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# Health and work ability among office workers

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## ABSTRACT

**OBJECTIVE:** To identify dimensions of health associated with work ability and to verify whether such relationships are influenced by demographic or occupational characteristics.

**METHODS:** A cross-sectional study was carried out, including 224 employees of an employee health insurance and retirement savings company in the city of São Paulo, Brazil, in 2001. Subjects responded to self-administered questionnaires evaluating demographic and occupational characteristics, job satisfaction, health, and work ability. Associations between variables were measured using Chi-square tests, analysis of variance, and analysis of covariance.

**RESULTS:** Occupational and demographic variables significantly associated with work ability were time in job ( $p=0.0423$ ) and job satisfaction ( $p=0.0072$ ). All dimensions of health evaluated were significantly associated with work ability ( $p<0.0001$ ), and were independent of demographic and occupational characteristics.

**CONCLUSIONS:** Results showed that, independently of other characteristics, better physical and mental health are associated with greater work ability. This provides evidence of the importance of considering health in all its dimensions.

**KEYWORDS:** Workers' health. Workers. Working conditions. Job satisfaction. Questionnaires. Psychosocial factors at work. Work ability.

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## INTRODUCTION

The concept of work ability relates to the capacity a worker has to perform his work tasks, given his work demands, health status, and physical and mental abilities and may be considered as a measure of functional aging.<sup>2,8</sup>

Work ability, which is regarded as a dynamic process of human resources in relation to work, is influenced by a number of factors, which include sociodemographic characteristics, lifestyle, the aging process, and work demands.<sup>8,14,20</sup> Among these different factors, health is considered as one of the primary determinants of work ability.<sup>8,10,14,17</sup>

Issues related to work ability have been the subject of investigations in the field of workers' health since the beginning of the 1990's. Such issues have gained in importance in the context of the demographic transition and of concomitant changes in production and work relationships.<sup>8</sup> In Brazil, the aging of the workforce started to take place during the 1980's, when a progressive increase in the participation in the workforce of persons aged 30 years or older began to occur.<sup>4</sup> Investigations of work ability and functional aging began to take place in 1997, following the translation and adaptation of the Work Ability Index (WAI) to the Portuguese language.<sup>22</sup> However, the factors associated with work ability among the Brazilian workforce have not yet been extensively investigated, in spite of the relevance of this subject in the current context of demographic transition in the country.

In light of the above, the present study was aimed at identifying dimensions of health associated with work ability and verifying whether these relationships are influenced by demographic or occupational characteristics.

## METHODS

We carried out a cross-sectional study including of-fice workers from an employee health insurance and retirement savings company in São Paulo, Brazil, which had recently undergone reorganization of its personnel structure and work process. Exclusion criteria included being on leave due to disease, being on vacation during data collection, having participated in the pretest, being one of the researchers, and having answered incompletely to any of the questions posed. This led to the exclusion of 5.6% of all workers. Our study sample comprised 224 workers who answered all questions in full, corresponding to 77.8% of the company's total staff. Participation in the survey was voluntary, and results were

regarded as confidential. Data collection took place in July 2001.

Subjects responded to four questionnaires. The first of these collected sociodemographic and occupational data (sex, age, marital status, income stratum, schooling, time in the company, and position). The second questionnaire evaluated job satisfaction, using the Portuguese language version of the "Job Satisfaction" scale from the Occupational Stress Indicator (OSI), translated and validated by Swan et al<sup>18</sup> (1993). This scale allows for the measurement of satisfaction in terms of 22 psychosocial aspects of work, generating a global job satisfaction score that ranges from 22 to 132 points. This score was divided into tertiles, the variable being thus categorized into "dissatisfaction" (1<sup>st</sup> tercile), "intermediate satisfaction" (2<sup>nd</sup> tercile), and "satisfaction" (3<sup>rd</sup> tercile).

The third questionnaire employed was the Medical Outcomes Study 36-item short form survey (SF-36), translated and validated for Portuguese by Ciconelli et al<sup>5</sup> (1997). The SF-36 is a generic health evaluation questionnaire comprising 36 items grouped into eight scales: physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional, and mental health.<sup>5</sup> The first four scales are representative of physical health, and the remaining four, of mental health.<sup>24</sup> The score for each scale ranges from zero to 100, corresponding to the worst and best health status, respectively.

The fourth questionnaire employed was the Work Ability Index (WAI), which evaluates the capacity for work considering physical and mental demands, as well as the resources and health conditions of workers according to their own perception.<sup>22</sup> WAI evaluates seven dimensions: current work ability compared with the lifetime best, work ability in relation to the demands of the job, number of diseases diagnosed by physician, estimated work impairment due to disease, sick leave during the past year (12 months), own prognosis of work ability two years from now, and mental resources. The score generated by this scale ranges from 7 to 49 points, scores being categorized as poor (7-27 points), moderate (28-36 points), good (37-43), and excellent (44-49) work ability.<sup>22</sup> This variable was further dichotomized into "satisfactory" (excellent and good) and "unsatisfactory" (moderate and poor).

The reliability of the questionnaires was assessed using Cronbach's Alpha Coefficient, and the study population was characterized by descriptive analysis (means, standard deviations, minimum and maximum values, and proportions). The normality of variables was verified using Kolmogorov-Smirnov test,

**Table 1** - Sociodemographic and occupational characteristics of office workers. São Paulo, Brazil, 2001.

Characteristic	Value
Number of participants	224
Females (%)	51.3
Age in years: mean (standard deviation)	34.7 (8.36)
Income: employees earning 4 to10 minimum wages (%)	44.7
Higher education (%)	63.4
Married (%)	55.4
Years in company (mean and standard deviation)	8.4 (4.8)
Analysts (%)	34.4
Technicians (%)	30.8

**Table 2** - Characteristics of office workers according to dimensions of health. São Paulo, Brazil, 2001.

Dimension	Mean	Standard-deviation	Minimum value	Maximum value
Physical functioning	87.9	13.8	20.0	100.0
Role-physical	80.0	28.5	0.0	100.0
Bodily pain	71.0	22.3	10.0	100.0
General health	79.4	16.4	32.0	100.0
Vitality	18.8	18.8	0.0	100.0
Social functioning	21.8	21.8	12.5	100.0
Role-emotional	31.7	31.7	0.0	100.0
Mental health	16.8	16.8	12.0	100.0

and variances were compared using the Levene test. This information was used to determine the type of statistical test adequate to each variable.

The association between work ability and each of the demographic and functional variables was analyzed using the Chi-square test. We then carried out analysis of variance between work ability and the means of each of the health-related variables. This analysis was repeated with adjustment of the comparison of means for demographic and occupational variables (covariance analysis). All analyses used a significance level of 5%.

The study was evaluated and approved by the Research Ethics Committee of the Faculdade de Saúde Pública da Universidade de São Paulo.

## RESULTS

In questionnaire reliability analysis, the OSI job satisfaction scale showed a Cronbach's Alpha coefficient ( $\alpha$ ) of 0.93. Of the eight SF-36 scales, seven had  $\alpha=0.70$ , and the "social functioning" scale showed  $\alpha=0.67$ . The alpha value for WAI was 0.73.

The 224 employees that participated in the study were similarly distributed between both sexes. Subjects were mostly young adults (mean age 34.7 years), with a predominance of incomes greater than four minimum wages, higher education, and married subjects. Mean time in job was 8.4 years, and most subjects were analysts or technicians (Table 1).

Job satisfaction scores were normally distributed, with a mean score of 88.4 (standard deviation 14.3; variance 47-132) points. Table 2 shows that the highest scores for health-related aspects were for physical health (physical functioning, role-physical, bodily pain, general health), with mean scores beginning at 71 points, whereas mean scores for the mental health scales were all below 32 points.

WAI scores indicated that the majority of employees showed excellent (45.5%) or good (39.3%) work ability; 15.2% of employees showed moderate ability; none showed poor ability.

Table 3 shows that work ability was significantly associated with time in job ( $p=0.042$ ) and job satisfaction ( $p=0.007$ ).

Mean values for all dimensions of health were significantly higher among employees with satisfactory (good and excellent) work ability. This effect remained significant after adjustment for sex, age, income, schooling, marital status, time in job, and job satisfaction (Table 4).

## DISCUSSION

There was no selection or sampling bias in the present study, given that the sociodemographic and functional characteristics of non-responders showed no evidence of differences with respect to the studied population (data not shown), which was representative of the company's personnel.\* Regarding external validity, gen-

\*Data not shown. Detailed information regarding the study population and the analysis of non-responders may be found in: Martinez MC. As relações entre a satisfação com aspectos psicossociais no trabalho e a saúde do trabalhador [masters dissertation]. São Paulo: Faculdade de Saúde Pública da USP; 2002.

eralization of the present results must be approached with caution given the scenario of organizational restructuring. However, restructuring of personnel, organizational downsizing, and job insecurity are a constant in contemporary Brazilian settings.<sup>16</sup>

The reliability of the questionnaires used was satisfactory (Cronbach's alpha  $\geq 0.70$ ), with the exception of the "social functioning" scale of SF-36. The lesser reliability of this scale may be due to the small number of items (only two) of which it is composed. Despite this low value, we chose not to exclude this scale from the instrument and from data analysis, given that (a) "social functioning" are complex phenomena, which may be influenced by work-related, financial, cultural, and other issues that may affect individual health, and (b) this is an important aspect of health.

The context of the company in which the present study was conducted must also be considered: at the time of data collection, a process of organizational restructuring was nearing completion; this process had been marked by a reductions in personnel and

modification of work processes. During data collection, an ergonomic analysis of work was also carried out, which showed that tasks were characterized by intellectual content and by constant use of mental abilities.\* These tasks characteristically required the reception and processing of a wide variety of information, involved great responsibility for abstract values, pressure to meet deadlines and large workloads, and often required high professional qualification.

The study population is in advantage in relation to the general Brazilian workforce in terms of income and schooling. According to the *Instituto Brasileiro de Geografia e Estatística*\*\* (Brazilian Institute of Geography and Statistics - IBGE), mean income among private-sector workers with long-term contracts in the Sao Paulo Metropolitan Area is approximately 3.9 minimum wages. None of the workers in the present sample earned less than four minimum wages.

Regarding schooling, whereas 53.9% of the economically active population of the Sao Paulo Metropolitan Area have secondary education,\*\*\*

**Table 3** - Analysis of associations between work ability and demographic and occupational characteristics among office workers. São Paulo, Brazil, 2001.

Variable (categories)	Work ability				N	Total %	p*
	Satisfactory N	Satisfactory %	Unsatisfactory N	Unsatisfactory %			
Sex							
Female	95	82.6	20	17.4	115	100.0	0.3431
Male	95	87.2	14	12.8	109	100.0	
Age (years)							
<30	57	89.1	7	10.9	64	100.0	0.3384
30-39	76	80.9	18	19.1	94	100.0	
$\geq 40$	57	86.4	9	13.6	66	100.0	
Income (no. of minimum wages)							
<11	85	85.0	15	15.0	100	100.0	0.1621
11-20	47	78.3	13	21.7	60	100.0	
$\geq 21$	58	90.6	6	9.4	64	100.0	
Schooling							
With higher education	121	85.2	21	14.8	142	100.0	0.8307
Without higher education	69	84.1	13	15.9	82	100.0	
Marital status							
Married	106	85.5	18	14.5	124	100.0	0.7583
Not married	84	84.0	16	16.0	100	100.0	
Years in job							
<3	40	97.6	1	2.4	41	100.0	0.0423
3-10	68	81.9	15	18.1	83	100.0	
$\geq 11$	82	82.0	18	18.0	100	100.0	
Position							
Specialized work	103	85.8	17	14.2	120	100.0	0.8907
Technicians	58	84.1	11	15.9	69	100.0	
Clerks	29	82.9	6	17.1	35	100.0	
Job satisfaction							
Satisfied	68	91.9	6	8.1	74	100.0	0.0072
Intermediate	67	88.2	9	11.8	76	100.0	
Dissatisfied	55	74.3	19	25.7	74	100.0	

\*Association tested using  $\chi^2$

\*Martinez MC. As relações entre a satisfação com aspectos psicossociais no trabalho e a saúde do trabalhador [dissertação de mestrado]. São Paulo: Faculdade de Saúde Pública da USP; 2002.

\*\*Instituto Brasileiro de Geografia e Estatística - IBGE. Pesquisa mensal de emprego: séries históricas: tabelas completas: rendimento real habitual do trabalho principal [indicadores na internet]. Rio de Janeiro; 2006. Disponível em [http://www.ibge.gov.br/home/estatistica/indicadores/trabalhoerendimento/pme\\_nova/defaulttab\\_hist.shtm?c=3](http://www.ibge.gov.br/home/estatistica/indicadores/trabalhoerendimento/pme_nova/defaulttab_hist.shtm?c=3) [acesso em 2 maio 2006]

\*\*\*Instituto Brasileiro de Geografia e Estatística - IBGE. Pesquisa mensal de emprego: março - 2006 [indicadores na internet]. Rio de Janeiro; 2006. Disponível em [http://www.ibge.gov.br/home/estatistica/indicadores/trabalhoerendimento/pme\\_nova/pmec032006.pdf](http://www.ibge.gov.br/home/estatistica/indicadores/trabalhoerendimento/pme_nova/pmec032006.pdf) [acesso em 2 maio 2006]

**Table 4** - Analysis of associations between work ability and dimensions of health among office workers. São Paulo, Brazil, 2001.

Dimension of health	Work ability	Analysis of variance		Analysis of covariance*	
		Mean (SE)	p	Mean (SE)	p
Physical functioning	Satisfactory	90.05 (0.99)	<0.0001	90.08 (0.94)	<0.0001
	Unsatisfactory	75.74 (2.20)		75.58 (2.25)	
Role/physical	Satisfactory	83.95 (2.00)	<0.0001	83.70 (2.00)	<0.0001
	Unsatisfactory	63.24 (4.73)		64.61 (4.81)	
Bodily pain	Satisfactory	74.83 (1.49)	<0.0001	74.82 (1.51)	<0.0001
	Unsatisfactory	49.91 (3.51)		49.99 (3.63)	
General health	Satisfactory	82.56 (1.06)	<0.0001	82.65 (1.07)	<0.0001
	Unsatisfactory	61.67 (2.51)		61.18 (2.56)	
Vitality	Satisfactory	67.40 (1.26)	<0.0001	67.00 (1.22)	<0.0001
	Unsatisfactory	47.06 (2.98)		49.27 (2.92)	
Social functioning	Satisfactory	82.96 (1.42)	<0.0001	82.81 (1.42)	<0.0001
	Unsatisfactory	55.52 (3.35)		56.35 (3.41)	
Role-emotional	Satisfactory	83.33 (2.21)	<0.0001	83.04 (2.20)	<0.0001
	Unsatisfactory	58.82 (5.23)		60.47 (5.28)	
Mental health	Satisfactory	74.06 (1.12)	<0.0001	73.73 (1.09)	<0.0001
	Unsatisfactory	55.41 (2.65)		57.27 (2.62)	

\*Adjusted for sex, age, income, schooling, marital status, time in job, position, and job satisfaction

63.4% of the population of the present study had higher education.

Mean level of satisfaction among workers was relatively high. However, it is well known that only a minority of workers actually state their dissatisfaction, which may lead to an underestimated prevalence of dissatisfaction in work. High levels of satisfaction are observed even in adverse situations, including accidents, inadequate working conditions, marked division of labor, and high rates of absenteeism.<sup>3,7</sup>

Regarding health status, results were more favorable for dimensions of physical health, with lower mean values for mental health dimensions. A possible explanation for this result may be the already mentioned process of restructuring. Negative effects on mental health of both inadequate organizational restructuring and exposure to high mental demands at work are consistently reported in the literature.<sup>11,12</sup>

According to WAI, the majority of our study population showed good or excellent work ability. Such favorable profile may be conditioned by the characteristics of work, which is predominantly mental. It is well known that workers performing intellectual tasks tend to have more preserved work ability than those whose work is predominantly physical. A likely explanation for this is that, in the latter situation, loss of work ability is more intense as a result of the wear and damage to health inherent to physical labor.<sup>9,21</sup> Moreover, there is also a possible "healthy worker effect," i.e., the progressive selection of employees through the exclusion of those in poorer health conditions, the workers who remain being those in better conditions to perform their activities.

In contrast to other studies carried out in Brazil,<sup>2,23</sup> demographic and occupational variables were not associated with work ability, with the exception of time in job and job satisfaction.

More recent employees (<3 years) showed greater work ability than the remainder. Since there was only one person with unsatisfactory work ability among recent employees, it was possible that this may have been a spurious result. We therefore analyzed the correlation between WAI score and time in job (continuous variable), which confirmed that the shorter the time in the job, the greater the WAI score ( $p=0.006$ ). Work ability may show a decline associated with the amount of time for which the worker was active in his or her task, given that, the longer the time workers are exposed to work requirements, the greater the functional aging.<sup>21</sup> Furthermore, time in the job may be correlated with age, with a reduction in work ability being caused by chronological aging.<sup>9,21</sup>

In the present study, satisfaction evaluated based on psychosocial factors at work was associated with work ability. The way in which these factors are organized may affect job satisfaction levels.<sup>14</sup> Job satisfaction is suggested to be an indicator of stress in the workplace and, given the negative correlation between these variables, it is also considered to have a positive effect on work ability.<sup>1,19</sup> In addition, job satisfaction is associated with health,<sup>6</sup> and may thus have indirect repercussion on work ability.

Although our experimental design does not allow for causal relationships to be established, one may speculate that the process of restructuring and the new configuration of both work organization and of the psychosocial work environment, by affecting the level

of satisfaction, may have influenced the health status and work ability of the studied population. This is in agreement with studies<sup>1,2,13</sup> that propose variables related to work demand and to psychosocial factors at work as causal or explicative factors for patterns of work ability and health status.<sup>2,11,21</sup>

Health is regarded as the factor with greatest impact on work ability.<sup>8-10,14</sup> In the present study, work ability was associated with all dimensions of health analyzed, better health being associated with better ability. The strength of this association remained after adjustment for demographic and occupational characteristics, indicating the relevance to quality of work and work ability of health in all its aspects.

The effects of physical health on work ability are well documented, especially with regard to functional capacity and the presence of disease.<sup>9,10,13,17</sup> Functional capacity plays a significant role in worker strain, since it provides a measure of performance under a given work demand. It may be understood by considering that WAI evaluates predominantly physical characteristics, being construed more as a measure of disability than as a measure that reflects positive aspects of health.<sup>13,15</sup> Health status, considered in its relationship to psychophysical symptoms and functional capacity, has been proposed as the basis for a constructive model of work ability.<sup>10</sup>

Mental health is generally considered as less strongly correlated to work ability than physical health,<sup>13</sup> and is regarded as more relevant for jobs with predominantly mental requirements.<sup>9</sup> In the population studied, whose work is characterized by mental content, all dimensions of mental health evaluated were associated with work ability. This association is especially important considering the unsatisfactory mental health profile of this population, which may have led to decreased work ability.

Considering the results and the limitations of the

present study, and based on a conception of work ability resulting from the interrelation between worker resources and job demands, we present a few suggestions.

We suggest the implementation of measures for the promotion, protection, and recovery of health through the expansion of the *Programa de Controle Médico de Saúde Ocupacional* (Program for the Medical Control of Occupational Health – PCMSO). This Program, which has already been implemented in the company, integrates occupational and clinical/care-related issues, in addition to studying and implementing specific measures aimed at preserving and recovering mental health and wellbeing.

Health status and work ability should be monitored through the routine inclusion of PCMSO. The work ability of all employees should be evaluated using WAI and SF-36, to allow for the early identification of alterations and for the implementation of corrective measures at both individual and collective levels. In addition, measures for improving organization and psychosocial work environment should also be implemented so as to improve job satisfaction and, indirectly, mental health.

Considering the present study's cross-sectional design and restricted external validity, as well as the incipient character of studies of health and work ability in Brazil, we suggest that further studies be conducted, if possible using designs that allow for the establishment of causal direction and/or evaluating interventions aimed at the promotion of work ability.

In conclusion, we found that the dimensions of health evaluated – both physical and mental – were positively and significantly associated with work ability, independently of demographic and occupational characteristics. We found that, the better the worker's health, the greater his work ability.

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