

Perception of noise, hearing health and quality of life of public school teachers

Percepção do ruído, saúde auditiva e qualidade de vida de professores de escolas públicas

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ABSTRACT

Purpose: To investigate perception of noise, occurrence of auditory and extra-auditory effects and teachers' quality of life of elementary and secondary education in public schools. **Methods:** This study was carried out with 57 teachers from 15 public schools, both men and women, who answered to a questionnaire prepared for this occasion, questioning about occupational profile and hearing health. They were also submitted to an abbreviated version of Quality of Life-Bref Questionnaire (WHOQOL-Bref). **Results:** Among the teachers participating in this study, many of them had some auditory or extra-auditory effect. The teachers without anxiety or headache had better scores in psychological and environmental domains and in the general scores of quality of life of WHOQOL-Bref – while those without intolerance to loud sounds and tinnitus had better quality of life in the physical and social domains. **Conclusion:** The teachers proved that they knew the consequences of noise exposure, but did not consider it as an occupational hazard. Among the effects investigated, the presence of tinnitus, intolerance to intense sounds, anxiety and headache were related to worse quality of life.

Keywords: Noise effects; Hearing; Quality of life; Public Health; Education

RESUMO

Objetivo: Investigar a percepção do ruído, a ocorrência de efeitos auditivos e extra-auditivos e a qualidade de vida de professores do ensino fundamental e médio de escolas públicas. **Métodos:** Estudo realizado com 57 professores de 15 escolas públicas, homens e mulheres, que responderam a um questionário elaborado para a ocasião, com perguntas relacionadas ao perfil ocupacional e à saúde auditiva. Também foram submetidos à versão abreviada do instrumento *Quality of Life-Bref Questionnaire* (WHOQOL-Bref). **Resultados:** Dentre os professores participantes do estudo, muitos apresentaram algum efeito auditivo ou extra-auditivo. Os professores sem ansiedade e cefaleia tiveram melhores escores nos domínios psicológico, ambiental e escore geral de qualidade de vida do WHOQOL-Bref, enquanto aqueles sem intolerância a sons intensos e zumbido apresentaram melhor qualidade de vida nos domínios físico e social. **Conclusão:** Os professores demonstraram conhecer as consequências da exposição ao ruído, mas sem considerá-la um risco ocupacional. Entre os efeitos investigados, a presença de zumbido, intolerância a sons intensos, ansiedade e cefaleia esteve relacionada à pior qualidade de vida.

Descritores: Efeitos do ruído; Audição; Qualidade de vida; Saúde pública; Educação

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INTRODUCTION

The quality of educational environment represents a fundamental factor for establishment of a harmonious relation between work and health, as well as for performance of teaching-learning process. However, unfavorable conditions related to physical structure of school (such as noise level) have been a recurrent teachers' complaint and considered as one of the main risk factors, being harmful to classroom development, to student learning and to communication⁽¹⁾.

The noise in classroom comes from internal sources, stating the most frequently as furniture, conversation between students in classroom, corridors or courtyard and proximity to multi-story courts; besides external sources – traffic and proximity to urban centers⁽²⁾.

In Brazil, the minimum conditions required for safety and comfort in acoustic environments are governed by law and technical standards, establishing the range from 40 dB to 50 dB of noise level, in order to have acoustic comfort in educational institutions, being acceptable the level of up to 65 dB in environments that require concentration⁽³⁾. The noise level in schools exceeds these limits recommended by the Brazilian National Standards Organization (ABNT), which, in fact, makes environment favorable for negative interferences on health and well-being, not only to students but also to teachers⁽²⁾.

The action of high noise levels in human body coming out with the manifestation of auditory effects (such as tinnitus and intolerance to loud sounds) and extra-auditory effects of general character (such as neurological, physiological and behavioral disorders), in addition to vocal changes (mentioning the hoarseness⁽⁴⁾ as the main one).

The noise as a risk factor and the effects on health of people involved in the scholar universe have been studied through objective and subjective evaluations^(2,5,6). The noise is among the factors that most get statistical correlation with the symptoms reported by teachers⁽⁷⁾.

Although the objective evaluation aims at creating important data to compare with allowed levels of noise in different workplaces, it is extremely important to consider the information contained in perception of workers daily exposed to this risk factor⁽²⁾. Reduction of work satisfaction and stress elevation also represent a direct impact of noise in teachers' life, reflecting in restriction of everyday activities and in deterioration of their quality of life⁽¹⁾.

There are several definitions for the term "quality of life" and they can include factors related to health or not. According to International Classification of Functioning, Disability and Health (ICF), quality of life is the building process of subjective well-being and it is measured by how people feel about their health condition⁽⁸⁾.

The measuring instrument of quality of life is WHO Quality of Life-Bref Questionnaire (WHOQOL-Bref), which has been used by several studies. The questionnaire was validated by

World Health Organization and allows the achievement of quality of life scores, considering physical, psychological, social relations and environment domains⁽⁹⁾.

Thus, the objective of this study was to investigate the perception of noise, as well as the questions related to occurrence of auditory and extra-auditory symptoms (arising from continuous noise exposure) and the teachers' quality of life of elementary and high school education in public schools.

METHODS

This is a descriptive and cross-sectional study that has a quantitative approach. It was approved by the Ethics Committee (EC) of *Universidade Federal de Santa Maria*, under protocol no. 306.039.

Randomly, 15 public schools were selected in a city of Rio Grande do Sul state's central region, in which interventions about the International Noise Awareness Day (INAD Brasil) were carried out in the period from April 25th to 28th, 2016. The invitation for taking part in the research was done to all teachers who were presented in gathering shifts. Those who did not accept to participate or did not sign the Informed Consent Form (ICF) were excluded.

The teachers who are involved in the research answered a questionnaire prepared for this occasion, with questions related to profile (age, sex, weekly workload, length of time in the role and in the current institution) and to occurrence of auditory and extra-auditory symptoms. They were also submitted to an abbreviated version of WHO Quality of Life-Bref Questionnaire (WHOQOL-Bref), which is composed by 26 multiple choice questions that were categorized through the physical, psychological, environmental and social domains. This questionnaire generated a quality of life score to each individual, evidencing their conditions in the last two weeks. In regard to the psychometric properties, the questionnaire did not establish a cut-off point; therefore, the closer to 100, the better is evaluated person's quality of life⁽¹⁰⁾.

The sample was constituted by 57 teachers (both women and men) of elementary and high school education in public schools. The data were tabulated in an Excel® spreadsheet and statistically analyzed. In the statistical analysis, it was carried out a descriptive and critical analysis, the Mann-Whitney U test, and, to compare domains and correlation between variables, it was also used the Spearman's rank correlation coefficient through the software *Statística* version 9.1, considering a significance level of 5%.

RESULTS

The sample was composed by 50 (87.72%) women and 7 (12.28%) men, with a median age of 45 years and 5 months ± 10.85 , ranging from 24 to 70 years-old, 38 (66.67%) were teachers of elementary education and 19 (33.33%) of high

school education. The average of time teaching was 17 years and 6 months ± 11.03 , of workload was 33 hours and 30 minutes ± 9.07 , of length of time in the same role was 15 years and 4 months ± 10.69 and in the current institution was 8 years and 1 month ± 6.99 .

Among the teachers, 34 (59.65%) presented some type of auditory effect and 54 (94.47%) some type of extra-auditory effect (Figure 1 and Figure 2).

When questioned about the use of individual sound device, 14 (24.56%) teachers reported that they use it, 11 (78.57%) teachers use in-ear phone, 13 (92.86) use it in both ears and 12 (85.71%) use it up to one hour per day.

Most teachers said they knew the consequences of noise exposure and knew they worked in a “noisy workplace”. However, they did not recognize this exposition as an occupational noise (Figure 3).

Among the teachers who composed the sample, two of them did not answer satisfactorily the WHOQOL-Bref. Thus,

correlations and comparisons between variables and domains were analyzed in 55 teachers’ answers. The average domains and the quality of life score in WHOQOL-Bref showed that teachers have a good quality of life (Table 1).

There was difference between some variables that were analyzed, including: sensibility to loud sounds and physical domain at WHOQOL-Bref, tinnitus and social domain, anxiety and headache, both related to environmental and psychological domains and the quality of life score (Table 2).

There was no relation between occupational data and domains nor quality of life general score (Table 3).

At the end of the procedures, the teachers received orientations on hearing health in workplace, as well as referrals to reference services for evaluation.

DISCUSSION

According to the analyzed data, it was possible to obtain an

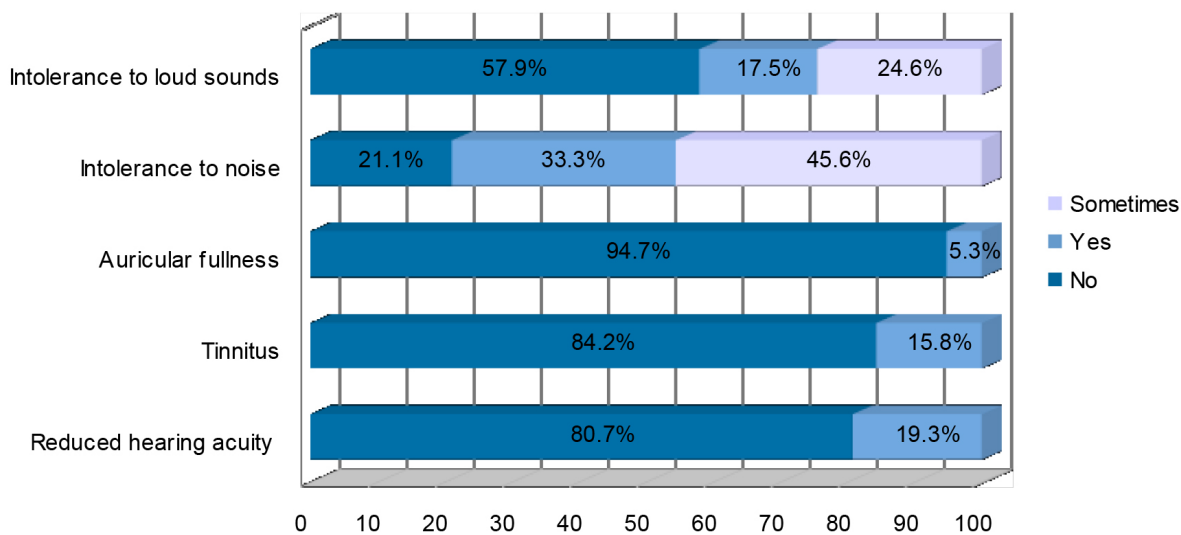


Figure 1. Percentage distribution of auditory effects presented in teachers sample (n=57)

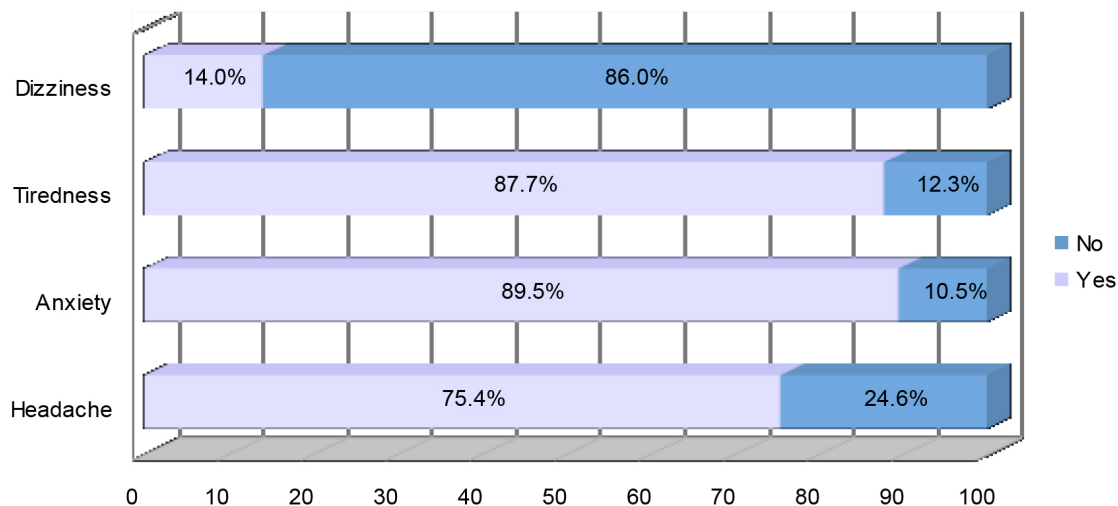


Figure 2. Percentage distribution of extra-auditory effects presented in teachers sample (n=57)

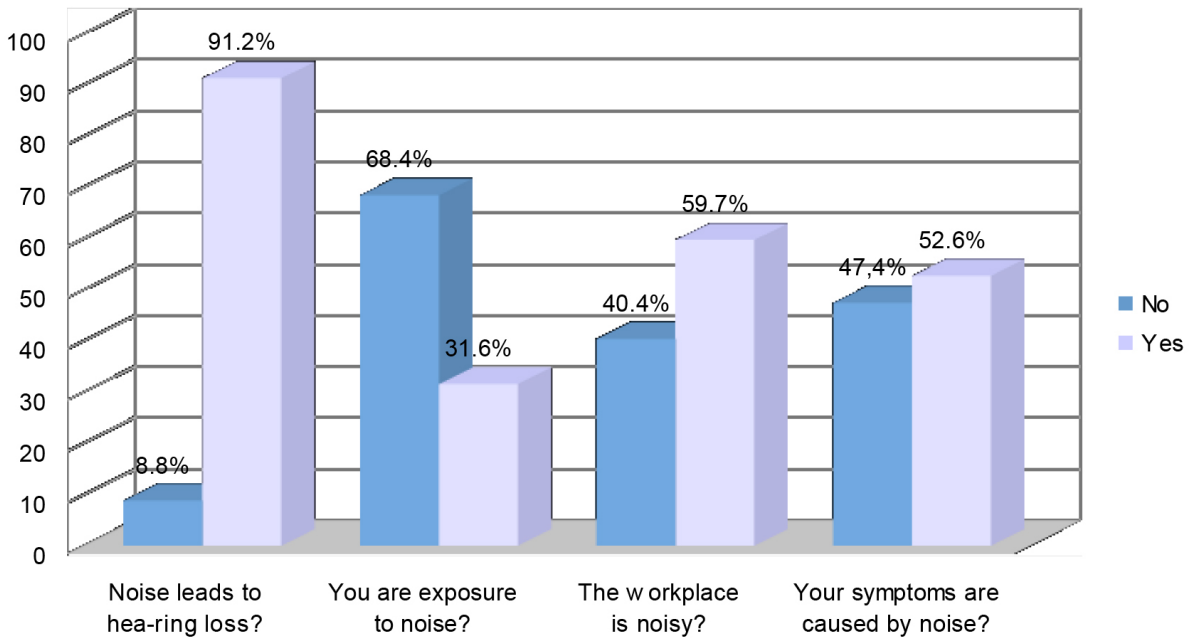


Figure 3. Percentage distribution of teachers answers to questions on hearing health (n=57)

Table 1. Results of World Health Organization Quality of Life-Bref questionnaire

WHOQOL	n	Mean	Minimum	Maximum	Standart deviation
Physical domain	55	67.57	20.80	100.00	14.41
Psychological domain	55	70.14	20.80	95.80	12.18
Social domain	55	73.94	33.30	100.00	15.39
Environment domain	55	62.46	28.10	100.00	10.97
Score of quality of life	55	68.52	25.80	91.80	10.55

Subtitle: n = number of teachers

Table 2. Comparison between WHOQOL-Bref scores obtained among the teachers who presented auditory or extra-auditory effects (yes) or did not present (no)

Effects	WHOQOL-Bref														
	Physical			Psychological			Social			Environment			Score		
	Yes	No	p	Yes	No	p	Yes	No	p	Yes	No	p	Yes	No	p
Auditory complaint	65.25	70.80	0.36	70.96	69.02	0.43	74.22	73.55	0.79	62.1	62.24	0.82	68.25	68.90	0.57
Intolerance to loud sounds	62.86	70.96	0.02*	70.64	69.79	0.46	73.56	74.22	0.84	61.29	63.29	0.75	67.07	69.57	0.61
Intolerance to noise	67.41	68.14	0.92	70.24	69.79	0.80	73.26	76.38	0.50	62.37	62.77	0.92	68.31	69.27	0.66
Auricular fullness	65.50	67.69	0.67	70.83	70.11	1.00	86.13	73.23	0.11	69.80	62.03	0.35	73.03	68.26	0.46
Tinnitus	60.20	68.83	0.25	64.59	71.09	0.09	65.62	75.36	0.05*	57.44	63.31	0.19	61.96	69.64	0.08
Reduced hearing acuity	66.08	74.27	0.09	69.44	73.32	0.43	73.52	75.83	0.55	61.26	67.82	0.13	67.57	72.81	0.19
Extra-auditory complaints	67.62	66.67	0.77	69.79	76.37	0.26	74.20	69.47	0.23	62.33	64.63	0.56	68.48	69.27	0.74
Dizziness	63.77	68.22	0.49	68.74	70.39	0.84	73.96	73.94	0.71	64.86	62.05	0.50	67.81	68.64	0.68
Tiredness	66.86	72.44	0.50	69.44	74.99	0.48	74.48	70.24	0.20	61.66	67.89	0.41	68.11	71.39	0.67
Anxiety	52.17	69.46	0.07	54.85	72.02	0.01*	56.93	76.02	0.08	52.10	63.72	0.03*	54.03	70.30	0.00*
Headache	59.86	70.20	0.13	63.39	72.45	0.04*	70.83	75.00	0.76	55.59	64.80	0.01*	62.42	70.61	0.05*

*Significant values (p≤0.05) – Mann-Whitney U test

Subtitle: n = number of teachers

Table 3. Correlation between occupational data and specific domains, and general WHOQOL-Bref score of quality of life

Occupational data	WHOQOL-Bref									
	Physical		Psychological		Social		Environment		Score	
	r	p	r	p	r	p	r	p	r	p
Age	-0.04	0.75	0.08	0.56	-0.19	0.17	0.00	0.98	-0.09	0.49
Length of time teaching	-0.12	0.40	0.04	0.79	-0.09	0.51	-0.11	0.43	-0.12	0.41
Daily workload	-0.25	0.07	0.13	0.36	0.09	0.53	-0.03	0.82	-0.07	0.62
Length of time in the role	-0.10	0.48	0.02	0.91	0.04	0.77	-0.11	0.42	-0.06	0.66
Length of time in the current place	-0.15	0.29	-0.01	0.94	0.01	0.93	0.04	0.77	-0.03	0.85

Spearman's rank correlation coefficient ($p \leq 0.05$)

Subtitle: n = number of teachers

overview about the perception of teachers on noise exposure in their workplaces, complaints and hearing habits, as well as the perception of quality of life related to the last two weeks before gathering.

In regard to the sample profile, the higher occurrence of female sex proves what was found in previous studies with teachers – since their samples were composed mainly by female sex –, with median age from 41 to 47 years-old^(11,12). The average length of time teaching in the present study (17 years and 6 months) was bigger than the last study (14 years and 10 months)⁽¹³⁾.

There is an extensive contribution of Speech Therapy in the literature related to teachers' health, but it is related to vocal health⁽¹⁴⁾. However, it is common knowledge in school practice (as well as in scientific production on the subject) that, in schools, there are focuses of noise production with measurements ranging from 70,3 dB (12) to 80,9 dB, and it is even higher in public schools⁽¹⁵⁾. These levels of sound pressure are above the recommended by standards and may interfere negatively on teaching-learning and labor processes in scholar environment⁽³⁾.

Concerning the investigated auditory effects, the tinnitus frequency was close to that report in the research with teachers of basic and elementary education, in which 20% of elementary education teachers reported these effects⁽²⁾. The term “tinnitus” is related to the conscious perception of an auditory feeling in the absence of an external corresponding stimulus. The tinnitus has different etiologies, such as metabolic, circulatory, psychological or generated by trauma, infections or ear cancer, among others⁽¹⁶⁾. A possible explanation for pathophysiological mechanisms of otological causes (that is often associated to hearing loss) is a neuroplasticity response to sensory deprivation⁽¹⁷⁾. The tinnitus predominance is high among workers exposed to occupational noise⁽¹⁸⁾, which is presented as a predictive symptom of hearing loss⁽¹⁹⁾.

Just a few teachers reported auricular fullness. This symptom was not found in literature or in studies with teachers, and, in general people, it is more frequently diagnosed as a Eustachian tube dysfunction (28.9%), followed by media otitis with effusion (13.4%) and by chronic media otitis (7.2%),

taking into consideration that a part of the patients did not received a definitive diagnostic⁽²⁰⁾.

Intolerance to loud sounds or noise, consistently mentioned by a substantial number of teachers, is a feeling that can be related to occurrence of Metz recruitment in cochleopathies and to pathological adaptation in retrocochlear affections⁽²¹⁾. The presence of complaint on annoyance caused by loud sounds indicates that teachers' population must be guided to regularly audiological evaluations, such as the preventive action to possible auditory pathologies related to noise exposure.

In regard to extra-auditory effects, the presence of significantly tiredness (fatigue) in the sample validates a previous study, in which 82.6% of teachers reported these effects – especially in relation to classroom with greater noise⁽¹²⁾. The tiredness is a state of depletion, characterized by a drop in productivity and a decrease in answer to stimuli, followed by a mental and physical effort. Although tiredness signal the presence of several diseases (such as metabolic or psychological problems⁽²²⁾, making fragile correlations with other variables, tiredness can be strengthened by noise exposure.

The dizziness and headache presented among the analyzed teachers had percentages close to previous results, whose study had same population, namely: 20% to dizziness and 80% to headache⁽²⁾. The anxiety was reported to 89.47% of the teachers, which was a percentage discreetly lower than the Freitas' study (2005), in which 94.2% of teacher reported some degree of anxiety.

Most teachers were aware that exposure to intense levels of sound pressure can lead to hearing loss. Nevertheless, several teachers did not consider the scholar noise as an occupational noise and ignore the correlation between auditory alterations, intensity of stimulus and time of exposure. This fact was observed between differences in answers for the questions “are you exposure to a noise?” and “is your workplace noisy?”, in this way, disregarding its harmful character.

According to the results obtained by scholars⁽²⁾, 100% of teachers in their samples did not know the rules of Brazilian Association of Standards related for noise in scholar environment, which could be one of the factors to neglect noise in classroom. The result in the present study, associated with quoted

researches, indicates the necessity of further clarifications to docent class about the risks related to their work activity.

In regard to quality of life, the average score obtained in WHOQOL-Bref was similar to previous studies with teachers⁽¹³⁾. The social domain (personal relations and social support) set the best average, but, in return, the environmental domain was the one with the most negative impact in teachers' quality of life. In this domain, issues regarding physical security, financial resources, availability and quality of access to health and leisure, in addition to the physical environment (contamination/noise/traffic/weather) are analyzed. The values obtained in this study ratify previous results of other researches about teachers' quality of life using WHOQOL-Bref, in which researchers found average score higher for social domain and lower for environmental domain, with values closed to the ones in the present study^(23,24).

Regarding the comparison between auditory and extra-auditory effects in the WHOQOL-Bref results, teachers with no intolerance to loud sounds showed a higher average in physical domain, concerning effects related to the presence of pain, level of energy or tiredness, as well as sleep and rest. Besides the structural questions of schools⁽²⁾, noise produced inside of classroom and in its surrounding becomes the environment improper for its application (learning), which may be a factor of a lower teachers' quality of life, related to environmental domain.

The teachers with tinnitus presented a lower average in social domain. The tinnitus may negatively affect daily activities and even higher mental activities. Furthermore, it may adversely impact in feelings, sleep, concentration and in carrying out patients' social activities, leading them to isolation⁽²⁵⁾. Therefore, the tinnitus may aggravate or unleash the reduction of quality of life related to social domain.

Teachers with complaints of anxiety and headache had lower average in environmental and psychological domains (feelings, memory, concentration, self-esteem), as well as in general score of quality of life. The headache is a common symptom with varied etiology, that can cause a big impact in quality of life in the affected individuals, with a substantial worsening during periods of crisis⁽²⁶⁾. The anxiety has been intensified among teachers of basic education and is related to unfavorable situations of work process⁽²⁷⁾.

There was no relation between the variables of age, time of teaching, weekly workload, time working in the role and time in the current institution with the physical, psychological and environmental domains, as well as general score of WHOQOL-Bref. The data were different in previous research, in which teachers of state's educational system presented a lower score in general quality of life, being statically significant and correlated to a greater time teaching and a greater weekly workload⁽²³⁾.

The results in the present study strengthened the importance of investigation about relations of the explored effects in teachers of elementary and high school education, with

instruments to evaluate quality of life, as well as the casual link between them.

It stands out as a study limitation the absence of a noise levels evaluation in schools of the participated teachers, in order to compare results with reality, besides holding a hearing evaluation to detect possible alterations.

CONCLUSION

The investigated teachers showed that they knew the consequences of the noise exposure but without consider it as an occupational hazard. Among the investigated effects, the presence of tinnitus and the intolerance to loud sounds (auditory), anxiety and headache (extra-auditory) were related to a worse quality of life. It is extremely important to carry out new studies on teachers' quality of life and on the strategies to soften possible alterations arising from occupational activities and, with this, improve these professionals' quality of life.

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