



Review

Working conditions, vocal health and work ability in teachers: an integrative review

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ABSTRACT

Introduction: Work Ability (WA) is the balance between job demands and a worker's individual resources to satisfy those demands. Teachers who have health problems related to musculoskeletal disorders (MSD) and respiratory diseases (RD) have their WA affected.

Objective: To understand the relationship between working conditions, vocal health, and WA in teaching work according to literature.

Methods: An integrative review was carried out with a search of the scientific literature in 7 databases: Medline Complete, Proquest, Pubmed, Scencedirect, Scopus, Virtual Health Library (VHL) and Web of Science (WOS). Original studies in Spanish, English and Portuguese related to the topic were included.

Results: 7 studies were analyzed in this review. Results show Giannini and Vertanen-Greis as the main authors who have published about the topic. 100% of the studies of this review have investigated the topic in primary and secondary teachers. Teachers with voice problems are almost three times more likely to lose their WA than those without voice problems, and there is a stronger association between loss of WA and voice problems.

Conclusions: Studies related to working conditions, vocal health and WA in teaching work are recent and the evidence is scarce. To date, greater decreases in WA have been found in teachers who report high levels of stress, poor air quality, and have a diagnosed voice problem.

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Condiciones de trabajo, salud vocal y capacidad laboral en profesores: una revision integradora

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RESUMEN

Introducción: La Capacidad Laboral (CL) es el equilibrio entre las demandas laborales y los recursos individuales de un trabajador para satisfacer esas demandas. Los profesores que tienen problemas de salud relacionados con trastornos musculoesqueléticos (TME) y enfermedades respiratorias (ER) tienen afectada su CL.

Objetivo: Comprender la relación entre las condiciones de trabajo, la salud vocal y la CL en la labor docente según la literatura.

Métodos: Se realizó una revisión integrativa con búsqueda de la literatura científica en 7 bases de datos: Medline Complete, Proquest, Pubmed, Sciencedirect, Scopus, Biblioteca Virtual en Salud (BVS) y Web of Science (WOS). Se incluyeron estudios originales en español, inglés y portugués relacionados con el tema.

Resultados: En esta revisión se analizaron 7 estudios. Los resultados muestran a Giannini y Vertanen-Greis como los principales autores que han publicado sobre el tema. El 100% de los estudios de esta revisión han investigado el tema en profesores de primaria y secundaria. Los profesores con problemas de voz tienen casi tres veces más probabilidades de perder su CL que aquellos sin problemas de voz, y existe una asociación más fuerte entre la pérdida de la CL y los problemas de voz.

Conclusiones: Los estudios relacionados con las condiciones laborales, la salud vocal y la CL en la labor docente son recientes y la evidencia es escasa. Hasta la fecha, se han encontrado mayor disminución en la CL en profesores que reportan altos niveles de estrés, mala calidad del aire y tienen un problema de voz diagnosticado.

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1. INTRODUCTION

Work Ability (WA) is the balance between job demands and a worker's individual resources to satisfy those demands. [1]. WA contributes to workplace well-being and reduces the risk of musculoskeletal diseases, sick leave, and early retirement. A low WA affects the company's productivity and its capacity to compete in the market [2]. Workers who have a physically strenuous job have a significantly lower WA than those who have a light job [3]. Some authors have reported that employees that lose WA are at risk of suffering from depression, therefore, these people require psychological support to overcome its effects [4]. Furthermore, WA decreases markedly in workers who present severe and persistent neck and shoulder pain [5]. On the other hand, it has been found that it is necessary to change work schedules, improve sleep quality, limit working hours, and not schedule sensitive people for night shifts to improve WA [6]. In case of teachers, those who present greater emotional exhaustion [7], stress [8] and burnout [9], have lower WA. Teachers who have health

problems related to musculoskeletal disorders (MSD) and respiratory diseases (RD) also have their WA affected [10]. Likewise, the coexistence of MSD and depression affects WA and reduces teachers' efficiency [11]. Moreover, there is a relationship between decrease in WA, voice problems, stress, and poor quality of the indoor environment in the teachers' workplace [12]. Work Ability Index (WAI) may be used at the individual and collective level; individually to identify workers with compromised functional capacity and adopt support measures, at a collective level, it allows identifying a general profile of WA and factors that affect it to generate corrective measures [13]. Additionally, WAI is valid to predict work disability, quality of life after retirement, mortality, and positive work reintegration [14]. For these reasons and to understand the importance of WA and vocal health in teachers, this review aimed to understand the relationship between working conditions, vocal health, and WA in teaching work according to literature.

2. METHODS

An integrative review of literature was carried out based on six stages proposed by Botelho, Cunha and Macedo (2011) [15].

1. Initially, the guiding question was formulated: How are working conditions and vocal health related to WA?
2. To answer the question, a search of scientific literature was carried out in 7 databases: Medline Complete, Proquest, Pubmed, Sciedirect, Scopus, Virtual Health Library (VHL) and Web of Science (WOS). The terms “work ability”, “voice disorders” and “teachers” were used with the Boolean operator AND to construct the following search equations: ("work ability") AND ("voice disorders") AND (teachers) and work ability AND voice disorders AND teachers.
3. After search, duplicate records were eliminated using Zotero bibliographic manager version 6.0.30.
4. Likewise, the following inclusion criteria were considered: studies in Spanish, English and Portuguese no publication time limit related to working conditions, vocal health, and WA in teachers. Studies related to other occupational voice users and studies related to WA in teachers that considered other health conditions were excluded. Moreover, conference proceedings, letters to editor, book chapters, books, dissertations, master's or doctoral theses, review articles, reflection articles, essays, articles that did not allow downloading or reading full text and articles published in other languages than those previously referred to were also excluded.
5. During preselection stage, title, abstract and keywords were read to verify inclusion and exclusion criteria to organize and select studies that were read in full text to perform data extraction.

Finally, to extract data from the studies, a matrix was created in Microsoft Excel 365 to organize and synthesize the information of the following variables: main author, year of publication, journal of publication, objective, methodology (type of study, sample) and main results.

3. RESULTS

During search, 148 records were identified, of which 59 were duplicates. In screening, 74 records that did not meet the inclusion criteria were excluded. In eligibility stage, 15 articles were read in full text. Ultimately, seven studies were

included and were analyzed in this review (Figure 1).

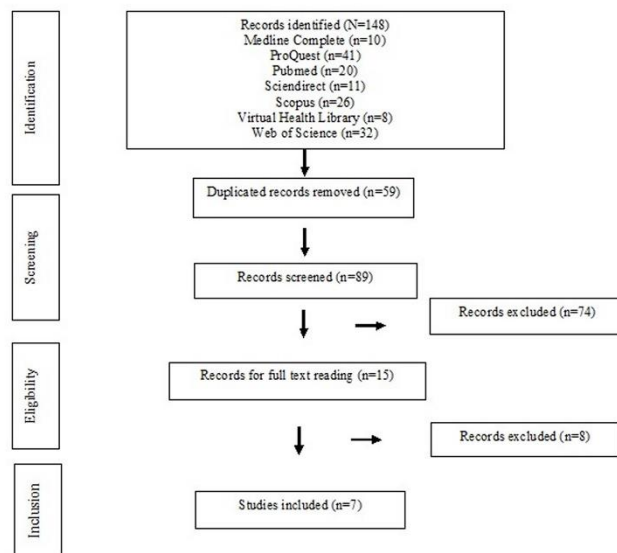


Figure 1: Flowchart of included studies.

Results show Giannini and Vertanen-Greis as the most notable authors with two (25.8%) studies. The first research related to the topic was published in 2013. Studies have been carried out in only two countries, Brazil, and Finland. Three descriptive observational studies (42.8%), three analytical observational studies (42.8%) and one comparative analytical observational study (14.2%) have been published. Among institutional affiliations of the main authors stands out, Pontifícia Universidade Católica de São Paulo [16,17,18,19], University of Turku [8,12] and Helsinki University Hospital [20]. Studies have been published in 6 journals, highlighting Journal of Voice [12, 18] from United States, Revista CEFAC [16], CoDAS [17] and Saúde e Sociedade [19] from Brasil. 100% of studies have investigated the topic in primary and secondary teachers (Table 1).

Table 1: Synthesis of included studies

Reference	Objective	Methodology	Main results
Vertanen-Greis (2022) [8]	To study whether lower WA associated more strongly when the variables of voice disorders and stress at work were combined as opposed to evaluating these two factors separately.	Cross-sectional study. 1,198 teachers and subsample of 538 primary and secondary school teachers.	Nine out of ten teachers who do not have voice problems or stress report a good WA, while four out of 10 of teachers who suffer from voice problems and stress have a poor WA.
Vertanen-Greis, (2022) [12]	To determine whether self-reported WA is associated with voice disorders, stress at work, and the quality of the perceived indoor environment.	Cross-sectional study. 1,198 teachers and subsample of 538 primary and secondary school teachers.	Decreased WA in teachers is related to voice problems, stress at work, and poor perceived quality of the indoor environment.
Ferreira (2016) [16]	To analyze the association between voice disorder and WA in teachers at municipal schools of São Paulo.	Case-control study. 272 women. 167 cases (with voice problems) and 105 controls (without voice problems).	Female teachers with voice problems are almost three times more likely to lose WA, and as it gets worse, there is a stronger association with the voice problem.
Giannini (2013) [17]	To evaluate the association between teaching-related stress along with loss of functional ability and voice disorders among teachers.	Case-control study. 272 women. 167 cases (with voice problems) and 105 controls (without voice problems).	Poor and moderate WA are associated with voice problems, independently of work stress factors, age, and classroom acoustic properties.
Giannini (2015) [18]	To identify the association between voice disorders and WA among teachers from public schools in São Paulo, Brazil.	Case-Control Study. 272 women. 167 cases (with voice problems) and 105 controls (without voice problems)	There is an association between decreased WA and voice problem ($p < 0.001$). Poor classroom acoustics ($OR = 2.7$; $p = 0.007$) is one of the factors associated with voice problems.
Biserra (2014) [19]	To analyze, by means of manifestation of worsening or improvement in WA, the aspects conditioning changes in the relation between work and voice, according to the discourse of teachers working at the municipal education network of São Paulo, Brazil.	Comparative analytical observational study. Data collection stage: 52 female teachers with diagnosed voice problems. Group A: 24 female teachers with the worst scores in WAI and Group B: 28 female teachers with the best scores in WAI. Focus group stage 8 teachers: Group A 5 teachers, Group B 3 teachers.	In Group A, there is a condition of greater illness and the need to talk about difficulties at work. Group B shows more strength in facing work-related problems, including creative proposals.
Patjas (2021) [20]	To investigate the voice symptoms and their environmental risk factors as well as the WA associated with distance teaching and to compare these with symptoms in previous contact teaching.	Descriptive survey-type. 121 primary and secondary school teachers.	Background noise is the biggest risk factor for a teacher's voice in the classroom and in distance learning. Poor indoor air quality negatively influences their voices. Voice problems are associated with higher levels of subjective stress and lower WA.

WA: Work ability; WAI: Work ability index.

4. DISCUSSION

4.1. CHARACTERISTICS OF STUDIES INCLUDED

This review aimed to understand the relationship between working conditions, vocal health, and WA in teaching work according to literature. As observed, research topic is of recent, and little has been investigated in this regard. Only seven studies met the inclusion criteria. Results show Brazil and Finland as countries that contribute with research on the

subject. The included studies focus on primary and secondary teachers. There are no studies in teachers of other levels of education. Six studies have considered a quantitative approach, and one has developed a comparative analytical observational approach with two stages, collection stage and focus group stage. Quantitative studies are cross-sectional studies [8, 12] survey study [20] and case-control studies [16-18]. Overall, working conditions have been studied through self-reported questionnaires that reveal working environment conditions [16, 17, 20], working organization conditions [17, 18], stress [8, 16, 20], work ergonomics [20] and air quality [8, 12, 20]. Voice is

studied through laryngoscopy and perceptual-auditory assessment [16-18] using GRBAS-I (Grade, Roughness, Breathiness, Astheny, Strain, Instability) scale [21]. In addition, *Condição de Produção Vocal do Professor (CPV-P)* questionnaire [22] and other questionnaires to know the frequency of voice problems and vocal symptoms have been used [8,12]. On the other hand, Voice Handicap Index (VHI-10) [23] has been used to know perception of teachers' vocal disability [18]. Besides, WAI [24] translated and validated in Portuguese version [16, 17, 19] and Work Ability Score (WAS) [25] have been used in Finland to assess teachers' WA [8, 19, 20].

4.2. WORKING CONDITIONS

The included studies emphasize in unsatisfactory classroom acoustics as one of working conditions that most affects teachers' voices with a statistically significant association ($p < 0.001$; $OR = 2.7$) [17], ($p = 0.007$) [18]. Another working condition that may affect vocal health is noise. This condition is associated with subjective voice problems and higher VHI-10 scores [20]. Furthermore, poor indoor air quality perceived by teachers with voice problems and ergonomic deficiencies in school (electrically adjustable desks) also influence teachers' voices [20]. Stress in one of the working conditions most reported by teachers, which reaches up to 65% [20]. Job Stress Scale (JSS) developed by Paker & Decotiis in 1983 [26] shows that teachers with acute fatigue are 2.2 times more likely to develop voice problems than teachers with mild fatigue [17], which resembles to the results found in soccer coaches, who present an association between stress and frequent vocal symptoms [27]. Moreover, it has been found that women suffer from voice problems and stress more frequently than men [8].

4.3. VOCAL HEALTH CONDITIONS

Study of vocal health conditions includes reporting of vocal symptoms [17, 18], vocal disability [20], prevalence of voice problems [8, 12] and improvement in vocal production after teachers were in a therapeutic program [19]. Teachers report vocal symptoms such as hoarseness [17,18], loss of voice [17,18], shortness of breath when speaking [17,18], rough voice [17], voice changes [17], weak voice [17], pain when talking [18], tiredness when speaking [18], throat tension when speaking [18], dry throat [18], tight throat [18] and phlegm [18] more frequently in teachers with a diagnosed voice problem. It is observed in statistically significant differences ($p < 0.001$) in relation to group of teachers without a diagnosed voice problem at the time of

the analysis [18]. It is also important to highlight that 71% of teachers experience vocal symptoms in regular teaching and 44% of teachers experience them in distance teaching during the time of COVID-19 pandemic, indicating that distance teaching is usually more beneficial for teachers compared to regular teaching [20] and voice quality improves in remote education [28]. Other authors have concluded that teachers with and without voice complaints have a different incidence of vocal symptoms, but these symptoms are usually similar in both groups, including, hoarseness, shortness of breath, tone changes and vocal fatigue with statistically significant differences ($p < 0.005$) between the compared groups [29]. In addition, other studies show that teachers who have suffered from some vocal pathology during their career tend to present more symptoms than those who have only presented some vocal pathology during the previous semester of their work [30], standing out primary schoolteachers above kindergarten teachers. Another study has also identified that almost half of schoolteachers present voice problems at the time of the research and almost three quarters have had vocal symptoms throughout their careers [31]. It confirms that voice problems have an impact on the personal and professional lives of teachers and imply a significant financial burden for society [32] and in the same way impact quality of life of these workers [33]. At the same time, it is highlighted that the voice production of female teachers with a diagnosed voice problem improves during therapy. However, it is found that almost half of female teachers still report recent voice problems due to factors such as the presence of depressive symptoms, effect of dryness of the vocal folds due to taking medication for depression, intense vocal demand and the presence of laryngopharyngeal reflux and some of them report the need to return to therapy [19]. In this sense, some authors emphasize that voice therapy is a strong predictor of maintaining employability among teachers with dysphonia if it is performed early [34]. It is common to abandon vocal therapy process, which generates poor adherence to the treatment, and it may increase the risk of a greater recurrence of voice problem and patients may suffer from a more complex pathology in the future [35]. On the other hand, previous studies that have used VHI show that 70% of teachers have a voice alteration [36] and have a greater perception of vocal disability [37], however, one of the included studies shows that this perception decreases during distance learning [20]. According to above, prevalence of voice problems in teachers is high; it is found at 52.42% [8] and 53.17% respectively [12] in two of the included studies and is confirmed by results in public schoolteachers (47.52%) [38] and in university professors,

which may reach up to 41% [39].

4.4. WORK ABILITY AND VOCAL HEALTH

Results of included studies recognize that teachers who report voice problems and present an associated diagnosis (cases) have their WA reduced [8, 16–18, 20]. Three of case-control studies in Brazil show that 67.4% of sick teachers (cases) consider WA as bad or moderate and 66.6% of healthy teachers (controls) rate it as good or very good [16–18], which implies that teachers with a better vocal health condition have a better WA. In addition, female teachers with voice problems are almost three times more likely to lose WA, and as it gets worse, there is a stronger association with the voice problem [16]. The above has similar results with the descriptive studies carried out in Finland, since the 69% [8] and 71% [12] of teachers with self-report of voice problems present good WA. However, it is necessary to carry out more studies with different methodological designs to measure WA and vocal health conditions in teachers due to the little evidence found in this review. On the other hand, it was observed that women report a lower WA than men [8, 12]. Low physical and mental WA, according to other results, show a significant association with factors such as physical and verbal violence in kindergarten and primary schoolteachers [40]. Furthermore, teachers over 45 years old present deterioration of WA due to effects of various diseases, which indicates that teachers in aging process see their WA affected, mainly when high rates of psychosomatic, RD and even hearing impairment occur [41]. Additionally, there are other variables that are significantly associated with a decrease in WA in teachers. It includes the perception of a worsening health situation, having children, difficulty sleeping well at night, a history of physical pain in the previous six months, be a teacher with a contract and work as a teacher for longer [42]. Above provides interesting data to conduct more research that studies other factors that may be associated with WA in teachers and that may affect their vocal health.

4.5. RELATIONSHIP BETWEEN WORKING CONDITIONS, VOCAL HEALTH, AND WORK ABILITY

There is a significant association between voice problems and workplace stress, as well as between voice problems and WA loss among female teachers [17]. Besides, the presence of voice problems in teachers is associated with higher levels of stress and lower WA [20]. Decreased WA in teachers is also related to voice problems, work stress and self-reported poor air quality [12], which is consistent with a recent study [43]. One of included studies shows that teachers with a

diagnosed voice problem and worse scores on WA present associated factors such as difficulties in relationships, lack of support from colleagues and the school directors [19]. Presence of voice problems and its significant association with WA decreased ($p < 0.001$) may eventually compromise the ability for teachers continue working. [18]. It is noteworthy that, nine out of ten teachers who do not have voice problems or stress report a good WA, while four out of ten teachers who suffer from voice problems and stress have a poor WA [8]. It indicates that teachers who report work stress are more likely to report voice problems [44] and teachers with a voice problem have worse psychosocial conditions than those who have a healthy voice [45], which may impact WA. At last, the results obtained emphasize that teachers with voice problems are almost three times more likely to lose their WA than those without voice problems, and there is a stronger association between the loss of WA and voice problems [16].

According to results above, some limitations are presented. It is unknown if there are studies published in other languages than English and Portuguese. Research has prioritized self-report of working conditions, vocal health related mainly to stress and poor air quality in primary and secondary schoolteachers. There is a lack of evidence that allows us to know more in depth about the relationship between working conditions, vocal health, and WA in teachers.

In conclusion, research on working conditions, vocal health and WA in teaching is recent and the evidence found is scarce. Included studies have been carried out only in Brazil and Finland. More than 50% of studies inquired about WA in teachers with a diagnosis of an associated voice problem (cases). To date, greater decreases in WA have been found in teachers who report high levels of stress, poor air quality, and have a diagnosed voice problem. It is important to carry out more studies on teachers of different levels of education with and without diagnosed voice problems that allow us to reach more compelling conclusions. Finally, it is suggested to develop more research with different methodological designs that identify early voice problems and working conditions that may generate loss of WA in teachers of different levels of education. It may improve their vocal health, quality of life, productivity and in this way to decrease prevalence of voice problems, work absenteeism, sick leave, and rates of return to work related to an occupational voice disorder.

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6. CONFLICT OF INTERESTS

The authors have no conflict of interest to declare. The authors declared that this study has received no financial support.

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