Stress-related psychosocial factors at work, fatigue, and risky driving behavior in bus rapid transport (BRT) drivers

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ARTICLE INFO

Keywords:
- Professional drivers
- Working conditions
- Job stress
- Fatigue
- General fatigue
- Need for recovery
- Fatigue at work
- Risky driving

ABSTRACT

Introduction: There is consistent scientific evidence that professional drivers constitute an occupational group that is highly exposed to work related stressors. Furthermore, several recent studies associate work stress and fatigue with unsafe and counterproductive work behaviors. This study examines the association between stress-related work conditions of Bus Rapid Transport (BRT) drivers and risky driving behaviors; and examines whether fatigue is a mechanism that mediates the association between the two.

Method: A sample of 524 male Bus Rapid Transit (BRT) operators were drawn from four transport companies in Bogotá, Colombia. The participants answered a survey which included an adapted version of the Driver Behavior Questionnaire (DBQ) for BRT operators, as well as the Effort-Reward Imbalance and Job Content Questionnaires, the Subjective Fatigue subscale of the Checklist Individual Strength (CIS) and the Need for Recovery after Work Scale (NFR).

Results: Utilizing Structural Equation Models (SEM) it was found that risky driving behaviors in BRT operators could be predicted through job strain, effort-reward imbalance and social support at work. It was also found that fatigue and need for recovery fully mediate the associations between job strain and risky driving, and between social support and risky driving, but not the association between effort/reward imbalance (ERI) and risky driving.

Conclusions: The results of this study suggest that a) stress related working conditions (Job Strain, Social Support and ERI) are relevant predictors of risky driving in BRT operators, and b) that fatigue is the mechanism which links another kind of stress related to working conditions (job strain and low social support) with risky driving. The mechanism by which ERI increases risky driving in BRT operators remains unexplained.

Practical applications: This research suggests that in addition to the individual centered stress-reduction occupational programs, fatigue management interventions aimed to changing some working conditions may reduce risky driving behaviors and promote safety in the professional drivers' jobs and on the road.

1. Introduction

There is growing scientific evidence that professional drivers experience among the highest levels of work-related psychosocial risk (Bindić et al., 2013; Cendales et al., 2016; Imran and Devi, 2013; Tse et al., 2006, 2007; Useche et al., 2017a,b,c; Tsai et al., 2014). Furthermore, it is known that work conditions, especially job stress, is associated with adverse behavioral changes. Documented job stress effects on behavior include smoking, drinking, unhealthy diet (Siegrist and Rödel, 2006) and counterproductive work behavior (Fida et al., 2015). It is known that specifically in professional drivers, work stress is associated with aberrant driving behaviors (Kontogiannis, 2006), which in turn are closely related to road accidents (Reason et al., 1990; Parker et al., 1995; Aberg and Rimmo, 1998). However, few studies have directly addressed the mechanisms that link the two. This study addresses this gap in the literature, by examining the mediating role of fatigue on the association between work stress and aberrant driving in a sample of Bus Rapid Transit (BRT) operators.

Risky driving behavior is related to individual variables, which are normally dealt with via road safety training (e.g. attitudes, habits, behavior and specific performance factors), and particular variables pertaining to the work environment, such as physical and mental fatigue, lack of experience, the tasks' physical and psychological demands, and job strain (jobs characterized by high demands and low
According to Reason, Manstead, Stradling, Taylor and Dorn (2005), timely interventions can significantly reduce risk to lives and property among others (Kee et al., 2010; Boksen et al., 2005). However, work-related fatigue is easily reversible in the short term through typical compensation strategies such as taking task breaks or slowing the pace of work. On the other hand, these compensating mechanisms are of little effectiveness to reducing general or prolonged fatigue, which require more drastic actions such as prolonged rest periods or behavioral changes (Meijman, 1991).

In the scientific literature, in addition to fatigue, work stress, including DC model’ and ERI model’ approaches, is one of the most frequent processes associated to the dangerous behavior of professional drivers (Kontogiannis, 2006; Taylor and Dorn, 2005; Westerman and Haigney, 2000). According to van Amelsvoort, et al. (2003) and Gómez, Cendrales and Useche (2015), job strain in public transport drivers has been found to be associated with negative physical (e.g., musculoskeletal and cardiovascular diseases and physical fatigue in general) and mental (e.g., psychological discomfort, sleep problems, mental fatigue) health outcomes (Raggaat and Morrissey, 1997; Gómez et al., 2014). According to some studies, the work characteristics of professional drivers, such as high demand and low control, contribute to the perception of higher indices of accumulated fatigue and consequently to higher rates of sickness and absenteeism (Sluiter et al., 1999). As stated in a qualitative study on professional drivers, fatigue can be maximized by various work-related psychosocial factors, such as low social support and highly irregular work schedules, but, more importantly, by job strain (Biggs et al., 2009).

The most frequently documented work stress models are the Job-Demand-Control-Social Support Model (also known as DCS, JDC or DC model) (Karasek, 1998) and the Effort-Reward Imbalance Model (or ERI model—jobs characterized by requiring high efforts and providing low rewards) (Siegrist, 2002). According to the DC model, processes of stress take place when high psychological demand and low control or autonomous decision-making converge (Karasek, 1998; de Lange et al., 2009). This combination is called Job Strain. Many studies have established links between employment characterized by job strain and different negative results in terms of workers’ physical and mental health, and even a considerable increase of self-perceived fatigue in and out of work (van der Hulst et al., 2006; Sluiter et al., 1999; de Lange et al., 2009; Zuraida et al., 2016). Another component of the DC model is comprised by the social support of supervisors and colleagues. It is known that the presence of social support protects workers from stress and positively influences worker satisfaction and well-being. Similarly, it has been demonstrated that workers exposed to high levels of demands, low control, and low levels of social support reveal the greatest stress reactions and risk of morbidity and mortality in their physical and mental health (Luceño et al., 2004; López-Araújo and Osca, 2011).

A second psychosocial approach, the ERI model (Siegrist, 2002; Siegrist et al., 2004) is based on two work-related psychosocial risk factors. The model is based on the hypothesis that when the efforts...
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