Spanish version of Bus Drivers’ Job Demands Scale (BDJD-24)

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Abstract

Background: Karasek and Theorell’s Job Demands-Control Model argues that adverse health-related outcomes, both psychological and physiological, arise from a combination of high job demand and a low level of job control. The objective was to adapt Meijman and Kompier’s Bus Drivers’ Job Demands Scale (BDJD-24), which enables us to assess the job demands of bus drivers, to Spanish. Method: The final version of the Spanish adaptation was applied to a sample made up of 287 bus drivers living in Spain (80.1% men and 19.9% women), whose average age was 40.44 (SD= 11.78). Results: The results yielded a three-factor structure for the scale used: Time Pressure, Safety, and Passengers. These findings confirm that the Spanish version replicates the factor structure of the original English scale. The reliability of the three subscales was acceptable, ranging from .75 to .84. Furthermore, the subscales were also related to different external correlates and to other scales and showed good convergent and criterion validity. Conclusions: The present instrument can be used to evaluate job demands of bus drivers, as its psychometrics are substantially sound.

Keywords: job demand-control model, transport, bus drivers, scale, instrumental study.

According to the Programme on Safety and Health at Work and the Environment (Safe Work) of the International Labour Organization (2011), over 160 million workers fall ill every year due to occupational hazards. In order to cut down illnesses this programme intends to promote prevention for workers in hazardous occupations and sectors which, for example, have very demanding work hours. This is the case of bus drivers. It also aims to create diagnostic tools that will enable us to evaluate job health and work hazards, including psychosocial hazards.

One important risk factor that may lead to health problems at work is occupational strain. The Job Demand Control (JDC) Model by Karasek and his collaborators (Karasek, 1979; Karasek & Theorell, 1990; Karasek et al., 1998) has been used in numerous studies and its cornerstone is control. Consequently, Cieslak, Knoll and Laszczynska (2007) consider that neuroticism plays an important moderating role in the relations between social support from work-related sources and two work strain characteristics (job demands and job control). Furthermore, Daniels and Harris (2005) found that control and support can enhance the effectiveness of problem-focused as well as certain other forms of coping. In addition, Ferret, Guay and Senécal (2004) point to a three-way interaction effect between job demands, job control and work self-determination in predicting each dimension of burnout (emotional exhaustion, depersonalization, and personal accomplishment). Finally, Janssen, Peeters, de Jonge, Houkes and Tummers (2004) have shown that the association between psychological job demands and emotional exhaustion is partially mediated by negative work-home interference (NWI).

The present model points to two possible results (strain and learning) as an outcome of various combinations of job demands (quantitative work load) and job control (defined as the capacity to take job-related decisions, in combination with the capacity to use and develop skills). The JDC considers that both psychological (for example, job burnout) and physiologically detrimental health-related outcomes (for example, an increase in musculoskeletal
few decision-making options. This option de-
low control. Workers with high strain (Karasek & Theorell, 1990),
complaints) are the result of a combination of high demand and
of challenges in their job. All this is accompanied by frequent
and cleaners (Karasek & Theorell, 1990) often show a lack of
In this respect, active workers learn more ef-
solving, which in turn is facilitated by a high level of control.
The present model also indicates that learning is the outcome of
an active job which entails high demand and a high level of control;
employees with active jobs, such as lawyers, doctors, teachers
and engineers (Karasek & Theorell, 1990), are able to transfer
energy generated by a high level of demand through problem
solving, which in turn is facilitated by a high level of control.
In this respect, active workers learn more efficaciously. They
master relevant skills better and are more productive. In contrast,
passive workers (low demand, low control) such as receptionists
in their job posts, such as repairmen, installers, etc. (Karasek &
lower than average strain in their job because
in their job (due to the control they have).
their work (high-stress occupation). The characteristic features of this occupation are high
job demand, low control and low support (Carrere, Evans, Palsane,
complaints, diseases (fractures, sprains, dislocations, musculoskeletal
complaints (Anderson, 1992; Robb & Mansfield,
and low control are related to psychological malaise. Bus drivers
see Table 2), psychological and physical symptoms (Machin & Hoare,
difficulty sleeping (Duffy & McGoldrick, 1990; Philip,
physiological and psychological symptoms (Machin & Hoare,
state of depression (Da Silva-Junior, Nunes de Pinho,
lower back pain (Issever, Onen, Sabuncu, & Altunkaynak,
lower back pain (Issever, Onen, Sabuncu, & Altunkaynak,
heart disease (Krantz & McCeney, 2002).
In the present study, we have used a series of variables to
demonstrate the scale’s convergent validity adapted to the Spanish
language. First of all, we used external correlates such as, for
example, “the number of passengers who use the bus when you are
driving”, “the number of kilometres you do”, “the number of
traffic accidents you have been involved in”, “the number of orders
received from your supervisor”, “the number of stops you make”,
“the number of days you have felt tired and without energy over
the last week”, and “the number of days you have gone in to work ill”.

Furthermore, we took into account two constructs as validity
indexes. The first was psychological wellbeing as an index of
mental health on the job (Cifre & Salanova, 2000). Psychological
wellbeing, assessed using the GHQ-12 (Sánchez-López & Dresch,
2008), has three components: Success in coping, self-esteem and
stress. This scale does not focus so much on personality aspects
but rather on the stressful situations that prevent a person from
functioning normally (Cifre & Salanova, 2000). Thus, Blasco,
Prieto and Cornejo (2003) have related stress with a higher accident
rate among drivers.

The second construct was safety behaviours (personal and in the
vehicle) and psychophysiological disorders (Bouda-Grau, Sánchez-
García, Prizmic-Kuzmina, & Vigil-Colet, 2012). Hence, safety
behaviours are the outcome of a social influence process whereby
the safety behaviour level contributes to determining the job’s
real risk level (Melíá, 2007). Furthermore, psychophysiological
disorders were also taken into account, given that their prevalence
among professional drivers is significant (Tse, Flín, & Mearns,
2006).

In line with all the above, this study informs on the psychometric
properties of the Spanish version of the Bus Drivers’ Job Demands
Scale (BDJD-24) by Meijman and Kompier (1998), which
assesses tight schedules, safety behaviours in response to the
demands of traffic and interaction with passengers. This study sets
three objectives: (1) to check the internal structure empirically,
(2) to analyse factor reliability, and (3) to draw up the convergent
validity indices of the investigated scale. Finally, the development of this scale entails certain advantages, such as: it cuts down the time it takes to respond to the items. It also minimises bias related to tiredness in the case of a lengthier instrument and it enables us to quickly evaluate the items and their factors whilst providing initial valuable information as a screening (Leilite, Palumbo, & Hunley, 2001).

Method

Participants

A total of 287 bus drivers, residents in Spain took part in the study. Of them, 80.1% were men and 19.9% were women. As far as their marital status is concerned, the distribution was as follows: married (55.1%), civil union (10.1%), single (20.9%), divorced or separated (12.9%) and widow(er) (1%). The drivers had different educational backgrounds: Without studies (2.2%), certificate of completion (16.8%), completed compulsory education or equivalent (48.2%), completed secondary education or equivalent (27%) and university studies (5.8%). The bus drivers were distributed as follows: urban transport passengers (38.8%), regular intercity-route passengers (31.1%) and chartered bus passengers (30.1%). The mean age of the sample was 40.44 years ($SD = 11.78$). The mean distance between their place of work and their place of residence was 14.12 km ($SD = 50.2$). Mean seniority in their occupation was 10.51 years ($SD = 10.41$). The mean number of hours of work per week was 48 ($SD = 22.91$).

Instruments

The Bus Drivers’ Job Demands Scale (BDJD-24; Meijman & Kompier, 1998) allows us to evaluate the psychosocial demands of a bus driver’s job. This measure was adapted in keeping with the proposals by various authors on adapting assessment measures (Beaton, Bombardier, Guillemin, & Bosi-Ferraz, 2000; Hambleton, 1994; Hambleton, Merenda, & Spielberger, 2005; Muñiz & Bartram, 2007; Hunt et al., 1991). First, the items were translated from English into Spanish by expert researchers (e.g., Muñiz & Bartram, 2007; Hunt et al., 1991). We consulted six experts. The items were then translated back from Spanish into English (back-translation) by other expert translators and the equivalence of the two versions (Brislin, 1970) was then checked. There were no disagreements concerning the back-translation of the items. The English version is made up of three subscales and features 24 items. The first and second have 9 items, which have to do with Time Demands ($\alpha = .82$) and Safety ($\alpha = .79$); and the third is Passengers and has 6 items ($\alpha = .84$). The response anchor was a 7 point scale (1 = Completely disagree; 7 = Completely agree).

The transport scale (TRANS-18; Boada-Grau et al., 2012) allows us to detect safe behaviours (personal and in the vehicle) and psychophysiological disorders in professional drivers. It has 3 subscales, each of which is made up of 6 items. The factors are as follows: 1. Psychophysiological disorders ($\alpha = .81$; for example, Item 14: “My job has caused me some type of muscular and/or skeletal disorder (e.g., lower back pain, tendinitis, etc.)”; 2. Personal safety behaviours ($\alpha = .80$; for example, “Item 10: “I avoid driving after a heavy meal”); and 3. Safety in the vehicle behaviours ($\alpha = .70$; for example, Item 9: “I pay attention when I get out of the vehicle”). The response format is a five-point scale (1 = never, 2 = almost never, 3 = sometimes, 4 = almost always, and 5 = always).

The General Health Questionnaire (GHQ-12; Goldberg, 1972, 1978), in its Spanish version (Sánchez-López & Dresch, 2008), can be used to effectively assess psychological wellbeing and mental health. It features 3 subscales and 12 items. The factors are: 1. Coping with problems ($\alpha = .82$; 6 items; for example, Item 1: “Were you able to concentrate well on what you were doing?”); 2. Self-esteem ($\alpha = .70$; 4 items; for example, Item 6: “Have you had the sensation that you cannot cope with difficulties?”); and 3. Stress ($\alpha = .78$; 3 items; for example, Item 5: “Have you ever felt constantly overwhelmed and stressed out?”). The scale indicates that Item 9 (“Have you felt unhappy or depressed?”) loads on two factors, positively on Factor-2 and negatively on Factor-3. The items are coded by means of four response options whereby higher scores indicate a poorer state of health and lower scores indicate greater psychological wellbeing.

Some correlates (Del-Libano, Llorens, Salanova, & Schaufeli, 2010), also known as external indicators (Gimeno, Benavides, Mira, Martínez, & Benach, 2004), were used to evaluate convergent validity.

Procedure

In all cases, the tests were administered in the bus drivers’ workplace. They took part voluntarily and with prior consent from their bosses from the companies taking part. This test was administered in a customised fashion by a Graduate in Psychology with prior expertise who was there during the administration of the tests to answer any queries that participants might have. The data facilitated by the bus drivers was treated as strictly confidential. Non-probabilistic sampling was used (Hernández, Fernández, Mira, Martínez, & Bench, 2000), also known as random accidental sampling (Kerlinger, 2001). The response rate of participants was 81%.

Data analysis

To begin with, the exploratory factor analysis was carried out using the principal axis factoring extraction method and applying Promin rotation. This was done in order to clarify the structure of the factors extracted from the scale. Following this, polychoric correlation matrices were used, given that these are specially suited in cases where items present a Likert-type response format (Muthén & Kaplan, 1992). FACTOR 7.2 programme (Lorenzo-Seva & Ferrando, 2006) was used to carry out the parallel analysis (promin rotation), which is not available in the SPSS. We then calculated reliability using Cronbach’s alpha for each of the three factors that were extracted. The validity matrices were obtained by correlating the three factors of the BDJD-24 scale with the external correlates: the GHQ-12 and the TRANS-18. And, finally, the data analysis was carried out using the SPSS 19.0 and FACTOR 7.2. programmes.

Results

An exploratory factor analysis was performed, and the Kaiser-Meyer-Olkin (KMO) sample appropriateness index was .75, showing that the data were suitable for applying a factor analysis. The scree-test (Cattell, 1966) recommended a three-factor solution.
Two more techniques were applied to determine the number of factors that would be obtained, as well as Vellicer’s (1976) "minimum average partial" criterion and parallel analysis (Lattin, Carroll, & Green, 2003). Both criteria pointed to the suitability of the three factor solution. Figure 1 shows the sedimentation graph along with the parallel analysis indicating the three-factor solution.

Once the most appropriate factor solution was determined, the Promin rotation method (Lorenzo-Seva, 1999) was used to obtain a simple factor solution. This oblique rotation method tends to obtain as simple a solution as possible even in those cases where some of the items display a complex structure. The 24 items of the adapted scale did not present saturations below .40 nor were these complex (above .40 in more than one factor). Thus, 24 items were kept from the original English scale (Table 1), which all together account for 50.4% of the variance.

As we can see in Table 1, the saturation matrix for the obtained factor solution enabled us to identify the contents of the three factor items, which were what we had expected. Moderate correlations were found among the factors, between -.01 and .26. These correlations are displayed in Table 2. Table 2 shows the means, standard deviations, reliability coefficients and confidence intervals as well as the correlations among the three factors of the Bus Drivers’ Job Demands scale. It also shows the correlations between the three subscales of the adapted scale and some correlates, the GHQ-12 and the TRANS-
The resulting scale reliability and factor structure indicate that the measure is appropriate and that the three obtained factors are clearly differentiated from each other. It also features the correlations between the measure we presented and two scales (GHQ-12 and the TRANS-18) as well as external correlates, which enable us to inform on validity indices. We can thus observe correlations between the three factors of the scale we analysed, on the one hand, and the measures as well as external correlates, on the other. Hence, the factor that expresses internal consistency and validity for evaluating the job demands of driving such as driving fast in order to catch up when running late, leaving and arriving on time, and feeling forced to keep to timetables. It is the factor with the most variance, accounting for 24.80% of variance, and is made up of nine items (from A1 to A9). The second factor, Safety, has to do with safety lights, exceeding the speed limit, not giving right of way, and driving into a crossroad so that other vehicles will give way. It is made up of nine items (from B1 to B9), which account for 14.00% of variance. The last factor, Passengers, has to do with passengers, treating them appropriately and getting on well with them. It accounts for 11.60% of variance and is made up of six items (from C1 to C6). The correlations between the three factors in the Spanish version we presented are as follows: F1-F2 \( r = .26 \), F1-F3 \( r = -.01 \) and F2-F3 \( r = .06 \). They are quite different from those found by Meijman and Kompier (1998): F1-F2 \( r = -.45 \), F1-F3 \( r = -.06 \). They are quite different from those found by Meijman and Kompier (1998): F1-F2 \( r = -.45 \), F1-F3 \( r = -.06 \) and F2-F3 \( r = .09 \).

Our second objective was to analyse reliability, which was confirmed, given that the reliability coefficients are appropriate. In the Spanish version, the reliability indices for the three factors range from .75 to .84, practically the same as those for the original version (.79 to .84). As regards validity, the data obtained from this study found a significant association between the three factors.

### Table 2

<table>
<thead>
<tr>
<th></th>
<th>F1 Time demands</th>
<th>F2 Safety</th>
<th>F3 Passengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Means</td>
<td>42.46</td>
<td>20.86</td>
<td>28.79</td>
</tr>
<tr>
<td>SD</td>
<td>10.29</td>
<td>10.17</td>
<td>6.91</td>
</tr>
<tr>
<td>Reliability</td>
<td>.80</td>
<td>.84</td>
<td>.75</td>
</tr>
<tr>
<td>Confidence interval</td>
<td>.77-.83</td>
<td>.81-.86</td>
<td>.70-.80</td>
</tr>
<tr>
<td>In the last week: Number of days you have felt tired and without energy over the last week</td>
<td>.19*</td>
<td>.18*</td>
<td>.02</td>
</tr>
<tr>
<td>On a normal work day: Number of passengers who use the bus when you are driving</td>
<td>.27*</td>
<td>-.01</td>
<td>-.19*</td>
</tr>
<tr>
<td>On a normal work day: Number of stops you make</td>
<td>.19*</td>
<td>.11</td>
<td>-.06</td>
</tr>
<tr>
<td>On a normal work day: Number of kilometres you do</td>
<td>-.05</td>
<td>-.21*</td>
<td>-.06</td>
</tr>
<tr>
<td>On a normal work day: Number of orders received from your supervisor</td>
<td>.08</td>
<td>.29**</td>
<td>-.03</td>
</tr>
<tr>
<td>In the last 12 months: Number of traffic accidents you have been involved in</td>
<td>.19*</td>
<td>.34**</td>
<td>-.16</td>
</tr>
<tr>
<td>In the last 12 months: Number of days you have gone in to work ill</td>
<td>.18*</td>
<td>.18*</td>
<td>.11</td>
</tr>
<tr>
<td>GHQ (Success in coping)</td>
<td>.18</td>
<td>.13</td>
<td>.05</td>
</tr>
<tr>
<td>GHQ (Self-esteem)</td>
<td>.14</td>
<td>.33**</td>
<td>-.06</td>
</tr>
<tr>
<td>GHQ (Stress)</td>
<td>-.18*</td>
<td>-.39*</td>
<td>.07</td>
</tr>
<tr>
<td>TRANS (Psychophysiological disorders)</td>
<td>.06</td>
<td>.30**</td>
<td>-.16</td>
</tr>
<tr>
<td>TRANS (Personal safety behaviours)</td>
<td>-.06</td>
<td>-.39*</td>
<td>-.21*</td>
</tr>
<tr>
<td>TRANS (In the vehicle safety behaviours)</td>
<td>-.13</td>
<td>-.23**</td>
<td>-.18*</td>
</tr>
<tr>
<td>Time demands</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Safety</td>
<td>.26</td>
<td>–</td>
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</tr>
<tr>
<td>Passengers</td>
<td>-.01</td>
<td>.06</td>
<td>–</td>
</tr>
</tbody>
</table>

** p<.01, * p<.05
of the scale we analysed and other scales, which means that the third objective has been met. Our stress, assessed using the GHQ-12, is associated both with Time Demands factor ($r = -.18, p<.05$) and with Safety ($r = -.19, p<.05$). These correlations are similar to those found by Meijman and Kompier (1998). Furthermore, the Safety factor is associated with self-esteem ($r = .33, p<.01$), with psychophysiological disorders ($r = .30, p<.01$), and with personal safety ($r = -.19, p<.05$) and safety in the vehicle behaviours ($r = -.23, p<.01$). The Passengers factor correlates negatively with personal safety ($r = -.21, p<.05$) and safety in the vehicle ($r = -.18, p<.05$).

The third objective was to find indications of validity. On the whole, the results of the study found a significant association between the three factors of the scale we analysed and those of other scales and external correlates. Although Meijman and Kompier (1998) did not use external correlates to determine the validity of the BDJD-24 scale, we decided to incorporate some of these in our research study and found significant correlations with some of these: fatigue (with Time Demands, $r = -.19, p<.05$ and with Safety, $r = -.18, p<.05$), the number of passengers being transported (with Time Demands, $r = .27, p<.05$ and with Passengers, $r = -.19, p<.05$), the stops made during the service (with Time Demands, $r = .19, p<.05$), kilometres covered during a working day (with Safety, $r = -.21, p<.05$), orders received from an immediate superior (with Safety, $r = .29, p<.01$), accidents the driver has been in (with Time Demands, $r = .19, p<.05$ and with Safety, $r = .34, p<.01$) and the days the driver has gone in to work ill (with Time Demands, $r = .18, p<.05$ and with Safety, $r = .18, p<.05$).

In conclusion, taking into account the findings of this research, the Spanish version of the BDJD-24 scale can be a useful measure for evaluating the job demands of bus drivers. Furthermore, this measure is brief, easy to understand and quick to apply and to interpret using the three subscales that it is made up of.

As regards the applicability of the Bus Drivers’ Job Demands scale (BDJD-24), it can be used to introduce prevention programmes (Evans & Johansson, 1998; Machin & Hoare, 2008; Tse, Flin, & Mearns, 2007) as well as to set up health hazard prevention programmes (Boix, Benavides, Soriano, Moreno, Roe, & García-Gómez, 2000) by gathering, analysing and systematically interpreting data concerning workers’ occupational health in order to safeguard their health and prevent illnesses. In this way, it can enable us to safeguard the occupational health of professional drivers and to avoid possible occupational hazards (Thacker & Berkelman, 1992). Furthermore, it facilitates decision making in preventive healthcare backed by contrasted scientific tests that meet basic psychometric criteria (Boada-Grau, González, Vigil-Colet, Mañas, & Agulló, 2009; Spencer, Robertson, & Folkard, 2006). These can, in turn, lead to psychosocial initiatives such as Employee Help Programmes (Sold & Balduque, 2006) that can provide valuable information to prevent both existing and future high occupational hazards.

The limitations of the present study will give rise to research initiatives we intend to carry out in the future. We shall now go on to comment on these. To begin with, the internal structure needs to be corroborated by means of a confirmatory factor analysis with a new sample. Similarly, the functioning of the subscales and items needs to be studied in different collectives of bus drivers, for example, drivers of different national and cultural backgrounds whose presence in this sector in Spain is on the increase. Secondly, the validation of a scale is a dynamic process that does not end with its construction and publication (Padilla, Gómez, Hidalgo, & Muñiz, 2006). Therefore, new research efforts are likely to contribute new data on this scale. Thirdly, it would be a good idea to look into whether the proposed scale addresses critical issues in the transport industry, such as the lack of motivation for occupational safety, shift work, night shifts and a long list of other matters. And fourthly, we consider that it would be very much worthwhile to examine whether certain basic personality traits such as impulsiveness, daringness, minute attention to detail, responsibility, locus of control, etc. might be modulating variables of Time Demands, Safety and Passengers.

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