



An exploratory study of long-haul truck drivers' secondary tasks and reasons for performing them



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ABSTRACT

Research on drivers has shown how certain visual-manual secondary tasks, unrelated to driving, increase the risk of being involved in crashes. The purpose of the study was to investigate (1) if long-haul truck drivers in Sweden engage in secondary tasks while driving, what tasks are performed and how frequently, (2) the drivers' self-perceived reason/s for performing them, and (3) if psychological factors might reveal reasons for their engaging in secondary tasks. The study comprised 13 long-haul truck drivers and was conducted through observations, interviews, and questionnaires. The drivers performed secondary tasks, such as work environment related "necessities" (e.g., getting food and/or beverages from the refrigerator/bag, eating, drinking, removing a jacket, face rubbing, and adjusting the seat), interacting with a mobile phone/in-truck technology, and doing administrative tasks. The long-haul truck drivers feel bored and use secondary tasks as a coping strategy to alleviate boredom/drowsiness, and for social interaction. The higher number of performed secondary tasks could be explained by lower age, shorter driver experience, less openness to experience, lower honesty-humility, lower perceived stress, lower workload, and by higher health-related quality of life. These explanatory results may serve as a starting point for further studies on large samples to develop a safer and healthier environment for long-haul truck drivers.

1. Introduction

In Sweden, the goal of the "Vision Zero" initiative is to reduce traffic fatalities and serious injuries (Tingvall and Haworth, 1999). Still, 270 people died in crashes in Sweden during 2016 (Trafikanalys, 2016). In 32 of these deaths a truck was involved.

Past research has shown that "human error" is believed to be the cause of between 75% (Stanton and Salmon, 2009) to 90% (Treat et al., 1979) of crashes. A study done by the U.S. Department of Transportation reported a higher rate: 94% (National Center for Statistics and Analysis, 2015). However, to attribute the main cause of crashes to human error is an oversimplification; there are always other underlying causes for people acting or behaving in a certain way. An alternative viewpoint is that human error is more a symptom, not a cause, of an overall human, technological, and organizational system which needs to be re-designed (Dekker, 2001). To understand contributing factors influencing the causation of crashes one must look beyond what can appear to be direct cause factors.

Driver distraction can be defined as something that can occur in "situations where the driver allocates resources to a non-safety critical activity while the resources allocated to activities critical for safe driving do not match the demands of these activities" (Engström et al., 2013, p. 35). The definition by Engström et al differentiates between *vehicle-external distraction* (e.g. allocation of visual attention and gaze towards a commercial billboard next to the road) and *vehicle-internal distraction* (e.g. allocating attention towards an in-vehicle secondary task).

While the proportion of crashes mainly due to distraction has been claimed to be between 7% and 23% (Hanowski et al., 2005; Klauer et al., 2006), other sources claim distraction to be present in nearly 50% of crashes (Parr et al., 2016). A secondary task has been defined as a "task, unrelated to driving, which requires subjects to divert attention resources from the driving task, e.g., talking on the hand-held device, talking to passenger, eating, etc." (Klauer et al., 2006, p. 16). In a naturalistic driving study involving truck drivers, Hanowski et al. (2005) found an increased risk related to the frequency with which the

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drivers engaged in secondary tasks while driving. It is estimated that secondary tasks dividing the driver's visual attention for more than two seconds increase the risk of a crash three fold (Klauer et al., 2006). The Swedish National Road and Transport Research Institute (Kircher et al., 2011) published a review regarding the use of mobile phones and other communication devices and their impact on traffic safety. They found the use of mobile phones affects driver performance, regardless of whether one is talking, texting or using them for other purposes. Most of these studies have been performed in a controlled environment. Naturalistic studies present results, which are to some degree different. Several naturalistic studies have shown that talking or listening on a hands-free phone can have a so called "protective effect" (e.g., Olson et al., 2009; Victor et al., 2015). The protective effect for these particular, non-visual-manual demanding, secondary tasks refers to lower odds of being involved in a crash while performing these tasks compared to when just driving. The reason for this is not clear, but one theory is that a cognitive loading task, such as listening to music or conversing via a hands-free phone, possibly could help the driver decrease driver underload and maintain driver alertness. Performing a cognitive loading task may potentially also displace the engagement of a visual-manual demanding task (e.g., texting or looking at social media) with a less dangerous task where drivers still allocate gaze attention towards the road ahead. In a meta-analysis of naturalistic studies by Simmons et al. (2016) increased risk and degraded driver performance was found for drivers engaged in tasks involving handheld mobile phone tasks which required them to take their eyes off the road. Talking on a handheld device did not increase the risk of being in a safety critical event. A systematic review has been made in order to compare results from naturalistic studies with those from more controlled settings. Ferdinand and Menachemi (2014) examined 206 empirical studies from 1968 to 2012 and showed that 80% of the studies indicated that engaging in secondary tasks negatively affects driving performance. About 10% of studies reported the protective effect of engaging in a secondary task while driving, and 9.7% did not show any effect at all. Studies using experimental designs, conducted in a simulated setting, were 37% less likely to report the negative effect of secondary tasks on driving. Studies examining mobile phone use while driving were 16% more likely to find negative effects on various driving outcomes, such as lane keeping, vehicle speed, and headway.

About 70% of passenger car drivers engage in secondary tasks voluntarily, which means that drivers choose to interact with their phone, the in-vehicle system, eat, or drink (Chen et al., 2016). It is not reported if professional truck drivers also engage in secondary tasks voluntarily. A study involving 1100 truck drivers found that 99% reported using their mobile phone while driving (Troglauer et al., 2006). Some studies have shown that drivers engage in secondary tasks when there seems to be less risk of being involved in a crash (Kircher et al., 2011). Fitch et al. (2015) found commercial motor vehicle drivers altered their behavior by conversing less frequently when the driving task became more complex. Other studies have shown that traffic conditions don't have any effect (Goodwin et al., 2012). Boredom has been found to be one reason drivers perform secondary tasks. Previous studies have found that boredom was correlated with driver distraction (Heslop, 2014), and Hammond et al. (2016) found that engaging in these secondary tasks can be a kind of coping strategy to resist drowsiness.

Age has also been shown to have an impact on engaging in secondary tasks (Pope et al., 2017). For instance, younger and middle-aged car drivers typically need to allocate more cognitive resources to driving compared to older and more experienced drivers. The necessity of allocating more cognitive resources causes younger drivers to be more likely to be distracted. Young drivers who engage in a secondary task have also been observed to increase the odds of a crash or a near-crash (Klauer et al., 2014). Furthermore, young drivers as well as individuals who spend a lot of time on the road (more experienced drivers), use their phones more frequently than older drivers and those who clock low mileage (Kircher et al., 2011).

Only a few studies have investigated the relationship between personality traits and secondary task involvement. Parr et al. (2016) found that greater openness to experience, extroversion and conscientiousness were related to increased texting and interaction with mobile phones, while high agreeableness was related to low mobile phone use while driving. Lajunen (2001) and Clarke and Robertson (2005) found that high extraversion correlated with more crashes. Lajunen also found that both high and low neuroticism were related to increased crash rates. Gowda et al. (2016) found that the group of drivers labeled as "accident-prone" (Carty et al., 1999) had higher scores on openness to experience than the group who were non-accident-prone. High scores on conscientiousness indicated that the driver was less likely to be involved in a crash (Winfred and Graziano, 1996). The reason seems to be that drivers who are more conscientious tend to be more self-disciplined, plan rather than act spontaneously, and carry out their work without cutting corners. They also seem to be less inclined to take risks (Carty et al., 1999). In contrast, de Vries et al. (2017) indicated that conscientious long-haul drivers show more risky driving behavior. A higher score on honesty-humility correlated with a lower number of risk-taking driving behaviors, both in general and in driving (Burtaverde et al., 2017; de Vries et al., 2009).

Stress can arise from different sources and affect people both positively and negatively, depending on the source of stress and how prolonged it is (American Psychological Association, 2013). Less truck driving experience may be related to increased stress in situations involving time pressure and a schedule for the loading and unloading of cargo (Apostolopoulos et al., 2013; Beilock, 2003), as well as to loneliness (as they usually work alone), and boredom. Shatnell et al. (2010) found that 12% of the truck drivers reported that they felt stressed and anxious. Stressful life events affect drivers negatively and put them at a higher risk of being involved in a crash. Carty et al. (1999) found that drivers who have a high level of stress are more often involved in crashes (Lagarde et al., 2004; Rowden et al., 2011). Perceived stress is positively related to the extent to which drivers engage in risky driving (Ge et al., 2014). In Italian bus drivers', perceived stress was positively correlated with neuroticism (0.61) and impulsiveness (0.56) (Bergomi et al., 2017).

Health-related quality of life in truck drivers has also been studied (Shatnell et al., 2010); 76% had physical health problems related to their back, knee, neck, leg, and hip. Among 316 truck drivers 42% had back and neck pain, 58% had chronic insomnia, and 56% had chronic fatigue (Apostolopoulos et al., 2013). Sagberg (2006) found that 10 out of 54 health-related issues, for example fatigue and anxiety, indicated an increased risk of being involved in a crash. This finding was replicated by Ting et al. (2008). A recent review (Crizzle et al., 2017) shows that long-haul truck drivers in Canada and the U.S. have multiple risk factors (e.g., lack of exercise, stress and sleep) that can lead to adverse medical conditions and adverse events (e.g., crashes).

1.1. Purpose

The purpose of this study was to answer the following research questions:

- 1 Do long-haul truck drivers engage in work tasks that involve secondary tasks during the daily operation of their vehicle?
 - If so, what secondary tasks are performed and to what extent do they occur?
- 2 If they do perform secondary tasks, what are the drivers' self-perceived reason/s for performing secondary tasks?
- 3 Does the number of secondary tasks correlate with age, driver experience, personality traits, perceived stress, workload and health-related quality of life?

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