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Developing effective professional bus driver health programs: An investigation of self-rated health

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ABSTRACT

The health of professional bus drivers is a critical factor in their driving performance; any impairment may lead to undesired consequences. In an attempt to develop and prioritize health and wellness programs, this study investigates the factors significantly affecting the health conditions of professional bus drivers, as well as the strength of these factors. This study uses self-rated health as the examination measurement. This simple assessment is an inclusive measure of health status for judging health trajectory, and is highly associated with changes in functional ability, including perceived control over driving. This study evaluates driver responses of self-rated health with ordered response models that consider factors such as the driver reported health problems, physical and psychological conditions, demographic factors, driving experience, and working environment. Analysis of a sample of 785 drivers shows that age, body mass index, depression, daily working hours, perceived company safety culture, and health problems are the factors significantly affecting self-rated health. Depression has the greatest effect among all factors except health problems. Unlike the linear relationships for the other factors, the relationships between depression levels and perceived health are S-shaped. The results of ordered response models suggest that these influential factors have distinct effects on the self-rated health of individual drivers and on the different levels of self-rated health.

1. Introduction

Professional drivers have a tremendous effect on public safety. In particular, the physical and psychological health of professional drivers is critical factors in driving performance. Any impairment may lead to undesirable consequences for drivers, passengers, and operators alike. Even today, when technologies, such as auto brake systems in railroad transportation, have been developed to reduce the adverse effects of professional drivers being suddenly incapacitated, professional drivers are classified as safety critical workers or high level safety workers (National Transport Commission of Australia, 2004). Their health conditions may lead to serious incidents affecting the public or the transport network. Professional bus drivers, who have less help from advanced technologies than train operators and pilots, require more cautious health management. This is why bus drivers are the subject of this study.

Due to their working environment and job characteristics, professional bus drivers are vulnerable to specific health problems. Continuous whole-body vibration, sedentary nature of driving, fatigue, tight timetables, irregular shift schedules, and various stressors from the driving environment (such as customer complaints and heavy traffic) make bus drivers more likely to suffer from musculoskeletal problems, cardiovascular diseases, and gastrointestinal complaints. Bus drivers also have a higher level of work-related stress than individuals in other occupations (Kompier and Dimartino, 1995; Magnusson et al., 1996; Tse et al., 2007; Tuchsen and Endahl, 1999; Wang and Lin, 2001). Professional bus drivers sometimes experience trauma at work, including injuries or deaths due to traffic accidents. This trauma can induce post-trauma stress disorder (PTSD), and might consequently lead to physical health problems, work burnout, and substance abuse (Chen and Cunradi, 2008; Issever et al., 2002; Vedantham et al., 1999).

The vulnerability of professional bus driver health and its importance to driving performance have prompted governments and companies to provide various health and wellness programs that typically involve regular health examinations. Health examinations can provide valuable information about the examinee's current health condition. However, health examinations do not capture the complete state of physical, mental, and social well being of examinees due to the restrictions and limitations of examination time, budgets, procedures, and equipment (Idler and Benyamini, 1997). The field of psychosocial epidemiology has attempted to develop

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other measurements to investigate the health condition of individuals in addition to health examinations. Relevant measurements include smoking, alcohol use, overweight, and perceived health.

This study measures perceived health, or self-rated health, by asking respondents to rate their overall health as being excellent, good, fair, or poor. While health self-rating provides a global and simple assessment, previous studies have shown that this measure is an inclusive and accurate measure of health status and health risk factors for judging trends, and not only the current level of health (Idler and Benyamini, 1997). Self-rated health is also a reliable predictor of mortality, is highly associated with changes in functional ability (such as perceived control over driving), and possesses satisfactory validity and reliability (Idler and Benyamini, 1997; Idler and Kasl, 1995; Kaplan and Camacho, 1983; Windsor et al., 2008). Accordingly, this study uses perceived health as a tool to investigate professional bus driver health.

The aim of this study is to investigate the perceived health conditions of professional bus drivers and explores factors significantly affecting perceived health. Identifying these significant factors and how their strengths are associated with self-rated health could allow companies and governments to develop and prioritize health and wellness programs for professional bus drivers. The considered factors include professional bus driver health problems, physical and psychological conditions, demographic factors, and working environment. A sample of 785 professional bus drivers was collected in a national survey in Taiwan. The collected responses of self-rated health formed an ordinal variable that is analyzed using four types of ordered response models: the conventional ordered logit model and three other ordered response models considering the heterogeneity of individual respondents and the heterogeneous effects of factors on different levels of perceived health.

The remainder of this paper is organized as follows. Section 2 introduces the survey plan, the selected variables and associated measures, and the applied ordered response models. Section 3 presents the analysis results, followed by discussions in Section 4.

2. Methodology

2.1. Survey

The dataset in this study comes from a government research project, a preliminary study aiming at exploring the relationships between the health conditions of professional driver and their driving safety in Taiwan (Wong, 2009). The survey was conducted from October to November 2009, with a response rate of 87.1%. The participants were randomly chosen from driver lists acquired by the government, and asked about their health conditions, physical and psychological statuses, socio-demographic conditions, driving experience, and working environment. The anonymous questionnaires were mailed with self-addressed envelopes enclosed. The completed questionnaires were returned directly to the research team.

2.2. Selected variables and associated measures

This study has one dependent variable, perceived health, and adopts three types of explanatory variables: the physical and psychological conditions of drivers, demographic factors, and driving experience and working environment, as detailed below.

2.2.1. Perceived health

Researchers have proposed different ways to ask respondents regarding their self-rated health. However, previous studies have shown that the concept of self-rated health is relatively insensitive to the semantic variations in the questions eliciting the self-rating (Idler and Benyamini, 1997). This study asks professional drivers to compare their health to that of others of the same age to dismiss age-related conditions. The question is stated as follows: "How is your health, compared with others your age? Is it better, same, or worse?" Other studies have also used similar questions (Ho, 1991; Jagger and Clarke, 1988).

2.2.2. Physical and psychological conditions

This study considers indicators representing the physical and psychological conditions of professional drivers, including reported health problems (RHP), depression levels, stress levels, sleep quality, and burnout. The RHP variable is coded as 1 if respondents had experienced any health problems in the previous year. Note that reported health problems include not only problems diagnosed by medical specialists, but also general discomfort and pains.

The depression level is measured using the Taiwanese depression scale. This scale is designed specifically for Taiwanese people aged 18 or above, and has satisfactory reliability and validity (Chen et al., 2010). The scale consists of 18 items with a four-point Likert scale coded from 0 to 3. The global score ranges from 0 to 54; a score of 19 or above suggests the possibility of depression, and a score of 29 or above indicates a need for professional medical treatment.

Stress is measured using Siegrist's effort/reward imbalance model. This model postulates that psychological strain results from the interaction between job demands and job control. The combination of low control and high demand produces job strain; this undesired property is a condition experienced by professional bus drivers (Tse et al., 2006). The adopted scale consists of 17 items; the first six items measure a participant's efforts, followed by 11 items measuring the rewards (Tseng and Cheng, 2002). The items are rated on a five-point Likert scale coded from 1 to 5. The global score is calculated as the sum of effort scores divided by the sum of reward scores with adjustment of the number of items. A score of 1 represents a balance between effort and reward, while a score above 1 indicates disproportionate effort.

Sleep quality is measured using the Pittsburg sleep quality index (PSQI), representing the professional driver sleep quality and disturbance retrospectively over a one-month period based on self-reports (de Pinho et al., 2006; Sabbagh-Ehrlich et al., 2005). The PSQI produces a global score between 0 and 21. The inventory consists of seven components, including sleep quality, sleep onset latency, sleep duration, sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. A participant scoring higher than 5.0 is typically classified as having poor sleep quality.

Burnout level is measured using the Copenhagen burnout inventory (CBI) developed by Kristensen et al. (2005). The adopted inventory (Chang et al., 2007; Yeh et al., 2007) consists of 19 items, seven of which are specifically for work-related burnout, the focus of this study. Each item is recorded on a five-point scale, with responses ranging from always (score 100) to never (0), or very seriously (100) to very slightly (0). The global score represents the average of these seven items.

2.2.3. Demographic factors

The demographic factors concerned in this study include professional driver age, gender, and body mass index (BMI). The BMI is computed as the weight (kilogram) divided by the square of height (square of centimeter). According to the Department of Health, Taiwan, a BMI value equal to or greater than 24 is considered overweight.

2.2.4. Driving experience and working environment

This study considers five variables for driving experience and working environment, including driving experience, years of service, daily driving hours, daily working hours, and perceived company safety culture. The driving experience variable measures