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NEW HORIZONS IN MANAGEMENT

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The psychosocial environment of commercial driving: morbidities, hazards, and productivity of truck and bus drivers

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INTRODUCTION

Commercial drivers, licensed truck and bus drivers operate in demanding work environments that require long periods of concentration in challenging physical conditions with potentially serious consequences to personal and public health. The work environment, characterized by high job demands and low control, influences the health of commercial drivers through complex pathways; individual behaviors and characteristics interact with fatigue and job strain to impair health. Job strain may increase the risk of mental health disorders such as anxiety and depression, and contribute to hypertension, cardiovascular disease and sleep disorders. Both mental and physical conditions contribute to increased medical claims, disabilities and loss of productivity. Furthermore, the psychosocial environment of commercial drivers remains a significant public safety issue because of increased risk of motor-vehicle incidents caused by fatigued commercial drivers involving other motorists and pedestrians.

The chapter applies several theoretical perspectives of stress to explain how the psychosocial environment of commercial drivers may negatively impact their health. These perspectives include the Person–Environment Fit Model, the Effort–Reward Imbalance Model, and the Demand–Control Model. Application of these theoretical perspectives requires an exploration of the psychosocial environment determined, in part, by government policies and organizational procedures, and in part by individual characteristics. The resultant psychosocial problems are among the main causes of morbidity and mortality for commercial drivers. The epidemiology of mental health disorders, chronic diseases and occupational hazards for commercial drivers are presented in support of these perspectives. Psychosocial problems also contribute to lower productivity levels influenced by absenteeism and presenteeism, and increased medical and disability claims. Because the psychosocial environment impairs the health, safety and work performance of commercial drivers, the chapter concludes with an overview of promising intervention strategies to improve the work environment for commercial drivers.

THEORETICAL PERSPECTIVES

The work environment of commercial drivers is characterized by long working hours requiring physical exertion and mental concentration. Poor road and weather conditions
may increase the need for mental concentration to drive heavy cargo or numerous passengers. Noise, temperature extremes and mechanical vibrations contribute to challenging physical conditions. The schedule of commercial drivers may include irregular shift work, night-time driving and inconsistent days off. The combination can lead to stress, fatigue and sleep deprivation that affect driver performance (Kahn, 2004; Saltzman and Belzer, 2007). The work environment causes commercial drivers to experience stress for a variety of reasons, such as being separated from friends and family, having to meet stringent deadlines to maintain a schedule, and operating their vehicles in less than ideal conditions (Saltzman and Belzer, 2007). The work environment of commercial drivers does not support healthy behaviors, such as physical activity and good nutrition, which can moderate stress. Thus the challenging psychosocial environment exposes commercial drivers to levels of stress that are higher than levels experienced in other occupations (Orris et al., 1997).

The challenging work environment exposes commercial drivers to stressors that initiate a physiological response in the body. In response to stress, the body releases hormones, including adrenaline and cortisol, to prepare for physical and mental work (Baker and Karasek, 2000). Heart rate, breathing rate and blood pressure increase while the liver provides additional sources of energy. The body attempts to return to homeostasis after the stressor is removed. In contrast to isolated stressors, chronic stress includes repeatedly experiencing a stressful event or experiencing persistent stress. Chronic stress can affect health through adaptive behaviors or through physiological mechanisms. Overload of the endocrine-mediated response can cause changes in body functioning. Thus, when someone is exposed to chronic stress, these physiological changes can adversely affect health outcomes (Cohen et al., 2007). The effects of chronic stress include increased heart rate, increased oxygen demand, high blood pressure, chest pain, abnormal heart rhythms and difficulty breathing (Torpy et al., 2007). Inflammatory response and decreased immune function associated with chronic stress contribute to the relationship between heart disease and stress (Cohen et al., 2007, Yusuf et al., 2004).

According to the National Institute for Occupational Safety and Health, ‘job stress can be defined as the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker’ (NIOSH, 1999, p. 6). Stress can cause both positive and negative outcomes in work performance. When at a level at which an individual can cope, stress can increase productivity; however, reduced productivity occurs when stress exceeds the individual’s ability to cope (Tansey et al., 2004). Job strain is characterized by continued work under these latter conditions, where stressors exceed coping ability. Three models of the relationship between stress and health outcomes, the Person–Environment Fit Model, the Effort–Reward Imbalance Model and the Demand–Control Model, which becomes the Social Disequilibrium Theory, are discussed below and applied to commercial drivers.

**Person–Environment Fit Model**

Early work to describe workplace stress used the Person–Environment Fit Model. Within this model, the environment includes the physical, social and cultural surround-
The psychosocial environment of commercial driving

Both the environment and the individual have objective and subjective measures, but it is the subjective measures of the person and the environment that initiate coping responses (Baker, 1985). Job strain can result from a mismatch, or lack of fit, between the person and the environment through two pathways: (1) discrepancy between the motives or goals of a person and the supplies/provisions of the environment; or (2) discrepancy between job demands and an individual’s capabilities. Work environments that provide a low level of compensation or limit interactions between the driver and his or her family may cause a lack of fit; work environments that require long hours and shift work may exceed a driver’s abilities. Thus the lack of fit results in job strain for the commercial driver; however, because different individuals may perceive the same environment differently, not all individuals will experience this strain. The Person–Environment Fit Model emphasizes subjective perceptions of the environment; therefore it is limited in suggesting objective changes to the work environment (Baker and Karasek, 2000).

Effort–Reward Imbalance Model

The Effort–Reward Imbalance (ERI) Model (Siegrist, 1996) offers an alternative to the Person–Environment Fit Model and the Demand–Control Model. In this model, strain results when there is an imbalance between expended effort and rewards received. Effort includes both intrinsic and extrinsic dimensions, individual coping strategies and external demands and job requirements, respectively, and reward includes compensation, esteem and ‘status control’ (Siegrist, 1996, p. 30). Status control encompasses the individual’s ability to control their career and maintain or improve their social status, an important component in his or her identity and self-esteem. It includes not only job security, but also forced job change and promotion potential. Because commercial drivers are often paid by the mile, extended shifts among these drivers do not receive the same level of reward as in other sectors of the economy, for example time and a half for hours worked over 40. Also, time spent waiting for pick-up or loading alters the effort–reward balance for truck drivers. The environment and accompanying health effects may force commercial drivers into a job change at earlier ages because they are no longer able to expend enough effort.

Four facets of effort have been identified for bus drivers, including: (1) adverse road conditions and passenger behavior; (2) poor management support; (3) personal discomfort; and (4) workload and fatigue (Tse et al., 2007). Higher workload and fatigue and lower reward contribute to decreased mental and physical health.

Demand–Control Model

The Demand–Control Model (Baker and Karasek, 2000; Karasek and Theorell, 1990) describes the relationship between the objective work environment and stress. The work environment is characterized by levels of job demand and decision latitude. Job demands include psychological demands (PD) such as sustained mental responsibility or burdens and physical exertion. Decision latitude (DL), that is, control, is the ability to develop and use skills and have the authority to make decisions. PD would include workload and pace, monotony and physical constraints; DL would include the
authority to solve problems and set working conditions including timing and scheduling (Baker, 1985). Both constructs are conceptualized as being either high or low, resulting in four combinations: (1) passive jobs, low PD and low DL; (2) active jobs, high PD and high DL; (3) low job strain, low PD and high DL; and (4) high job strain, high PD and low DL. The last category, high job strain, is hypothesized to increase risk for psychological disorders, fatigue and so on. (Theorell and Karasek, 1996) because it limits how an individual can respond to demands. The Demand–Control Model has evolved into the Stress-Disequilibrium Theory, which is an ‘attempt to provide a more-elaborated and generalized explanation of the job strain hypotheses of the demand control model’ (Karasek, 2008, p. 127).

With this expanded theory, the central nervous system (the controller) of an individual (the system) causes physical responses by the individual (external work) and physiological responses within the person (internal work) to stimuli from the physical and social environment. As with the Demand–Control Model, low control and high demand cause job strain; however, the Stress-Disequilibrium Theory presents biological mechanisms that mediate the relationship between stress and disease; extended external stress can limit the ability of the body to regulate physiological processes. The internal system must continuously attempt to return the physiological processes of the nervous system, the cardiovascular system and the psychoendocrine system to equilibrium (Baker and Karasek, 2000). Most studies support the Demand–Control Model as long-term job strain is associated with an increased risk of coronary heart disease (Collins et al., 2005; Kivimäki et al., 2006a; 2006b).

The work of commercial drivers can be characterized as having high job strain. The psychological demands of commercial driving include long working hours requiring continuous alertness. The decisional latitude of commercial drivers is low because they are limited in how they can respond to their physical and social environments, deadlines must be met regardless of weather and road conditions, and drivers must be available when the cargo is ready. Commercial drivers with greater job control have been shown to have lower rates of job turnover and those commercial drivers who enter into a different profession experience a decrease in job strain (de Croon et al., 2004). Stress-related hormones and heart rate are elevated among bus drivers during their working time compared to off-duty time (Aronson and Rissler, 1998; Raggatt and Morrissey, 1997). A significant relationship was found between occupational stress and elevated serum glucose, total and low-density lipoprotein (LDL) cholesterol, and triglycerides among commercial drivers (Jovanović et al., 2008).

Whether individual or in combination, stressors appear to induce suboptimal psychophysiological states among workers in diverse occupational categories, thus potentially producing high levels of occupational stress (Kivimäki et al., 2006a; 2006b). Repercussions from chronic stress range from relationship and family problems to increased cholesterol levels linked to dietary patterns and overweight and obesity, to high rates of suicide (Bernard et al., 2000; Steptoe and Brydon, 2005). In most cases, these adverse effects are independent of individual factors. Among Australian long-haul truck drivers, suicide accounted for 10 percent of all deaths, was the fourth most common cause of death among these drivers, involved victims younger than 36 years, and was linked to financial pressures (Quinlan, 2001).
COMMERCIAL DRIVING WORK ENVIRONMENT

Commercial driving encompasses a variety of professions including bus drivers, long-haul truck drivers, and pick-up and delivery drivers (BLS, 2009). While drivers spend the majority of their working time in the vehicle cab or cabin, they also work at warehouses loading and unloading cargo, or at depots, loading and unloading passengers, completing paperwork, and managing inspections and maintenance. These additional responsibilities of commercial drivers are not typically compensated; yet these responsibilities increase the stressors to which commercial drivers are exposed. For instance, commercial drivers may be subjected to verbal abuse from other motorists, freight-yard staff or customers as they travel roadways and load and unload cargo (Mayhew and Quinlan, 2006). The shift toward just-in-time (JIT) deliveries reduces the level of control drivers are able to exert as they are directed from dispatchers and have shorter timeframes to make deliveries. Commercial drivers may utilize truckstops for mandatory rest periods and off-duty times when traveling far from home. Occupational pressures often induce, facilitate or exacerbate substance use and sexual activity risk taking by transport personnel (Apostolopoulos and Sönmez, 2007). They may feel lonely, bored or isolated; they may be exposed to violence or engage in illicit behaviors such as prostitution and drug use (Shattell et al., 2010).

Deregulation of the transportation industry allowed for increased competition with the result of decreased wages for commercial drivers (Mayhew and Quinlan, 2006); but increased competition has created potential stressors for commercial drivers. The transportation industry relies on using larger vehicles and reducing driver pay by using trip-based pay, using self-employed drivers, and getting drivers to work longer hours for the same compensation. The decreased levels of compensation result in increased strain as the drivers try to work longer and harder to maintain their livelihood. The demanding work environment leads to driver fatigue and increases the likelihood for driver error and crashes; thus it negatively impacts driver health through increased job strain.

Numerous requirements have been established to protect the safety of the public. In the USA, a commercial driver’s license (CDL) is required to operate a vehicle with a gross weigh over 26,000 pounds, and operators are required to pass a biennial physical examination. Medical exclusions apply for impairment or loss of certain limbs, insulin-dependent diabetes, respiratory disease, certain high blood pressures, mental disease, use of a controlled substance or alcoholism (Fleming, 2008). Drivers must be at least 21 years of age to cross state lines and submit to pre-employment and random alcohol and drug testing. The work is physically demanding and may require separation from family for extended periods of time.

The Hours of Service regulations (HoS) stipulate the maximum working hours for commercial drivers. In the USA, Canada and Australia, these regulations are primarily designed to address fatigue, while regulations in the European Union (EU) also attempt to improve the working conditions of drivers (Jensen and Dahl, 2009). In the USA, commercial drivers of property-carrying vehicles are limited to 11 hours of driving time and 14 hours of total work per day with 10 hours off. Drivers in Australia and Canada have the same limitation of 14 hours of on-duty time, but may drive for 12 and 13 hours respectively while drivers in the EU are limited to 9 hours of driving time. Commercial drivers of passenger-carrying vehicles are limited to 10 hours of driving time and 15
hours of total work per day with 10 hours off. Commercial drivers are limited to working 60 hours in a seven-day period or 70 hours in an eight-day period in the USA while drivers in the EU are limited to only 56 hours per week. Compensation may be tied to the number of miles traveled, providing incentive to work longer hours. Because of the competition in the transportation industry, many commercial drivers exceed the regulations for HoS (Saltzman and Belzer, 2002).

The HoS regulations stipulate mandatory breaks for drivers, yet drivers may remain sitting in the same position in the vehicle, with no physical activity, for 4.5 to 5 hours with limited social interaction (Jensen and Dahl, 2009). Sleep that occurs in truck berths while parked at truckstops or highway rest areas or while a partner drives may be regularly interrupted, leading to chronic sleep deprivation. The extended periods of shift work, with inadequate recovery, can lead to fatigue and drowsiness while driving. For drivers, working longer hours is associated with an increased risk of stress and hypertension (Australian Rotary Health Research Fund, 2008; Yang et al., 2006). From a public health perspective, it is alarming that over half of commercial drivers have fallen asleep at some time while driving and that driver fatigue is associated with one-fifth of crashes involving commercial drivers (European Transport Safety Council, 2001).

MENTAL HEALTH PROBLEMS

Mental health disorders may limit the ability of a commercial driver to respond appropriately to the numerous stressors associated with job performance. In the USA, commercial drivers may be deemed unfit to drive if they are diagnosed with a ‘mental, nervous, organic, or functional disease or psychiatric disorder likely to interfere with their ability to drive a commercial motor vehicle safely’ (FMCSA, 2004, 49 CFR 391.41 b). Data on mental health disorders among commercial drivers are sparse (Krueger et al., 2007a), but mental illnesses, such as depression, anxiety and mood disorders, were ranked among the lowest of importance as safety issues in a survey of US carrier safety managers (Knipling et al., 2003).

An assessment of Brazilian truck drivers found that 13.6 percent could be classified as having minimal to severe depression compared to the rate within the general male Brazilian population, estimated at 1.9 to 5.9 percent (da Silva-Júnior et al., 2009). The Health Survey of the New South Wales Transportation Industry found a one-month prevalence of 13.3 percent for depression and 7.9 percent for anxiety (Australian Rotary Health Research Fund, 2008). Among US adults, there is a 12-month prevalence for mental disorders of 26 percent; anxiety and mood disorders, including depression, are most common (Kessler et al., 2005); however, no study to date has identified the level of mental disorders among US or EU commercial drivers. High levels of occupational stress put commercial drivers at greater risk of developing mental disorders, while regulation and limited access to healthcare reduce the likelihood that they will seek professional treatment. Some truckers may also engage in risky behaviors such as substance misuse as a way to cope with pressures (Shattell et al., 2010), while other commercial drivers may be at increased risk for suicide (Quinlan, 2001). Because of the dearth of epidemiological data of mental disorders among commercial drivers and the increased vulnerability of this population, further research and interventions are warranted.
OTHER CO-MORBIDITIES

Smoking, obesity, hypertension, physical inactivity, poor diet and psychosocial factors increase the risk for heart disease (Yusuf et al., 2004). The psychosocial factors of job strain may have a direct link to negative health outcomes as well as an indirect link by increasing commercial drivers’ unhealthy behaviors; fortunately, these risk factors are modifiable. Targeting the causes of psychosocial factors, that is, job strain, may prove to be an effective way to reduce disease risk among this hard-to-reach population. Changes in the psychosocial factors at the organizational level may have a direct benefit on the health of commercial drivers and may also provide support for individual-level interventions to change behaviors. Obesity, hypertension and sleep disorders are illustrative of the negative health consequences suffered by commercial drivers.

Overweight and obesity result from a caloric imbalance between calories consumed and calories expended. Overweight and obesity are defined as a body mass index (BMI) greater than 25 and greater than or equal to 30, respectively. A BMI is the ratio of a person’s weight in kilograms to the square of his or her height in meters (NIH, 1998). Obesity is a risk factor for heart disease, hypertension, high triglycerides, low HDL cholesterol and certain cancers, and is associated with diabetes. Obesity is also associated with decreased endurance (US Department of Health and Human Services, 2001) and increased risk of sleep disorders such as sleep apnea among truck drivers (Stoohs et al., 1995) and thus contributes to both health and safety risks.

In the USA, when comparing different occupations, obesity rates are highest among motor vehicle operators (Caban et al., 2005). Recent studies of obesity levels among commercial drivers are lacking (Krueger et al., 2007a); however, one study conducted nearly two decades ago found that among a large sample (about 3000) of truck drivers attending a trade show, 73 percent had a BMI greater than 25 such that they were overweight or obese, one-third were obese while an additional 40 percent were overweight (Korelitz et al., 1993; Roberts and York, 2000). Obesity levels among US men at the time of the trade show study were 20.6 percent as measured by the NHANES III survey and rose significantly in the following years (Egan et al., 2010; Flegal et al., 2002). The high prevalence of obesity among commercial drivers has been corroborated by others; 38 percent of long-haul truck drivers were found to be obese in one study (Stoohs et al., 1994) and 49.6 percent of respondents to a mailed survey were found to have a BMI of 27.8 or more in another (Maislin et al., 1997). In comparison, only 15.9 percent of the US adult population (16.5 percent for males) was obese and 35.5 percent (44.3 percent for males) was overweight in 1995 (CDC, 1995).

Obesity levels have steadily increased in the US population; 26.9 percent of the US adult population (28.6 percent for males) were reported as obese in 2009 (CDC, 2009). It is hypothesized that obesity levels among commercial truck drivers have increased as well. The hypothesis is supported by a more recent study that found 53.4 percent of 103 commercial drivers to be obese and an additional 18.4 percent to be overweight (Wiegand et al., 2009b). Of 501 commercial drivers working for a utility company, 90 percent were overweight (46 percent) or obese (44 percent) (Harshman et al., 2008). Among a predominantly female survey of school bus drivers, 28 percent of respondents were overweight and an additional 61 percent were obese (Doyle et al., 2010).

Commercial drivers remain sedentary for extended periods during the day and have...
limited options for healthy meals. The combination of physical inactivity and poor diet contributes to the high levels of obesity among commercial drivers; however, the psychosocial environment may also contribute. Weight gain is associated with job demands and difficulty paying bills for both men and women, whereas lack of decision authority is associated with weight gain among men (Block et al., 2009). Chronic stress in the workplace increases the risk of developing metabolic syndrome, of which obesity is one of several contributing factors (Chandola et al., 2006). This relationship may be caused by the effects of stress upon the autonomic nervous system.

Hypertension, also referred to as high blood pressure, is defined as a systolic blood pressure greater than 140 mmHg and/or a diastolic blood pressure greater than 90 mmHg (Chobanian et al., 2003). Consistent with this definition, hypertension is cause for disqualification under the US commercial driver fitness determination (FMCSA, 2004). Often there are no symptoms associated with hypertension, but it is known as a silent killer because it may damage the heart, blood vessels and kidneys, leading to heart disease and stroke (NIH, 2008). The prevalence of hypertension has increased in the USA; while approximately 30 percent of adults are hypertensive, less than half of these adults have the condition under control (USDHHS, 2000, 2009).

Prior to an educational intervention administered by a utility company, 28 percent of a random sample of 501 commercial drivers were found to be hypertensive and an additional 51.9 percent were identified as pre-hypertensive (Harshman et al., 2008). In a study of commercial truck drivers and sleep disturbances, 16 percent of participants had elevated blood pressure measurements, above 159 mmHg systolic and/or above 89 mmHg diastolic, while additional participants reported a diagnosis of hypertension, but had normal readings (Stoohs et al., 1995). Over 50 percent of a sample of school bus drivers reported a prior diagnosis of hypertension; only 40 percent of participants were non-hypertensive prior to an intervention (Doyle et al., 2010). Drivers may experience several risk factors simultaneously; for example, risk factors for heart disease including BMI, hypertension, cholesterol levels and triglyceride levels were higher among bus drivers in Taiwan compared to skilled workers (Wang and Lin, 2001). Overweight and obese truck drivers have higher levels of hypertension, cholesterol and diabetes than drivers of normal weight (Martin et al., 2009). These results support the need to educate commercial drivers of the risk of hypertension and obesity, and change the psychosocial environment to reduce their exposure to job strain.

Sleep apnea, insomnia and other sleep disorders reduce the amount and quality of sleep. While these sleep disorders increase the risk of negative health outcomes, they also pose significant public health risk because decreased alertness can lead to motor vehicle crashes (Krueger et al., 2007a; Krueger et al., 2007b; Hartenbaum et al., 2006). Commercial long-haul drivers who were monitored for oxygen saturation while asleep were found to have mild or moderate (68 percent) to severe (10 percent) sleep-disordered breathing, whereas obese drivers were significantly more likely to have higher oxygen desaturation indexes (Stoohs et al., 1995). From a written questionnaire that included the subset of monitored drivers, 14 percent of respondents indicated that they suffered from insomnia while 19 percent reported suffering from hypersomnia (excessive sleepiness). In contrast, prevalence of mild/moderate sleep apnea was found among 29 percent of commercial drivers and severe sleep apnea found among 6.9 percent (Pack et al., 2002). While drivers diagnosed with sleep apnea were more likely to be involved in
crashes over a seven-year period, the difference was not significant; however, drivers with severe sleep apnea were more likely to be involved in severe crashes (Pack et al., 2002). Because obesity is a risk factor for sleep-disordered breathing, it contributes to decreased alertness and fatigue in commercial drivers (Guilleminault et al., 1988; Wiegand et al., 2009b). Obese drivers report unintentionally falling asleep more often than non-obese drivers (Stoohs et al., 1994). Because there is a two- to seven-fold increase in vehicle accidents among drivers with obstructive sleep, sleep disorders are now assessed during the Federal Motor Carrier Safety Administration’s annual medical examination (Hartenbaum et al., 2006). Consequently, reducing obesity may be an effective strategy to reduce sleeping disorders among commercial drivers (Maislin et al., 1997).

ACCIDENTS AND CRASHES

From 1975 to 2005, the number of registered large trucks in the USA has increased from 5.36 to 8.48 million and the number of vehicle miles traveled by large trucks has increased from 81.330 million to 222.836 million (FMCSA, 2007). During this time, the fatality per 100 million vehicle miles traveled in the USA decreased from 5.51 to 2.34. Still, the fatality for driver/sales workers and truck drivers is 28.2 per 100,000 workers; more deaths occur among drivers of large trucks than in any other single profession (USDHHS, 2010).

Based on a Michigan sample, approximately 21 percent of fatal crashes involving a large truck result from actions of the truck driver while 59 percent and 6 percent result from other drivers and non-motorists, respectively (Hedlund and Blower, 2006). Crashes involving one truck and one vehicle are most common among those involving trucks (FMCSA, 2006). For crashes involving truck drivers, driver non-performance resulting from falling asleep, heart attack or other physical impairment was responsible for 11.6 percent of accidents (FMCSA, 2006). Commercial driver fatigue, which is influenced by the time of day/night, a sleep deficit and irregular schedule, contributes to 13 percent of crashes where the truck driver causes the accident and 14.7 percent of crashes where the driver of the other vehicle is at fault (ETSC, 2001).

Research indicates that substance misuse can be a significant problem for commercial drivers (Apostolopoulos et al., 2010; Crouch et al., 1993; Insurance Institute for Highway Safety, 2007; Korelitz et al., 1993). A study of 3500 truckers attending a trade show found between 49 percent and 54 percent of participants smoked tobacco and 30 percent misused alcohol (Korelitz et al. 1993). Furthermore, the presence of alcohol was reported after crashes for 18 percent of fatally injured truckers (Roberts and York, 2000), stimulants were found to be the most frequently unidentified (15 percent) drug class among fatally injured truckers (Insurance Institute for Highway Safety, 2007), 33 percent of 168 fatally injured truckers tested positive for psychoactive drugs or alcohol, and marijuana (13 percent), cocaine (8 percent) and other stimulants (12 percent) were detected in fatally injured truckers (Crouch et al., 1993). More recent statistics indicate that estimated deaths among tractor-trailer drivers with a blood alcohol concentration of 0.08 declined from 16 percent in 1982 to 2 percent in 2005 (Insurance Institute for Highway Safety, 2007), attributable to drug and alcohol testing that became mandatory
in the USA in 2001. Ongoing ethnographies corroborate truckers’ far-reaching use of amphetamines, cocaine, crack and marijuana to stay awake and alert while driving, relax between trips or improve sleep (Apostolopoulos and Sönmez, 2007; Apostolopoulos et al., 2010).

The work environment of commercial driving may cause fatigue through heavy workloads, schedule irregularity, insufficient places to rest during work and inadequate recovery between work periods (Morrow and Crum, 2004). A study of Japanese truck drivers revealed that over one-third worked predominantly at night, while a separate majority was exposed to day and night work; one-third of drivers worked more than 80 hours of overtime per month (Kanazawa et al., 2006). Among Brazilian truckers, 43 percent drove for more than 16 hours per day and slept approximately six hours on average (Souza et al., 2005). There is a high frequency of falling asleep among bus drivers while driving that contributes to crashes and near misses (Vennelle et al., 2010). Drivers for large truck fleets were less likely to report recent serious crashes, possibly because they are experiencing greater levels of sleep and reduced fatigue due to greater compliance with logbook regulations (Mayhew and Quinlan, 2006).

**DIMINISHED WORK PERFORMANCE**

The psychosocial work environment of commercial drivers exposes them to long, demanding work hours with low levels of decisional control. Working in this environment results in psychosocial strain for commercial drivers. The strain is manifested as anxiety, tension, distress and depression that impact the drivers’ work performance; and productivity decreases as absenteeism and presenteeism increase. Commercial drivers may become dissatisfied with the job and have high rates of job turnover as a result (de Croon et al., 2004). Medical and disability claims are also influenced by the amount of strain experienced by commercial drivers. In fact, the International Labor Organization’s report indicated that work-related stress expenditures cost employers over $200 billion each year (Tangri, 2003).

Research has shown that truckers experience heightened levels of stress and are at significant risk for various psychiatric disorders (Bernard et al., 2000; Wong et al., 2007). In a test of psychological distress, parcel-delivery truck drivers scored significantly higher than any other occupational group. Truck drivers were also found to be in the 91st percentile for the Global Stress Index portion of the Symptom Checklist SCL-90 (Orris et al., 1997). Other studies have revealed that stressful situations and conditions are directly linked to the trucking work environment, and include social isolation and loneliness, stress from financial pressures, disrespectful treatment by shipping and receiving personnel, insufficient sleep and chronic fatigue, continually rotating shift patterns and tight schedules, fear of assault or robbery, and lack of job satisfaction and control (Anderson, 2004; Anderson and Reed, 2002; Belman and Monaco, 2001; Belzer, 2000; Saltzman and Belzer, 2007). Owner–operators experience greater levels of psychological distress compared to small and large fleet drivers (Mayhew and Quinlan, 2006); the difference is due in part to income instability experienced by these proprietors. As utilization of owner–operators in the transportation industry increases in order to reduce costs, even more commercial drivers are likely to experience this distress.
Morbidities affect the number of work days missed (absenteeism) and the productivity of workers while distracted or limited (presenteeism) by the health condition (Davis et al., 2005). Overweight and obese drivers are positively associated with increased absenteeism (Cawley et al., 2007; Frone, 2007), while obesity also contributes to presenteeism by increasing the time needed to complete a task and perform physically demanding work (Gates et al., 2008). Overweight and obese truckers experienced higher levels of co-morbidities than normal-weight drivers and were linked to higher healthcare costs (Martin et al., 2009). Because the prevalence of obesity is so high among commercial drivers, the efficiency of the transportation industry is potentially significantly curtailed. Hypertension and depression/mental illness are among the greatest contributors to presenteeism; depression/mental illness was identified as the greatest cause of health related days missed (Goetzel et al., 2004). Therefore the psychosocial work environment that contributes to depression among commercial drivers increases both absenteeism and presenteeism.

Work-related psychological stress also contributes to higher number of injuries and illnesses, even when employees are away from work. Although aggregate injuries and illnesses in the USA declined by about 20 percent for all occupations from 1992 to 1999, incidence rates for truckers increased by nearly 5 percent between 1992 and 1996 (BLS, 2002). The economic environment puts different economic pressures on commercial drivers. Owner–operators are more likely to continue to work even when injured compared to fleet drivers (Mayhew and Quinlan, 2006). Drivers who experience an injury may return to work sooner due to financial pressure and be limited in ability to work (Mayhew and Quinlan, 2006). Commercial drivers who voluntarily transfer to another industry experience a greater reduction in job strain than drivers who transfer within the industry (de Croon et al., 2004). The implication is that job strain of commercial drivers is a systemic problem.

‘Lifestyle choices are bound to have profound effects on the health and wellness of commercial motor-vehicle drivers [truckers] and in the Agency’s [Federal Motor Carrier Safety Administration (FMCSA)] best judgment may, by themselves, be predictive of higher rates of cancer, CVD, diabetes, and back problems’ (FMCSA, 2005, p. 50007). While the FMCSA blatantly acknowledges the problem, anticipated spikes in morbidity rates, it equates truckers’ occupation-induced health detriments with lifestyle choices. By doing so, the FMCSA not only ignores the indisputable impact of the trucking environment on drivers’ behavioral patterns, but also denies any responsibility for the dismal state of health of transport-sector personnel by completely shifting the blame to the workers themselves. The foregoing discussion has substantiated that it is mainly governmental and corporate policies that trigger, exacerbate and sustain truckers’ elevated risks for a plethora of morbidities.

PREVENTIVE INTERVENTIONS

Prevention of work-stress-related illnesses among commercial drivers can be targeted at three levels (Baker and Karasek, 2000). At the primary level, job demands and decision latitude can be changed to reduce the strain experienced by drivers. These interventions require change at the policy level of governments or organizations. At the secondary
level, drivers can be educated on stress management and behavior modification techniques. At the tertiary level, after negative health outcomes have occurred, drivers can be counseled and/or medically treated for stress-related illnesses. An evaluation of several natural experiments that involved changes in work environment and personal knowledge suggests that these changes may benefit organizations and commercial drivers alike (Kompier et al., 2000).

Changes in the organization allow for modification of the environment to remove or lessen sources of job stress through government regulation or employer initiation. Such amendments can include structural and psychological changes (Michie, 2002). Structural changes would include scheduling, staffing levels and the physical environment, while psychological interventions can improve social support, control and participation. Companies can make ergonomic improvements to vehicles in order to reduce the physical demands on drivers and to reduce workplace injuries (Krueger et al., 2007b).

At the organizational level, NIOSH (1999) recommends several strategies consistent with the Demand–Control Model and Effort–Reward Imbalance Model. These include: matching the skills and responsibilities of individuals to resources and workload of the company; defining the current expectations of work and outlining future career expectations for the worker; engaging workers in participatory decisions and actions, providing social interaction; and creating work schedules that acknowledge outside responsibilities. For commercial driving companies this means involving drivers in the development of new policies that reduce job strain. ‘Moving the focus from simple control of time spent driving or not driving to fatigue management could improve job control and working conditions for truck drivers without loss of traffic safety’ (Jensen and Dahl, 2009, p. 363).

Changes in the individual allow for changes in perception and coping strategies (Michie, 2002). Interventions to alter coping strategies include increasing communication skills and changing behavioral and mental responses to stress. Adequate time for rest and revitalization is also important. A survey of motor carriers suggests that site-based resources are not used by commercial drivers; therefore reaching drivers is a prerequisite for success (Roberts and York, 1997). Traditional work-site facilities may be inappropriate for commercial truck drivers who spend little if any time within the corporate campus. Instead, individual-focused training sessions have potential to improve the strategies that drivers use to cope with stress and fatigue associated with their job demands while working (Machin and Hoare, 2008). Trucks, Inc. utilizes the ‘Getting in Gear’ training course that focuses on changing driver behaviors related to smoking, physical activity and nutrition (Krueger et al., 2007b). Female commercial drivers were found to be particularly interested in stress reduction, physical activity, fatigue prevention and self-defense techniques (Bernard et al., 2000). Additionally, mental health nurses might be able to accompany occupational health nurses in settings frequented by commercial drivers (Shattell et al., 2010).

Tertiary prevention entails the treatment of stress-related illnesses to minimize their impacts on drivers and on public health. It is recommended that companies offer more testing services and follow-up treatment to their drivers. In fact, by working more closely with commercial drivers, companies can potentially change the culture of denial of illnesses that disproportionately affect drivers. For instance, after successfully pilot-testing a diagnosis and treatment intervention for sleep apnea among its drivers, Schneider...
National, Inc. began to offer testing services and to cover treatment costs for all of its drivers, which led to significant savings to its healthcare costs and improvement in driver retention (Krueger et al., 2007b). Companies can also offer annual physical exams with a follow-up from health coaches (Krueger et al., 2007b). Benefits of worksite wellness programs include improved morale, reduced turnover, increased recruitment, decreased healthcare costs, improved trucker health status and improved productivity (Krueger et al., 2007b).

CONCLUDING REMARKS

This chapter has focused on the link between work stressors rooted in shift work, long hours and heavy workload, among others; psychosocial strains including depression, anxiety, distress and burnout; and morbidities; highway accidents; and decline in productivity. The unique demands of the commercial driving sector and the significant consequences to public health and safety warrant further epidemiological research on commercial drivers and the development of organizational and (intra/inter)personal interventions to improve the conditions for health. As the global economy supports deregulation and increased competition from new labor markets, commercial drivers may experience even more job strain. Therefore it is imperative to enact primary preventive measures to ensure the health of commercial drivers and in turn maintain the safety of the public.

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