure action value (85 dB)
85 dB	8 hours
95 dB	45 minutes
100 dB	15 minutes
105 dB	5 minutes
110 dB	Under 2 minutes
115 dB	Under 30 seconds

Daily noise dose %	Lep,d dB(A) (8hour)
70	83.5
80	84.0
90	84.5
100	85.0
200	88.0
400	91.0
600	92.8
800	94.0
1,000	95.0
1,500	96.8
2,000	98.0
4,000	101.0
6,000	102.8
8,000	104.0
10,000	105.0

Research conducted by a student at Wolverhampton University clearly shows that exposure to noise for patrons of entertainment venues can be extremely high.

Wolverhampton data

A number of different types of venues were studied; ranging from pubs with incidental music, to bistro bars with live bands and full blown night clubs. Personal dose meters were worn for the periods of exposure and the results captured in real time. The example in Figures 1 and 2 on page 16 show the exposure of three individuals in a night club over the course of an hour carrying out a mixture of activities, dancing, drinking, or visits to the quiet room area, but all the venues (without exception) evidenced significant exceedances of the WHO guideline values.

P16 ▶

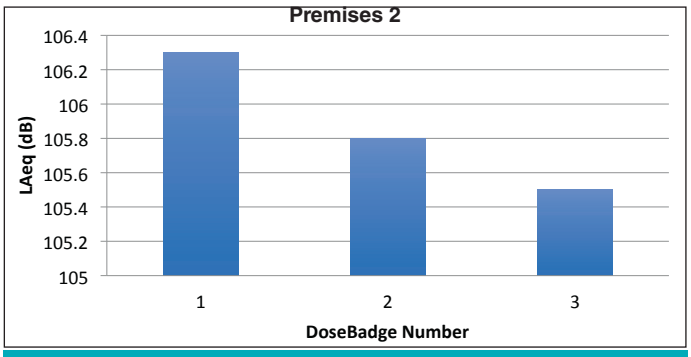


Fig.1

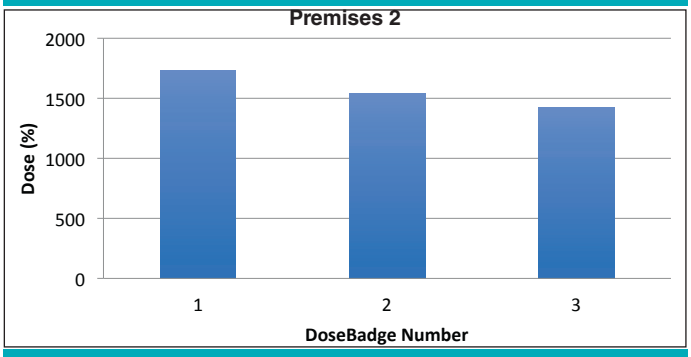


Fig.2

The results show significant exceedances of the recommended WHO guidelines for the patrons of the club. Note that this data is for *one hour of exposure*, where many patrons would likely be present for several hours (increasing the dose). Based on the data collected, the noise dose is at least 14 times the recommended level, and clearly likely to cause significant hearing damage if repeated regularly. Put another way, the music noise in this particular nightclub could be safely observed for no more than five minutes without causing potential harm.

Worryingly, this data isn't an isolated case. It is entirely consistent with other surveys and the HSE's own data presented for noise from entertainment venues. Many young people will be exposed regularly to very significant levels of occupational noise, and then routinely expose themselves to even greater levels of entertainment noise without realisation of the harm being caused, and of course, this ignores the use of personal audio devices and intra ear amplification.

The cumulative impact is projected to have significant effects on health and wellbeing in later years.

Health effects

The health effects of exposure to excess music and entertainment noise are well understood. Anyone who has been to a concert will recognise effects like temporary threshold shift, or tinnitus, which will normally affect some, if not most, attendees for a short period following a concert or entertainment event. The WHO report endorses the outcome of the National Institutes of Health Consensus Development Conference Statement (1990)[4] and advises that the magnitude of temporary threshold shift and tinnitus can be a good indicator of early development of irreversible hearing loss.

The Department of Health report, 'Action Plan on Hearing Loss'[5] suggests:

"3.3 In older age, hearing loss becomes a major challenge and people with hearing loss can find it difficult to follow speech without hearing aids and are at greater risk of social isolation and reduced mental well-being. Social isolation has an effect on health and in older people there is a strong correlation between hearing loss and cognitive decline, mental illness and dementia."

The growing body of evidence on health effects from entertainment noise surely calls for a more robust approach to noise exposure and protection of public health in a more holistic manner.

Conclusion

We started this article by discussing a simple evening out. Review of the research and comparison of the ongoing acoustic impacts with relevant standards clearly shows potentially serious concerns, with national implications for resourcing our health needs into the future. There seems no good reason why occupation health-related standards should not also apply as noise dose exposure standards more generally.

The Department of Health document acknowledges that prevention is one of the key actions to be taken, and correctly identifies some of the key issues that need addressing (occupational noise, environmental noise, entertainment noise and personal devices etc.). It further demonstrates objectives to be pursued in addressing the needs, but regrettably fails to ask the key questions about HOW we should integrate these noise exposure categories into a broader health model.

It appears to me that, to put controls in place is both possible and advisable, but the issue of noise impacts on health need to be more robustly researched as a whole, and those at risk from significant exposure to noise should be made aware of the likely impacts on their health. We already control noise at work and environmental noise, as well as noise from some machinery (though we could usefully control maximum noise dose from personal devices), and we could issue additional guidance to limit noise from entertainment, or require venues to publicise health data and/or offer hearing protection.

For the time being it is left to local authority EHOs and acoustic consultants to do what they can to limit exposure to noise in the workplace, entertainment venues and the environment as a whole, not only to protect the public but also the businesses at risk from claims for hearing loss or damage, and more importantly, those entertainment venues we all enjoy, who might face claims from staff and patrons alike for deliberately exposing us to very high levels of noise. To quote section 3 of the Health and Safety at Work etc. Act 1974:

"It shall be the duty of every employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not thereby exposed to risks to their health or safety."

Footnotes:

[1] Sadhra, S., Jackson, C., Ryder, T. and Brown, M. (2002) Noise exposure and hearing loss among student employees working in university entertainment venues. Annuals of Occupational Health, 46(5), pp. 455-463

[2] Beach, E., Gilliver, M. and Williams, W. (2013) Leisure noise exposure: Participation trends, symptoms of hearing damage and perception of risk. International Journal of Audiology, 52(1), pp. s20-s25.

[3] Hearing loss due to recreational exposure to loud sounds (2015) World Health Organisation

[4] National Institutes of Health Consensus Development Conference Statement January 22-24, 1990 Noise induced Hearing loss [online] [accessed 09.10.18] https://consensus.nih.gov/1990/1990NoiseHearingLoss076html.htm

[5] Action Plan on Hearing Loss (2015) Department of Health