The Transfer of Stress from Daily Hassles to the Driving Environment in a Fleet Sample

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ABSTRACT

It is widely recognised that stress can have a profound effect on individual lives. For organisations, stress has been shown to have considerable impact on several outcomes such as employee absenteeism, turnover, and injury rates. As work-related motor vehicle crashes have been shown to be the major source of workplace fatalities it is considered important to quantify the role of stress in fleet driving. Previous studies have shown that stress from life events has been associated with increased crash involvement. Accordingly, this study aimed to investigate how stress from daily hassles (outside of work) may impact upon driving lapses, errors, and violations for drivers of Queensland Government fleet vehicles. Participants ($N = 247$) completed a modified version of the Daily Stress Inventory, the Driver Behaviour Questionnaire (DBQ), and a brief questionnaire for demographic and exposure information. Hierarchical multiple regression revealed that after controlling for age, gender, and hours per week driving, daily hassles significantly predicted DBQ scores. This suggests that drivers' subjective responses to specific antecedent events (e.g., hassles at home) places them in a vulnerable state that affects their driving behaviour. This is discussed in terms of Matthews' (2001) Transactional Model of Driver Stress. The implications of the research are discussed, including the need for organisations to consider the far reaching effects of stress and the associated costs in terms of fleet safety and, accordingly, address such issues within organisational policies and procedures.

INTRODUCTION

Negative stress-related outcomes in the workplace have drawn much research interest over the past 30 years and are well documented (see Beehr, 2000 for a review). These include a range of physical, psychological, and behavioural strains for individual employees as well as considerable expense to organisations through increased absenteeism, staff turnover, and compensation claims. Life stress has been shown to be associated with higher rates of disease and accidents (Stuart & Brown, 1981), and daily hassles with poorer general mental health (Brantley, Waggoner, Jones, & Rappaport, 1985). However, one negative consequence of stress that is rarely considered by organisations is its impact upon drivers of fleet vehicles. Previous research has shown that stress can affect how people drive in terms of increased cognitive lapses, errors, traffic violations (Hartley & Hassani, 1994; Westerman & Haigney, 2000), and crash involvement (Lagarde et al., 2004; Legree, Heffner, Psotka, Martin, & Medsker, 2003; McMurray, 1970; Norris, Matthews, & Raid, 2000). Accordingly, for organisations managing fleets of vehicles, there should be clear concern for the well-being of staff in relation to stress, particularly as work-related motor vehicle crashes have been shown to account for the majority of all workplace fatalities (Queensland Transport, 2005).

Defining the Concept of Stress
Initially, it is important to briefly clarify some of the common terms used in stress research. This is because the concept of stress is commonly studied at both the physiological/biological level and the psychological level. Additionally, many of the terms have been used somewhat interchangeably in previous research (Lazarus & Folkman, 1984). Within this current study the term "stress" will broadly refer to psychological processes in regard to a person's exposure to stimuli in the environment that may be interpreted as threatening (stressor), resulting in subjective or observable states of distress (strains). Table 1 shows strains that are commonly reported in the stress literature. When examining these strains it is reasonable to argue that many would impact on an individual's ability to drive safely (see Lawton & Parker, 1998 for a discussion).

The concept of 'personal maladjustment', inclusive of emotional strains, manifest anxiety, and personal arguments, was shown to be associated with increased risk of crash involvement (Mayer & Treat, 1977). Additionally, behavioural strains such as increased risk taking and alcohol/substance abuse represent potential dangers to road safety.

Table 1.
Strain Domains

Physical	Psychological	Behavioural
Cardiovascular disease	Anxiety	Alcohol/substance abuse
Headaches	Depression	Violence
Increased blood pressure	Tension	Sleep disturbances
Increased cortisol levels	Emotional burnout	Fidgeting
		Increased risk taking

Sources: Beehr (2000); Lawton & Parker (1998); Spector, Dwyer, & Jex (1988).

Moderator Variables
Whilst the relationship between stressors and subsequent strains has been widely studied, this relationship is not necessarily direct in nature. Stress is best described as phenomenological in nature, with a range of individual differences impacting upon the subjective perception of the person (Lazarus & Folkman, 1984). What may be stressful to one person may be interpreted as quite acceptable by another. Beehr (2000) conceptualised these moderators in terms of human psychological processes such as cognitive appraisal, personal characteristics (e.g., Type-A personality, self esteem, locus of control, trait anxiety), and situational characteristics (e.g., support, level of control over specific task). Effective coping skills have also been shown to reduce the strain experienced by certain individuals in comparison to those that may adopt more maladaptive approaches (Jones & Johnston, 1997; Promecene & Monga, 2003). This is pertinent to the driving context in two ways: coping effectively with stressful situations in the driving environment may limit the potential for problems to escalate; and effective coping with stressors such as minor daily hassles minimises the likelihood that a person will carry the strain from external events into the vehicle with them (e.g., feeling tense, high blood pressure).

Work-Related Driving Stress
Full-time drivers are exposed to a range of stressors such as the behaviour of other drivers, traffic congestion, ergonomic factors, noise, climate conditions, and work scheduling, resulting in poorer health and work performance (Evans, Johansson, & Rydstedt, 1999). Kloimuller, Karazman, Geissler, Karazman-Morawetz, and Haupt (2000) examined stress-inducing factors for bus drivers and found that irregular driving services, long periods of sitting, and thermal conditions were the main stressors. In turn, the main strains experienced were unusual tiredness, headaches, and sleep disorders, which significantly impacted on the drivers' ability to work. Carty, Stough, and Gillespie (1998) studied psychological predictors of work-related motor vehicle crashes in a sample of Australian transport industry workers and found a significant positive correlation between occupational strain and self-reported crash involvement. Similarly, Hartley and El Hassani (1994) found a significant relationship between self-reported stress and traffic violations for full-time truck drivers. Whilst the link between stress and driving is clearly evident from these studies, the source of stress may not always be directly driving related. That is, potential exists for the effects of stress (strains) to be carried over from other aspects of people's lives outside of the driving environment and affect individual functioning and their subsequent safety.

Life Events, Daily Hassles, and Driving
Life stress, viewed as an accumulation of strains resulting from specific major events and/or daily hassles, has been linked to detrimental road safety outcomes in several previous studies. McMurray (1970) examined the driving records over a seven year period for 410 drivers who had been involved in divorce proceedings (stressful life event measure).

She found that crash involvement and traffic violations were significantly higher for this group than for the greater driving population. Furthermore, the percentage of participants involved in crashes and traffic violations steadily rose in the six months immediately prior to filing for divorce, reached a peak within three months after filing, then declined. It is suggested that this period is when the psychological strain would be particularly paramount.

Lagarde et al. (2004) used retrospective self-report data from a sample of French drivers to examine at-fault serious motor vehicle crash involvement over a seven year period and found a significant odds ratio (4.4) for participants who had been involved in marital separation or divorce within the year prior to the crash compared to those who had not. However, it must be mentioned that it is possible that there is some other underlying characteristic that renders individuals prone to both motor vehicle crashes and marital problems (e.g., aggressive personality).

Similarly, Legree et al. (2003) used retrospective self-report to examine antecedents to road crashes over the previous five years. They found that "heightened stress due to life events" was significantly positively correlated with at-fault status. Hennessy, Wiesenthal, and Kohn (2000) found that greater exposure to daily hassles over the previous month significantly predicted state driver stress when exposed to high traffic congestion. For drivers with high trait stress (ie. chronic) this effect was more pronounced. This suggests that daily events from outside the driving environment can interact with situational (on-road) and more enduring personal traits to elevate levels of subjective strain. Finally, financial difficulties have been found to be associated with higher crash risk (Norris et al., 2000). This further highlights the need to examine the impact of subjective stress that develops external to the driving environment.

Theoretical Perspective
The transactional model of driver stress (Matthews, 2001) as shown in Figure 1 highlights the stressor-strain process in regard to the on-road environment. It is based on principles espoused in the Transactional Theory of stress (Lazarus & Folkman, 1984). The basic premise of the model is that individuals will perceive stressful situations in a range of different ways depending upon their own personal experiences, personality, and appraisal processes. Therefore, it is the subjective interpretation of stressful situations that is important in determining outcomes. The current study specifically examined stress in terms of demands external to the driving environment. The basic premise of such a notion is that tension experienced by a person is internalised and therefore generalised across a range of functional domains (including tasks such as driving). It is important to note that the current study did not measure the individual level of exposure to environmental stressors *per se*, rather the subjective response in regard to such stimuli. Subjective stress represents each individual's interpretation of potentially stressful stimuli and, as such, is the most appropriate level of measurement when considering individual driver behaviour. That is, irrespective of the frequency of stressors experienced and the role of personality, subjective stress represents the end product (the level of internalised stress) and, hence, the level of potential vulnerability in regard to driving performance within the person.
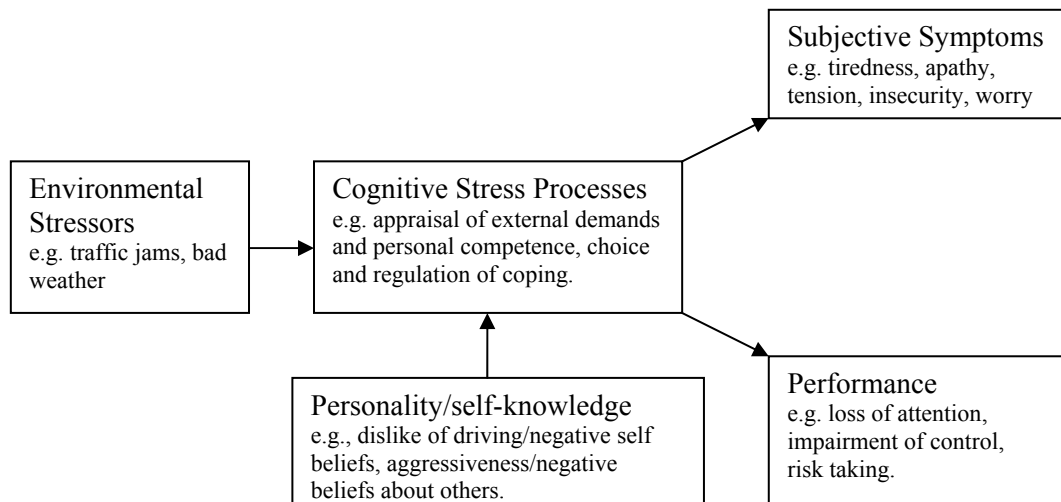
Figure 1. Transactional model of driver stress (source Matthews, 2001).

Study Aims

The study aims to explore whether stress from sources external to the driving context can actually influence driving behaviour for drivers of fleet vehicles. This notion is akin to that of "spillover" of stress from life events into the workplace that is commonly discussed in the occupational stress literature. Specifically, it is hypothesised that subjective stress from daily hassles (other than work and/or driving) will predict negative driving outcomes over and above the influence of age, gender, and hours of driving.

METHOD

Participants

A total of 247 Queensland Government employees from five departments completed and returned a mail-out questionnaire from 901 that were originally distributed throughout the state. Additionally, 37 were returned "not at this address" resulting in a net response rate of 28.6%. Participation was voluntary and anonymous. The sample was obtained through Q-Fleet (the administrators of all Queensland Government vehicles) who randomly selected clients from their database for each of the relevant organisations. All participants were working, however driving was not the core focus of their job. They were required to be of a minimum driving age (17 years) for control of Queensland Government vehicles. The age of the final sample of respondents ranged from 22 years to 69 years (*M* = 45.7 years, *SD* = 9.91). The majority of participants were male (*n* = 192, 77.7%).

Materials

Daily hassles. A modified version of the Daily Stress Inventory (Brantley et al., 1985) was used in the study. It is a self-report measure of subjective stress experienced during the previous 24 hours as a response to daily hassles (e.g. " criticised or verbally attacked", "money problems", "had problems with children"). The 58-item summated scale has been shown to have sound psychometric properties (Brantley et al., 1985). Responses are normally recorded on a seven-point Likert scale ranging from "1" (occurred but was not successful) to "7" (caused me to panic) with an additional indicator "x" (did not occur). For the purpose of this study the latter was included in the Likert scale as "0" (did not occur). Four items were omitted because they related specifically to work or driving-related stressors and therefore were considered to be potential confounds. The excluded items were "thought about unfinished work", "had car trouble", "had difficulty in traffic", and "was late for work/appointment". The instructions were also modified to advise participants that responses should not be interpreted in relation to driving or work related incidents, thereby endeavouring to a provide a clearly separate conceptualisation of daily hassles from those that may be experienced as part of workplace driving.

Driving behaviours. The 24-item version of the Driver Behaviour Questionnaire (DBQ; Reason, Manstead, Stradling, Baxter, & Campbell, 1990) was used in the study to measure common self-reported driving errors, lapses, and violations. The scale is scored on a six-point Likert scale with responses ranging from "0" (never) to "5" (nearly all the time). The errors, lapses, and violations factors have been confirmed in a large British sample ($N = 2806$) with Cronbach Alpha's reported as 0.76, 0.74, and 0.74 respectively (Westerman & Haigney, 2000). The errors and violations subscales of the DBQ have been shown to be associated with higher crash involvement (Parker, West, Stradling, & Manstead, 1995). Whilst several different versions of the DBQ have been developed, the 24-item version that included lapses was chosen because of the relationship that has been previously shown with stress (Westerman & Haigney, 2000).

Demographic information and driving history. The survey also collected information on age, gender, and driving exposure (in the form of hours driving per week for both work and personal reasons).

Procedure

Arrangements were made with the industry partner, Q-Fleet, to secure their participation in the study. Questionnaires were sent by post to the work addresses of potential participants. To avoid identification of individual participants, no identifiers were recorded or requested and questionnaires were not collected directly from them, nor centrally through their respective workplaces. Rather, each participant returned their questionnaire directly to the research team within the reply-paid envelope provided.

RESULTS

Scale Reliability

The reliability of each of the scales used was examined in terms of internal consistency using Cronbach's Alpha as reported in Table 2. Scales were found to have acceptable reliability (>.70) with the exception of DBQ lapses and DBQ violations which were marginally less reliable.

Table 2
Internal Reliabilities for Established Scales (N = 247)

Scale	Cronbach's α
Daily Stress Inventory	.95
DBQ total	.81
DBQ errors	.73
DBQ lapses	.64
DBQ violations	.68

Descriptive Statistics

Table 3 shows means, standard deviations, and bivariate correlations for key variables/scales used in the study. Participants reported relatively low levels of aberrant driver behaviours (as indicated by DBQ scores) in comparison to previous research (Davey, Wishart, Freeman, & Watson, 2006; Lajunen & Summala, 2003; Lawton, Parker, Manstead, & Stradling, 1997). As expected, DBQ subscales show a moderate positive correlation with each other. Notably, age is negatively correlated with all DBQ measures, indicating that younger drivers in the sample show a higher tendency towards unsafe road behaviours. The Daily Stress Inventory (daily hassles) shows a significant positive relationship to all DBQ measures, suggesting that tension from everyday life does impact upon driving actions.

Table 3
Means and Simple Correlations Between Variables (N=247)

	M	SD	DBQ tot	errors	lapses	violation	Age	Hrs work dr
DBQ Total	.65	.31						
DBQ errors	.55	.38	.81**					
DBQ lapses	.82	.42	.80**	.57**				
DBQ violations	.60	.42	.71**	.36**	.26**			
Age	45.66	9.90	-.22**	-.16*	-.06	-.27**		
Hrs/wk work dr	11.28	9.37	-.04	.05	-.15*	.04	.11	
Daily hassles	.64	.61	.34**	.27**	.27**	.22**	-.07	.04

$* p < .05$ $** p < .01$ $*** p < .001$

Regression Analysis

Hierarchical multiple regression was used to examine whether daily hassles could predict total DBQ scores over and above demographic and driving exposure variables. Predictor variables were entered in two blocks, with demographic and exposure variables entered first and daily hassles entered in the second block. Where required, variables were transformed to meet normality assumptions of regression analysis (as noted in Table 4). The analysis was first conducted with DBQ total as the dependent variable using untransformed then transformed variables for comparison, with the latter accounting for more overall variance in DBQ scores. Accordingly, transformed variables were adopted for this analysis.

As shown in Table 4, the first block comprising demographic and exposure variables was significant in predicting total DBQ scores (*Fchange* (3, 226) = 4.51, $p<.01$) but only accounted for 6% of the overall variance. The second block, comprising daily hassles variables, was also significant (*Fchange* (1, 225) = 35.68, $p<.001$) accounting for an additional 12.9% in overall variance in the final step.

The overall model (with all variables entered) significantly predicted DBQ total scores ($F_{(4, 225)}$ =12.82, $p<.001$), accounting for 17.1% (adjusted R^2) of the variance in total. Significant individual predictors in the overall model were daily hassles ($p<.001$) and age ($p<.01$). When DBQ subscales (errors, lapses, and violations) were separately entered as dependent variables, hierarchical multiple regression revealed that daily hassles was a significant predictor over and above demographics and exposure variables for each subscale ($p<.001$). Table 5 provides a summary of these analyses.

Table 4
Hierarchical Regression for Daily Hassles as a Predictor of Total DBQ Scores (N=229)

Variables	B	SE	β	sr^2	R^2	$Adj\ R^2$	ΔR^2
Block 1 – demographic factors							
Age	-.02**	.01	-.17	.03			
Gender	.21	.15	.09	.01			
Hrs/wk work driving [2]	.03	.04	.05	.00			
					.06**	.04	
Block 2							
Daily hassles [1]	.81***	.14	.36	.13			
					.19***	.17	.13***

 *$p < .05$ **$p < .01$ ***$p < .001$
1. Logarithmically transformed. 2. Square root transformed.

Table 5
Summary Table of Hierarchical Regressions for Predicting DBQ Subscale Scores

Variables	R^2	$Adj\ R^2$	ΔR^2
DBQ Errors			
Block 1 - Demographics	.04*	.03	
Block 2 – Daily hassles	.11***	.10	.07***
DBQ Lapses			
Block 1 - Demographics	.04*	.03	
Block 2 – Daily hassles	.16***	.15	.12***
DBQ Violations			
Block 1- Demographics	.07***	.06	
Block 2- Daily hassles	.12***	.10	.05***

 *$p < .05$ **$p < .01$ ***$p < .001$

DISCUSSION

The aim of this study was to explore whether daily hassles from everyday life would be reflected in the driving behaviours of Queensland Government fleet drivers.

Whilst the effect size was not large, support for the study hypothesis was found, indicating that the transfer of stress from sources external to the driving environment may negatively impact on driver performance. The results are consistent with previous findings regarding life stress and driving (Lagarde et al., 2004; Legree et al., 2003; McMurray, 1970; Norris et al., 2000). However, the current study examined the influence of relatively minor daily hassles rather than major life events. It is also important to note the current study sample was comprised of participants for whom driving was not generally the main focus of their work. Therefore, it can be reasoned that they would not have been subject to the intensity of on-road stressors that full-time professional drivers may be.

Importantly, the results support the notion that individuals may be predisposed to drive in an unsafe manner due to stress experienced in other aspects of their life, and that exposure to an on-road stressor is not necessarily required to initiate stress-related responses when driving (however this is potentially additive). This further highlights that stress from one dimension of a person's life may manifest as strain in a number of ways and that such "transfer" is potentially harmful. However, it is acknowledged that several other factors such as personality and coping styles as shown in the Transactional Model of Driver Stress (Matthews, 2001) potentially moderate the relationship between exposure to stressors and driving behaviour. Furthermore, it must be noted that the present research did not examine all potential relationships within the model as this was beyond the scope of the study.

Emotional State

The subjective states reported by participants in this study in direct response to specific stressors, and the further relationship with driver behaviour (DBQ) supports the notion that emotion is central to the concept of stress-related driving. Appraisal of stressors as threatening has been shown to result in a state of anxiety (Spielberger, 1979), whilst appraisal of stressors as frustrating may result in anger (Shinar, 1998). Lazarus (1999a, p37) highlights the unity of stress and emotion in the following statement:

> *"We should view stress, emotion, and coping as existing in a part-whole relationship. Separating them is justified only for the convenience of analysis because the separation distorts the phenomena as they appear in nature. The three concepts, stress, emotion, and coping belong together as a conceptual unit…."*.

Matthews (2001) transactional model of driver stress (as shown in Figure 1) views moods as a by-product of cognition in the stress process. Alternately, the present study asserts that moods and emotions elicited as reactions to specific stressors are an integral influence in regard to driver behaviour and performance. That is, emotion, cognition, and motivation are entwined in the context of reactivity to antecedent events (hassles). Lazarus (1999b) asserts that emotion, cognition, and motivation are generally bound by the principle of reciprocal determinism and to adopt a reductionist approach is unwarranted when considering pragmatic issues and outcomes.

Practical Implications

As the current study was of an applied nature it has several meaningful implications. Findings suggest that organisations need to incorporate stress management into their existing safety culture for management of vehicle fleets. Whilst this recommendation has been found in select publications (Bomel, 2004; Lancaster & Ward, 2002), it is an issue that is not widely promoted within the area of fleet safety and, where included, is aimed at full-time drivers in regard to on-road and scheduling stressors. Accordingly, it is essential for organisations to develop methods of limiting stress placed upon drivers, to provide education on the subject of stress for all drivers (even if part-time), and to promote resources such as Employee Assistance Programs to assist employees to effectively deal with stressful situations that they may encounter (whether work related or not).

Further, this study has implications for potential compensation claims against organisations for stress-related crashes and the debatable issue of excluding people from driving-related employment based on their subjective susceptibility to stress.

The findings also have broader implications for road safety in general. That is, all drivers need to be aware of their individual levels of stress/emotion before they take control of a vehicle. This highlights the need for interventions that educate all drivers of the risks associated with behaviours such as using a motor vehicle as a means of "blowing off steam" after exposure to daily hassles (e.g., an argument with one's spouse). As such, specific "at risk" groups need to be identified through further research.

Limitations

Whilst the current study produced results supporting the proposed hypothesis these must be interpreted with some caution due to several limitations. Firstly, the overall response rate of 28.6% was relatively low, albeit consistent with mailout surveys of this nature, and it is unknown whether any differences existed between those who chose to respond and those who did not. Therefore generalisation of the results to all potential respondents cannot be made. Additionally, generalisation of the results must be considered in the context that the final sample was comprised predominantly of male government employees. Secondly, the study was subject to the inherent limitations of self-report data in terms of honest, accurate, and bias-free reporting, although the anonymous nature of the questionnaire should have assisted in controlling these in some regard (Lajunen & Summala, 2003). Thirdly, the study assessed current levels of stress from daily hassles providing a "snapshot" of participants' emotional state, whereas driver behaviours were measured over the last year. However, it can be reasoned that individuals are subject to a range of hassles everyday and, as mentioned earlier, these are strongly linked to more enduring psychological states.

Future Directions

Future investigation into the effects of stress could focus upon how specific harmful behaviours such as drink driving, fatigue and speeding are explicitly affected by stress in the chain of causal factors for crash involvement. It is envisaged that this may be particularly pertinent to drink driving due to the known association between stress and alcohol consumption. Additionally, the current study did not examine particular at-risk populations for stress and driving, however future research should aim to identify such populations. Ultimately, future research needs to develop ecologically sound methodologies to capture the momentary effects of transient stressors in their application to driving. For example, in-vehicle technology such as on-board cameras may help to capture emotional states as antecedents to crashes or unsafe driving behaviours.

Conclusion

The impact that factors extraneous to the driving environment have on driving behaviour highlights the need for a holistic approach when considering road safety and associated interventions. That is, a persons driving behaviour is not only affected by the on-road factors that they may encounter, but also by the constellation of personal attributes/issues that they themselves bring to that environment. To effectively manage the safety of workplace drivers, organisations need to take sufficient measures to account for such influences.

REFERENCES

Beehr, T. (2000). An organizational psychology meta-model of occupational stress. In C. L. Cooper's (Ed.), *Theories of organizational stress* (pp. 7-27). Oxford, UK: Oxford University Press.

Bomel Limited (2004). *Safety culture and work-related road accidents.* (Road safety research report no. 51). London: Department of Transport.

Brantley, P. J., Waggoner, C. D., Jones, G. N., & Rappaport, N. B. (1987). A daily stress inventory: Development, reliability, and validity. *Journal of Behavioral Medicine, 10*(1), 61-74.

Carty, M., Stough, C., & Gillespie, N. (1999). The psychological predictors of work accidents and driving convictions in the transport industry. *Safety Science Monitor, 3,* 1-13.

Davey, J., Wishart, D., Freeman, J. & Watson, B. (2006). An application of the driver behaviour questionnaire in an Australian organisational fleet setting. *Transportation Research Part F*, in press.

Evans, G. W., Johansson, G., & Rydstedt, L. (1999). Hassles on the job: A study of a job intervention with urban bus drivers. *Journal of Organizational Behavior, 20*, 199-208.

Hartley, L. R., & El Hassani, J. (1994). Stress, violations and accidents. *Applied Ergonomics, 25*(4), 221-230.

Hennessy, D. A., Wiesenthal, D. L., & Kohn, P. M. (2000). The influence of traffic congestion, daily hassles, and trait stress susceptibility on state driver stress: An interactive perspective. *Journal of Applied Biobehavioral Research, 5*(2), 162-179.

Jones, M.C., & Johnston, D. W. (1997). Distress, stress and coping in first-year student nurses. *Journal of Advanced Nursing, 26*(3), 475-482.

Kloimuller, I., Karazman, R., Geissler, H., Karazman-Morawetz, I, & Haupt, H. (2000). The relation of age, work ability index and stress-inducing factors among bus drivers. *International Journal of Industrial Ergonomics, 25*, 497-502.

Lagarde, E., Chastang, J, Gueguen, A., Coeuret-Pellicer, M., Chiron, M., & Sylviane, L. (2004). Emotional stress and traffic accidents: The impact of separation and divorce. *Epidemiology, 15*(6), 762-766.

Lajunen, T., & Summala, H. (2003). Can we trust self-reports of driving? Effects of impression management on driver behaviour questionnaire responses. *Transportation Research, Part F,* 6, 97-107.

Lancaster, R., & Ward. R. (2002). *Management of work related road safety*. Research report 018. Scottish Health and Safety Executive.

Lawton, R., & Parker, D. (1998). Individual differences in accident liability: A review and integrative approach. *Human Factors, 40*(4), 655-671.

Lawton, R., Parker, D., Stradling, S., & Manstead, A. (1997). The role of affect in predicting social behaviours: the vase of road traffic violations. *Journal of Applied Social Psychology, 27,* 1258 – 1276.

Lazarus, R. S. (1999a). *Stress and emotion: A new synthesis*. London: Springer Publishing.

Lazarus, R. S. (1999b). The cognition-emotion debate: A bit of history. In T. Dalgleish & M. Power (Eds.), *Handbook of cognition and emotion* (pp 3-19). Chinchester, UK: John Wiley & Sons.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer Publishing.

Legree, P. J., Heffner, T. S., Psotka, J., Martin, D. E., & Medsker, G. J. (2003). Traffic crash involvement: Experiential driving knowledge and stressful contextual antecedents. *Journal of Applied Psychology, 88*(1), 15-26.

Lujunen, T., & Summala, H. (2003). Can we trust self-reports of driving? Effects of impression management on driver behaviour questionnaire responses. *Transportation Research part F: Traffic Psychology and Behaviour, 6*(2), 97-107.

Matthews, G. (2001). A transactional model of driver stress. In P. A. Hancock & P. A. Desmond's (Eds.), *Stress, workload and fatigue* (pp. 133-163). New Jersey, USA: Lawrence Erlbaum.

Mayer, R. E., & Treat, J. R. (1977). Psychological, social and cognitive characteristics of high-risk drivers: A pilot study. *Accident Analysis and Prevention, 9*, 1-8.

McMurray, L. (1970). Emotional stress and driving performance: The effect of divorce. *Behavioral Research in Highway Safety, 1,* 100-114.

Norris, F. H., Matthews, B. A., & Riad, J. K. (2000). Characterological, situational, and behavioral risk factors for motor vehicle accidents: A prospective examination. *Accident Analysis and Prevention, 32*, 505-515.

Parker, D., West, R., Stradling, S., & Manstead, A. S. R. (1995). Behavioural characteristics and crash involvement in different types of traffic accident. *Accident Analysis and Prevention, 27*(4), 571-581.

Promecene, P. A., & Monga, M. (2003). Occupational stress among obstetrician/gynaecologists. *Southern Medical Journal, 96*(12), 1187-1189.

Queensland Transport (2005). *Fleet safety*. www.roadsafety.qld.gov.au

Reason, J. T., Manstead, A. S. R., Stradling, S., Baxter, J. S., & Campbell, K. (1990). Errors and violations on the roads: A real distinction? *Ergonomics, 33*, 1315-1332.

Shinar, D. (1998). Aggressive driving: The contribution of the drivers and the situation. *Transportation Research Part F, 1*, 137-160.

Spector, P. E., Dwyer, D. J., & Jex, S. M. (1988). Relation of job stressors to affective, health, and performance outcomes: A comparison of multiple data sources. *Journal of Applied Psychology, 73*(1), 11-19.

Spielberger, C. (1979). *Understanding stress and anxiety.* Melbourne: Thomas Nelson Australia Pty Ltd.

Stuart, J. C., & Brown, B. M. (1981). The relationship of stress and coping ability to incidence of diseases and accidents. *Journal of Psychosomatic Research, 25*(4), 255-260.

Westerman, S. J., & Haigney, D. (2000). Individual differences in driver stress, error and violation. *Personality and Individual Differences, 29*(5), 981-998.