

## Work ability and stress in a bus transportation company in Belo Horizonte, Brazil

Avaliação da capacidade para o trabalho e estresse  
em uma empresa de transporte coletivo de Belo Horizonte, Brasil

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**Abstract** *Demographic, occupational and psychosocial characteristics affect the health and occupational performance of workers. The objective of the present study was to elaborate a profile of the work ability and factors that affect it in a bus transportation company in Belo Horizonte, Brazil. The instruments used included a socio-demographic and occupational questionnaire, the Work Ability Index and the Job Stress Scale. Demographic information revealed that 85.7% of the 126 employees of the company were active workers, 98% were males, with an average of 39 years of age (SD= 10) and 79 months working in the company (SD= 68); more than half reported having a low schooling level. In terms of personal habits, 88% were exposed to one or more risk factors, especially a sedentary lifestyle. The average strain value (as a consequence of stress) was 0.78 (SD= 0.2) and 75.3% reported episodes of violence at the workplace. The work ability was good to excellent among 89% of the workers. Results from the logistic regression analysis showed that strain was the only significant variable in relation to the Work Ability Index, (estimated odds ratio of 0.02). The results suggest that psychosocial factors presented the greatest association with work ability, and preventive and/or corrective measures should be implemented.*

**Key words** *Occupational health, Work stress, Work ability, Motor vehicles*

**Resumo** *Características demográficas, ocupacionais e psicossociais afetam a saúde e o desempenho dos trabalhadores. O objetivo deste estudo foi elaborar um perfil da capacidade para o trabalho e fatores que a afetam em uma empresa de transporte coletivo de Belo Horizonte, Brasil. Os instrumentos utilizados foram o Índice de Capacidade para o Trabalho, a Job Stress Scale e um questionário sociodemográfico e ocupacional. Dos 126 trabalhadores, 14,3% estavam aposentados ou afastados, todos por doença. Entre os ativos, a maioria era do sexo masculino (98%), com idade média de 39 anos (DP=10), baixa escolaridade (acima de 50%) e tempo médio na empresa de 79 meses (DP=68). Quanto aos hábitos pessoais, 88% estavam expostos a um ou mais fatores de risco, em especial o sedentarismo. O valor médio de desgaste (consequência do estresse) foi 0,78 (DP=0,2) e 75,3% relataram episódios de violência no trabalho. A capacidade para o trabalho foi boa ou ótima em 89% dos casos. No modelo de regressão logística com variável resposta ICT, a única variável significativa foi o desgaste (razão de chance estimada de 0,02). Os resultados sugerem que fatores psicossociais apresentaram maior associação com a capacidade para o trabalho e medidas preventivas e/ou corretivas devem ser implementadas.*

**Palavras-chave** *Saúde do trabalhador, Índice de capacidade para o trabalho, Estresse ocupacional, Transporte coletivo*

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## Introduction

According to the 2000 demographic census<sup>1</sup>, Belo Horizonte is one of the largest cities in Brazil, with around 2.2 million inhabitants. The city has a municipal fleet of 2.956 buses, which along with the 1.978 metropolitan buses<sup>2</sup> transport about 34.3 million passengers per month<sup>3</sup>. In Belo Horizonte, the operation of bus transportation has always been in the power of private business initiatives, with the responsibility of system's planning and monitoring falling on the public power (Transport and Traffic Company of Belo Horizonte S/A-BHTrans).

The essential nature of quality transportation is widely known. This is true both in regards to infrastructure for productive processes and as a prerequisite for a good quality of life for the population. Despite this observation, bus transportation in large Brazilian urban centers presents serious organizational, material and security deficiencies. Such problems hinder the professional activities in this field, reduce the identification of employees with their job, and intensify the sensation of a loss of control regarding their functions, subjecting them to very arduous working conditions that affect health and generate stress<sup>3,4</sup>.

Occupational stress can be defined as "harmful physical and emotional responses that occur when job requirements do not match the capabilities, resources or needs of the worker"<sup>5</sup>. If the cause of stress (stressor) is continuous or repetitive, the stress itself can become pathological. This situation can produce physical effects – cardiovascular disorders, obesity, asthma, peptic ulcers, rheumatoid arthritis – and psychological effects – cognitive symptoms (job dissatisfaction, difficulty in concentration), emotional symptoms (anxiety, anger, depression), somatic symptoms (headaches, perspiration, dizziness) and behavioral symptoms (use of alcohol and drugs, reduction in work performance, increase in levels of absenteeism or medical leave, increase in the number of on-the-job accidents and high personnel turnover). When the stressor is acute and intense, as in the case of assaults, the individual can present unpleasant or escapist symptoms related to situations that are similar to the initial trauma and psychological conditions associated with anxiety, depression, thoughts of suicide, panic, anti-social personality, agoraphobia and substance abuse<sup>6-8</sup>.

Currently, there are four dominant theoretical models on occupational stress<sup>7</sup>. Each theory explains important aspects regarding this type of stress, differing in the emphasis given to the as-

pects of work environment or individual factors and personal strategies for dealing with problems. Despite the variation regarding emphasis, the theories are for the most part complementary. In comparison with the other models, the demand-control/support model (DC/S)<sup>9,10</sup> has led the research on occupational stress in recent decades<sup>7,11,12</sup>. Besides the strong empirical data, this model presents considerable validity in consideration of the work environment and has provided key elements for interventions in the main international policies on occupational stress. Furthermore, this model is capable of identifying work dimensions and is clearly based upon scientific evidence<sup>7</sup>. Its emphasis is on the work environment and the purpose of the model is to characterize strain<sup>13</sup>, which is considered a consequence of stress. The relation between strain and further risk for psychological and physical disorders has been demonstrated<sup>7</sup>. According to the DC/S model, strain results from the combined effects of high demand and low control at the workplace and is exacerbated by a low level of social support<sup>7,10,13</sup>.

Excessive demands and stress factors at work can trigger a functional aging of the worker, that is, they can generate an early loss of work ability<sup>14,15</sup>, which is defined as "how well a worker is in the present, or will be in the near future, and how capable he/she can be in executing his/her work in function of the demands on his/her state of health, as well as his/her physical and mental capabilities"<sup>16</sup>. Besides being harnessed to the functional context and the socio-cognitive repertoire of the worker, studies have highlighted the relationship between work ability and worker's age (the older the age, the lower the work ability)<sup>17</sup>. Results from research in the field of health and work also suggest strong associations between the perception of the level of stress, lifestyle and a self-evaluation of health<sup>18,19</sup>. These factors, together with personal and occupational characteristics can influence the health, work ability, efficiency and productivity of the worker<sup>3,14,20-22</sup>. Good working conditions and a healthy lifestyle allow the maintenance of health and work ability throughout advanced age<sup>14</sup>. Therefore, a systemized assessment of work ability is needed to identify possible agents associated with occupational symptoms, injuries, illnesses and stress<sup>14,17</sup> so that preventative and/or corrective measures can be implemented.

The aim of this study was to assess work ability and the factors that affect it, as well as the stress level of workers from a bus transportation company in the city of Belo Horizonte/Brazil.

## Material and methods

All the workers from a bus transportation company in Belo Horizonte participated in the study, grouped into three sectors: administration, maintenance and operation. The company is responsible for three bus lines in town and has a fleet of 23 vehicles.

An observational cross-sectional study was carried out. Data collection was divided into two steps. In the preliminary step, there was a collection of demographic and occupational data, as well as data related to employee health: gender, age, occupation, time at the company, average salary level, work shift, work situation (active, on leave or retired), illnesses reported by the workers (collected by the work security technician) and diagnosis of retired workers or those on leave in accordance with the International Statistical Classification of Disease and Related Health – 10th Revision (ICD-10)<sup>23</sup>.

Based on the preliminary information, assessment instruments were selected for the second step, consisting of three questionnaires and one open question, which made available information on the general characteristics of the worker, occupational stress, work ability and complaints toward the company. In interviews with drivers and change-makers, further questions were added regarding violence in the workplace. All retired workers were excluded in the second step, as were those on leave, on vacation or recent hired. Interviews were carried out on an individual basis following the consent of the interviewees, and conducted in locales that assured privacy and the confidentiality of the information. One examiner was responsible for the application of two of the questionnaires. Another examiner was responsible for the third questionnaire and the open question. Data collection was carried out from October to February 2005.

The general characteristics of the employees included additional demographic data and personal habits. Smokers were considered those workers that reported smoking regardless of regularity or quantity. The consumption of more than 14 doses of alcoholic beverage per week and/or 5 doses on a single occasion was considered alcohol abuse<sup>18</sup>. The practice of regular physical activity was considered that with a minimum duration of 30 minutes and a frequency of at least three times per week.

Occupational stress was assessed through the Job Stress Scale (JSS), an instrument based on the DC/S model<sup>9,10,14,24</sup>. The instrument was adapted to Portuguese and tested on a Brazilian population<sup>13</sup>. There is a total of 17 questions divided into three categories: psychological demand (five ques-

tions); control or amplitude of decision-making, subdivided into intellectual discernment (four questions) and authority over decisions (two questions); and social support (six questions). Responses are presented on a Likert scale (scores 1 to 4). Job strain is obtained through the ratio between psychological demand and amplitude of decision-making, with the highest quartile (high demand and low control) considered exposure to a high degree of job strain<sup>10,13,25</sup>. Low scores in the category of social support also contribute to a high level of job strain<sup>10,13</sup>.

Work ability was assessed by means of the Work Ability Index (WAI). The WAI is an instrument adapted for the Brazilian population<sup>16</sup> and utilized in other studies in the country<sup>14,17,21,26</sup>. The WAI is composed of 60 questions regarding personal aspects as well as physical and mental demands that are present in the workplace, along with questions on the health state of the worker. The instrument provides a final score that varies between 7 and 49. The work ability and the objectives of any necessary measures to be taken are classified in the following manner: 7 to 27 points (poor work ability – restore ability); 28 to 36 points (moderate work ability – improve ability); 37 to 43 (good work ability – improve ability); and 44 to 49 points (excellent work ability – maintain ability). The WAI is a reproducible instrument that can be used with an individual or with groups and can be utilized for follow-up<sup>16</sup>.

The literature has documented consistent psychometric properties for the instruments used. The WAI exhibited acceptable test-retest reliability index for classifying workers into categories (agreement percentage of 66%)<sup>27</sup>. The JSS adapted to Portuguese demonstrated response stability in a test-retest study (intra-class correlation coefficients – ICC: 0.88 for the demand dimension, 0.87 for control and 0.86 for social support). Concerning the sub-dimensions, “authority in decision-making” had the lowest stability level (0.64), while the value for intellectual discernment was 0.87. The values of internal consistence (Cronbach alpha coefficients) varied between 0.63 and 0.86<sup>13</sup>.

Complaints related to the company were obtained through an open question. The responses were grouped in accordance with the classification of the National Institute for Occupational Safety and Health (NIOSH)<sup>5</sup> in six broad categories referring to possible sources of stress at the workplace: task design, management style, interpersonal relationships, rules of work, concerns with career and environmental conditions. In the present study there was the need to add a category refer-

ring to violence, as this is an issue that is peculiar to Brazilian bus companies. Violence was also assessed through a question regarding previous episodes of assaults, physical aggression and/or verbal threats, as well as regarding the fear of the occurrence/re-occurrence of this type of event.

Descriptive analysis was carried out for all the variables studied. For measuring the association between variables, the chi-square test for nominal variables and the linear correlation for continuous variables were used. The Student's t-test was used for identifying differences between averages. A logistic regression model was used to test associations between work ability and the other variables. The logistic regression model was chosen considering that the dependent variable, WAI, was re-codified into two categories (1-final WAI score less than or equal to 36; and 2-final WAI score greater than 36). This technique allowed the quantification of the degree of association between the dependent variable and the other variables. The association index is called the odds ratio, which is the chance of the occurrence of a given work ability in function of an explicative variable in the presence of variables in the model. In the analyses,  $\alpha=0.05$  was adopted. The descriptive and inferential significance level of analyses was conducted with the Statistical Package for Social Sciences software, version 12.0.

## Results

### Preliminary step

All employees were included in the first phase of the study and the results are presented on table 1. The company currently has 126 employees, among which 85.7% are active, 3.2% are retired and 11.1% are on leave for reasons of illness.

Among the active workers, the majority was male and just over half had up to 39 years of age (51.4%). The drivers were the employees that presented the highest average age (45 years, SD=10). The operations sector united 79.6% of the workers (n=86), the maintenance sector contained 12% and the administration sector 8.3%. In an initial survey on illnesses reported by the employees, 100% of the active workers presented musculoskeletal complaints and 85% reported symptoms related to stress.

All of the retired workers were male, with an average age and time of service prior to retirement higher than the active workers. Following the ICD-10<sup>23</sup>, one worker retired because of Circulatory System Illness; one because of Osteomuscular and Conjunctive Tissue Illness; one because of Injuries, Poisoning and Other Consequences of External Causes; and another because of Nervous System Illness.

All the workers on leave were male, with an average age at the time of entering on leave also higher than the active workers and an average time of service prior to going on leave lower than active workers. Following the ICD-10<sup>23</sup>, 64.3% of the workers on leave presented diagnoses of Diseases of the Musculoskeletal System and Connective Tissue and Mental and Behavioral Disorders.

### Second step

Along with the 4 retired workers and 14 workers on leave, 2 employees that were on vacation and 1 that was hired during the time of the interviews were also excluded from the second step of the study, which then totaled a sample of 105 workers (83.3%). Of the 105 employees, 100 showed up for the interviews, which represented a dropout rate of 4.8%.

The general characteristics of the workers are presented on table 2. The majority of workers were

**Table 1.** Demographic and occupational data of the workers from a bus transportation company of Belo Horizonte/Brazil – results from the preliminary step.

	Active workers	Retired workers	Workers on leave
Workers (n)	108	4	14
Male workers (n)	106	4	14
Average age (years/SD)	39(10)	50(9)*	44(11)*
Average time of service (years/SD)	79 (68)	107/50**	63(47)**
Average salary (R\$/SD)	687.22 (252.16)***	-	-

\* At the time of retirement; \*\* At the time of entering on leave; \*\*\* Approximately 250 US dollars.

married or lived with their companion, reported having up to 1 child (55%) and low levels of schooling. Concerning personal habits, it was verified that the greater part of the workers (88%) were exposed to one or more risk factor, with a special emphasis on a sedentary lifestyle.

Results concerning the JSS and WAI are also presented on table 2. Using the WAI, 89.3% of the individuals had good (39.3%) or excellent (50%) work ability. The operations sector presented an average score of 42.5 (SD=5.3) at the WAI; maintenance presented an average score of 40.3 (SD=7.3); and administration presented an average score of 41.3 (SD=6.1).

In reference to individual complaints, more than half of the workers (58%) reported no negative factors related to the company. Among the remaining portion, 26.2% (n=11) stated violence at the workplace as the main complaint. This was followed by 19% (n=8) that reported aspects related to environmental conditions (unpleasant or dangerous physical conditions); 16.7% (n=7) reported difficulties in interpersonal relationships (poor social environment and lack of support or help from coworkers and supervisors); 16.7% (n=7) demonstrated career concerns (job insecurity and lack of opportunity for growth, advancement, or promotion); 11.9% (n=5) criticized the design of tasks (unpleasant characteristics regarding working hours, breaks, shifts, bus lines, salary, and tasks that provide little sense of control); 4.8% (n=2) mentioned difficulties regarding the work roles (conflicting or uncertain job expectations, too much responsibility); and 4.8% (n=2) questioned the management style (lack of participation by workers in decision-making, poor communication in the organization).

Among the drivers and money collectors that participated in the interviews, 75.3% reported having suffered some form of violence at the workplace, registering an average of 4.8 episodes (SD=5.7), and 41.6% stated being constantly worried about the possibility of the occurrence or re-occurrence of such episodes.

Table 3 displays the linear correction coefficients between some of the variables. Negative associations were found between WAI and job strain, between WAI and the demand category of the JSS, between the control category and job strain of the JSS, between the social support category and job strain of the JSS, and between the demand category and social support of the JSS. Positive associations were found between the demand category and job strain of the JSS, and between the control category and social support of the JSS.

Sedentary lifestyle presented a tendency toward a negative association with the WAI (Fisher's Exact Test with a value of  $p=0.068$ ), which suggests that a sedentary lifestyle is related to lower work ability. The other variables showed no significant association with the WAI.

The association between the WAI and the variables of job strain, age and sedentary lifestyle was tested in the logistic regression model. The job strain variable was selected for having a significant association with the final WAI score in the univariate analysis. The demand category of the JSS was not included, as it presented a positive correlation with job strain. Age is considered in the literature as an important factor in the determination of work ability (16,17). Therefore, for its biological plausibility, age was included in the model. Sedentary lifestyle was also included for having presented a tendency toward association with the WAI. As a

**Table 2.** Demographic data, personal habits, occupational stress and work ability of active workers from a bus transportation company of Belo Horizonte/Brazil – results from the second step.

	Percentage of workers	Average values (SD)
Married or lived with their companion	68	-
Less than four years of schooling	67	-
Number of children	-	1.8 (1.8)
Consumption of cigarette	24	-
Alcoholic beverages	25	-
Sedentary lifestyle	81	-
Demand Category of Job Stress Scale	-	11.6 (2.5)
Control Category of Job Stress Scale	-	15.3 (2.7)
Social Support of Job Stress Scale	-	19.9 (3.7)
Strain of Job Stress Scale	-	.78 (.2)
Work Ability Index	-	42.1 (5.7)

**Table 3.** Linear correlation coefficients between the pairs of variables indicated on the lines and in the columns.

		<b>Correlations</b>					
		<b>Work Capacity Index</b>	<b>Age in years</b>	<b>Strain = Demand/Control</b>	<b>Demand Category of Job Stress Scale</b>	<b>Control Category of Job Stress Scale</b>	<b>Social Support Category of Job Stress Scale</b>
Work Capacity Index	Pearson correlation	1	-.158	-.238*	-.334**	-.034	.182
	Sig. (2-tailed)	.	.115	.017	.001	.737	.069
	N	100	100	100	100	100	100
Age in years	Pearson correlation	-.158	1	.001	.104	.109	.114
	Sig. (2-tailed)	.115	.	.989	.303	.282	.258
	N	100	100	100	100	100	100
Strain = Demand/Control	Pearson correlation	-.238	.001	1	.715*	-.536**	-.343**
	Sig. (2-tailed)	*.017	.989	.	.000	.000	.000
	N	100	100	100	100	100	100
Demand Category of Job Stress Scale	Pearson correlation	-.334**	.104	.715**	1	.178	-.233*
	Sig. (2-tailed)	.001	.303	.000	.	.078	.020
	N	100	100	100	100	100	100
Control Category of Job Stress Scale	Pearson correlation	-.034	.109	-.536**	.178	1	.198*
	Sig. (2-tailed)	.737	.282	.000	.076	.	.048
	N	100	100	100	100	100	100
Social Support Category of Job Stress Scale	Pearson correlation	.182	.114	-.343**	-.233*	.198*	1
	Sig. (2-tailed)	.069	.258	.000	.020	.048	.
	N	100	100	100		100	100

\* Correlation is significant at the 0.05 level (2-tailed); \*\* Correlation is significant at the 0.01 level (2-tailed).

result, job strain was the only variable that proved significant, with an estimated odds ratio of 0.02 in relation to the WAI, that is, the increase of 1 unit of job strain causes the WAI to be multiplied by 0.02.

## Discussion

Results from the present study reveal that the socio-demographic and occupational profile of the workers is similar to that of other studies. The predominance of male workers and the higher average age among the drivers was also reported in a recent study<sup>22</sup>. The older age of the drivers in relation to other workers could possibly be explained by the fact that their function requires more qualified and experienced workers. The average salary and low level of schooling are in accordance with the situation of bus drivers throughout Belo Horizonte and São Paulo<sup>3</sup>. Interviews carried out with 984 of the approximately 15.000 drivers of transportation companies of the metropolitan area of

Belo Horizonte indicated that there was the same predominance of male workers (99.8%) and 76% of the workers had between 30 and 49 years of age, 68.8% had less than eight years of schooling and 58.6% lived with one or no child. The average salary was also similar to the present study (R\$689,00)<sup>28</sup>.

The most frequent complaints during the initial assessment of health conditions were musculoskeletal problems and stress, according to the self-reported illness pattern for bus transportation professionals<sup>3,22</sup>. According to the literature, aspects related to the health of bus drivers in Belo Horizonte are related to musculoskeletal problems, chronic headache, nervousness and depression, cardiovascular and gastrointestinal affections, eyes irritation and hearing reduction<sup>28</sup>. Improvements in work conditions have already been done, such as placement of the motor in the central or back part of the buses<sup>28,29</sup>, construction of a small room and toilet at the ends of lines, implantation of hydraulic direction, retractable steering wheels with

height regulation, impact reduction and ergonomic comfort devices at the driver and money collector seats, development of projects aiming at assaults reduction<sup>28</sup> and monitoring excessive muscle efforts on curves and brakes, and other technological equipments have also been acquired, such as fuel consumption and high velocity controllers, sonorous signals devices synchronized with luminous signs and retardation, and informational and electronic systems to control the costs and manage the fleet of vehicles<sup>29</sup>.

From the results concerning problems related to the company, the high number of violent episodes merits particular attention. The direct consequence of this violence is evidenced by the fact that a large portion of the professionals in the operations sector report working with the constant fear or concern of being subjected to some type of coercion on the job. It should be highlighted that the reports of violent episodes at the present study refer only to those that occurred during the current job. Nonetheless, prior episodes of violence in all likelihood contribute toward the concern and fear during the day-to-day work.

An interview carried out with transportation company managers, administrative organs and unions showed that they did not consider spontaneously that the violence is a generator of problems at work. Nevertheless, 43.3% of the drivers reported assaults using weapons inside the bus within the last year and 40.1% reported verbal aggressions. The majority of drivers reported fear of being assaulted, suffering accidents, dying, becoming ill and being dismissed<sup>28</sup>.

The present study did not take into account the differences of stressors among the bus lines and this may have influenced the results. The company rotates workers and has two lines that are considered to have problems. One line has a greater number of episodes of violence and the other has a high number of passengers, which also triggers stress.

The negative factors related to environmental conditions, task design and rules of work can probably be explained by the peculiarities of the public urban transportation system. Issues such as noise and vibrations, as well as low levels of control over their tasks and little possibility of change<sup>12</sup>, simultaneity between production and consumption, irregular demands, geographic dispersion on not controlled environments, the possibility of being influenced by a variety of variables like topography, urban trajectory and traffic, the little differentiation in the service provided, the context and the relation among users (demand), employers (offer) and the public power (regulation)<sup>29</sup>.

According to the literature, the great majority of the drivers have fixed schedules (77.6%), among which 19.7% practice the double shift on rush hours. This information indicates that 42% of the workers have unhealthy schedules<sup>28</sup>. The literature emphasizes work shift, time spent working at the function, workers' age and lifestyle as relevant factors in explaining the perception of the worker regarding his/her work ability<sup>17,21</sup>. In the present study, no association was found between work shift and the WAI. This was probably due to the fact that some workers frequently change shifts and lines.

The workers' time of service at the company was also assessed, but had no influence on the WAI. Many of the workers may have performed the same type of service prior to be contracted by the company in question. This possibility was not taken into account and may have generated such a result. However, a study carried out with 475 electric sector workers demonstrated a significant progressive decrease of the WAI associated to the increase of the time at the company<sup>30</sup>.

The age of the workers presented no significant correlation with the WAI, which is different to what is found in the literature<sup>16,30</sup>. In our results, the weak association may be attributed to the fact that the individuals with the greatest losses had already been removed from the work force, whether voluntarily or not (effect of healthy workers or of selection)<sup>14,15,31</sup>. Bellusci and Fischer<sup>14</sup> found that just the 40 to 50-year age group presented a significant association between aging and a reduction in the WAI. The authors also hypothesized the healthy worker effect to explain such a fact. For supplying an instantaneous image of the assessed relation, cross-sectional cohort studies such as this one can lead to the identification of just the survivors of the effect under study (prevalence bias) and of its situation in regards to present exposure. This situation could lead to an underestimation of the degree of risk present in the work process, as the most affected do not remain on the job<sup>14</sup>. Furthermore, the cross-sectional cohort study renders impossible the establishment of the causal direction of the relations encountered<sup>15</sup> and does not allow the prediction of how the health aspects will develop, nor how such aspects were prior to the study<sup>14</sup>. Despite these limitations, it has been the most used design in studies that investigated the relations between work ability and health at work, as well as between occupational stress and health at work<sup>15</sup>.

The fact that all the workers showed a good to excellent work ability, which was also observed in other studies that used the WAI<sup>27</sup>, can also be explained by the aforementioned healthy worker ef-

fect. There is a need for longitudinal studies in order to elucidate the causal direction of the associations identified<sup>15</sup> as well as to analyze possible changes for an effective intervention in the prevention of aspects that are harmful to health<sup>14</sup>. Both the WAI and the JSS are instruments that can and should be used in longitudinal studies with follow-up measures.

Despite other studies pointing out that a healthy lifestyle contributes toward maintaining health and work ability<sup>14,20,26,30</sup>, the risk factors of smoking, consumption of alcoholic beverages and the failure to practice physical activities showed no significant relation with the dependent variable. Only the practice of physical activities exhibited a tendency toward association with work ability in the present study. These findings suggest that the practice of physical activity can contribute to the maintenance of the work ability, in accordance with other study<sup>30</sup>. An unhealthy lifestyle was expected among the workers of the transportation sector<sup>22</sup>. Problems related to obesity can also be encountered among drivers, what can be explained by the characteristics of the job (mostly seated), stress, lack of time and location for adequate meals<sup>28</sup>.

The elevated frequency of a sedentary lifestyle at the actual study can be due to the fact that the content of this type of report was not altogether socially acceptable, leading the workers to diminish the impact of their information<sup>7</sup> and resulting in an unfaithful representation of the actual situation. Despite the weight of such considerations, studies have demonstrated that data obtained from the self-report measures provide important elements regarding health and working conditions<sup>3,7,11,17</sup>.

It has been demonstrated that there may be differences in work ability between occupational groups, which is possibly related to content and working conditions, as well as individual perceptions<sup>10</sup>. Furthermore, an investigation developed in cellulose and paper industry demonstrated that the particularities of the work process in each sector present an important influence on the emergence of ailments<sup>32</sup>. Thus, in the present study, we opted for the utilization of work sector variable instead of position or occupation at the company, considering that the employees assumed very distinct tasks. Such distinctions could have influenced the results and the sector variable presented no significant association with job strain or with the WAI.

There is strong evidence in the literature that occupational stressors are important factors leading to health problems among workers in bus transportation companies<sup>33</sup>. The negative association found between the WAI and the job strain variable suggests that the stress factor is related to func-

tional aging. Other investigations have verified that job strain in the work environment is associated with a greater risk of illness or injuries<sup>10, 24</sup>, which in turn can generate a reduction in work ability. A negative association was also found between the WAI score and the demand category of the JSS, but no relation was found between the WAI and the control category. Araújo *et al.*<sup>31</sup> observed that the psychological demands of work exercise more influence over the health of workers than control exercises over work.

In our study, we also found no association between the WAI and the support category of the JSS. Results from Araújo *et al.*<sup>31</sup> demonstrated a significant association between this category and mental health, but according to the authors, social support did nothing to modify the association between job strain and mental health.

Among the approximately 26.000 workers of transportation companies of Belo Horizonte (including drivers, money collectors, mechanics and inspectors), 900 drivers reported stress as a common health problem<sup>28</sup>. In a random sample of 925 bus drivers and money collectors in the city of São Paulo there was a prevalence of 20.3% of minor psychiatric disorders<sup>34</sup>. The prevalence of stress among bank workers showed that 47% present any symptom typical of stress<sup>35</sup> and a study regarding administrative workers reported a prevalence of strain in 14% of the workers<sup>36</sup>. The Psychosocial Working Conditions surveys in Great Britain indicates that 15.2% of workers find their job very or extremely stressful<sup>37</sup>. The differences encountered in stress prevalence may be due to the characteristics of the different occupational groups studied and the diversity of instruments used to classify stress.

In a cross-sectional study developed in a population of electric sector workers, the multiple analyses adjusted for sex and time at company showed that the factors that better explained the variability of WAI were work stress and physical health. Excluding health dimensions, the factors that better explained the variability of WAI were work stress, local of work and lifestyle<sup>30</sup>. Another study involving administrative workers at the same city identified that time in job and job satisfaction were significantly associated to the WAI and physical and mental health were independently associated with the work ability<sup>38</sup>. Another study concerning physicians also indicated that stress negatively influenced WAI scores<sup>39</sup>.

As can be seen, an individual's response to environmental stressors is multi-factorial, undergoing influences from the characteristics of the stressor, biological factors, prior history of stressors



and capacity to cope with stressful situations<sup>6,33</sup>. In a number of studies, one individual parameter, the Sense of Coherence (SOC), has been considered as important factor in the capacity of coping with stressors and in maintaining health<sup>25</sup>. It is also known that the family-work interference influences the occupational stress<sup>40</sup>, but these features were not assessed in the present study.

Studies regarding the transportation management with special focus on the organization of work at the bus companies are scarce<sup>29</sup>. Some studies point out the importance of a holistic approach in the assessment of bus transportation workers due to the interaction between occupational and personal factors<sup>12</sup>. It is important to consider such issues in future investigations. Despite this observation, the isolated characteristics of the work exercise a strong influence over the health and productivity of workers and there is a considerable possibility of confronting problems through organizational interventions<sup>7,12,33</sup>.

In the work environment, it is important to seek solutions that maximize the balance between ability and demand. For such, it is necessary to establish flexibility in the tasks and identify specific requirements for promoting health among the workers who have lost the functional ability for work. In several countries, the notion has been spread that a functional psychosocial environment in the workplace depends, in a large part, on an adequate organization of the work force<sup>10</sup>. Added to this is the importance of lifestyle and individual perceptions, which serve as motivational factors for the processes of organizational changes in the work<sup>10,14</sup>. It should also be assured that capability, experience and autonomy regarding decision-making and opportunities for growth in the profession are fully utilized, thereby permitting the permanence of workers in their jobs and avoiding situations of temporary leave or early retirement due to an inability for work<sup>12,14,32</sup>.

Considering that in the present study all the workers demonstrated a good to excellent work ability, measures are recommended for improving or maintaining this ability. Moreover, the WAI presents questions on self-reported and diagnosed illnesses, but only the diagnosed illnesses are considered in the final score<sup>16</sup>. This does not seem to have been the case with the sample studied, but the self-reported illnesses could have perhaps interfered in the work ability of individuals, and thus, could be analyzed with greater attention.

Regarding the issue of violence in Brazil, the tremendous difficulty in controlling it is widely perceived. Direct confrontation with transgressors generates fear and panic, as well as increasing the risk of fatalities. Psychological consequences can emerge, with a negative influence on the health of the workers. Therefore, measures for the recuperation of self-esteem and stress control should be instituted<sup>4</sup>, along with public policies for the reduction of violence<sup>3</sup>.

Based on the observations described herein and considering the importance of public transportation to the well-being of the entire community, we can conclude that it is necessary to implement broad and continuous preventative measures in the work environment, as well as establish an epidemiological monitoring of the physical and mental health of the professionals in this field<sup>3,33</sup>.

## Collaboration

RF Sampaio, CM Coelho and FB Barbosa worked on the elaboration of the research project, data collection and analysis, and on the conception and writing of this paper. MC Mancini and VF Parreira worked on the final version of the paper.

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