

Factors associated with work ability in the elderly: systematic review

Fatores associados à capacidade para o trabalho em idosos: revisão sistemática

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ABSTRACT: *Objective:* To synthesize the evidence on factors associated with the maintenance of work ability during the aging process. *Methods:* SciELO, LILACS and PubMed databases were consulted, in order to find out studies in Portuguese, English and Spanish published from 2000 to 2013. Descriptors which encompassed terms related to work ability, aging and elderly were used. Quantitative observational studies were included to investigate the work ability and the effect of aging. Studies aiming at analyzing the clinical course of illnesses related to aging and/or papers and publications in the form of editorials, interviews, projects, clinical notes and preliminary or conceptual data were excluded. *Results:* A total of 924 articles were obtained, but 27 were included in the analyses. Later on, 2 intervention and 8 repeated studies were excluded. Variables that showed negative correlations with work ability were the following: age, smoking, service time and physical demands in occupational activities. Satisfaction with life, sufficient income, physical activity, volunteerism and mental workload were considered positive associations that protect the elderly from functional loss. *Conclusion:* This study was reported as a protective mechanism against depression, disability and fragility, maintaining the well-being, good cognitive function and autonomy in daily activities. Increased investments in the health care of this population are needed regarding musculoskeletal and cardiorespiratory capacity. Physical activity must be encouraged by policies to foster health promotion.

Keywords: Work ability. Work ability assessment. Work ability index. Workers. Elderly. Aging.

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RESUMO: *Objetivo:* Sintetizar as evidências acerca dos fatores associados à manutenção da capacidade de trabalho durante o processo de envelhecimento. *Métodos:* Foram consultadas as bases de dados SciELO, LILACS e PubMed, buscando-se estudos em português, inglês e espanhol publicados no período de 2000 a 2013. Os descritores utilizados abarcaram termos relacionados à capacidade para o trabalho, envelhecimento e idosos. Foram incluídos estudos observacionais quantitativos, que investigaram a capacidade laboral e o efeito do envelhecimento. Foram excluídos estudos interessados em analisar curso clínico de doenças relacionadas ao envelhecimento e/ou trabalho e publicações sob a forma de editoriais, entrevistas, projetos, notas clínicas e dados preliminares ou conceituais. *Resultados:* Obteve-se um total de 924 artigos, sendo que 27 foram incluídos na análise e em seguida dois estudos de intervenção e oito repetidos foram excluídos. As variáveis que apresentaram correlações negativas com a capacidade para o trabalho foram idade, tabagismo, tempo de serviço e demanda física na atividade ocupacional. A satisfação com a vida, renda suficiente, prática de atividade física, voluntariado e demanda mental de trabalho foram considerados associações positivas que protegem os idosos da perda funcional. *Conclusão:* O trabalho foi relatado como mecanismo de proteção contra a depressão, incapacidade e fragilidade, mantendo o bem-estar, bom nível cognitivo e independência nas atividades diárias. São necessários maiores investimentos na saúde dessa população no que diz respeito à capacidade musculoesquelética e cardiorrespiratória e a prática de atividade física deve ser encorajada por políticas de incentivo à promoção da saúde.

Palavras-chave: Capacidade para o trabalho. Avaliação da capacidade para o trabalho. Índice de capacidade para o trabalho. Trabalhadores. Idoso. Envelhecimento.

INTRODUCTION

Population ageing has been described as a global phenomenon. Brazil, unlike developed countries, has shown rapid growth in recent decades¹. In 1977, the elderly accounted for 4.9% of the economically active population (EAP); in 1988, 9%, and expectations are that in 2020, they account for at least 13% of the economically active population². The earned income of the elderly is crucial in the composition of their personal and family income, so that they can hardly expect compensatory mechanisms that allow them to lower their participation in the labor market³.

Work ability (WA) is the basis for well-being, and the variables that affect it may be influenced by factors related to the individual, the environment and life outside of work, according to the multidimensional conceptual model⁴. Although functional ageing can be often noticed before chronological ageing in national⁵ and international⁶ studies, there is evidence that formal or voluntary work⁷ is an important protector of disability and is related to the maintenance of well-being, physical activity and active lifestyle life among the elderly^{7,8}.

Due to a greater susceptibility to conditions that reduce their ability to work, the elderly are frequent associated with impairments in body functions, difficulties in performing work activities and restrictions in social participation. However, it is noteworthy that the studies are not consistent with regard to the factors that promote the sustainability of the WA in the elderly, indicating a gap in the literature that needs to be completed for the development of public policies to promote the health of the elderly that remain at work.

The identification and stratification of risks in individual groups exposed to certain factors and conditions that place them in a position of priority for health care are important tools in the analysis of the health situation. Given the accelerated population ageing associated with increased participation of the elderly in the labor market, the aim of this systematic review was to summarize the evidence about the factors associated with maintenance of the work ability during the ageing process.

METHODS

This is systematic review of literature, exploratory in nature and of quantitative approach, which used a combination of the descriptors “assessment of work ability” AND “elderly” OR “ageing” AND “workers” and their Portuguese and Spanish equivalents, according to the health sciences descriptors (DeCS). Articles that had the searched keywords in its title or abstract and were published between 2000 and 2013 were screened. The search took place between March 29th and April 25th, 2013. A bibliographic survey was conducted in indexed databases MedLine, SciELO and LILACS.

Unlike the term “job performance”, the concept of work ability in this review was based on studies by Ilmarinen⁹, discussed by Sampaio and Augusto¹⁰, which is the combination of human resources in relation to physical, mental and social demands of work activity, incorporating individual resources, factors related to work and the environment outside of work.

SELECTION OF ARTICLES

The selection of articles found with the search in different databases was conducted in three distinct stages. First, we selected items with abstracts available, with a quantitative methodology (cohort or cross-sectional), for the evaluation of AW and the effect of aging. We excluded studies whose samples did not include older people, those interested in analyzing the clinical course of age- and/or work-related illnesses and those published in the form of editorials, interviews, projects, clinical notes, preliminary or conceptual data, descriptive and revisions.

The articles found in journals should contain the terms listed above, not necessarily all, but the term “assessment of the work ability” was the primary inclusion factor, and

should be related to ageing, with individuals that are healthy and/or capable of continuing with their work. They could not focus on diseases.

DATA EXTRACTION AND ANALYSIS

With the studies previously established, a reading was performed in an exploratory way, and a specific form was developed specifically to analyze the articles for the review and extract the data. This tool was based on the recommendations of The Cochrane Library¹¹, adjusted according to the interests of authors. The extraction of data considered the following:

- study design and place of conduction of the study;
- aspects of the study methodology;
- follow-up period;
- results;
- variables that were associated with AW. These variables were distributed in the following sections: sociodemographic (age, gender, education, marital status, income, social participation and physical activity), clinical and functional (health status, medical condition, lifestyle, physical and mental functionality) and labor (hours/week of dedication to work, time of exposure and types of physical or mental requirements).

The selection of articles was performed by two independent reviewers, based on information from the title and abstract of the articles. If there was some disagreement, the reviewers would read the study in its entirety, discuss and even consult a third reviewer. After this step, the data were consolidated into a database. Variables related to AW in the articles were categorized according to the didactic model described by Sampaio and Augusto¹⁰ and presented in this review if there was a statistically significant relationship with the outcome measure indicated by the studies.

RESULTS

In the search performed, 924 articles were obtained after defining descriptors and applying the inclusion criteria. The characteristics of the articles selected are presented in Tables 1 and 2. Among the 17 studies included, the number of longitudinal studies with follow-up represented minority (35.2%), with mean follow-up of 4.8 years (SD \pm 3,9 years). Although only studies involving elderly in the sample have been selected, the result reveals that only 35.2% of these studies investigated individuals above 60 years of age who had some sort of work activity. Brazil represented the largest number of publications on the topic, representing 41.1% of the studies analyzed, but conducted only cross-sectional studies (64.7% of the total).

Table 1. Factors associated with work ability in professionals in different age groups, according to longitudinal studies, years and country.

Author, year and country	City	Study area	Sample		Follow-up time (years)	WA outcome instruments	Association method/model	Main results: factors associated with WA
			n	Age group (years)				
Wilkie, 2011 ²⁹ England	Massachusetts	Urban	552	55 and over	1	Self-reported questionnaire; SF-12	Univariate analysis and multiple linear regression model	Dysfunctions limited their ability to work.
Mohren, 2010 ³² Netherlands	Maastricht	Not defined	7,734	18 – 65	2	Self-reported questionnaires; DQEEW	Poisson regression analysis; Cox multivariate regression analysis; RR	The presence of chronic illness, family conflict, greater number of hours worked per week, psychological demands, living alone and smoking were associated with increased need for recovery at work.
Jung, 2010 ¹⁴ USA	Los Angeles	Urban	1,072	70 – 79	4	Katz Index; Semi-tandem balance test; SPMSQ; Self-reported questionnaire; Fragility Criteria; Hopkins Symptom Checklist; YPAS	Logistic Regression Model; OR	Follow-up revealed that engaging in productive activity reduces the chances of developing fragility, regardless of age, disabilities and cognitive function.
Schwingel, 2009 ¹³ Malaysia	Singapore	Urban	1,754	55 and over	2	Self-reported questionnaire; IADL Scale; GDS; MMSE; SF-12; Life satisfaction scale.	Multivariate Linear Regression Model	Inactivity predicts depression. Continuing to work prevents disability in ADL and IADLs and well-being and satisfaction. Performing unpaid work predicts better cognitive function.
Martinez, 2006 ⁷ USA	Baltimore	Urban	134	60 and over	4	Self-reported questionnaire; MMSE; Trail Making Test; Health performance tests.	Univariate analysis	No significant correlation.
Savinainen, 2004 ¹⁵ Finland	Not defined	Urban	95	55 and over	16	Self-reported questionnaire on health status, work; EWA; Muscle Strength Dynamometer; Exercise Testing; SRT	Univariate analysis; RR	There was a decline in physical function related to age. Positive correlation was observed between HS and workload among women. Reduced workload was associated with better isometric trunk extension force, aerobic capacity and physical capacity.

WA: Work Ability; DQEEW: Dutch Questionnaire on the Experience and Evaluation of Work; SPMSQ: Short Portable Mental Status Questionnaire; YPAS: Yale Physical Activity Survey; IADL: Instrumental Activities of Daily Living; GDS: Geriatric Depression Scale; MMSE: Mini-mental State Examination; EWA: Ergonomic Work Analysis; SRT: Sitting-rising Test; RR: Relative Risk; OR: Odds Ratio.

Table 2. Factors associated with ability to work in professionals in different age groups, according to cross-sectional studies, year and country.

Author, year and country	Study area	Sample	Age group	WA outcome instruments	Association method/model	Main results: factor associated to WA
van den Berg, 2011 ²⁸ Netherlands	Urban	10.542	18 – 68	Productivity Quantity and Quality Scale; WAI; Self-reported questionnaire; Job Stress Scale	Univariate and multivariate logistic regression analysis; OR	Elderly workers and females showed an inverse association with loss of productivity at work.
Costa, 2011 ²⁵ Portugal	Urban	50	37 – 63	WAI	Multiple Linear Regression Analysis	There was a negative correlation between all items of the Work Ability Index and age.
Souza, 2011 ³³ Brazil	Urban	199	60 and over	Whoqol-bref Self-reported questionnaire	Multiple Linear Regression	Higher scores in the psychological, quality of life and social relationships domains were observed between elderly volunteers.
Monteiro, 2011 ³⁴ Brazil	Urban	241	20 – 68	WAI; Self-reported questionnaire;	Univariate Analysis and Multivariate Logistic Regression	Obesity, not performing leisure activities, longer hours of working at the institution showed good correlation with low WA.
Gómez-Lomelí, 2010 ²² Mexico	Urban	416	60 – 87	Self-reported questionnaire; GDS; Abdominal circumferences.	Univariate Analysis	Self-perceived health was good, although there is inherent risk to obesity. The reason for working as a packer was economic necessity.
Almeida, 2009 ³⁵ Brazil	Urban	67	18 – 74	Self-reported questionnaire;	Univariate Analysis	Nociceptive symptoms are not correlated with ageing and do not interfere with the degree of personal satisfaction, housing type and occurrence of occupational accidents.
Monteiro, 2006 ³⁰ Brazil	Urban	651	20 – 69	WAI; Self-reported questionnaire;	Univariate Analysis	There was a positive relationship between educational levels, WA, mental and physical demands of work. Ageing, low education and more time on the job are related to low WA.
Pérez, 2006 ²¹ Brazil	Urban	2.113	60 and over	Self-reported questionnaire; ADL;	Binomial Logistic Regression Analysis	Worse health status was associated with worse WA.
Raffone, 2005 ³⁶ Brazil	Urban	885	35 – 68	Self-reported questionnaire; WAI	Multiple Logistic Regression Analysis; OR	The degree of education, participation in physical activities and educational level were correlated with good ability to work.
Giatti, 2003 ³⁷ Brazil	Not informed	2.886	65 and over	Secondary data from PNAD	Multiple Logistic Regression Analysis; OR	Regarding elderly retirees: those who worked were younger, had more education and higher income; reported a lower frequency of chronic diseases, less difficulty in performing ADLs.
Pohjonen, 2001 ¹⁹ Finland	Urban	636	19 – 62	WAI; Self-reported questionnaire; NMQ; MFHS ; Occupational Stress Questionnaire	Multiple Logistic Regression Analysis; Oneway Variance Analysis; OR	Age, in the group of elderly, was associated with moderate capacity for global work, decline in physical demands sub-item and in the health status.

WA: Work Ability; WAI: Work Ability Index; ADL: Activities of Daily Living; GDS: Geriatric Depression Scale; PNAD: National Survey by Household Sampling (IBGE); NMQ: Nordic Musculoskeletal Questionnaire; MFHS: Mini-Finland Health Survey; RR: Relative Risk; OR: Odds Ratio.

The instruments for outcome assessment used by most articles were: Work Ability Index (WAI) (35.2%), self-rated health (35.2%), SF-12 (23.5%), Instrumental Activities of Daily Living scale (IADLs), of life satisfaction, and the Nordic Musculoskeletal Questionnaire (NMQ) (17.6%).

Being satisfied with life (17.6%), having higher income (11.7%), doing any kind of physical activity (11.7%), volunteering (5.8%) and mental labor demand (5.8%) were presented as positive associations of the determinants against functional loss (Table 3). Table 4 shows the main negative associations, identified as risk variables, which showed correlation with WA. Noteworthy are the variables being elderly (41.1%), not having a partner, physical demand at work (11.7%), being a smoker and prolonged time of service in years (5.8%). The variables education, health status, comorbidity, functionality, cognition and number of hours worked in the week showed no statistically significant associations.

Table 3. Factors positively associated according to the sociodemographic, clinical, functional and labor sections.

Variable	Number of articles	%	References
Sociodemographic			
Age	-	-	-
Gender	-	-	-
Schooling	3	17.6	21; 36; 37
Marital status*	-	-	-
Income	2	11.7	21; 37
Social participation**	-	-	-
Physical activity	2	11.7	34; 36
Clinical, functional			
Health status	1	5.8	19
Emotional status	1	5.8	13
Comorbidity and chronic illnesses	1	5.8	34
Smoking	-	-	-
Functionality (muscle function, aerobic capacity, mobility, ADL and IADL)	3	17.6	13; 15; 37
Cognition	1	5.8	13
Satisfaction	3	17.6	13; 34; 35
Labor			
Remunerated work	2	11.7	13; 14
Volunteering	1	5.8	33
Hours of work/week	1	5.8	15
Years of service	-	-	-
Mental demand in work	1	5.8	30
Physical demand in work	-	-	-

*Not having a partner; **Participation in community activities (trade unions, clubs, political parties, religious cults).

Table 4. Factors associated negatively according to sociodemographic, clinical, functional and labor sections.

Variable	Number of articles	%	References
Sociodemographic			
Age	7	41,1	14; 15; 19; 25; 28; 30; 34
Gender	-	-	-
Schooling	2	11.7	29; 30
Marital status*	1	5.8	32
Income	-	-	-
Social participation**	-	-	-
Physical activity	-	-	-
Clinical, functional			
Health status	1	5.8	21
Emotional status	2	11.7	14; 32
Comorbidity and chronic illnesses	2	11.7	32; 36
Smoking	1	5.8	32
Functionality (muscle function, aerobic capacity, mobility, ADL and IADL)	1	5.8	14
Cognition	1	5.8	14
Satisfaction	-	-	-
Labor			
Remunerated work	-	-	-
Volunteering	-	-	-
Hours of work/week	2	11.7	15; 32
Years of service	1	5.8	34
Mental demand in work	-	-	-
Physical demand in work	2	11.7	19; 30

*Not having a partner; ** Participation in community activities (trade unions, clubs, political parties, religious cults).

DISCUSSION

The relationship between ageing and work is being approached from different aspects. In this review, the fact that the elderly remains inserted in the labor market, which leads to a good expectation of its future, is reinforced. The main associations that negatively influence the WA, such as age, smoking, time of service in years and physical work demands, are stressed. The positive association between factors that can maintain a good WA during the ageing process tend to satisfaction with life, better financial conditions, regular physical activity, volunteer work and occupational activities with prevalence of mental demand, protecting the elderly from functional declines.

Due to the heterogeneity of the sample, the small number of articles included at the end of this review and the different statistical methods applied, it was constrained in inferences regarding the magnitude and the impact of factors associated with WA in the elderly, since the tendency of the results cannot be accurately measured, a situation

often found in systematic reviews of observational studies¹². However, in this review, 41.1% of the studies presented estimates of relative risk, odds ratio or attributable risk, which are important to verify the association between exposures and outcomes. The statistical power is not the best indicator to analyze the susceptibility of the study for being biased¹², being also necessary to determine the sample composition and size. Few studies have examined only the elderly and the majority of studies were cross-sectional and, as a consequence, causality could not be determined.

Further studies on this topic are worth mentioning, and this review does not exhaust the possibility that other relevant evidence have not been located for being available in other bases, sources or different languages from those considered. However, the selection of studies included only considered publications in databases that require peer review of submitted articles, which gives them greater credibility regarding the methodology used.

Schwengel¹³ describes that seniors who volunteer and/or to remain active and busy after retirement have better cognitive conditions, greater life satisfaction, well-being and continue to exert their ADLs independently. Elderly who engage in productive activities are less likely to develop frailty syndrome regardless of age¹⁴. Aged people who retire and become inactive have higher rates of depression¹³.

Staying in the labor market seems to be strongly determined by physical capacity. Longitudinal study by Savinainen et al.¹⁵ concluded that the strength of isometric trunk extension and good aerobic capacity are found most often in workers with low workload, less time and intensity of exposure to physical work activity. These data may explain the emergence of work-related diseases and injuries¹.

Regular physical activity can be an important tool for health promotion for older people to continue working. In this review, sectional and longitudinal studies show the effects of this regular practice on the performance at work, thus corroborating the revisions by Kenny¹⁶ and Crawford¹⁷, in which the protection of the elderly against functional loss at work was evidenced. The increase in oxygen consumption by 25%, and consequently the improvements in cardiorespiratory and muscular performance, the promotion of sociability, mental and emotional well-being are directly linked to improved self-perceived health, and a strong association has been shown with the lowest rate of absenteeism¹⁸⁻¹⁹.

The relationship of gender and social participation were not apparent in the primary studies in this review, whether by low statistical power or lack of association, contrary to what we expected. Females are increasing participation in the labor market, prevailing the double shift, justified by lower incomes and need for relationships, not by satisfaction. These events put them at disadvantage in maintaining WA compared with males²¹. According to Pèrez²¹, it has been increasingly observed that elderly adults provide financial aid to their adult sons and daughters, a phenomenon called intergenerational transfer.

In relation to social participation, studies indicate that work is a source of maintenance of independence in ADLs, because the contact with other people provides fundamental relations of cooperation and interactivity. The labor activity may also involve mechanisms of beneficial competition to some extent, since they involve daily challenges that keep the worker active and assist in maintaining functional capacity^{13,14,21,22}.

The mental demand of work was shown as positive association that can protect the elderly from the loss of WA. The reverse relationship is also true, in that the work preserves cognitive function during ageing. The memory, learning, attention and information processing are influenced by the kind of work and ageing itself, which can be reversed with the development of competence to perform the work²⁰. These changes do not occur in a systematic manner, and can be compensated by experience, ability to work independently and greater bonding to their jobs that older workers tend to have²⁰. It is recommended, therefore, that high productivity demands, stress, time pressure and complex decisions be avoided by the elderly, but the workload should be adjusted in order to promote the social inclusion process²³.

The decline in sensory function and deterioration of muscle performance may explain work accidents. The review by Luis and Díaz²³ points out that falls remain one of the most frequent events. These data provide important information to our study, in which none of the articles addressed the relationship between these variables, possibly because studies involving workplace accidents were excluded.

The evaluation of WA should include physical, mental and social abilities, as well as other disabilities²⁴. In addition to clinical or laboratory measures, several authors have suggested the use of the WAI as a practical means to monitor the changes related to the functional ageing of workers. In the studies included in this review, 35.2% have adopted the WAI as an outcome measure, determining which workers need support from health services. Costa et al.²⁵ demonstrated a negative relationship between all items of the WAI and age and point out that the use of this instrument can make the workplace better adapted to the elderly. Although the Brazilian version has been translated²⁶, validated and has good psychometric properties²⁷, it has not yet been developed for longitudinal studies to establish normative values according to the WAI scores for the general population and in the elderly.

Our findings support a study conducted by van den Berg et al.²⁸ when analyzing the determinants of WA related to the instrument. Unlike our study, the authors emphasize overweight, changes in body balance, low income, high mental demands and lack of job autonomy as negative associations for the loss of ability to work.

CONCLUSION

This review shows a shortage of studies in elderly inserted in the labor market, despite the great importance of the subject and of numerous publications related to

diseases. Likewise, few studies have reported the value of older workers as a healthy individual who is able to continue their work activities.

The permanence of elderly people in the labor market becomes increasingly emerging, since the Health Care and Social Security systems have shown their bankruptcy. However, to keep working requires careful adjustments so that undesirable damage to the elderly are avoided or minimized. The work was considered positive in this study as an important protective mechanism against depression, disability and frailty, maintaining well-being, good cognitive function and independence in daily activities. However, for this to occur, greater investment in the health of this population are needed, particularly with regard to musculoskeletal and cardiorespiratory fitness, and physical activity in the workplace should be encouraged by incentive policies as a health promotion strategy. Alcohol consumption, long working hours and physical demands of work activity were negatively associated with WA, which may favor the early functional ageing. However, more longitudinal studies, mainly Brazilian, are needed to determine causality of these factors among the elderly.

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