Perceptions of rock band musicians about the effects of loud music and protective practices

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ABSTRACT: Rock band musicians are an important group in what regards to the exposure to high sound pressure levels. They can be exposed to loud music, which can result in hearing damages. However, there are very few studies focused on this issue. In view of this, this study attempts to analyze the perceptions about musicians in relation to the loud music risks, as well as to characterize their preventive behaviors and health effects. To analyze this issue, a questionnaire was applied to 14 musicians belonging to three garage rock bands. The results showed that group rehearsals and concerts are considered the noisiest activities and the sound pressure levels at individual practices are seen as low. Guitar and drums were identified as the noisiest instruments and the piano was seen as the instrument that produce lower sound levels. The results also showed that only a part of the musicians were concerned with the health effects related to the exposure to high sound levels and the majority of them reported do not use hearing protection. The findings of this study emphasize the need to give more attention to these groups, informing them about the risks and on the need of risk reduction measures.

Keywords: *musicians, risk perception*, *rock, sound pressure levels*

INSTRUCTION

The importance of musicians' exposure to high sound pressure levels has been emphasized in the last decade. Previous studies have been shown that professional musicians are exposed to loud music in the course of rehearsals and performances (O'Brien *et al*., 2008; Jansen *et al*., 2009; Qian *et al*., 2011; Rodrigues *et al*., 2013; 2014), and that hearing damages can appear as a result of this exposure (Jansen *et al*., 2009). Despite the importance of this issue for professional musicians, it is essential to recognize that other musical groups can also be exposed to high sound pressure levels, as is the case of the garage rock bands musicians.

In a previous study the authors showed that rock bands are exposed to dangerous sound pressure levels in the course of rehearsals (Almeida *et al*., 2014). Values of equivalent continuous sound pressure levels (Lp,A,eqt) were higher than 100 dB(A) for all musicians and values of peak sound pressure levels (Lp,Cpeak) were higher than 135 dB(C). These results were related by the authors to the poor acoustic conditions of the venues, where most of them were small, with the use of egg cartons as absorption material on the wall and ceiling, which has been referred as inadequate material for this purpose. Furthermore, as no sound reduction material or protection was used to the drums, amplifiers had to be used to the other instruments. The levels of exposure found by the authors can lead to ear pathologies, particularly Music-Induced Hearing Loss (MIHL). In fact, studies with professional musicians, where the sound levels are significantly lower than with rock musicians, have related the exposure levels to MIHl and other other hearing loss-related symptoms such as tinnitus, hyperacusis and diplacusis (Laitinen *et al*., 2008; Jansen *et al*., 2009; Schink *et al*., 2014). Furthermore, most of these musicians are non professional and, accordingly, they can have additional professional activities where they can be also exposed to high sound pressure levels. In view of this, this is a group of musicians with particular interest for environmental health. However, despite the importance of this issue, there are few studies focused on the problem of rock band musicians loud music exposure, particularly about their perceptions and behaviors.

In view of this, this study attempts to analyze the perceptions about musicians in relation to the loud music risks, as well as to characterize their preventive behaviors and health effects.

MATERIALS AND METHODS

Sample

For this study a total of 14 musicians belonging to three garage rock bands were inquired, 2 pop-rock and 1 heavy metal. The majority of the participants were males (93%), and their mean age was 26 years old (SD = 5; interval range 19-35 years old).

Musicians' risk perception analysis

The questionnaire developed by Rodrigues *et al*. (in press) to to analyse of students' perceptions about sound pressure levels, the health effects related to the exposure to loud music and preventive behaviours was adapted for this study.

The questionnaire was divided in five parts. In the first part of the questionnaire, musicians were inquired about age and gender. The second part included questions about the instrument played, weekly activities dedicated to music and other noisy activities. The third part of the questionnaire analysed the perception of musicians about the sound pressure levels in what concerns to: (1) practice and concerts; (2) different type of instruments. They were also inquired about the influence of loud music on their own performance. The fourth part was composed of seven questions to gathering musicians' views about heath effects on the following: (1) general negative health effects; (2) degree of care about health effects; (3) previous hearing exams; (4) hearing symptoms. In the last part of the questionnaire, musicians were inquired about the usage of hearing protection in different situations. If they answered to use hearing protection, they were queried about the type that they use, and if not, they were asked about the motive to not use it. At the final, they were inquired about additional care to reduce the sound levels at their own practice.

The questions included in the questionnaire were closed, except the last one that was an open question as mentioned above. For the other questions three types of measurement scales were used: ratio scale and nominal scale (are classifications, allowing describe the variables and assign the subject without recourse to quantification), and ordinal scale (are distributed according to a certain order, which can be ascending or descending, allowing the establishment of differentiations). The values were reported in ascending order, according to the seriousness of the situation.

Musicians completed the questionnaires at the end of a group rehearsal. They were notified that their participation was voluntary and confidential and that the results would only used to purpose of this research.

RESULTS

The number of practice hours per week was analysed. Results show that musicians spend on average 7 hours (sd=5.85) practicing alone and 4 hours (sd=1.51) at ensembles.

Table 1 presents the musicians' perceptions about the sound pressure levels in relation to the different activities that they perform and to the different instruments that can be a part of the band. Results show that group rehearsals and concerts are considered the noisiest activities, despite a significant percentage of respondents assess the sound pressure levels at these activities as "Moderate". The sound pressure levels at individual practices are seen by most of musicians as very low (35.7%) or low (21.4%). According the presented results, guitar and drums were identified as the noisiest instruments and the piano was seen as the instrument that produce lower sound pressure levels.

Table 1 - Perception about the sound pressure levels by activity and instrument (%)

		VL	L	M	H	VH
Activity	Individual practice	35.7	21.4	35.7	-	7.1
	Group rehearsals	0.0	0.0	14.3	35.7	50.0
	Concerts	0.0	0.0	21.4	7.1	71.4
Instrument	Guitar	0.0	0.0	35.7	35.7	28.6
	Bass	0.0	28.6	42.9	14.3	14.3
	Drums	0.0	0.0	0.0	28.6	71.4
	Piano	14.3	42.9	21.4	21.4	0.0

VL= "Very Low"; L="Low"; M="Moderate"; H="High"; VH="Very High".

The incidence of hearing loss-related symptoms was analysed and the results are presented in Table 2. Tinnitus was the highest reported disorder (64.3%) followed by diplacusis (50.0%) and hyperacusis (35.7%). Sound distortion was only reported by 14.3% of musicians. Musicians were also asked about the influence of loud music on their own performance and it was observed that 28.6% of respondents identified a high negative effect, 28.6% a moderate negative effect and 42.8% an effect with a certain extent.

Table 2 - Reported hearing disorders (%)

Hearing disorder	Percentage of musicians
Tinnitus	64.3
Hyperacusis	35.7
Diplacusis	50.0
Sound distortion	14.3

Table 3 presents the degree of concern of respondents in relation to some health effects. In general, musicians indicated low concerns in relation to health effects. Higher levels of concerns were identified for hearing loss (42.9% reported “Very High” concerns) and tinnitus (28.6% reported “Very High” concerns).

Table 3 - Degree of concern with health effects (%)

	Secondary School				
	N	L	CD	H	VH
Stress	21.4	14.3	14.3	35.7	7.1
Headache	21.4	21.4	7.1	35.7	14.3
Heart rate	14.3	21.4	42.9	14.3	0.0
Hearing loss	14.3	0.0	21.4	14.3	42.9
Tinnitus	7.1	21.4	21.4	14.3	28.6
Hyperacusis	21.4	28.6	21.4	0.0	21.4
Diplacusis	28.6	28.6	14.3	7.1	14.3
Sound distortion	21.4	21.4	28.6	7.1	21.4

N=”None”; L=”Low”; CD=”To a Certain Degree”; H=”High”; VH=”Very High”.

The usage of hearing protection was also analysed. Results showed that, in general, musicians never wear hearing protection, since 71.5% of respondents reported never wear it at individual practice, 35.7% at the group rehearsals and 57.1% at the concerts. The musicians that wear it reported only use the hearing protection in an occasional way. When they opted to not use it, most of respondents indicated that they are uncomfortable.

DISCUSSION

Results of this study indicated that rock band musicians have a low perception regarding the sound levels in the course of the different activities. According previous studies, they are exposed to dangerous sound pressure levels during ensembles (Mordini, 1994; Almeida et al., 2014). However, some of musicians assessed the sound levels as "Moderate". Furthermore, the majority of musicians classified the sound levels during individual practice as "Low" or "Very Low". Despite lowest sound pressure levels may be found at individual practice once musicians are not exposed to the sound produced by other instruments, previous studies demonstrated that the levels of exposure at these activities are still significant, and in some cases, higher than in ensembles (O'Brien et al., 2013). In fact, in most of the times that rock musicians practice alone, they use amplifiers and reproduce the other instruments and this can lead to similar levels of exposure between individual practice and ensembles. This problem is higher when considered the high number of hours that musicians spend in training per week, increasing the risk of MIHL.

With respect to type of instrument, musicians assessed guitar and drums as the noisier instruments types. For drums these results were not surprising, since Almeida et al. (2014) have previously identified them as the louder instruments. However, bass was identified by the authors as the second noisiest instrument, but the authors in this study identified guitars producing higher sound pressure levels. These results can be related to the timbre and dynamics of the guitars, which can be the source of more discomfort to the other musicians. It is important also to note that a considerable

percentage of musicians indicated the piano as less noisy instrument. However, despite the lower the sound level produced by these instruments in comparison with other instruments as identified in previous studies (Almeida et al., 2014), the sound levels are still significant.

In this study a high prevalence of tinnitus was detected, as well as, a significant prevalence of hyperacusis and diplacusis. Once hearing loss-related symptoms were noted, this suggest that, throughout their exposure time, musicians might develop MIHL (Laitinen *et al*., 2008; Jansen *et al*., 2009), which may also have important consequences on their own performance as musicians (Royster *et al*., 1991).

Despite the identified hearing symptoms, as well as the important results of previous studies that identified that rock musicians are exposed to high sound levels, this study also showed that they are not entirely concerned about this issue. A considerable percentage of musicians did not appear to be worried with the different health effects. Lack of knowledge about the risks of their exposure can justified these results.

This study also showed that rock band musicians are resistant to the use of hearing protection. Only few respondents reported to use it but in an occasional way, emphazing one more time that rock musicians are not provided with a correct knowledge about the risks that they are exposed, and about the importance to protect themselves.

CONCLUSIONS

The findings of this study showed that rock band musicians are not entirely aware of the risks associated with the exposure to loud music in the course of their practice. A significant number of musicians perceived the sound levels at individual practices as low and very low. Additionally, despite they reported some hearing loss-related symptoms such as tinnitus, hyperacusis and diplacusis, the study showed that not all of them are concerned with this issue.

In view of this, it is important to give more attention to these groups. Musicians should be informed about the risks that they are exposed and about the importance of the risk reduction measures, particularly about the importance of hearing protection and audiological exams.

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