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Health behaviour and safety in the construction sector

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Workers' health behaviour includes habits or actions related to physical exercise, nutrition, smoking, and drug or alcohol consumption. Unhealthy behaviour, and especially alcohol consumption, has been considered a source of accidents and injuries among construction workers. However, unhealthy behaviour can also be seen as a result of the safety and risk conditions of these jobs. The purpose of this paper is to contrast the role of unhealthy behaviour as a source or as an outcome of safety and risk in the construction sector. Data was collected from 180 workers belonging to a Spanish construction company. Two path models representing these two hypotheses were tested. The model in which unhealthy behaviour is an antecedent of injuries did not fit the data (Chi square= 73.798, df= 3, p<0.001). Results support the hypothesis of unhealthy behaviour as a result of safety and risk factors through the mediating effect of the experience of tension (Chi-square= 4.507, df= 2, p= .212). This model not only corroborates the stressful nature of exposure to risk and the absence of supervisors' safety response, but it also makes it possible to consider injuries as a cause of tension that, in turn, affects the employees' unhealthy behaviour.

Conducta saludable y seguridad en el sector de la construcción. La conducta de salud abarca hábitos relacionados con el ejercicio, nutrición, tabaco y consumo de drogas o alcohol. La conducta no saludable, en especial el consumo de alcohol, se ha considerado una fuente de accidentes en construcción. Sin embargo, la conducta no saludable puede también verse como un resultado del nivel de seguridad y riesgo de esos trabajos. El propósito de este trabajo es contrastar el papel de la conducta no saludable como fuente o resultado de la seguridad y el riesgo en construcción. Los datos fueron obtenidos en 180 trabajadores de una empresa constructora española. Dos modelos path representando estas dos hipótesis fueron contrastados. El modelo en que la conducta no saludable es un antecedente de los accidentes no ajusta a los datos (Chi-cuadrado= 73,798, gl= 3, p<0,001). Los resultados apoyan la hipótesis de la conducta no saludable como un resultado de factores de seguridad y mediados por la experiencia de tensión (Chi-cuadrado= 4,507, gl= 2, p= 0,212). Este modelo corrobora la naturaleza estresora de la exposición al riesgo y la ausencia de una respuesta de seguridad de los supervisores, y permite considerar los accidentes como una causa de tensión que, a su vez, afecta la conducta no saludable.

Increasingly, the workplace is viewed as an appropriate context for the development, maintenance and promotion of employees' health behaviours. Health behaviours of employees include habits or actions related to their physical activity, eating habits, drug use or cigarette and alcohol consumption. Programs aimed at improving the health behaviours of employees are important not only because they benefit employees' health, but also because they benefit organizations by contributing to creating healthy work environments. Positive features, such as high productivity, high employee satisfaction, good safety records, few disability claims and union grievances, low absenteeism, low turnover and an absence of violence, characterize a healthy work environment (Quick, 1999).

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Employees' job stress appears across studies as an important condition linked to the development of different unhealthy behaviours. Stress at work is associated with less physical activity (Heslop et al., 2001; Ng & Jeffery, 2003) and diets characterized by a higher fat intake (Hellerstedt & Jeffery, 1997) or higher consumption of fast food (Pak, Olsen, & Mahoney, 2000). Studies on stress and smoking have predominantly shown that smokers report higher stress levels than non smokers (Adriaanse, vanReek, Zanbelt, & Evers, 1991; Pak, Olsen, & Mahoney, 2000; Parrot, 1999), and stress at work is also linked to consumption of caffeine (e.g., Swanson, Lee, & Hopp, 1994). Multifactorial models for the explanation of alcoholism consider stress as an important factor linked to the alcohol abuse (Echeburúa, Bravo, & Aizpiri, 2008; Peyser, 1992), and higher intakes of alcohol have been associated with stress at work (e.g., Heslop et al., 2001; Bravo, Echerburúa, & Aizpiri, 2008).

Perhaps due to the presence of other main obvious risks, the construction sector was not identified as a traditional sector at high risk of work related stress. However, recent studies suggest that stress can be a concern in this industry (e.g., Madine, 2000). The

Chartered Institute of Building (2006) conducted a survey with a sample of 847 UK construction workers, in which they identified that 68.2% of the workers suffered from stress, anxiety or depression. In this survey, organizational factors related to the company and supervisors, such as lack of feedback, poor communication, poor relations with superiors and inadequate managerial support; physical factors, such as inadequate ventilation, poor lighting, inadequate temperature controls and noise levels; and safety factors, such as site safety and inadequate equipment, were cited by the respondents as important causes of their occupational stress.

Beswick, Rogers, Corbett, Binch, and Jackson (2007) conducted a survey for the analysis of the prevalence and distribution of stress in 1,732 UK construction workers. Only about 5% of the respondents described that they had suffered from work-related stress, depression or anxiety; however, 88% of the respondents reported some level of stress. In this survey, an important stressor for many members of the construction industry was having too much to do in the available time. In addition, for some management levels, being responsible for the safety of others was found to be particularly stressful, and labourers found the dangerous nature of their job to be stressful.

Job stress has also been considered as a risk factor (e.g., Miró, Solanes, Martínez, Sánchez, & Marín, 2007) for injury in a variety of occupations, such as farmers (e.g., Thu et al., 1997), healthcare workers (e.g., Ahlberg-Hultén, Theorell, & Sigala, 1995), offshore petroleum workers (e.g., Rundmo, 1992) or clerical officers (e.g., Marcus & Gerr, 1996). In the construction sector, Goldenhar, Williams and Swanson (2003) support a model in which work stressors are related, either directly or indirectly through the mediating effects of physical or psychological symptoms, to injuries and near misses. In these studies, several accident rates are considered a safety outcome of job stress (e.g., Gonçalves et al., 2008). However, taking into account the high rates of accidents in the construction sector in the majority of the developed nations (e.g., Karjalainen, 2004; Lundholm, 2004), the frequent and constant occurrence of minor individual injuries, such as microaccidents, could also be considered a possible stressor for employees, having important consequences for their health behaviour. The use of self reported minor injuries or microaccidents has been recognized as an accurate measure for detecting the individual accident frequency in organizational contexts (e.g., Chmiel, 2005).

Unhealthy behaviours have also been studied as another risk factor for the occurrence of injuries at work. The evidence about the role of some unhealthy behaviours, such as the consumption of illicit drugs and alcohol, in work accidents is mixed (Macdonald, 1997; Roberts, 2004). In reference to illicit drugs, the research is inconclusive with regard to a causal link between drug use and work accidents (Macdonald & Wells, 1994). Some studies find no associations between illicit drug use and work accidents (e.g., Dell & Berkhout, 1998; Normand, Salyards, & Mahoney, 1990). Smith, Wadsworth, Moss and Simpson (2004) found no association between drug use and workplace accidents; however, they also reported that illegal drug use may reduce performance efficiency and safety at work because of its effect on cognitive functions, such as reaction times, concentration and memory. Others studies find a certain relationship. Zwerling, Ryan and Orav (1990) found that workers testing positive for marijuana or cocaine were significantly more likely to have reportable work injuries. Kaetsner and Grossmann (1998) found that among males, but not among women, direct estimates of the effect of marijuana or cocaine consumption raised the probability of having a workplace accident by approximately 25 percent.

With regard to alcohol consumption, there is also unclear evidence about its relationship with work accidents. The alcohol consumption of workers has been considered one main factor contributing to approximately 17% of all occupational accidents (e.g., Gutiérrez-Fisac, Regidor, & Ronda 1992), and other studies elevate this percentage to the 20%-25% range (e.g., Henderson, Hutcheson, & Davies, 1996; Hutcheson, Henderson, & Davies, 1995). However some reviews state that there is not enough available evidence to conclude that alcohol plays a substantial causal role in work injuries (e.g., Stallones & Kraus, 1993; Webb et al., 1994).

The construction sector has been identified as a sector at special risk for the use of drugs and alcohol and as being one of the sectors in which there are higher indices of marijuana, cocaine and alcohol consumption (OIT, 1998). Job stress, occupational and co-worker norms, the availability of these substances at the workplace and long periods spent outside the family environment can be considered some characteristics contributing to the alcohol and drug consumption in this sector. Therefore, this sector can be considered a suitable place for the study of the relationship between unhealthy behaviours and the occurrence of injuries.

Following the two approaches found in the literature, the specific objective of this study is to contrast two alternative models about the relationships among unhealthy behaviour and safety and risk conditions. In the first model, unhealthy behaviour is considered a source of work related tension and microaccidents, affected by safety and risk. In the second model, unhealthy behaviour is considered a result of work related tension, with this variable being explained by safety, risk exposition and microaccidents.

Method

Participants

180 workers belonging to the same Spanish construction company participated in the study. The majority of the 180 participants were male (69.7%). Of them, 35.8% were more than 40 years old, 33% were less than 30 years old, and 31.3% were between 30 and 39 years old. The main educational levels were secondary studies (29.5%), professional technicians (23.9%), university studies (21.6%) and primary studies (21%). The more frequent hierarchical levels were employees (71.2%), middle and upper managers (15.3%) and supervisors (13.6%). 43.3% of the respondents were workers doing specific construction jobs, such as bricklayers, mates, plumbers, welders and site supervisors, 24.2% were administrative officers, 22.5% were commercial building agents and 10.1% were professional technicians, such as engineers or architects.

Instruments

Employees filled out an extensive employee well-being and psychosocial safety battery (Meliá, 2006; Meliá & Becerril, 2007; Meliá et al., 2008). This battery was applied to measure all the variables included in the models. Each variable was measured using items answered on an 11 point Likert frequency scale. The

main verbal anchorages were: 0 never; 2 rarely; 4 sometimes; 6 frequently; 8 quite often; 10 continuously.

Supervisors' safety response (Meliá & Sesé, 2007) was made up of a 5-item scale concerning safety actions, contingencies, communication and attitudes of supervisors at work (e.g., my superior makes an effort to do his work in a safe way). The coefficient alpha for this scale is 0.98. This variable represented what Zohar (2000) has called the group level safety climate, which in this research has been considered an indicator of the state of safety in the worker's immediate surroundings.

Risk exposition was measured using a 20-item scale regarding the employee exposure to inherent risks in the work context (e.g., Risk of falls to lower levels). The coefficient alpha for this scale is 0.93.

The micro-accidents scale consisted of 6 items measuring physical health problems due to the work (e.g., in my job, I get small bumps or bruises on my legs, feet, trunk). The coefficient alpha for this scale is 0.82. This measure can be considered a more sensible indicator of the effects of safety at the individual level (Chmiel, 2005).

Tension was measured by means of 17-item scales (e.g., I feel anxious during my workday) that assess the frequency with which workers perceive mental strain and anxiety on their jobs. The coefficient alpha for this scale is 0.87.

Unhealthy behaviour was measured using an 11-item scale concerning unhealthy behaviours carried out by employees outside of work. This scale includes items about the following issues: (1) alcohol consumption, tobacco and caffeine consumption (e.g., I drink wine, beer or other alcoholic beverages during the morning snack break or during the morning), (2) unhealthy habits of physical activity (e.g., I do sports or some other physical activity apart from what I do at work), and (3) unhealthy nutrition habits (e.g., I eat foods that are high in fats). The coefficient alpha for this scale is 0.64.

Procedure

To subject firm of our study was a small Spanish construction company. The company's safety technician served as the chief sponsor of the survey. A psychosocial safety battery (Meliá, 2006) was administered, which comprised the safety and health measures of supervisors' safety response, risk exposition, micro-accidents, tension and unhealthy behaviour. 180 workers participated voluntarily in the study. All the company departments were invited to participate. The survey was accompanied by a covering letter, which outlined the purpose of the study, gave contact details and assured participants of their anonymity and confidentiality. All questionnaires were returned to a collection box in sealed envelopes provided.

Data analysis

The maximum likelihood method of the AMOS 6.0 Structural Equation Modelling program was used (Arbuckle, 2005) to test which pattern of the described inter-relationships between the variables fit the empirical data. The use of several types of goodness-of-fit indices is recommended (Hair, Anderson, Tatham, & Black, 1998; Hoyle, 1995). In this study, the absolute fit indices, chi-square statistic and root mean square error of approximation (RMSEA) are reported (Browne & Cudeck, 1993). A non-significant chi-square shows that the empirical data are in agreement with the theoretical model. The comparative fit index (CFI) is also reported. As a rule of thumb, values CFI are unacceptable if they are less than 0.9 (Bentler & Bonett, 1980; Bentler, 1990). The recommended value for a well-fitting model should approximate .95 (Hu & Bentler, 1995).

Results

Figure 1 shows the standardized coefficients for the path model displaying the relationships between the variables explained in model one.

The significant paths in figure 1 show the following:

– The negative effect of supervisors' safety response on tension; i.e., the safer the response of supervisors, the less tension experienced by workers. However, the supervisors' safety response did not have a significant effect on unhealthy behaviour.

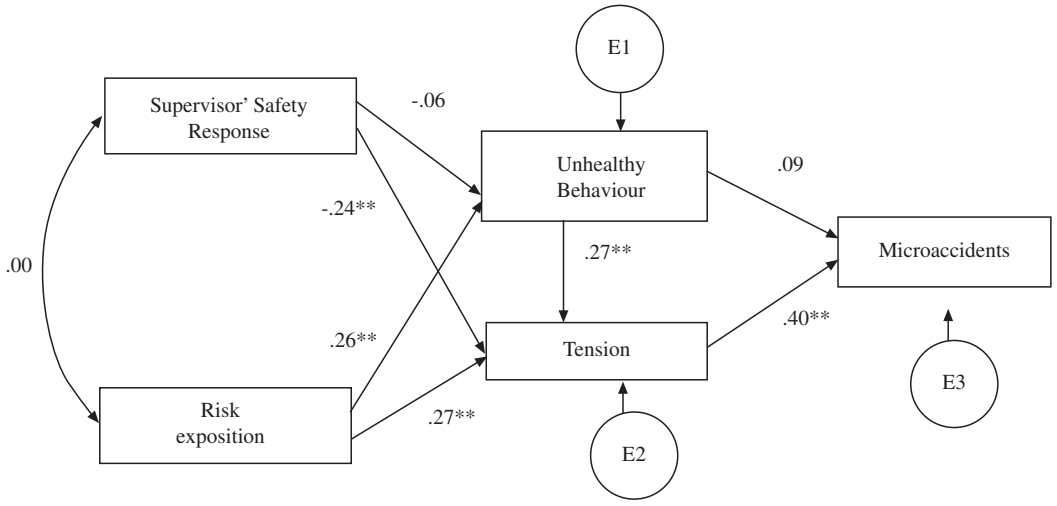

Figure 1. *Standardized paths coefficients for model 1: Unhealthy behaviour as a source of work related tension and microaccidents (Chi square= 73.798, p<.001; RMSEA= .448; CFI= .544). ** = p<.01*

- The positive effect of risk exposition on unhealthy behaviour and tension; i.e., workers exposed to more risky environments develop more unhealthy behaviours and experience more tension.
- The positive effect of unhealthy behaviour on tension; i.e., the workers carrying out unhealthier behaviours also tend to experience more tension. However, the development of unhealthy behaviours is not related to the occurrence of microaccidents.
- The positive effect of tension on microaccidents. i.e., the greater the workers' experience of tension, the greater the occurrence of microaccidents.

The risk exposition, unhealthy behaviour and negative supervisors' safety response are significant predictors of tension which, in turn, is a significant predictor of microaccidents. Unhealthy behaviour appears as a significant antecedent of tension, but it does not significantly predict microaccidents at work. However, the goodness-of-fit indices for this model show that it is not a good representation of the empirical data (Chi square= 73.798, d.f= 3, p<.001; RMSEA= .448; CFI= .544); therefore, this model should be rejected.

Figure 2 shows the standardized coefficients for the path model displaying the relationships between variables explained in the second model.

The significant paths in figure 2 show the following:

- The negative effect of supervisors' safety response on microaccidents and tension. i.e., the safer the response of supervisors, the fewer the microaccidents and the less tension experienced by workers.
- The positive effect of risk exposition on microaccidents. i.e., the greater the exposition to risk in the workplace, the more microaccidents experienced by workers. However, the exposition to risks at work does not appear as a significant source of tension.
- The positive effect of microaccidents on tension. i.e., the more microaccidents suffered by workers, the greater their experience of tension.
- The positive effect of tension on unhealthy behaviour, i.e., the greater the tension experienced by workers, the more they develop unhealthy behaviours.

In this model, supervisors' safety response and risk exposition predict microaccidents which, in turn, affect tension. Tension is the only variable directly affecting unhealthy behaviours. The goodness-of-fit indices for this model show that the model is a good representation of the empirical data (Chi-square= 4.507, d.f.= 3, p= .212; RMSEA= .053; CFI= .99).

Discussion

The role of unhealthy behaviours in accident prevention is controversial. One approach considers that some unhealthy behaviours, especially those related to drug and alcohol use and abuse, are a source of unsafeness and can be related to negative safety outcomes, such as minor injuries or microaccidents (e.g., Gutiérrez-Fisac, Regidor, & Ronda 1992; Kaetsner & Grossmann, 1998; Henderson, Hutcheson, & Davies, 1996). Following this approach, stimulating healthy behaviour and controlling the consumption of alcohol and other drugs are primary strategies in order to achieve safe workplaces and organizations.

A second approach emphasizes the role of unhealthy behaviour as a non-adaptive response to the work related tension (Adriaanse, vanReek, Zanbelt, & Evers, 1991; Hellerstedt & Jeffery, 1997; Heslop et al., 2001; Ng & Jeffery, 2003; Pak, Olsen, & Mahoney, 2000; Swanson, Lee, & Hopp, 1994) that could be partially due to unsafe conditions and risk exposition. Following this approach, a primary intervention increasing safety and decreasing inadequate work risk conditions may help in the promotion of healthy behaviours.

In this paper these two approaches have been contrasted, developing and testing two path models. In the first model, unhealthy behaviours were conceived as a source of tension and microaccidents. Although the path between unhealthy behaviour and tension and the path between tension and microaccidents were significant, the path between unhealthy behaviours and microaccidents does not achieve the level of significance, and the whole model was not an acceptable representation of the data. Therefore, these results are in accordance with studies that did not find a causal relationship between some unhealthy behaviours and work accidents (e.g., Dell & Berkhout, 1998; Webb et al., 1994).

In the second model, unhealthy behaviour was considered the result of the work related tension predicted by unsafeness, risk

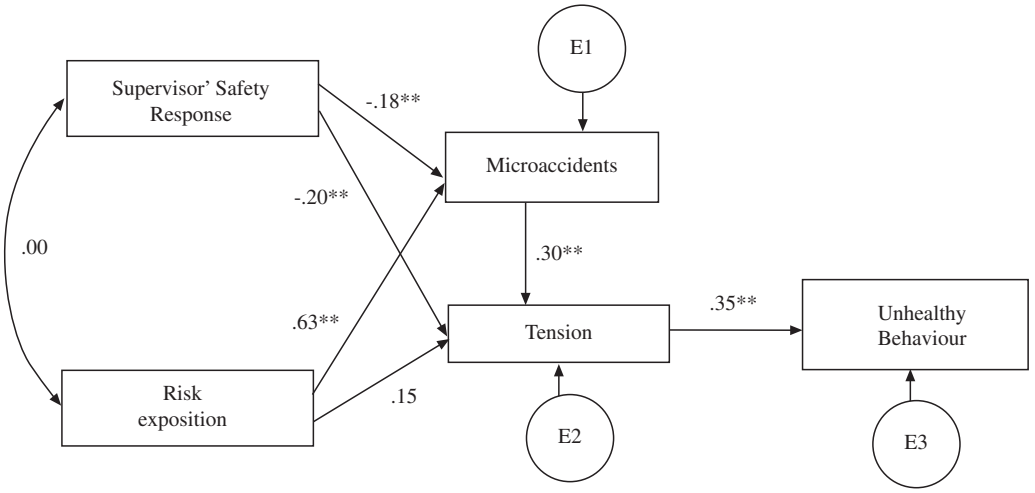

Figure 2. *Standardized paths coefficients for model 2: unhealthy behaviour as a consequence of work related tension (Chi-square= 4.507, p= .212; RMSEA= .053; CFI= .99). ** = p<.01*

exposition and microaccidents. Results show that microaccidents can be significantly and positively predicted by risk exposition and negatively predicted by supervisors' safety response, and that work related tension can be significantly and positively predicted by microaccidents and negatively predicted by supervisors' safety response. Unhealthy behaviour is the final variable in the chain affected directly by tension, and indirectly by risk, safety and microaccident factors.

In the construction sector, some literature has highlighted the importance of some unhealthy behaviours, such as alcohol consumption, considered a part of the «workers culture» (OIT, 1998). In our results, the employee's unhealthy behaviours do not appear as a direct source of microaccidents. Such unhealthy behaviours could be seen as an inadequate or non-adaptive response to the tension originated by the hard conditions that characterize many construction jobs. An adequate control and self-control of unhealthy behaviours should be considered a necessary part of a safety prevention strategy, at least in all those sectors where these unhealthy behaviours can compromise the safety and the lives of workers. However, the results of this research emphasize that unhealthy behaviours should be understood at least partially as a result of the experience of tension induced by risk and unsafe conditions. Therefore, the improvement of these safety and work conditions can contribute to reducing work-related tension and, thus, help in the development of adequate healthy behaviours.

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