EFFECTS OF DISTRACTION AND DROWSINESS ON SIMULATED DRIVING PERFORMANCE IN POLICE OFFICERS

By

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A dissertation submitted in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

WASHINGTON STATE UNIVERSITY
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AUGUST 2015

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To the Faculty of Washington State University:

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ACKNOWLEDGMENTS

I wish to acknowledge the California Commission on Peace Officer Standards and Training for funding the research presented in this dissertation.

I would also like to thank and acknowledge the members of the Sleep and Performance Research Center, and specifically the director Dr. Van Dongen, for their assistance and mentoring during this process. Without which this dissertation would not have been possible.

Lastly, I wish to thank Dr. Vila for his exceptional mentorship over the past seven years. It is my hope and desire he will continue to play such a pivotal role in my development as a researcher for at least seven more.
EFFECTS OF DISTRACTION AND DROWSINESS ON SIMULATED
DRIVING PERFORMANCE IN POLICE OFFICERS

Abstract

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August 2015

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Motor vehicle collisions are a leading cause of police officer on-duty deaths. Distracted driving is a major contributing factor in motor vehicle collisions among the general public. Within policing, fatigue associated with shift work is a well-established and pervasive problem that affects officer performance, safety, and health. Although drowsy driving among post-shift workers is a well-established risk factor, no data are available about officer injuries and deaths due to drowsy driving. To address this gap in the literature, we assessed the impact of distraction, fatigue, and the interaction of distraction and fatigue on officers’ driving using laboratory experiments with high fidelity simulation. In addition, we assessed the ability of a well-validated psychomotor vigilance test to assess post-shift drowsy driving risks.

Experienced police patrol officers (n=80) from all four shifts of a medium-sized city's police department were tested using a within- and between-subjects design to assess the impact of distraction and fatigue on individual officers, as well as the impact of different work shifts, on driving performance. Controlled laboratory experiments were conducted during which participants drove high-fidelity driving training simulators on two separate occasions: immediately following five
consecutive 10:40-hour patrol shifts (fatigued condition) and again 72 hours after completing the last shift in a work cycle (rested condition).

Generalized linear mixed effects model analyses of driving performance showed that officers’ distracted driving performance had significantly greater lane deviation ($f=88.58, df=1, 308, p<0.001$)—a leading indicator of collisions. This analytical framework found officers working night shifts had significantly greater lane deviation during post-shift, non-operational driving than those working day shifts ($f=4.40, df=1, 150, p=0.038$). The same method also showed that easy-to-measure psychomotor vigilance test (PVT) scores for reaction time predicted both lane deviation ($f=31.48, df=1, 151, p<0.001$) and collisions ($f=14.10, df=1,151, p<0.001$) during the simulated drives. We also found a significant impact of distraction ($f=14.90, df=1, 305, p<0.001$), working the graves (midnight) shift ($f=4.89, df=1, 305, p=0.028$), and distraction/shift interaction ($f=4.81, df=1, 305, p=0.029$) on the probability of a collision.

This is the first experimental research to assess the impact of distraction, fatigue, and shiftwork on police patrol driving and post-shift driving.
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DEDICATION

This dissertation is dedicated to the incredibly strong women in my life.

Without whom I would not be here today…
INTRODUCTION

In 2012, the U.S. Attorney General, Eric Holder, listed the three most pressing issues facing law enforcement in America.¹ These issues are:

1. public perceptions of how respectfully, fairly, and justly police officers treat people
2. dramatically reduced budgets and staffing
3. police officer health and safety

Police motor vehicle operations are impacted by or impact each of these three issues. The deaths of officers due to vehicle collisions have great emotional cost for these officers’ families, friends, and departments. There are also significant financial costs associated with officer-involved collisions.

Within the general driving public, it is well recognized by the driving research community that distracted driving is a major contributing factor in an estimated 80% of collisions (Weiss M., 2007). Distracted driving is dangerous. Police are exempt from many road traffic restrictions, such as distracted driving laws when operating an emergency vehicle, yet they are asked to write citations for civilians for similar behaviors. The states’ governments, through a growing body of legislation, are telling their constituents that distracted driving is dangerous yet allow their most visible agents to continue to do so. The failure of officers and police leadership to recognize their higher risk exposure only serves to reinforce unsafe

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¹ Personal communication with Bryan Vila Ph.D. Vila attended a Law Enforcement Executives Summit hosted by the U.S. Attorney General in Washington D.C. on June 27, 2012. He was one of two dozen law enforcement executives and experts from across the nation invited to discuss the issues facing police in America (see Appendix A).
practices, underestimates the impact that evidence-based research can provide, and delivers no guidance to key stakeholders on how to improve driving safety (Wehr, 2015).

Staffing shortages due to budget restrictions require greater amounts of overtime and extended shift lengths for police, leading to greater levels of fatigue. Fatigue is associated with a greater risk of collision when operating a motor vehicle, and is a significant health and safety concern. This concern has been re-addressed by the President’s Task Force on 21st Century Policing, which released its final report in May 2015. The task force identified officer wellness and safety as one of the six challenges facing policing in this century. Within the task force’s sixty recommendations two are of direct relevance to this study. The first, recommendation 6.3, encourages law enforcement agencies to utilize fatigue science to inform their shift length policies.

“6.3 Recommendation: The U.S. Department of Justice should encourage and assist departments in the implementation of scientifically supported shift lengths by law enforcement. It has been established by significant bodies of research that long shifts can not only cause fatigue, stress, and decreased ability to concentrate but also lead to other more serious consequences. Fatigue and stress undermine not only the immune system but also the ability to work at full capacity, make decisions, and maintain emotional equilibrium. Though long shifts are understandable in the case of emergencies, as a standard practice they can lead to poor morale, poor job performance, irritability, and errors in judgment that can have serious, even deadly, consequences.”

(President’s Task Force on 21st Century Policing, 2015, p. 65)
Shift length is an important factor but it is also important to consider the time of day shifts start and end as this dictates opportunities for officers to sleep and whether these opportunities occur during a time of day conducive to sleep.

The second, recommendation 6.8, addresses the trend in officer fatalities due to vehicle related incidents. It states that, between 2003 and 2012, “49 percent of officer fatalities were a result of vehicle-related accidents” (President’s Task Force on 21st Century Policing, 2015, p. 68). It suggests that collision avoidance technology should be considered to address the problem.

“6.8 Recommendation: The U.S. Department of Transportation should provide technical assistance opportunities for departments to explore the use of vehicles equipped with vehicle collision prevention “smart car” technology that will reduce the number of accidents. Given that the FBI’s 2003 to 2012 Law Enforcement Officers Killed in Action report showed that 49 percent of officer fatalities were a result of vehicle-related accidents, the need for protective devices cannot be understated. New technologies such as vehicle collision prevention systems should be explored.”

(President’s Task Force on 21st Century Policing, 2015, p. 68)

This dissertation takes a step back from these recommendations to consider the effects of both distraction and fatigue on officers’ driving performance, and thus adds to the scant body of literature on law enforcement driving, distraction, and fatigue.
Statement of the Problem

Motor vehicle collisions are the leading cause of on duty death for law enforcement in America. Fatigue and distraction are associated with a greater risk of collision when police officers operate motor vehicles.

- Police officers are often distracted while driving.
- Police officers are often fatigued while driving.
- Police officers are often both distracted and fatigued while driving.

Despite this, officer-involved collisions have been largely ignored by the research community and, as a result, there is little empirical knowledge concerning the prevalence of vehicle collisions, the injury and fatality outcomes of these events, or the characteristics of these collisions. The impact of this empirical gap is a lack of knowledge for developing policy, practice, and training aimed at reducing injuries and fatalities resulting from vehicle collisions. In order to increase officer safety, it is important to understand the impact distraction and fatigue, and their interaction, have on police officer driving performance.
Statement of Purpose

This dissertation seeks to add to the body of knowledge on both distracted driving and driving while fatigued. It will specifically address how these issues impact law enforcement motor vehicle operations. The research had four goals: a) examine the impact of distraction on driving performance within law enforcement officers; b) assess the impact of fatigue, obtained from operational duties, associated with shift work and long work hours on police officer driving safety; c) identify fatigue indicators that can be used to warn officers that their driving performance is becoming degraded by fatigue—preferably well before they are impaired; and d) examine the interaction between distraction and fatigue and this interaction’s impact on driving performance.

In order to accomplish these goals, we compared the driving performance of 80 experienced police officers during a number of driving scenarios in a high fidelity driving training simulator that is widely used by police (PatrolSim IV, L3 Corporation) during two conditions: a) while fatigued after working five consecutive 10:40 hr. shifts in the field, and b) at the same time of day after three consecutive days off. This driving task came at the end of a five-hr. experimental session designed to mimic an officer’s work activities.
Research Questions and Hypotheses

This dissertation will address four research questions:

1) How much do text-based distractions degrade law enforcement driving performance?

Hypotheses

H1₀ = Text-based distractions do not degrade law enforcement driving performance.

H1₁ = Text-based distractions degrade law enforcement driving performance.

2) How much does work related fatigue degrade law enforcement driving performance?

Hypotheses

H2₀ = Work related fatigue does not degrade law enforcement driving performance.

H2₁ = Work related fatigue degrades law enforcement driving performance.

3) Can we predict fatigue related degradation of law enforcement driving performance?

Hypotheses

H3₀ = An assessment of work related fatigue does not predict law enforcement driving performance degradation.

H3₁ = An assessment of work related fatigue predicts law enforcement driving performance degradation.

4) Do distraction and fatigue interact in degrading law enforcement driving performance?

Hypotheses

H4₀ = Distraction and fatigue do not interact in degrading law enforcement driving performance.

H4₁ = Distraction and fatigue do interact in degrading law enforcement driving performance.
A series of driving simulations in a high fidelity computerized driving simulator (L3 Communications MPRI PatrolSim IV, New York) were used to evaluate these questions. Questions 1 and 4 were addressed using a short 16-minute patrol drive simulation. Half of the patrol drives included a text based distraction task. Questions 2 & 3 were addressed using a longer 30-minute drive home simulation. Work related fatigue was assessed using two well validated measures 1) the Karolinska Sleepiness Scale (KSS); a brief self-report assessment of subjective sleepiness on a nine point Likert scale (Akerstedt & Gillberg, 1990) and 2) a Psychomotor Vigilance Tests (PVT); a simple reaction-time task with high stimulus density, which measures participants’ ability to sustain attention (Lim and Dinges, 2008).

**Expected Outcomes**

Although there has been very little research conducted on law enforcement driving and collisions, there has been extensive research conducted on the general driving public and other occupational drivers. Based on the distracted driving and drowsy driving literature available we expected to reject the null hypotheses for research questions 1 to 3.

As text-based distractions and fatigue both affect attentional resources required for safe driving we expected to reject the null hypothesis for research question 4.

**Summary of Chapters**

Chapter one introduces the key concepts of this dissertation research: distraction, fatigue, and their impact (individually and collectively) on police driving. The importance of the problem is stated: motor vehicle collisions are the leading cause of on duty death for law enforcement in the U.S. The purpose of the dissertation is explained: to add to the body of knowledge on both
distracted driving and driving while fatigued, specifically in a law enforcement population. Finally, the research questions, hypotheses, and expected outcomes are laid out.

Chapter two discusses the body of empirical literature on distracted and drowsy driving to date. This discussion includes: examining statistics on officer involved collisions; the challenges associated with police driving; understanding why distraction degrades performance; legislation around distracted driving; sleep, shift work, fatigue and driving; and the distraction / fatigue interaction effect on driving.

Chapter three explains the methods used to collect and analyze data. Detailed information on the research protocol, study procedures, research participants, study variables, and analytical models used is provided.

Chapter four describes the research findings. This chapter is organized by the following categories: tests for normality, descriptive statistics, demographic variables, and inferential statistics.

Finally, chapter five discusses the implications, limitations, and future directions of the research.
LITERATURE REVIEW

Introduction

Due to rise in the number of law enforcement officers killed in the United States between 2010 and 2011, the Bureau of Justice Assistance and Office of Community Oriented Policing Services created the national Officer Safety and Wellness (OSW) group to identify and support efforts to improve officer safety (Stephens, Fielder, & Edwards, 2012). An important observation from the OSW group was that little is known about officer-involved vehicle collisions, despite evidence showing collisions are consistently a leading cause of officer fatalities in the United States (Stephens, Fielder, & Edwards, 2013). Officer-involved collisions have been largely ignored by the research community and, as a result, there is little knowledge concerning the prevalence of police vehicle collisions, the injury and fatality outcomes of these events, or the characteristics of these collisions. As a result of this gap, there is insufficient empirical evidence upon which to base policies and practices or develop training aimed at reducing injuries and fatalities resulting from vehicle collisions.

Officer-Involved Vehicle Collisions

The deaths of officers due to vehicle collisions have emotional costs for these officers’ families, friends, and departments. In addition, non-fatal injury collisions also place significant burdens upon involved officers who may suffer serious physical or psychological trauma, which can potentially lead to long-term disabilities and expensive therapies. On an even broader level, officer-involved collisions often injure or kill members of the public.

There are also significant financial costs associated with officer-involved collisions. For
each officer killed in the line of duty, the federal government (through the Public Safety Officers' Benefits Program) pays the survivors or beneficiaries a minimum of $333,605 (BJA, n.d.). In addition to these costs, a recent report by the National Highway Traffic Safety Administration (NHTSA) estimated that the average fatal vehicle collision had an approximate total cost of $1.4 million (Blincoe et al., 2014). This estimate, based on collisions involving the general public, includes such costs as medical care, lost market productivity, legal expenses, emergency services, and property damage. NHTSA estimated that, on average, 9% of these costs would be paid by federal and state governments for collisions that resulted in death to a member of the public. In the case of law enforcement officers, however, these costs tend to be carried primarily by local, state and federal governments. Given that the annual number of officers killed from automobile and motorcycle collisions across the U.S. has ranged from 48 to 60 over the past ten years (FBI, 2008), the total cost to federal, state, and local governments resulting from these incidents is in the tens of millions of dollars annually. It is important to note, however, that this figure does not consider the more numerous non-fatal injury collisions. According to NHTSA, such incidents resulted in costs that range from roughly $13,300 to $1,100,000 per collision in 2010 (approximately $37,000 to $5.5 million with inclusion of loss of quality of life costs), depending on the classification of injury severity (Blincoe et al., 2014).

Paradoxically, the seriousness of law enforcement collisions is counterbalanced by perceptions among officers that driving is an innocuous event (Dorn & Brown, 2003). In other words, the routine and normality of driving is often viewed as merely part of an officer’s employment, reinforcing the idea that vehicle collisions are inevitably going to occur and are unavoidable. This sentiment fails to appreciate that the occupational responsibility of officers requires them to engage in driving actions that place them at a higher risk for collisions than the
average citizen driver. Officers spend considerably more time in a vehicle than the average citizen. Moreover, they engage in atypical driving actions – such as vehicle pursuits and responding to emergency calls at high speeds – that may legally involve violations of roadway laws. Officers must also routinely conduct traffic stops and engage in traffic management alongside moving vehicles. Rix, Walker, and Brown (1997) note that the collision exposure of officers is even unique from other emergency occupations such as fire and ambulance. While the latter may also travel at high speeds and legally violate roadway rules in response to emergency calls, they do not engage in routine patrols that result in further collision risk exposure. In addition to this risk officers often drive while operating more equipment than the average road user; lights, police radio, speed camera, and mobile data computers (laptops); adding risks associated with distracted driving. Police work is shift work and involves working during hours when the body wants to sleep, and the long (i.e., >8 hrs.) shifts officers often work also add risks associated with drowsy driving. These risks need to be assessed in order to be considered in their totality understand the true level of risks officers operate under.

Unfortunately, the failure of many officers and police leaders to recognize the hazards associated with higher risk exposure reinforces unsafe practices, underestimates the impact that evidence-based research can provide, and delivers no guidance to key stakeholders on how to improve driving safety. The development of evidence-based efforts to improve officer safety in this area has also been limited by a lack of comprehensive research conducted on the topic. In the area of officer safety, the academic community has almost exclusively focused on police pursuits and the subsequent collisions that may occur (Alpert, 1987; Alpert, 1997; Alpert & Dunham, 1989; Crew, Kessler, & Fridell, 1994; Payne & Fenske, 1996; Crew & Hart, 1999). While this line of research has been informative and provides insight into reducing such collisions, it
captures only a small portion of vehicle collisions involving law enforcement officers. For example, Alpert and Dunham (1989) found that only 5% of police vehicle collisions were related to pursuits. As a result, the narrow focus on pursuit-related collisions has limited efforts to reduce overall officer-involved collision rates.

However, despite the lack of research attention from the academic community, a handful of government agencies in the United Kingdom and the United States have investigated this issue. A British Home Office study published in 1997 that examined officer-involved collisions resulting in serious injuries or fatalities represented the first of these efforts (Rix, Walker, & Brown, 1997). The study examined the prevalence and trend in officer-involved collisions in England and Wales from 1991 to 1995 based on official reports from all 42 police forces, which was supplemented by an analysis that examined a sample of the collisions in order to capture incident characteristics. The first such research in the United States was conducted by the California Commission on Peace Officers Standards and Training (CalPOST) (2009). The primary focus of the CalPOST report was to examine the impact of different forms of driver training on collisions. In the process, the report also provided preliminary analysis regarding characteristics of officers involved in fatal and injury collisions in California and proximal situational factors related to those collisions. Building on these efforts, a recent study by NHTSA provides the most detailed analysis of officer-involved collisions to date (Noh, 2011). The study is based on data from the Fatality Analysis Reporting System (FARS) which is maintained by NHTSA. It examined the situational and officer characteristics of vehicle collision events that resulted in the death of 823 police officers in the United States between 1980 and 2008.

Collectively, the Home Office, CalPOST, and NHTSA reports have provided insight into the limited literature concerning officer-involved collisions. The problem, however, is that thus
far there has been no holistic examination of officer-involved collisions in a way that captures fatality, injury, and non-injury outcomes. This gap limits our understanding of the prevalence of these outcomes relative to one another. Moreover, little is known about the differences in situational characteristics across these outcomes.

**Safety in Police Vehicle Operations**

When controlling for the increase in the law enforcement officer population in the United States, the rate at which officers die from motor vehicle collisions has remained relatively consistent from 1996 to 2010 (Federal Bureau of Investigation, 2011). Figure 1 below shows the rate of officer deaths due to vehicle collisions per 100,000 sworn, full-time officers in the United States. The figure also shows the rate at which officers die in felonious circumstances, such as shootings. While the rate of felonious deaths appears to be trending downward, the rate officers die in motor vehicle collisions appears to remain relatively constant at between 6 and 8 officers per 100,000 officers per year. Since 1998, vehicle collisions have been one of the leading causes of death for law enforcement officers while on duty.

It is not just officer deaths that are of concern; the rate at which officers sustain career-ending injuries from collisions in their patrol vehicles is also on the rise. This is unexpected given the improvements in driver training (e.g. emergency vehicle operations training, simulation based judgment training, behind-the-wheel training at police training facilities, etc.), road safety (e.g. improvements to road signage, safer intersections), and the protective capability of modern patrol cars (e.g. air bags, crumble zones, pursuit rated suspension and brakes). Data on the deaths of drivers working in other industries that require a considerable amount of driving in their daily work life, such as delivery drivers or taxi drivers, are not as accessible as the specific
occupational deaths of law enforcement personnel. The Bureau of Labor Statistics reports all occupational highway accidents that result in death (U.S. Bureau of Labor Statistics, 2009). When normalized to the total employed population, the annual rate at which the general working population is fatally injured in a vehicle collision is declining. A review of the National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System (FARS) data shows a downward trend in road traffic fatalities from 1996 to 2010 (see figure 2). Although figure 2 seems to show that law enforcement officers are killed at a much lower rate than the general population, it must be stressed that the deaths for law enforcement are only on-duty deaths and do not reflect the risk of fatal collision while driving off duty. When examining non-law enforcement shift workers, multiple studies have found the drive home after a night shift to be especially dangerous (Smith, Folkard and Poole, 1994; Scott et al., 2007; Kowalenko et al., 2000; May and Baldwin, 2009). An examination of all collisions recorded by the California Department of Motor Vehicles (DMV) in which a law enforcement officer was involved showed that only 48% of the 90,000 collisions that were recorded for this population between 1998 and 2010 occurred on duty.

Figure 3 shows the annual on- and off-duty collision rates for all law enforcement officers in the state of California between 1996 and 2009. When comparing the trend lines of on-duty collision rates with those that occurred off-duty collision, we again see on-duty collisions remaining relatively constant over time, while off-duty collisions appear to be trending downward.

Why, then, is the trend for law enforcement different from that of the general public? And why is on-duty driving different from off-duty driving? A major difference between law enforcement driving and that of the general public is the extent to which a law enforcement
officer has his or her attention diverted from the task of driving. This may be exacerbated by being both distracted and fatigued due to shift work. The added distractions of police specific technology are not present in officers personally owned vehicles. The reduction in distraction load for officer’s off-duty in their own vehicles may account for the declining collision rate that is not seen in on-duty driving. We will consider the effects of distraction first.
Figure 1: Fatality rates for full-time, sworn law enforcement officers in the United States by cause of death\(^2\). Blue solid line = the rate of officer deaths due to vehicle collisions per 100,000 sworn, full-time officers in the United States. Blue dotted line = linear regression line of officer deaths due to vehicle collisions. Green solid line = the rate at which officers die in felonious circumstances, such as shootings. Green dotted line = linear regression line of officer deaths due to felonious circumstances. While the rate of felonious deaths appears to be trending downward, the rate officers die in motor vehicle collisions appears to remain

\(^2\) Source: FBI Uniform Crime Reports (UCR) Law Enforcement Officers Killed and Assaulted (LEOKA), the deaths related to vehicle pursuits have been recoded from felonious to motor vehicle collisions, and Bureau of Justice Statistics (BJS) officer census (yearly population calculated by amortizing four yearly census data). \(R^2\) is the measure of confidence in the linear regression line.
relatively constant at between 6 and 8 officers per 100,000 officers per year. Since 1998, vehicle collisions have been one of the leading causes of death for law enforcement officers while on duty.

Figure 2: Annual road traffic fatality rate in comparison to law enforcement. Red solid line = all drivers Fatality Analysis Reporting System (FARS) road traffic fatalities from 1996 to 2010. Red dotted line = linear regression line of all drivers road traffic fatalities. Blue solid line = law enforcement fatalities from road traffic collisions. Blue dotted line = linear regression line of law enforcement road traffic fatalities. Law enforcement officers are killed at a much lower rate than the general population: on duty deaths and does not reflect the risk of fatal collision while driving off duty, such as the drive home from shift.
Figure 3: On duty versus off duty collision rates of California law enforcement. Annual on-duty (blue solid line) and off-duty (red solid line) collision rates for all law enforcement officers in the state of California between 1996 and 2009. When comparing the linear regression trend lines of on-duty (blue dotted line) collision rates with those of off-duty (red dotted line) collision rates, we again see on-duty collisions remaining relatively constant over time while off-duty collisions appear to be trending downwards.

Source: California Commission on Peace Officer Standards and Training agency and officer database combined with California Department of Motor Vehicles (DMV) collision database generated from California Highway Patrol (CHP) Form CHP555 mandatory collision reporting. Note: prior to 1/1/2004 the threshold for reporting collision on the CHP555 form was “an injury”, “and/or property damage of more than $400,” subjectively assessed on scene. After 01/01/2004 this threshold was raised to “an injury”, “and/or property damage of more than $750,” subjectively assessed on scene.
Distracted Driving In Law Enforcement

Within the general driving public, distracted driving is a major contributing factor in an estimated 80% of collisions (Weiss, 2007). Distracted driving is dangerous. There has been considerable research on the use of communication devices such as cellular telephones while driving (Klauer, et al., 2014) (Drews, et al., 2008) (Weiss, 2007) (Kass, et al., 2007) (Strayer, et al., 2003) (Strayer & Johnston, 2001) (Redelmeier & Tibshirani, 1997). To date, every study has found that cell phone usage while driving has a detrimental effect on driver performance. Redelmeier and Tibshirani concluded that talking on a cellular telephone increased the probability of a collision by between 300% and 650% (1997). By engaging in two cognitively challenging activities simultaneously, such as driving and talking on a cell phone, it is possible to directly affect the decision process of one action with the thought process of the other; this is a process known as a “psychological refractory period” which results in incorrect or late responses (Recarte & Nunes, 2003).

Kass et al. found that cell phone use reduced the driver’s situational awareness (Kass, et al., 2007). Again, this study found that hands-free devices produced the same degradation in performance, leading the authors to conclude that it was the cognitive effort required in engaging in a conversation that has a negative impact, regardless of the medium. However, the authors found that experience with dual tasking did mitigate some of the negative effects. A study conducted by Ma and Kaber examined situational awareness during a simulated driving task that required the participants to divert their attention to a laptop (2007). This study has direct relevance to police performance as officers’ attention is frequently diverted to a Mobile Data Computer (MDC) situated in their patrol cars. The results showed this task had a detrimental effect on driving behavior similar to that associated with the use of a cellular phone. The authors
did state that conditions in actual work driving may vary from their results due to the seriousness of the consequences in a moving vehicle. However, given that 80% of collisions for the general public are related to distracted driving, that is unlikely to be the case (Weiss, 2007).

The specific driving behaviors found to be negatively affected by this reduced situational awareness due to diverting attention to another task are described as tactical driving behaviors. These include changing lanes, overtaking, negotiating intersections, etc. (Ma & Kaber, 2007). The importance of this degradation in situational awareness is that it affects a driver’s perception and comprehension of their surroundings while driving. It limits the driver’s ability to project scenarios forward in time and to understand the consequence of their actions or inaction. An element of this is spatial awareness, which allows the driver to register and understand where other objects are in relation to him or herself and where they will be in the future (Bolton & Bass, 2009). As law enforcement officers regularly drive while distracted, this degradation of situational awareness may be expected to have a negative impact on their driving performance.

Law enforcement agencies in the United States began adopting motor vehicles without communications in the 1920s. By the 1930s, the use of the radio car was a standard law enforcement practice (Vila & Morris, 1999). The radio car enabled larger patrol areas (“beats”), giving wider service coverage with fewer law enforcement officers (Esbensen, 1987). Originally, law enforcement officers tended to patrol in two-officer patrol vehicles because the increased distance between officers, due to the larger beats, brought about a fear that they would not have backup in a timely fashion when needed (Brannon, 1956). Most law enforcement agencies have since transitioned to single officer patrol cars.

In 2010, a survey of 233 California police and Sheriff’s departments by CalPOST
reported that 91% of agencies responding to the survey utilized single-officer patrol vehicles. Of the 233 agencies, only LAPD utilized two-person patrol staffing in all of their patrol vehicles.

The decision to move from the traditional two-officer patrol vehicle to single-officer patrols started with the 1953 Kansas City experiment (Wilson, 1990). Kelling and colleagues (1974) report that the public did not notice the difference in levels of police presence. Changing patrol staffing did not significantly affect crime rates or the fear of crime. Within one year of the experiment, Kansas City changed to 100% single-officer patrol vehicles, and other cities were quick to follow suit. Limited research has been conducted on the effectiveness of this change or related dangers to law enforcement personnel as a result of this it. Wilson conducted a meta-analysis of the relevant research that had been published up to 1990 (Wilson, 1990). Her study stated that the majority of the research on this topic was flawed. Comparisons made between the two patrol models did not account for how many vehicles were on patrol or the ratio of single-to two-officer vehicles. The conclusions drawn from this analysis were that there seemed to be no efficiency advantages or safety issues with either patrol model. Any advantage of having more patrol vehicles available to respond to calls for service in single-staffed vehicles was negated by the fact that officers in those vehicles took longer to answer each call and therefore, were out of service for a longer period of time. Kaplan also found that there were advantages to one-officer vehicle patrols, but many of them, although statistically significant, had a minimal effect in the real world (Kaplan, 1979).

It is important to note the configuration of police vehicles has changed substantially since the early 1950s. Although there have been no studies to date comparing law enforcement vehicle collision rates in relation to single- or two-officer patrol car staffing. The modern patrol vehicle now tends to have many distractions, perhaps more than a single officer can safely operate while
driving. Research into the effectiveness of single-officer versus two-officer patrol manning needs to consider the added cost of serious injury to, or the death of, law enforcement officers brought about by distracted driving.

The driver’s cockpit of a contemporary law enforcement patrol vehicle has an array of communications devices and other electronic equipment. Figure 4 below shows the array of devices in a modern patrol vehicle. It is common to see a two-way police radio, a speed camera gun, a LoJack® initiator, duty and private cell phones, and a mobile data computer (MDC). The MDC is one of the prevalent communication devices providing distraction inside a patrol vehicle. Add to this the requirement for law enforcement officers to scan the road ahead to check for possible traffic violations, scan the sidewalks for suspicious activity, and, at times, contend with unruly, unwilling passengers in the backseat of the vehicle.

A simple solution would be to remove these distractions from the driver (Weiss, 2007). However, equipment such as the radio has been an integral part of the law enforcement operations for 80 years (Vila & Morris, 1999). Over the last 20 years, the MDC has become almost standard issue in law enforcement patrol vehicles (Agrawal, et al., 2003). The federal program Community Oriented Policing Service: Making Officer Redeployment Effective (COPS MORE) allocated funding to local law enforcement agencies for redistributing law enforcement personnel through the adoption of remote computing (Agrawal, et al., 2003). The 2010 CalPOST survey found only 30 of 233 agencies did not have MDCs mounted in their patrol vehicles. These were the smaller agencies (average number of full-time sworn officers = 28), and they accounted for less than 2% of the officers covered by this survey. Since 1995, law enforcement communication infrastructure and operational procedures have been built around these communication technologies. Thus, it is unlikely that these devices will be removed from
The complex interactions between an officer, his or her driving, and the equipment in the vehicle require further research to evaluate the level risk to law enforcement officers and the public with whom they share the road. Talking on a cell phone produces the same level of impairment as being intoxicated at a blood alcohol level of .08 (Drews, et al., 2008). The added distractions in a police patrol car may impair an officer’s driving even more. This dissertation describes the level to which a simple distraction task degrades an officer’s driving performance while during simulated driving.

Figure 4: Spokane County Sheriff’s Office Patrol Vehicle Interior. It is common to see a two-way police radio, a speed camera gun, a LoJack® initiator, duty and private cell phones, and the mobile data computer (MDC).
Distraction and Human Performance Limitations in Police Driving

There has been no research to date on the effects of MDCs and other law enforcement specific devices (e.g. two-way radio with a handheld pressel-switch, speed camera guns) on driver safety and driver distraction load. The argument has been presented that experience with dual tasking will mitigate some of the negative effects of dual task-induced performance degradation in driving (Kass, Cole, & Stanny, 2007). However, it seems likely that law enforcement personnel are subject to the same performance and cognitive limitations as the population at large. There has been considerable research on the use of communication devices among the general public, such as cellular telephones and GPS devices, while driving (Drews, Yazdani, Godfrey, Cooper, & Strayer, 2009; Drews, Pasupathi, & Strayer, 2008; Weiss, 2007; Kass, Cole, & Stanny, 2007; Ma & Kaber, 2007; Recarte & Nunes, 2003; Strayer, Drews, & Johnston, 2003; Strayer & Johnston, 2001; Violanti, 1998; Redelmeier & Tibshirani, 1997). To date, every study has found that cell phone usage while driving has a detrimental effect on driver performance. Violanti (1998) associates cell phone usage with a fourfold increase in the probability of being involved in a collision for the general public. Redelmeier and Tibshirani (1997) conclude that, for the public, talking on a cell phone increases the probability of a collision by between 300% and 650%. Talking on a cell phone produces the same level of impairment, in the public, as being intoxicated at a blood alcohol level of .08 (Drews, Pasupathi, & Strayer, 2008).

Strayer and Johnston (2001) found there was a slight difference in collision risk based on whether the driver was talking on a handheld or a hands-free device. However, both reduced driver performance in a study on the public; on average distracted drivers missed twice the number of traffic signs as their un-distracted control group. This is because the attention required...
to hold a conversation diverts cognitive function away from driving. By engaging in two activities that require the same cognitive resources simultaneously, such as driving and talking on a cell phone, it is possible one focus of attention to directly affect the decision process of another. This is known as a “psychological refractory period” and can result in incorrect or late responses (Recarte & Nunes, 2003).

Kass and colleagues found that a driver’s situational awareness is reduced when a cell phone is in use (Kass, Cole, & Stanny, 2007). Similar to Strayer and Johnston’s study, this study found that hands-free devices produced the same degradation in performance, leading the authors to conclude that it was the cognitive effort required to hold a conversation that had a negative impact, regardless of the medium. However, the authors also found that experience with dual tasking did mitigate some of the negative effects of cell phone usage while driving.

In a related study, Drew and colleagues found that the level of complexity of the driver’s conversation, as measured by the syllable count, reduced in relation to the increasing complexity of the traffic (Drews, Pasupathi, & Strayer, 2008). This supports the hypothesis that driving and communication vie for the same cognitive resources.

Ma and Kaber examined situational awareness while participating in a simulated driving task that required participants to briefly divert their attention to a laptop (Ma & Kaber, 2007). This study has direct relevance to law enforcement performance because their attention is also diverted to a laptop: the MDC situated in their patrol cars. Ma and Kaber’s results showed that this task had a similar detrimental effect on driving behavior, comparable to the use of a cell phone. Real-world driving may vary from this simulated driving study due to the seriousness of the consequences of failure in the real world compared to those in a simulator.
Operational (controlling the vehicle) and tactical (e.g. decisions such as distance from other vehicles) driving behaviors are negatively affected by reduced situational awareness due to cognitive resources being diverted to another task (Drews, Pasupathi, & Strayer, 2008). Operational driving behavior includes the ability to maintain a stable course (measured by lane deviation), and a stable speed (measured by deviation from mean speed) (Ma & Kaber, 2007). Tactical driving behaviors include changing lanes, overtaking, negotiating intersections etc. (Drews, Pasupathi, & David, 2008) (Ma & Kaber, 2007). The importance of this degradation in situational awareness is that it affects a driver’s perception and comprehension of his or her surroundings while driving. It also limits the driver’s ability to project scenarios forward in time (i.e., to anticipate potential problems and drive defensively) and to understand the potential consequences of his or her actions or inactions. Spatial awareness is another operational element that allows the driver to register and understand where other objects are in relation to him or herself, and where they will be in the future (Bolton & Bass, 2009).

The Situation Awareness Rating Technique (SART) measures ten constructs found to be relevant to situational awareness (Taylor, 1990):

- Instability of situation
- Variability of situation
- Complexity of situation
- Arousal
- Spare mental capacity
- Concentration
- Division of attention
- Information quantity
- Information quality
- Familiarity

It is clear that situational awareness is important for driving, and that distraction impairs driving performance. Now we turn to a discussion of why this is the case.
Understanding Why Distraction Leads to Performance Degradation

Why accidents happen can be explained by Perrow’s theory of “normal accidents” (Perrow, 1999). This theory argues that the probability of accidents is a function of coupling and complexity (Perrow, 1999). To put it simply, coupling is the relationship objects have with each other in time and space, while complexity has to do with the number of objects or variables in the situation. The constructs of SART that fit with the theory of normal accidents are “instability of situation” and “variability of situation” as a function of coupling and the complexity of a situation. To mitigate the probability of an accident, a person must control the remaining seven constructs: spare mental capacity, concentration, division of attention, information quantity, information quality, and familiarity. Kass and colleagues found that familiarity with a situation can offset distracted attention (Kass, Cole, & Stanny, 2007). However, as the instability or variability increases, such as when the speed of the vehicle increases, familiarity becomes increasingly less likely to prevent an accident. Maximizing situational awareness by reducing attentional diversions and retaining spare mental capacity is paramount to avoiding so-called accidents.

Endsley developed a model for situational awareness in decision making (figure 5) that is relevant to understanding why a reduction in a law enforcement officer’s situational awareness (SA) will reduce his or her performance in tasks such as driving (Endsley, 1995).

“The deployment of attention in the perception process acts to present certain constraints on a person's ability to accurately perceive multiple items in parallel and, as such, is a major limit on SA. Direct attention is needed for not only perceiving and processing the cues attended to but also the later stages of decision making and response execution. In complex and dynamic environments, attention demands resulting from information overload, complex decision
making, and multiple tasks can quickly exceed a person's limited attention capacity” (Endsley, 1995, pp. 40-41).

If a law enforcement officer’s attention is directed inside the patrol vehicle at the MDC, he or she is increasingly unlikely to detect the situational cues required to avoid a collision, such as the brake lights of the vehicle ahead, a bend in the road, or traffic signals changing to red. Strayer and Johnston found that drivers using cell phones had a 100% increase in missed traffic signals compared to drivers who did not use their cell phones while driving (Strayer & Johnston, 2001). Drews and colleagues showed that the degradation in performance and the failure to react to situational cues is amplified when using text based communication devices (Drews, Yazdani, Godfrey, Cooper, & Strayer, 2009). The consequences for law enforcement officers of this research on the general public may be even more extreme because the use of an MDC is arguably more complex than a cell-phone text message.

Another important factor affecting attention to driving is that vehicles are designed to make the ride as smooth as possible (Walker, 2007). Suspension, rack and pinion steering, and cruise control all reduce the feedback from the road to the driver. Reduced feedback is reduces the amount and quality of information available to the driver – the “driving experience” – and reduces his or her situational awareness (Walker, 2007).

A typical contemporary law enforcement vehicle interior is depicted in figure 4 (page 23). As seen in Endsley’s 1995 version of his model of situational awareness in dynamic decision making (figure 6), the interface design is an element to consider in an attempt to promote situational awareness. One particularly important interface issue relating to the communications equipment in a patrol vehicle is the placement of the MDC.
The MDC in a patrol car is usually situated below the windscreen and off to one side of the driver. This is in contrast to the head-up-display (HUD) in a modern fighter aircraft. The HUD is designed to keep the pilot’s focus outside the cockpit. The placement of the MDC draws the officer’s attention into the vehicle—and away from the road.

The direction of a driver’s head (and gaze) can inadvertently affect his/her steering input (Readinger, Chatziastros, Cunningham, Bülthoff, & Cutting, 2002). This can lead a law enforcement officer to unconsciously apply steering input in the direction of the MDC, usually to their right (in a left hand drive car). As the driver’s attention is focused inside the vehicle, he or she may be unaware of steering the vehicle off the road or into another vehicle.
Figure 5: Endsley's 1988 Model for the Mechanisms of Situational Awareness

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4 (Endsley, 1995, p. 41)
Figure 6: Endsley’s 1995 Model of Situation Awareness in Dynamic Decision Making

(Endsley, 1995, p. 35)
Messaging in Law Enforcement

In March 2010, CalPOST conducted the SAFE (Situation-Appropriate, Focused, and Educated) Driving survey of California law enforcement agencies. Two hundred and thirty three agencies responded (45% of all police departments—excluding ports, schools and college police departments, and 51% of all Sheriff’s departments responded—representing 51,354 law enforcement officers and 62% of all sworn officers in police and Sheriff’s departments in California). Results from the CalPOST survey show that 163 agencies (90% of responding agencies) assign a lone officer to their patrol vehicles (only LAPD has two officers in every patrol car), and 93% are fitted with MDCs. When these two variables are combined, 37,434 California law enforcement officers are required to operate a MDC in a single crew patrol vehicle.

Legislation Pertaining to Distracted Driving

Each state in the United States has responded to the problem of distracted driving differently. Some target novice drivers only, while others make the distraction a secondary offense. By the end of 2015 forty-seven states, the District of Columbia, Guam, Puerto Rico, and the Virgin Islands will have distracted driving laws in effect (Governors Highway Safety Association, 2015). The notable exceptions are Arizona, Montana, and Texas. These forty-seven states, the District of Columbia and other territories restrict distracted driving in different ways. Some, such as California, have a complete ban for all drivers, with exemptions for drivers of emergency service vehicles, on hand-held cell phone for voice communication and texting.

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6 Calculated from CalPOST data provided to author, see section on data sources for further explanation.
Others, such as Arizona, ban hand-held cell phone for voice communication for school bus drivers only. Novice drivers, defined by either age or driving experience, are also treated differently in many states. Missouri has a texting ban only for drivers under the age of 21. There is also variation across states whether distracted driving due to hand-held cell phone for voice communication and texting is a primary or secondary offense. A primary offense is one that allows a law enforcement officer to stop a driver for that offense alone and issue a citation; a secondary offense may only be cited if the driver has been stopped for a different primary offense. Most states consider distracted driving a primary offense, but six states make use of a hand-held cell phone for voice communication a secondary offence only for novice drivers and texting a secondary offense for all drivers. For a complete breakdown of driving laws by state, please see Appendix A. For the legislative text from each state, the District of Columbia, and the territories see Appendix B. Figure 7 shows the rate at which the 50 states and the District of Columbia have adopted distracted driving law.

A spokesperson for the National Conference of State Legislatures described texting while driving as “negligent” behavior, and the laws in Utah reflect that sentiment: drivers who cause a fatal collision due to texting can be sentenced to up to 15 years in prison; this is on par with the penalty for fatal collisions caused by drunk driving (Richtel, 2009). However, most states exempt drivers of emergency vehicles from these distracted driving laws. Police officers are human beings who are likely to be subjected to the same performance and cognitive limitations as the population at large. Yet we require them to interact with these devices – and do so frequently – as a routine part of their duties.
Figure 7: Rate at which states adopted distracted driving laws. Starting with the adoption of distracted driving legislation in New York in 2001, this diagram shows the earliest year a state adopted a hand-held voice or text based distracted driving ban (National Conference of State Legislatures, 2015).
The use of communications devices, such as cell phones, is thought to be too distracting to drivers and prevents them from operating their vehicles safely. California’s Senate Bill 1475 also proposes that the driving examination have “a test of the applicant’s understanding of the distractions and dangers of handheld cell phone use and text messaging while operating a motor vehicle” (Simitian, 2010, p. 3). This suggests that state legislators consider text-based messaging a more serious distraction to driving than voice communications.

Given that these new laws are being passed to protect the public, how can law enforcement agencies with a mandate to protect and serve fail to adopt them? In September 2009, President Obama issued an executive order prohibiting federal employees from texting while driving on government business or with government equipment (Centers for Disease Control and Prevention, 2014). But the states’ laws restricting the use of personal communication devices in a vehicle while the vehicle is in motion have exemptions for personnel operating emergency service vehicles, such as police patrol vehicles in 36 of the states. Another issue is that this blanket exemption applies to the operators of emergency vehicles but is not specifically aimed at emergency situations. Also, state cell phone laws tend to allow any member of the public to use their cell phone when driving in the event of an emergency. The text for California’s amendment to their vehicle code reads:

“Section 23123 is added to the Vehicle Code, to read: 23123. (a) A person shall not drive a motor vehicle while using a wireless telephone unless that telephone is specifically designed and configured to allow hands-free listening and talking, and is used in that manner while driving.

(d) This section does not apply to an emergency services professional using a wireless telephone while operating an authorized emergency vehicle, as defined in Section 165, in
the course and scope of his or her duties.”

(California Department of Motor Vehicles, 2006)

Because the law will not affect law enforcement officer use of communication devices while driving, we must rely on the internal policies in law enforcement agencies to regulate this hazardous practice.

**Policies on the use of MDCs in California Law Enforcement Agencies**

Ninety-six percent of California law enforcement agencies are customers of Lexipol, a for-profit risk management organization. Lexipol provides policy manuals to these agencies that are consistent with federal and state law and aspire to reflect best practices. When a department becomes a customer of Lexipol, it is presented with a set of model policies over which it has full editorial rights. The agency can accept and implement the policy manual as a whole, reject sections, or edit individual policies within the manual. Any edits are reviewed by Lexipol’s in-house attorneys to ensure they still meet Federal and State regulations. One of the key components of this relationship between law enforcement agencies and Lexipol is that any change in legislation or best practice is updated on the model policy, and these updates are sent to every agency to either be incorporated into their policy, or rejected. This is noteworthy because it means that any agency that has *not* incorporated a policy change has done so actively and not by omission.

The CalPOST survey of law enforcement agencies (n = 149) reported that 66% of the agencies that operate MDCs in their patrol vehicles have incorporated the Lexipol policy option No. 448 Mobile Digital Computer Use. Fifty-one agencies (34%) of those surveyed rejected
implementing this policy (CalPOST, 2010). The model policy reads:

“448.2.1 USE WHILE DRIVING

Use of the MDC by the operator should be limited to times when the vehicle is stopped. Sending or reading MDC messages while a vehicle is in motion is a potentially dangerous practice. Short transmissions, such as entry of a license number for a stolen or registration check are permitted if they can be done safely. Reading messages while in motion by the operator should only be attempted when the message requires the operator's immediate attention. In no case shall an operator attempt to send or review lengthy messages while the vehicle is in motion.”

(Lexipol, 2015)

As can be seen by the use of an organization such as Lexipol, policy in law enforcement is designed to manage risk and reduce liability. Alpert and Smith agree with this assessment and add that these policies are often developed in reaction to a tragedy (Alpert & Smith, 1994). Policy is used to set standards and hold officers accountable to them. An issue with the above policy is that it allows some use of the MDC while a vehicle is in motion. Although it prohibits the sending or reading of lengthy messages, the term “lengthy” is not defined. It is more difficult to hold an officer accountable to an ambiguous policy. High-frequency, high-exposure activities require extensive policies and guidance (Alpert & Smith, 1994), and the use of the MDC is most certainly a high frequency activity. A motor vehicle collision due to a law enforcement officer’s inattention to the road opens the agency to civil lawsuits with potential damages awarded in the millions of dollars; this is high exposure indeed. The text from the model policy, relating to the use of MDCs while driving, is ambiguous and is less than 100 words in length, not the extensive
policy that is called for.

However, effective policies can change the way in which law enforcement organizations operate. Changes to pursuit driving policy during the past two decades provide an excellent example. The impetus for change in pursuit policies was brought about by growing public pressure and a proposed U.S. Senate Bill, the Pursuit Awareness Act of 1995, sponsored by former U.S. Senator Byron Dorgan (D, n.d.) after the death of his mother in a collision involving a police vehicle. In response to this mounting pressure, the International Association of Chiefs of Police (IACP) issued a model policy in 1990 that restricted pursuit driving to instances where the offender could be incarcerated (Alpert, Kenney, Dunhar, Smith, & Cosgrove, 1996). The need for apprehending the offender was to be weighed and tempered with the risk the pursuit posed to the public.

The liability for the actions of emergency vehicles operated by state or local law enforcement agencies was established under Title 42, Section 1983 of the U.S. Code [to be known as Sect. 1983] (Alpert, Kenney, Dunhar, Smith, & Cosgrove, 1996). Sect.1983 of Title 42 requires that the officer must be found guilty of negligence in order for his/her employing agency to be released from liability for that officer's actions. However, negligence on the part of the agency, municipality, or state could be proven under ‘willful neglect’ for failing to provide a policy that restricted employees’ actions. In 1978, Monell v. Department of Social Services (436 U.S. 658) held that municipalities could not be considered “persons” within the meaning of Sect. 1983 of Title 42. This allowed for suits against municipalities where “policies, customs or practices” are said to be the “moving force” in constitutional or federal statutory violations against the plaintiff (Monell v. Department of Social Services of the City of New York, 1978). The U.S. Supreme Court’s 1989 decision in City of Canton v. Harris (489 U.S. 378) changed
risk management for municipal law enforcement, particularly those associated with emergency vehicle operations (City of Canton, Ohio v. Harris, 1989). This ruling held that the absence of a policy that restricts the potential for the actions of its officers violated citizens’ constitutional protections, leaving the municipality open to prosecution. The text reads:

“For example, city policy makers know to a moral certainty that their police officers will be required to arrest fleeing felons. The city has armed its officers with firearms, in part to allow them to accomplish this task. Thus, the need to train officers in the constitutional limitations on the use of deadly force (see Tennessee v. Garner, 471 U.S.A 1 (1985)) can be said to be "so obvious," The failure to do so could properly be characterized as "deliberate indifference" to constitutional rights. It could also be that the police, in exercising their discretion, so often violate constitutional rights that the need for further training must have been plainly obvious to the city policy makers, who, nevertheless, are "deliberately indifferent" to the need.”

(City of Canton, Ohio v. Harris, 1989)

A growing body of research demonstrates the dangers of texting and other forms of communications while driving. Although current laws restricting the use of wireless communication devices have specific exemptions for the operation of emergency vehicles, they may leave law enforcement agencies open to litigation under Sect. 1983. The text from the model policy from Lexipol may still not satisfy the "deliberate indifference" clause of the City of Canton v. Harris ruling. The model policy from the IACP on “Police Traffic Services Policies and Procedures’ released in 2004 and developed by the IACP Highway Safety Committee does mention the use of MDCs (IACP, 2004). This was addressed in April 2013 with a model policy
on the use of Mobile Communication Devices:

“Officers may not operate patrol vehicles while using MCDs unless emergency circumstances exist and other means of communication are not available or suitable. When possible, officers should pull off the roadway in a safe location when using MCDs unless hands-free operational devices are authorized and available”

(International Association of Chiefs of Police, 2013, p. 2).

**Drowsy Driving**

Fourteen percent of officers in the first study of police fatigue (Vila 2000) reported that they were always or usually tired at the *beginning* of their work shifts. This research focused on the other end of the work shift when officers tend to be even more tired, by assessing the impact of work-related fatigue on an officer’s driving performance after a long work shift. Measuring fatigue at shift end provides an important performance indicator because that is when officers tend to either *continue working on overtime status or drive home or to another destination*. In any of these circumstances, increasing levels of fatigue associated with time-on-task, time-awake, and time of day effects may be expected to increase collision risks for officers and, consequently, others on the road with them. Although officer driving deaths and injuries that occur on the way home tend not to be counted as being “in the line of duty,” their consequences are equally tragic.

Drowsiness and falling asleep while driving are the result of fundamental human performance limits that affect us all. Drowsy driving is an important contributing factor in 22%–27% of all traffic collisions in the United States (Pack et al., 1995; Klauer et al., 2006) and Great
Britain (Parsons, 1986). Drowsy drivers tend to take longer to react, be less attentive to their environment, and have impaired decision-making skills (Jackson et al., 2013). Drivers who usually sleep ≤5 hours per 24 hour period or snore (a symptom of sleep apnea) are significantly more likely to report driving drowsy during the previous 30 days (Wheaton et al., 2014). Furthermore, sleep-related collisions tend to happen more often at night or in the mid-afternoon when drivers are more likely to be sleepy (Pack et al., 1995; May et al., 2009). Excessively sleepy individuals tend to have more—and more serious—traffic collisions (Tregear et al., 2009) and have much higher traffic fatality rates (NTSB, 1990).

Thus, it isn’t surprising that a relatively large proportion of drowsy driving collisions occur among workers driving home after night shifts (NTSB, 1990). The link between night work and accidents has been established by evidence from many studies using different methods and types of populations (e.g., see Akerstedt et al., 1994; Folkard, Lombard, Tucker, 2005). A classic study of a large engineering company showed that working a night shift increased traffic collisions by 50% (Smith, Folkard and Poole, 1994). Research on medical professionals showed that 79% of nurses working night shifts reported driving drowsy—nearly four times as great as was reported by day-shift nurses (Scott et al., 2007). Similarly, medical residents who had frequent on-call schedules had 6.7 times greater risk of motor vehicle collisions than those on less demanding schedules (Kowalenko et al., 2000; May and Baldwin, 2009). Historically, roughly 16% of police line-of-duty injuries each year—and 32% of fatalities—occurred in vehicle collisions (Houser et al., 2004). In 2013, 36% of police officer deaths occurred in on-duty vehicle collisions (FBI, 2015). It appears that no data on officer deaths during the drive home from work have been collected or analyzed.

Among the general public, 41% report having fallen asleep or nodding off while driving,
4% within the past month (Wheaton et al., 2014), and 7% within the past six months (Tefft, 2010). Among U.S. and Canadian police officers surveyed in 2004 by the AAA Foundation for Traffic Safety, 89% said drowsy driving is as dangerous as drunk driving, and more than 93% said that it was a serious problem for both passenger car drivers and commercial drivers. Ninety-five percent believed that drivers who cause a crash because they are fatigued should be charged with a driving violation (AAA Foundation, 2004).

Despite this apparent awareness of the hazards associated with drowsy driving, nearly 50% of all police officers report having fallen asleep while driving, and about 25% report that this happens one to two times per month (Rajaratnam et al., 2011). This is not particularly surprising given that more than 40% of police officers report symptoms consistent with at least one sleep disorder and 29% have been assessed as excessively sleepy (Vila, 2006; Rajaratnam et al., 2011).

Sleep, Shift Work, Fatigue, and Driving

Sleep, like food, water, and oxygen, is a fundamental biological need for every human. By the time drivers begin struggling with drowsiness as a consequence of sleep-related fatigue, they are already substantially impaired (Belenky et al., 2003; Van Dongen et al., 2003).

Sleep-related performance impairment due to fatigue is a function of three primary causal neurobiological factors: time of day, time awake without sleep, and the amount of sleep obtained during recent days (commonly referred to as “sleep debt”). Time of day is critical because, despite the 24/7 demands of contemporary life, humans’ inherent circadian rhythms push us to sleep at night and stay awake during the day. That is why people who have been up all night tend
to feel more alert in the afternoon than they did at 2 a.m, even though they have been awake longer. *Time awake* has a cumulative effect on how fatigued or drowsy we feel. *Prior sleep* affects how tired a person is at the beginning of his or her time awake. Each consecutive day with insufficient sleep adds to a person’s “sleep debt,” lowering the threshold at which fatigue will begin affecting performance. Although the impact of each of these three causal factors on fatigue is reasonably straightforward, their systematic interactions are complex (Hursh, Redmond and Johnson, 2004; Van Dongen et al., 2007; Van Dongen and Dinges, 2005).

It is challenging to predict how fatigued a person is at a particular point in time because it requires knowing the current time of day, how long they have been awake, and how much sleep they have had during the recent past. The magnitude of each of these factors is constantly shifting as well because of the circadian rhythms that coordinate the functions of the body’s complex biological processes across each day and time awake increases until sleep occurs. As we move into the late evening hours when our bodies are programmed to fall asleep, the *impact* of time awake and prior sleep on fatigue becomes increasingly strong. Later, as we move past daybreak, the impact tends to become weaker.

On top of this ever-shifting system of interactions, the manner in which fatigue affects driving performance shifts from moment to moment. If circadian phase, time awake, and prior sleep are known it is possible to predict driving performance. As a driver becomes more drowsy, the *probability* of lapses of attention caused by clusters of brain cells falling asleep tends to increase, but the timing and the duration of those attentional lapses are random. This means that drowsy drivers’ attention to the roadway around them tends to drift in and out. As a result of this unpredictable waxing and waning of attention, people often avoid the *consequences* of driving drowsy simply because their lapses of attention don’t co-occur with a potential hazard. For
example, if a person experiences a momentary attentional lapse while driving on a road and
regains alertness before the car runs off the road or collides with something, you may not even
realize you dozed off. But a collision might occur if, for example, the lapse happens just as
someone pulls in front of them, the road turns away from his or her current vector, or a vehicle
brakes unexpectedly in front of them.

Although lapses of attention are often the primary connection between fatigue and
driving performance, fatigue can also increase the probability of accidents, injuries, and errors on
the job by interfering with mood, cognitive ability, and risk-taking propensity (see reviews by
Durmer and Dinges 2005; Folkard and Tucker, 2003). For example, when one considers the
proximate causes of the 7,117 officer-involved injury and fatal collisions in California from
1997-2007, the three leading “primary causal factors” were unsafe speed (35%), automobile right
of way (12%), and improper turning (10%) (California Commission on Peace Officer Standards
and Training, 2009:12). It is plausible that sleep-related performance factors upstream from these
proximate causes include mood (which can bias decision making), cognitive ability (which
interferes with perception, decision making, and task execution), and risk-taking propensity
(which affects the behavioral choices that officers make).

**Distraction and Fatigue Interaction**

Considered separately, both distraction and fatigue are detrimental to driving
performance. Little is known about the interaction of distraction and fatigue on driving
performance. Even studies titled “Sleepiness/fatigue and distraction/intention…” consider the
elements of distraction and fatigue separately (Bunn, Slavova, Struttmann, & Browning, 2005).Beanland et al. (2013) characterize distracted attention and inattention due to fatigue as different
forms of driver intention. Distraction due to cell phones for text-based communications is categorized as *Driver Diverted Attention*, while inattention due to reduced attentional resources resulting from physical or biological factors, such as fatigue, is categorized as *Driver Restricted Attention*. This is possibly due to lapses in driver’s attention.

Both distraction and fatigue can result in inattention to the task of driving. Both distraction and fatigue are present *at the same time* in the normal work routines of many law enforcement officers. This study seeks to consider their combined impact on driving performance.

**Summary**

Between 2003 and 2012, “49 percent of officer fatalities were a result of vehicle-related accidents” (President’s Task Force on 21st Century Policing, 2015, p. 68). Officer-involved collisions have been largely ignored by the research community and, as a result, there is virtually no empirical knowledge concerning the prevalence of vehicle collisions, the injury and fatality outcomes of these events, or the characteristics of these collisions. There are significant emotional and financial costs associated with officer-involved collisions.

The failure of officers and police leaders to recognize their elevated risk exposure reinforces unsafe practices, underestimates the utility of evidence-based research, and delivers no guidance to key stakeholders on how to improve driving safety.

Research conducted by the CalPOST (2009) examined the impact of different forms of driver training on collisions. In the process, the report also provided preliminary analysis of the characteristics of officers involved in fatal and injury collisions in California and related
proximal situational factors. It is important to swim upstream from the proximal situational factors of the collision to examine the root cause. As inattention is associated with 80% of collisions in the general public it is plausible that it is a root cause of many law enforcement collisions (Weiss, 2007).

Inattention to driving can be a product of two factors, attentional resources that have been directed elsewhere (e.g. due to distraction) or attentional resources that are off line (e.g. due to fatigue). Within the general driving public, distracted driving is a major contributing factor in an estimated 80% of collisions (Weiss, 2007). Distracted driving is dangerous. There has been considerable research on the use of communication devices such as cellular telephones while driving (e.g., Klauer, et al., 2014; Drews, et al., 2008; Weiss, 2007; Kass, et al., 2007; Strayer, et al., 2003; Strayer & Johnston, 2001; and Redelmeier & Tibshirani, 1997). There has been no research to date on the effects of MDCs and other law enforcement specific devices (e.g. two-way radio with a handheld pressel-switch, and speed camera guns) on driver safety and driver distraction load.

A growing body of research demonstrates the dangers of texting, and other forms of distractions, while driving. By the end of 2015, forty-nine states, the District of Columbia, Guam, Puerto Rico, and the Virgin Islands will have distracted driving laws in effect (Governors Highway Safety Association, 2015). The states’ laws restricting the use of personal communication devices in a vehicle while the vehicle is in motion have exemptions for personnel operating emergency service vehicles in 36 of the states. These exemptions may leave law enforcement agencies open to litigation using willful neglect arguments.

The second factor affecting attention to driving is the depletion of attentional resources.
Lapses of attention are often the primary connection between fatigue and driving performance (Durmer and Dinges 2005). Drowsiness and falling asleep while driving are the result of fundamental human performance limits that affect us all. Drowsy driving is an important contributing factor in 22%-27% of all traffic collisions in the United States (Pack et al., 1995; Klauer et al., 2006) and Great Britain (Parsons, 1986). The link between shift work and accidents has been established by evidence from many studies using different methods and types of populations (e.g., see Folkard, Lombard, Tucker, 2005; Akerstedt et al., 1994). Despite this apparent awareness of the hazards associated with drowsy driving, nearly 50% of all police officers report having fallen asleep while driving, and about 25% report that this happens one to two times per month (Rajaratnam et al., 2011).

The research reported here had four goals: a) examine the impact of distraction on driving performance within law enforcement officers; b) assess the impact of operational fatigue associated with shift work and long work hours on police officer driving safety; c) identify fatigue indicators that can be used to warn officers that their driving performance is becoming degraded by fatigue—preferably well before they are impaired; and d) examine the interaction between distraction and fatigue and this interaction's impact on driving performance.

In order to accomplish these goals, we compared the driving performance of 80 experienced police officers during a number of driving scenarios in a high fidelity driving training simulator that is widely used by police (PatrolSim IV, L3 Corporation). This was completed during two conditions: a) while fatigued after working five consecutive 10:40 hr. shifts in the field, and b) at the same time of day after three consecutive days off. This driving task, the commute home, came at the end of a five-hour experimental session designed to mimic an officer’s work activities.
METHODOLOGY

Introduction

The methodology used in this study was built on one piloted by Waggoner and her colleagues (Waggoner, Grant, Van Dongen, Belenky, & Vila, 2012). Waggoner et al. used a novel combined field and laboratory design to assess the impact of fatigue from real world shift work on municipal police officers’ performance. This study uses the same basic design but expands upon it in three important ways: First, the sample size is larger, expanding from 27 participants in the pilot study to 80 participants in the study reported here. Second, the number and types of tasks have been substantially expanded, most notably from the standpoint of this dissertation, to include patrol driving with and without distraction (the pilot study only examined what we refer to as the “drive home”). And third, pilot study participants were drawn only from graves shift, but this study used roughly equal numbers of officers from each of the four shifts worked by patrol officers. The research was approved by Washington State University’s Institutional Review Board (IRB) (IRB protocol no.11624).

Eighty police officers, assigned to the patrol division, from Spokane, Washington, Police Department., completed at least one condition of this study. Participants were assigned to one of four shifts; Day (06:00 – 16:40), Power (10:00 – 20:40), Swing (16:00 – 02:40), and Graves (20:00 – 06:40). Participants were asked to come into the laboratory on two occasions; once during a fatigued condition and once during a rested condition. The fatigued condition was conducted at the end of a 5-day, 10:40 hour-a-day shift cycle. Officers attended the laboratory immediately after their last shift ended; due to the close proximity of our laboratory, officers started the protocol within 20 minutes of completing their shift. An officer’s rested condition was at the same time of day as his/her fatigued condition but 72 hours after their last shift in a 5-
day, 10:40 hour-a-day shift cycle.

This new version of the research design allows for a within-individual (rested vs. fatigued) and between-groups (i.e., between-shifts) analysis of distraction and fatigue effects on police driving performance. Moreover, it allows for an examination of interaction effects between fatigue and distraction on police driving performance.

**Research Protocol and Measurement**

This study was part of a larger research project assessing the impact of work-shift related fatigue on officers’ performance of simulated critical operational tasks: deadly force judgment and decision making, driving, cognition, and “non-operational” driving. Fatigue was incurred during real police patrol work, but all experimentation was conducted under laboratory conditions (the laboratory maintained consistent light, sound, and temperature level and assess was restricted to research participants and research staff assigned to data collection activities) in the Simulated Hazardous Operational Tasks laboratory in Washington State University’s Sleep and Performance Research Center.

Figure 8 describes the entire in-laboratory data collection protocol, (see appendix C). This dissertation focuses on officers’ characteristics, their sleep (measured by self-reported sleep diaries and wrist worn actigraphy), their driving performance, and assessments of fatigue. It will not report on data collected on the use of deadly force, nor the cognitive tasks performed during this experiment.
Figure 8. Experimental process used during fatigued and rested conditions. During the fatigued condition, participants reported to the laboratory immediately after their work-shift, approximately 20 minutes after coming off duty. Once they had been equipped with measurement devices, they completed the series of experimental tasks. Afterward, they slept in dark, sound-controlled, comfortable, and private rooms to assure that they were sufficiently rested to drive home safely. In the rested condition, participants reported to the lab at the same time of day and completed the same tasks in the same order, but were allowed to go home immediately after the study. Experimental activities associated with the research reported here are shaded in grey.

**Experimental Process: Day of Study**

**Fatigued Condition** Study Day (11.8 hrs.)

<table>
<thead>
<tr>
<th>Time Line (min):</th>
<th>60</th>
<th>12</th>
<th>16</th>
<th>12</th>
<th>16</th>
<th>12</th>
<th>45</th>
<th>12</th>
<th>60</th>
<th>12</th>
<th>30</th>
<th>12</th>
<th>30</th>
<th>360</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity:</td>
<td>Intake</td>
<td>PVT 1</td>
<td>Patrol Drive Simulation</td>
<td>PVT 2</td>
<td>Patrol Drive Simulation</td>
<td>PVT 3</td>
<td>Deadly Force Simulation</td>
<td>PVT 4</td>
<td>Cognitive Battery</td>
<td>PVT 5</td>
<td>Drive Home Simulation</td>
<td>PVT 6</td>
<td>Meal</td>
<td>Sleep in Lab</td>
<td>Debrief</td>
</tr>
</tbody>
</table>

**Rested Condition** Study Day (5.3 hrs.)

| Time Line (min): | 60 | 12 | 16 | 12 | 16 | 12 | 45 | 12 | 60 | 12 | 30 | 12 | 20 |
|------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|
| Activity:        | Intake | PVT 1 | Patrol Drive Simulation | PVT 2 | Patrol Drive Simulation | PVT 3 | Deadly Force Simulation | PVT 4 | Cognitive Battery | PVT 5 | Drive Home Simulation | PVT 6 | Debrief |
Study Procedures

The experimental procedure consisted of 7 phases:

1. Recruitment
2. Screening 1 – telephone
3. Screening 2 - in-laboratory
4. Condition 1 - at home
5. Condition 1 - in-laboratory
6. Condition 2 - at home
7. Condition 2 - in-laboratory

Recruitment

Participants for the study were selected from volunteers who were permanently assigned to patrol work at a single, mid-sized police agency near the laboratory. The agency executive approved access to the officers, but adopted a hands-off policy in order to avoid any appearance that the study was influenced by management—a critical issue in many policing agencies. WSU graduate students who were also law enforcement officers took the IRB-approved flyer to pre-shift briefings. The flyer (see appendix D) requested that officers interested in participating in the study either telephone or e-mail the study coordinator. The study coordinator then initiated the screening process. A discussion of the sample of officers follows the Study Procedures section.

Screening

Once a potential participant contacted the study coordinator expressing an interest in the study, the two-stage screening process was initiated.

Telephone Screening – potential participants were called and a script (see appendix E) containing a brief description of the study and the IRB approved inclusion/exclusion criteria was
read to them and their answers recorded. If a potential participant met the inclusion/exclusion criteria and was interested in participation, an in-laboratory screening session was scheduled.

In-Laboratory Screening – potential participants attended a screening session at the Sleep and Performance Research Center of Washington State University, Spokane. This screening session took approximately 3 hours and involved determining whether the individual was eligible to participate in the study. At the beginning of the screening session, he or she was asked to drive for 10-15 minutes in our high fidelity driving training simulator. Each participant was asked to perform basic driving tasks in order to verify that he or she was not susceptible to simulator adaptation syndrome (SAS) (a strong feeling of disorientation or nausea that some people experience in realistic simulator environments). We used a SAS screening tool (see appendix F), with a predefined cut off score (> 22.5), to verify that each candidate’s performance during the study would not be affected by SAS. Participants who were unable to drive in the high fidelity driving simulator, or had strong negative responses to the simulator environment (as indicated by the SAS screening tool) would be excluded from the study. No participants were excluded from the study due to their SAS screening score being above the threshold nor for not being able to control the simulator. This may be due to officers from SPD having previous experience with this model of driving simulator, through the Washington State Criminal Justice Training Commission’s driver training program.

After the simulator screening, potential participants were asked to fill out a series of questionnaires in order to determine their eligibility to participate in the study. These included demographic questionnaires (see appendix G) asking for basic personal information and several questionnaires regarding their sleep (see appendices H-L).
Potential participants were then asked to perform a 10-minute practice psychomotor vigilance task (PVT). The PVT is a 10-minute long computerized task administered on a laptop computer (PVT, Pulsar model 2.0.5.9, Philadelphia, Penn.). The PVT is a well-validated and simple reaction-time task with high stimulus density that is widely used in sleep research as an objective measure of alertness (Lim & Dinges, 2008).

At the end of the screening session, potential participants were asked to drive again for 30 more minutes in the driving simulator. This simulated drive was a practice drive of the drive home, one of the two types of drives used in the experiment. The driving tasks will be discussed in greater detail below.

Upon determination of their eligibility to participate in the study, the order of conditions for the participant, either rested first or fatigued first, was randomly assigned and participants arranged dates for the experimental sessions that fit their work schedules and laboratory availability.

Confidentiality

Every precaution was taken to preserve participant privacy and confidentiality. The subjects' data and information were kept strictly confidential, and that they will continue to be kept confidential to the extent allowed by State and Federal law. Furthermore, a Certificate of Confidentiality was obtained to protect the data against disclosure from legal processes such as subpoena.
**Participant Payment**

Participants were compensated for their participation in the study at a rate of $40 per hour. This amount was roughly equivalent to the average overtime rate for officers and sergeants within the agency. Participants received $760 for completing both conditions of the study. If they were unable to complete the study, or chose to withdraw from it, they received prorated payment for the time they participated as follows: $80 for the screening session, $200 for the rested condition, and $480 for the fatigued condition.

**At-Home Phase**

Five days prior to both laboratory testing sessions (rested condition and fatigued condition), the participants were asked to complete ‘at-home’ data collection sessions. Data was collected continuously for these 5 days regardless of the participants’ work/home schedule. These sessions involved completing a daily sleep/wake diary (see appendix M) and wearing an actigraph 24 hours a day (SBv2 ReadiBand by Fatigue Science, Vancouver, B.C.). Actigraphs are wrist-worn devices about the size of a small watch that record movement and provide an objective measure of when a participant was sleeping.

**In-Laboratory Phase**

The laboratory phase of the study consisted of two study sessions conducted in the Sleep and Performance Research Center at Washington State University–Spokane. We tested participants in two conditions: rested and fatigued. The order in which the conditions were presented was randomized and counterbalanced to control for order effects. Participants began fatigued-condition testing immediately after the last of five consecutive 10:40-hour patrol shifts in participants’ usual work week (fatigued condition). Rested-condition testing was conducted at
the same time of day 72 hours after completing the last shift in a work week (rested condition).
The minimum duration between test conditions was 12 days, in order to allow a full, uninterrupted duty/rest cycle to take place between testing. This ensured that the added workload from the first testing condition did not impact the subsequent testing condition. Subjects’ availability for the experiments varied due to work and personal schedules. The mean number of days between conditions was 32.4 (sd=24.5).

Following the rest condition, participants were free to drive themselves home immediately after testing. However, after participants completed the fatigued condition testing session, they were required to sleep in the laboratory or, if the laboratory sleeping rooms were unavailable, at a hotel at no charge to them, for 6 hours before driving home. This provided the opportunity for participants to obtain recovery sleep after being awake for an extended period of time.

For graves shift workers, testing began between 06:00-8:00 hours. For day shift workers, testing sessions began between 17:00-21:00 hours. For swing shift workers, testing began between 21:00-23:00 hours. For power shift workers, testing began between 03:00-05:00 hours. Each testing session lasted an average of 5 hours in the laboratory.

**Testing Process**

A trained research assistant was present at all times during the testing process to answer the participant’s questions, give instructions for each activity, and monitor his or her progress. When participants were performing tasks in a simulator or at a workstation, staff were able to observe him or her via closed circuit video cameras. The video files recorded were kept available until the close of the study and the final report had been submitted. The video files have been
deleted.

Each element of the intake and testing procedures will be listed in chronological order; the tasks reported in this analysis will be explained in greater detail below. Each participant moved through a detailed protocol (see appendix C):

**Intake Procedures**

- Retrieve actigraph and download data.
- Fit participant with a 5-lead EKG heart rate monitor.
- Participant sits in the driving simulator while the eye gaze tracking device is calibrated.
- Fit participant with a police uniform duty belt and a holster (participants were given the same make and model of holster they carried on duty).
- Show participant how the deadly force judgment and decision making simulator works and provide him or her with rules for interacting with the simulator.

**Testing Procedures Performed by Participants**

- Fill out the first of two Positive and Negative Affect Schedule (PANAS) questionnaires.
- Fill out the first of six Karolinska Sleepiness Scale (KSS) questionnaires.
- Takes the first of six psychomotor vigilance tests (PVT).
- Complete the first of two patrol driving simulations.
- Fill out the second of six KSS questionnaires.
- Take the second of six PVTs.
- Complete the second of two patrol driving simulations.
- Fill out the third of six KSS questionnaires.
- Take the third of six PVTs.
• Complete six deadly force judgment and decision making simulations.
• Fill out the fourth of six KSS questionnaires.
• Take the fourth of six PVTs.
• Perform a battery of cognitive tasks.
• Fill out the fifth of six KSS questionnaires.
• Take the fifth of six PVTs.
• Complete the drive home simulation.
• Fill out the sixth of six KSS questionnaires.
• Take the sixth of six PVTs.
• Fill out the second of two PANAS questionnaires.

Debrief Procedure

• Remove EKG.
• Remove holster and gun belt.
• Complete end-of-study questionnaire.
• Fatigued condition only
  o Provide a light meal,
  o Obtain 6 hours of recovery sleep.
  o Provide an opportunity to shower.

Description of Tests Relevant to Dissertation

Karolinska Sleepiness Scale (KSS)

The Karolinska Sleepiness Scale (KSS) is a brief, well-validated self-report assessment of
subjective sleepiness on a scale from 1 (extremely alert) to 9 (extremely sleepy—fighting sleep) and is also widely used in sleep research (Kaida et al., 2006). Participants complete the pen-and-paper KSS by marking the location on the scale that corresponds with their perceived sleepiness.

(see appendix N)

*Psychomotor Vigilance Tests (PVT)*

Participants took a total of 6 PVTs during each testing session. The PVT is a 10-minute long computerized task administered on a laptop computer (PVT, Pulsar model 2.0.5.9, Philadelphia, Penn.). The PVT is a well-validated and simple reaction-time task with high stimulus density. It measures participants’ ability to sustain attention (Lim and Dinges, 2008) and is the most widely used objective research measure of sleep-related fatigue. During each PVT, officers were asked to watch for a number to appear on a computer screen, then press the keyboard space bar as quickly as possible. The number appeared at random intervals ranging from 2 to 11 seconds. Once it appeared, the number on screen counted up in milliseconds until the spacebar was pressed. Participants completed from 72 to 98 tests during each experiment (mean = 93.8, sd=2.7). As is generally done in sleep research, a reaction time of less than 200ms was considered a ‘false start’ because it generally requires at least 200ms for people to perceive the stimulus, respond, and have the PVT device receive the signal. A reaction time longer than 500ms was considered a lapse in attention.

*Driving Simulations*

The driving simulations were conducted using a high fidelity computerized driving simulator (PatrolSim IV, L3 Communications MPRI, New York) (see figure 9). The simulator was adapted for driving measurement purposes by installing additional software and hardware
(Moore et al., 2009). The simulator itself used both software and hardware to realistically replicate the mechanics and driving characteristics of an actual car. Because changes in lane position are important for measuring driving performance, members of our research center previously assessed the realism of the manner in which changes in steering wheel position are translated into changes in vehicle heading, finding that they are realistically complex and reliable (See Forsman et al., 2013, for a complete description).

Figure 9: L3 Communications MPRI Patrol Sim IV. Image from 30 seconds into distracted driving task.

Patrol Drive

This task required the participant to drive for 16 minutes. The task was repeated, but the first and second drives were separated by a KSS and a PVT. The officer was asked to follow a
lead vehicle, keeping no farther than 100 feet away, during a rural freeway scenario. The lead vehicle traveled at 55 mph and braked at random intervals, continuing to brake until the officer applied the brakes of his/her own vehicle, a simulated Ford Crown Victoria. Once the officer applied more than 1% of the available braking pressure, the lead vehicle would accelerate back to 55 mph. The officer was instructed to remain in the right-hand lane of the freeway behind the lead vehicle, and there were no other vehicles in the scenario. During one of the two patrol drives, the officer was asked to complete a word search task, by interacting with a touch screen built into the dash of the simulator. This task simulates the operational requirement that officers interact with the mobile data computer found in their patrol vehicles. Officers were told to ignore the touch screen in the non-distracted patrol drive. Lane deviation and lane departures were measured on 7 1-mile perfectly straight zones (see figure 10).

Figure 10: Freeway circuit driven during patrol drive. Red zones depict the 7 1-mile straight sections of road where lane deviation and lane departures are measured.
Distraction Task

During one of the two drives, the officer was asked to interact with a word search task on the 9” wide x 12” high touch screen built into the simulator’s dashboard. The touch screen appeared to the right of the driver, 2” below the windscreen. After 30 seconds of driving, the officer received an onscreen message to ‘Start the MDC Task’. The officer interacted with the word search task at his or her own pace. The task required them to identify one of three words: ‘Discover’, ‘Project’, or ‘Mission’, and at a specific location in the line of text. ‘Discover’ had to be the first word in a line of three, ‘Project’ the second word, and ‘Mission’ the third. Three lines would appear at a time, and each iteration of the task had 10 lines of text; officers could scroll up and down to locate the correct line of text. Once the line of text with the correct word in the correct position was identified, the officer pressed a ‘select’ button. If the answer was correct, the officer could select a new set of words; if the selection was incorrect, he or she could try again. There was only one correct line in each iteration of the task. Officers could select a ‘Hint’ button if they forgot the words or their place in the line of text. Each letter was 3/8” in height (225% bigger than 12 point font) and each button was 1” x 2”. The text and button sizes were considerably larger than are typically found on an MDC. This distraction task is a modification of the in-vehicle information systems IVIS task (Donmez, et al., 2007), see figure 11.

This task was coded in Visual Basic for a 7” (diagonal measurement) touch screen. The original coding only recorded, into a comma separated values file, a time stamp to the nearest second for each correct answer. The author made major revisions to the original code to fit the task to the 9” x 12” touch screen. In addition to resizing the task, more data capture coding was added. The enhanced version used in this research required creating a time stamp to millisecond precision for each button press, and recording each incorrect line selected and its content to
enable error analyses (e.g. incorrect word or incorrect placement of word). Lastly, the ‘hint’ button was also added to allow for analysis of degradation in working memory.

Figure 11: Distraction Task: word search task on a 9” x 12” touch screen, in portrait orientation, built into the dash of the simulator. The touchscreen appeared to the right of the driver, 2” below the windscreen.
Figure 12: Data structure for patrol drive. Participants attended the laboratory on two separate occasions (one fatigued condition, the other rested condition) with a minimum of 12 days between sessions. During each session participants completed two drives; one distracted and one non-distracted.

Figure 12 shows the data structure for the patrol drive task. Participants conducted the patrol drive twice in each of the two sessions. One session was conducted in the rested condition and included a distracted and a non-distracted drive. The other session was conducted in the fatigued condition and included a distracted and a non-distracted drive. The order of the session, either rested or fatigued first, was randomly assigned. Similarly, the order of distracted or non-distracted drive first was also randomly assigned. During the officer’s second session, the order of distracted or non-distracted drive was reversed to counterbalance these drives for both learning and time-on-task effects.

**Drive Home**

During the drive home simulation that began about 4.3 hours into the research protocol (see figure 8 on page 50), participants drove a simulated Toyota Camry in a fixed-base, high-fidelity driving training simulator (L3 Communications, MPRI Patrol Sim IV, see figure 9).
Figure 13: Data structure for the drive home. Participants attended the laboratory on two separate occasions, once rested and once fatigued, with a minimum of 12 days between sessions. During each session participants completed a drive home simulation.

Figure 13 shows the data structure for the drive home task. Participants conducted the drive home in each of the two sessions. One session was conducted in the rested condition and one in the fatigued condition. The order of the sessions, either rested or fatigued first, was randomly assigned.

Officers drove standardized daytime driving scenarios in the simulator on a rural highway with no adverse weather or other vehicles. The 28-mile course was fixed, with ten 0.5-mile straight and uneventful segments, and eight 0.5-mile curved and uneventful road segments (see figure 14). Random events were placed at five to seven other locations around the track in which pedestrians or dogs would cross the road. Participants were instructed to maintain a speed of 55 mph around the track, stay in the same lane, and brake without swerving if a pedestrian or dog walked into the roadway at a leisurely pace. At that speed, *an alert person could readily stop* before striking them, so this was a conservative challenge. The drive home lasted approximately 30 minutes. In each condition, officers drove identical courses in which only the location and
timing of the pedestrian or dog events were varied along straight sections of the roadway. Conditions were counterbalanced to control for order effects between the two conditions by randomly assigning participants to have either the fatigued (51%) or rested (49%) condition first.

Figure 14: Structure of the 28-mile road course with measured 0.5 mile straights in red.

Figure 15 depicts the order the data used in this dissertation was collected. It also shows two variations of the randomization process.
Figure 15: Data used in this dissertation. Although more data on a larger number of tasks was collected during this experiment, only the data from the tasks listed below will be used in this dissertation. To highlight efforts to control for learning and order effects, the examples below show two of the four possible options for the randomly assigned condition and task order. The shift the officer was assigned to was fixed by their agency and not part of the randomized process.
Description of Sample

Our sample size was selected in a way that placed a premium on finding a relationship between work-related fatigue and performance in critical operational tasks such as driving - if it existed. This was appropriate because the consequences of poor performance are potentially catastrophic and the potential advantages of being able to better manage fatigue are great. Our challenge was to accomplish this in spite of concerns that variation associated with making the simulations appropriately realistic might mask performance effects. An earlier pilot study using the driving and deadly force simulators in a similar research design with 27 subjects working the graves shift\(^7\) established that they could detect significant effects for lane deviation and vigilance (Waggoner et al., 2012). The graves shift tends to have a greater impact on worker performance than other work shifts of similar length because it is contrary to both the body’s natural tendency to sleep at night and be awake during the day, and the rhythms of social life among the majority of the population. We accompanied the driving simulations with high-stimulus-load psychomotor vigilance tests (PVT) which provides a very sensitive and well-validated assays of fatigue. They are also predictors of driving performance degradation.

We set statistical significance at a Type I error rate of \(\alpha=0.05\) (one-tailed). Power calculations revealed that 80 subjects divided into four groups would allow us to detect an effect of the independent variables with an effect size as small as 0.2 with more than 80% power (Lipsey, 1990:92). Thus, with 80 subjects, we were confident that our study was sufficiently sensitive to meet Cohen’s criterion of less than 0.2 for the smallest worthwhile effect size (Cohen, 1988).

\(^7\)“Graves” or the “graveyard” shift typically starts during the early evening and extends through to the next morning.
Participants

All of the participants (n=80) were experienced police patrol officer volunteers who were assigned to full-time patrol work in the Spokane, Washington, Police Department (SPD). SPD is a medium-large municipal police agency with about 250 sworn, full-time officers. Of the 80 officers participating in the study, 78 completed both conditions. Only their data are included in the analyses presented here. These volunteers represented *about half of the patrol force assigned to each of four shifts*. Participants were asked to keep a normal routine during the study, with the exception of not accepting overtime assignments during the 72 hours prior to the rest condition. Participants' sleep was tracked objectively by wrist actigraphy (using the SBv2 ReadiBand by Fatigue Science, Vancouver, B.C.). These watch-sized devices record movement in one-minute bins as either sleep or awake. Subjective self reports of sleep were also collected using sleep diaries for five days prior to each condition. These diaries were used to corroborate actigraphy data and were to be used if actigraphy failed. No actigraphy failed during this study.

Roughly half of the officers worked night shifts that required them to get all or most of their sleep during the daytime, when it is most difficult for humans to fall asleep, sustain sleep, or sleep soundly (see reviews by Folkard, Lombardi and Tucker, 2005 and Folkard and Tucker, 2003). As table 1 shows, similar numbers of officers were recruited from all four patrol work shifts. On average, officers in the study were 40.4 years old and had 14.5 years of experience with SPD. Those on the Days (06:00-16:40) and Power (10:00-20:40) shifts (a.k.a. “night sleepers”) tended to be nine years older and have eight years more experience than those on the Swing (16:00-02:40) and Graves (20:00-06:40) shifts (a.k.a. “day sleepers”). Of the 80 officers, 11.3% were female; this is representative of the national average for a medium to large size
agency (≈ 250 sworn officers) (Bureau of Justice Statistics, 2010) and almost identical to the age/sex/experience averages within the agency. All but one female officer worked on either the Power or Swing shift. On average, officers’ one-way commute from home to work took about 24 minutes.

Table 1: Characteristics of police officer research participants on each work shift.

<table>
<thead>
<tr>
<th>Work Shift</th>
<th>Night Sleepers</th>
<th>Day Sleepers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Start/Finish Times</td>
<td>Days (06:00-16:40)</td>
<td>Power (10:00-20:40)</td>
</tr>
<tr>
<td>Fatigued condition</td>
<td>N=17</td>
<td>N=21</td>
</tr>
<tr>
<td>Rested condition</td>
<td>N=18</td>
<td>N=22</td>
</tr>
<tr>
<td>Male</td>
<td>100%</td>
<td>81.40%</td>
</tr>
<tr>
<td>Mean</td>
<td>46</td>
<td>43.9</td>
</tr>
<tr>
<td>SD</td>
<td>7.4</td>
<td>7.5</td>
</tr>
<tr>
<td>Age</td>
<td>21</td>
<td>16.6</td>
</tr>
<tr>
<td>Years Sworn Service</td>
<td>6.4</td>
<td>5.2</td>
</tr>
<tr>
<td>Commute one-way (min.)</td>
<td>00:25</td>
<td>00:13</td>
</tr>
</tbody>
</table>

Implications of Non-random (Volunteer) Sampling

Officers were recruited directly via posters and peer-led discussions during roll call with the permission of the department’s administration but without any encouragement from supervisors or superiors. During testing, watch commanders agreed to ensure that participants were relieved in time to come to the laboratory immediately after their last work shift in a cycle. Representativeness of the participants is a potential issue because of the non-random sampling design with regard to both the agency from which officers were recruited and the generalizability of results to police officers in the United States.
Representativeness of Subjects within the Department

We believe that our quasi-experimental research design and sample size made it very likely that the sample is representative of the department’s patrol force as a whole. Roughly half of the patrol force volunteered for the study and the within-subjects analysis of the impact of fatigue on performance meant that each subject served as his or her own control. The population was roughly evenly stratified between the four patrol shifts, and each of those shifts contained a different age cohort with substantial differences in age and experience between night sleepers and day sleepers (see table 1). There was no significant difference in age nor years of experience between officers that took part in the study, the remaining 50% of the patrol division⁸ that did not participate, those not assigned to patrol, nor the agency as a whole. The sample of officers in this study was representative of the agency, as can be seen in table 2.

Table 2: Age and years of sworn service of participants in relation to agency.

<table>
<thead>
<tr>
<th></th>
<th>Participants</th>
<th>All Patrol</th>
<th>Non-patrol</th>
<th>All Officers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Age</td>
<td>40.4</td>
<td>8.0</td>
<td>40.3</td>
<td>7.3</td>
</tr>
<tr>
<td>Years Sworn Service</td>
<td>14.5</td>
<td>7.5</td>
<td>13.0</td>
<td>7.2</td>
</tr>
</tbody>
</table>

⁸ De-identified demographic information on the patrol division was provided by SPD.
External Generalizability to Other Agencies

All of the officers who participated in this study came from the same, medium-sized policing agency. This was necessary in order to control their exposure to the central independent variable in this study: fatigue obtained in a genuine police environment. All of our subjects worked the same length shifts in the same mixed urban environment and for the same agency. Within their strata of the sample, they also worked the same time of day. This raises the question of how generalizable our results are likely to be to other agencies in the United States.

In order to assess generalizability, we compared the study population with national-level data on both demographics in similarly-sized policing agencies and workload as indicated by local crime rates and staffing levels. We also compared them with prior studies on officer fatigue, wellness, and operational performance in terms of demographic, experiential, and sleep characteristics. Because roughly 75% of all line-of-duty accidental deaths are vehicle-related, we also compared participants’ age, sex, and years of experience with those of officers who were killed accidentally in the line of duty during the last year for which data was available. The comparisons made below establish that our results are likely to be generalizable, although the level of work-related fatigue associated with their patrol work may be somewhat higher due to the agency’s substantially lower-than-average staffing ratios.

Few data are available at the national level for comparing our participants’ individual-level variables of interest, but there are sufficient indicators of workload. As table 3 shows, when compared with available national data, the proportion of male subjects is within 1.0% of the national average and the community rate for violent Uniform Crime Report (UCR) part I crimes is within 2.5% of the national average for cities with populations ≥100,000. Part I property crimes, however, are 2.3 times greater than the national average for cities ≥100,000, and the
sworn officer staffing level per 1,000 population is 64.3% lower than the national average.9 These coarse comparisons suggest that patrol officers in this study tend to have relatively high workloads when compared with urban police agencies. Higher workload may be expected to increase on-duty fatigue levels, which could result in officers being more fatigued during the on-duty (i.e., fatigued) condition. This increases the likelihood of capturing fatigue-related effects on driving performance if they exist.

Table 3: Representativeness of study officers, agency, and community crime rate (an indicator of officer workload) with the most recent data for local police agencies for communities ≥100,000 population in the United States (BJS, 2010).

<table>
<thead>
<tr>
<th>Officer/Agency/Community Characteristics</th>
<th>Study Agency</th>
<th>National Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>88.5%</td>
<td>87.5%</td>
</tr>
<tr>
<td>Agency staffing per 1,000 pop.</td>
<td>1.4</td>
<td>2.3</td>
</tr>
<tr>
<td>2012 crime rates compared to all U.S. cities ≥100,000 population10</td>
<td>645 Violent</td>
<td>8,730 Property</td>
</tr>
<tr>
<td></td>
<td>662 Violent</td>
<td>3,718 Property</td>
</tr>
</tbody>
</table>

Officers participating in the current study were also very similar to those from each of the prior studies of officer fatigue, wellness, and performance. Table 4 compares research participant similarity in age, years of sworn service, commute time to work, and self-reported recent average sleep per day from the following studies:

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9 This agency’s patrol division was so understaffed at the time of the study that it did not respond to routine property crimes. SPD press release October 2011.

• The highly detailed ongoing longitudinal BCOPS study (Violanti et al., 2009; Charles et al., 2007) collects data on hundreds of biological, psychological, work-hours, and demographic variables from nearly all of the officers in a single medium-large police department (patrol and other assignments);

• The Harvard police sleep study (Rajaratnam et al., 2011) used clinical assessments of officers from two agencies as well as survey studies of thousands of officers from across the United States (patrol and other assignments, plus 3% of subjects from Canada and Australia);

• The NIJ Police Work Shift study (Amendola et al., 2011) used experimental and clinical measures with two larger-sized police agencies (patrol officers only); and

• The NIJ Tired Cops study (Vila, 2000; Vila, Morrison and Kenney, 2002) used experimental and clinical measures with four medium-sized police agencies in different regions of the United States (patrol officers only).

As table 5 shows, the participants' demographic and experiential characteristics also are very similar to those from officers who died accidentally in 2013, the last year for which LEOKA data are available (FBI 2013). Historically, roughly half of all on-duty officer deaths in the United States are accidental, and vehicle-related deaths account for about 75% of all accidental deaths (Houser et al. 2004).
Table 4: Representativeness: Comparison of officer participants’ demographic, experiential, and sleep characteristics between this study and prior research on police sleep and fatigue.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>78</td>
<td>419</td>
<td>4,957</td>
<td>275</td>
<td>379</td>
</tr>
<tr>
<td>Population characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>40.2 7.9</td>
<td>42.1 7.3</td>
<td>38.5 8.3</td>
<td>36.0 7.6</td>
<td>34.8 8.6</td>
</tr>
<tr>
<td>Years sworn service</td>
<td>14.5 7.4</td>
<td>15.3 7.2</td>
<td>12.7 8.1</td>
<td>6.9 5.8</td>
<td>9.4 6.8</td>
</tr>
<tr>
<td>Commute time (min.)</td>
<td>24.0 11.9</td>
<td>16.4 5.4</td>
<td>NA NA</td>
<td>18.4 0.2</td>
<td>26.5 13.7</td>
</tr>
<tr>
<td>Recent avg. sleep/day</td>
<td>6.5 1.3</td>
<td>6.1 1.2</td>
<td>NA NA</td>
<td>7.7 1.1</td>
<td>6.6 1.4</td>
</tr>
</tbody>
</table>

Table 5: Representativeness: Comparison of officer participants' demographic and experiential characteristics with those of officers who were killed accidentally in 2013.

<table>
<thead>
<tr>
<th>Current Study</th>
<th>LEOKA 2013 Accidental Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean / %</td>
<td>Mean / %</td>
</tr>
<tr>
<td>Age (years)</td>
<td>40.2</td>
</tr>
<tr>
<td>Years sworn service</td>
<td>15</td>
</tr>
<tr>
<td>% Male</td>
<td>89%</td>
</tr>
</tbody>
</table>

\(^{11}\) Commute and sleep data were unavailable from the authors at the time this dissertation was written.
Variables

Driving Data in General

Data was sampled from the driving simulator at 72Hz; 72 rows of data on vehicle state (speed, direction, throttle pressure, brake pressure, etc.) and scenario variables (lane position, distance to other vehicles, etc.) were collected every second.

Lane Deviation

Lane deviation, the amount the officer’s own vehicle moved laterally relative to the center of the lane. During the patrol drives lane deviation was measured on seven straight road sections that were one mile long. During the drive home lane deviation was measured on ten straight road sections that were a half mile long. A participant who maintained a perfectly straight course would have a lane deviation value of zero. The greater the value for lane deviation, the less attention the participant dedicated to their driving performance.

Lane Departures

Participants were instructed to remain in the center of their driving lane. Lane departures are a count of each time all or part of the simulated vehicle crossed the painted white line bounding the allocated driving lane. Lane departures were measured on the same straight sections of road as lane deviation. Given that the driving lane within the simulation was 4m wide, and the simulated Ford Crown Victoria in the simulation is marginally less than 2m wide (1.96m), the vehicle would have to travel laterally more than 1m to leave its driving lane. Although lane departures can be viewed as a gross measure of lane deviation, they were
measured separately because they have more significance. Varying position within a driving lane is a correlate of inattention. When this variation takes the vehicle outside its lane, it adds considerably to the risk of a collision.

**Breaking Latency**

During the 15-minute patrol drive scenario, the officer’s braking latency was measured 36 times. Braking latency is the time measured in milliseconds between events; in this case, the lead vehicle applying its brakes, and the participant applying his or her own brakes.

**Distance from Lead Vehicle and Collisions**

Officers were asked to maintain a constant distance from, and stay within 100 feet of, the lead vehicle. Participants chose their own distance behind the lead vehicle within this margin. Distance between the participant’s simulated vehicle and the lead vehicle in the scenario was measured in feet. Finally, number of collisions with the lead vehicle was measured.

**Analytical Models**

IBM SPSS (v. 23.0.0.0, New York, N.Y.) was used for statistical analysis. Since the research protocol involved multiple observations per participant, the data violated the assumption of independence. To allow for this, a generalized linear mixed effects model with a hierarchal structure was used. These types of models use a combination of ANOVA and regression and are designed to deal with data that have multiple layers or that are hierarchical. In this case, the “layers” of data are participants and individual responses. Thus, individual data points from
within each experimental group cannot be considered independent from each other because they may be grouped or “clustered” around the responding participant.
RESULTS

Tests for normality

The tests for normality (Kolmogorov-Smirnov and Shapiro-Wilk) found that outcome variables were not normally distributed. A visual inspection of the distribution (histograms) showed that each of the outcome variables was slightly positively skewed (to the right). This indicated that some participants had considerably great lane deviation, more lane departures, took longer to brake, and allowed a greater distance between their vehicle and the lead vehicle, regardless of the independent variables. Given that these participant’s scores are accurate reflections of their simulated driving performance and not measurement anomalies the decision was made not to remove or transform data.

Descriptive Statistics

Kass and colleagues (2007) suggested that experience with dual tasks (driving and a distraction task) mitigated some of the risks of distracted driving. The current study sought to address the question of whether a text-based distraction has a negative impact on police officer driving performance. The experienced police patrol officers (n=80) who participated in this study were all assigned to the patrol division from SPD. All routinely drove a police cruiser while operating an MDC. As was discussed previously, the mean age of officers in this study was 40 years old (SD = 8.4) with an average length of service of 14.3 years (SD = 7.5). The sample of officers in this study accounted for half the patrol division of the agency. Almost a third of them (32.5%) had had at least one on-duty collision during the 3 years prior, and 6.3% were involved in an off-duty collision during that period.
Five driving performance measures were considered in this analysis: lane deviation, lane departures, braking latency, following distance, and collisions. The negative effects of distraction on driving performance can be observed at the aggregate level, see table 6.

Table 6: Driving Performance. Results of non-distracted versus distracted driving performance. Large individual differences were observed in baseline driving performance, reflected in the standard deviations below.

<table>
<thead>
<tr>
<th>Performance Measures</th>
<th>Non-distracted (N=141)</th>
<th>Distracted (N=144)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Lane Deviation</td>
<td>0.26</td>
<td>0.09</td>
</tr>
<tr>
<td>Number of Lane Departures</td>
<td>3.21</td>
<td>6.19</td>
</tr>
<tr>
<td>Mean Braking Latency (sec)</td>
<td>1.47</td>
<td>0.43</td>
</tr>
<tr>
<td>Mean Following Distance (m)</td>
<td>43.43</td>
<td>12.86</td>
</tr>
<tr>
<td>Number of Collisions</td>
<td>0.01</td>
<td>0.08</td>
</tr>
</tbody>
</table>

Lane Deviation for Patrol Drive

Average lane deviation for non-distracted driving was 0.26 (SD=0.09) compared to 0.39 (SD=0.18) for distracted driving. A generalized linear mixed effects model analysis of driving performance showed that officers’ distracted driving performance had significantly greater lane deviation (F=88.58, df=1, 308, p<0.001), see figure 16.\(^{12}\)

\[^{12}\] Lane deviation \((l)\) is calculated as \(l = \sqrt{\frac{1}{N-1} \sum_{i=1}^{N} (x_i - \bar{x})^2}\) where \(N\) is the number of observations per drive and \(\sum_{i=1}^{N} (x_i - \bar{x})^2\) is the sum of the variation from mean lane position squared. Seventy-two observations per second were collected.
Figure 16: Mean Lane Deviation for Distracted and Non-Distracted Driving. Lateral movement from true course (zero) is measured plus (lateral movement right) and minus (lateral movement left) in meters. See footnote 2 for further explanation on lane deviation calculations.

**Lane Departures for Patrol Drive**

Average number of lane departures for non-distracted driving was 3.21 (SD=6.19) compared to 9.35 (SD=8.85) for distracted driving. Instances of officers unintentionally leaving their assigned driving lane was also significantly correlated with distracted driving ($F=64.76$, $df=1, 308, p<0.001$), see figure 17.
Figure 17: Mean Lane Departures for Distracted and Non-Distracted Driving. Lane departures are a count of each time all or part of the simulated vehicle crossed the painted white line bounding the allocated driving lane. Lateral movement greater than 1m from the requested lane position was required for a lane departure.

**Breaking Latency for Patrol Drive**

Average mean braking latency\(^\text{13}\) for non-distracted driving was 1.47 seconds (SD=0.43) compared to 2.45 seconds (SD=0.74) for distracted driving. Braking latency was greater during distracted drives (F=200.82, df=1, 308, p<0.001) than during non-distracted drives, see figure 18. These measures are leading indicators for collision risk. The greater the latency, the greater the chance there will be insufficient time and distance to slow sufficiently to avoid a collision.

---

\(^{13}\) *Average mean braking latency* refers to the average of all mean braking latency measures; where mean braking latency is derived from a single drive measured 36 times over 15 minutes.
Figure 18: Mean Braking Latency, in seconds, for Distracted and Non-Distracted Driving. Mean braking was calculated from 36 individual braking instances. Participants were asked to react to the lead vehicle applying its brakes.

Distance from Lead Vehicle and Collisions for Patrol Drive

Average mean following distance\(^{14}\) for non-distracted driving was 43.43 feet (SD=12.86) compared to 51.96 feet (SD=15.75) for distracted driving. While officers interacted with the distraction task, they tended to drive significantly farther behind the lead vehicle (F=22.55, df=1, 308, p<0.001), yet collided with the lead vehicle more frequently (F=9.96, df=1, 308, p=0.002),

\(^{14}\) Average mean following distance refers to the average of all mean following distances measured; where mean following distance was derived from a single drive measured at 72Hz for 15 minutes.
see figure 19. Of the 23 collisions from 22 officers observed during the course of this study, *only one occurred during a non-distracted drive*, see figure 20.

![Figure 19: Mean Following Distance, in feet, between the participant’s vehicle and the lead vehicle for Distracted and Non-Distracted Driving.](image_url)
Officer Sleep

Across both conditions (rested and fatigued) there was no significant difference between day shifts (days and power) and night shifts (swing and graves) in the amount of sleep officers received prior to participating in the study. Participants assigned to the days shift slept an average of 7.0 hours. (SD=1.1), power 7.4 hours. (SD=1.1), swing 7.2 hours. (SD = 1.5), and graves shift 7.2 hours. (SD=1.7) in a 24 hour period.

There were highly significant differences in the amount of sleep officers received per 24-hour period in the 72 hours preceding their participation in the rested- and fatigued-condition experiments as calculated by one-way ANOVA. As table 6 details, on average, days shift officers slept 1.6 hrs. more each day while off duty before the rested condition (F=28.9, df=1,33,
swing shift officers slept 1.3 hrs. more each day while off duty before the rested condition \((F=7.3, df=1,30, p=0.011)\); and graves shift officers slept 2.2 hrs. more each day while off duty before the rested condition \((F=36.35, df=1,38, p<.001)\). Each of these groups slept significantly less during their work week, with graves shift officers sleeping the least and relying more on their off-duty days to catch up on sleep.

However, officers on power shift did not significantly vary the amount of sleep they acquired between on-duty and off-duty workdays. This likely is because their shift (10:00-20:40) allows ample time to sleep at night without the burden of getting up early enough for the 06:00 days shift. On average, they slept only 0.5 hrs. more each day while off duty before the rested condition than during on-duty days \((SD=0.8, F=2.1, df=1,40, p=0.151)\).

**Officer Age**

The age of officers participating in this study ranged from 28 to 58 years old. As table 6 shows, although the age distribution appears normal across the sample, age is not normally distributed between work shifts. Officers at the upper age range tend to be on days and the younger officers tend to work nights. Age can interact with circadian disprution to affect performance (Forsman & Van Dongen, 2013). We tested this hypothesis using a general linear mixed effects model to control for condition, time of day, prior sleep, and hours awake. Of the four shifts only the power shift did not show a significant relaionship between age and reaction time during the PVT. The other three shifts showed a significant inverse relationship; however, the effect size of age on reaction time was small. Each additional year in age reduced day-shift officers’ average reaction time by 2.9ms \((F=7.11, df=4, 29, p=0.012)\), power shift officers by 2.4ms per year \((F=5.40, df=5, 34, p=0.026)\), and graves shift by 6.8ms per year \((F=6.77, df=5, p=0.001)\).
When examining the effect of age on driving performance measures, the only significant relationship was between the graves shift and lane deviation. This inverse relationship accounted for 1 centimeter of variation per year of age. This means that, on average, for every year older a participant gets, HIS OR HER lane deviation decreased by 1 cm (but only for graves shift officers). This analysis uses a mixed effects multilevel model where each participant is the highest unit of analysis (session being the second and drive iteration being the third). The mean number of days between testing session was 32.4 (SD=24.5), age therefore would account for less than 1/10th of a centimeter of variation between sessions. Since, the standard deviation in lane deviation was 17cm across all drives (drive home), This small effect size associated with age was not considered further in these analyses.

Collisions by Work Shift

Generalized linear mixed effects model analyses of driving performance showed that officers working night shifts (swing and power shifts) had significantly greater collisions during post-shift, non-operational driving than those working day shifts (F=4.40, df=1, 150, p=0.038).

Recall that the Days shift worked 06:00-16:40, the Power shift worked 10:00-20:40, the Swing shift worked 16:00-02:40, and the Graves shift worked 20:00-06:40.

More simulated collisions occurred in the fatigued condition compared to the rested condition, and this effect was much stronger for day-sleeping officers (swing and graves shifts). Among days-shift officers, 11% of rested-condition drives ended in a collision vs. 19% of fatigued-condition drives. Officers assigned to the power shift had slightly fewer collisions during the fatigued condition (14% of fatigued-condition drives ended in a collision vs. 15% of rested-condition drives). However, one of the power-shift officers had two collisions in one
fatigued-condition drive, making the total number of collisions in the fatigued condition higher than those during the rested condition. The lack of significant finding for the Power shift is not surprising as their prior sleep, time awake, and time of day are not significantly different between conditions. The effect of fatigue during the swing shift was much greater than during either of the night-sleeping shifts. Among swing-shift officers, only 6% of rested-condition drives ended in a collision, compared with 41% of fatigued condition drives. Among grave-shift officers, 14% of rested-condition drives ended in a collision, compared to 22% of fatigued-condition drives. Interestingly, collisions increased at the same rate between conditions for both graves and days officers, although the graves-shift officers started at a higher base rate (14% collision rate for rested grave-shift officers vs. 11% collision rate for days-shift officers). Figure 21 illustrates these findings.

**Prior Sleep, Fatigue Predictors, and Driving Performance**

A within- and between-subjects design was used to compare participants’ performance by shift in the fatigued and rested conditions using well-established driving performance metrics, such as the standard deviation of a vehicle’s position within the lane, leaving the assigned lane, and braking latency that are strong predictors of the likelihood of a collision. The design also was used to assess the predictive power of the relatively simple PVT and KSS instruments. PVT and KSS scores are potentially important practical indicators of fatigue because predicting fatigue in real time is complex—one must assess the combined influence of time of day, time awake, and prior sleep. If PVT or KSS are strong predictors, they would be relatively easy to use in the field to help manage fatigue.
In the between-subjects analysis, there was considerable variation between-subjects in PVT response times (rt), PVT lapses of attention (rt > 500ms), KSS self-assessed sleepiness scores, and driving performance. A general linear mixed-effects model was used to control for between-subject variation by using repeated measures to compare participants’ fatigued performance against their own rested performance. In other words, the method allowed each participant to serve as his or her own control.
Table 7: Rested vs. Fatigued-condition relationships between participants’ regular work shift and work hours and performance variables measuring reaction time, vigilance, self-assessed alertness, driving precision, braking latency, and collisions.

<table>
<thead>
<tr>
<th></th>
<th>All Shifts</th>
<th>Days 06:00-16:40</th>
<th>Power 10:00-20:40</th>
<th>Swing 16:00-02:40</th>
<th>Graves 20:00-06:40</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td><strong>PVT Response Times (ms)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rested</td>
<td>298.17</td>
<td>68.74</td>
<td>270.78</td>
<td>45.41</td>
<td>294.73</td>
</tr>
<tr>
<td>Fatigued</td>
<td>332.10</td>
<td>113.71</td>
<td>286.00</td>
<td>59.83</td>
<td>311.24</td>
</tr>
<tr>
<td>Difference</td>
<td>33.93*</td>
<td></td>
<td>15.22</td>
<td></td>
<td>16.51</td>
</tr>
<tr>
<td><strong>PVT Lapses (Response Times &gt; 500ms)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rested</td>
<td>3.00</td>
<td>5.07</td>
<td>1.22</td>
<td>2.29</td>
<td>2.32</td>
</tr>
<tr>
<td>Fatigued</td>
<td>5.12</td>
<td>7.21</td>
<td>2.06</td>
<td>4.66</td>
<td>4.00</td>
</tr>
<tr>
<td>Difference</td>
<td>2.12*</td>
<td></td>
<td>0.84</td>
<td></td>
<td>1.68</td>
</tr>
<tr>
<td><strong>KSS Scores (1 to 9)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rested</td>
<td>5.71</td>
<td>1.96</td>
<td>4.83</td>
<td>1.58</td>
<td>6.68</td>
</tr>
<tr>
<td>Fatigued</td>
<td>7.35</td>
<td>1.42</td>
<td>5.88</td>
<td>1.58</td>
<td>7.71</td>
</tr>
<tr>
<td>Difference</td>
<td>1.64***</td>
<td></td>
<td>1.05</td>
<td></td>
<td>1.03**</td>
</tr>
<tr>
<td><strong>Lane Deviation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rested</td>
<td>0.36</td>
<td>0.14</td>
<td>0.34</td>
<td>0.15</td>
<td>0.35</td>
</tr>
<tr>
<td>Fatigued</td>
<td>0.37</td>
<td>0.20</td>
<td>0.30</td>
<td>0.11</td>
<td>0.34</td>
</tr>
<tr>
<td>Difference</td>
<td>0.01</td>
<td></td>
<td>-0.04</td>
<td></td>
<td>-0.01</td>
</tr>
<tr>
<td><strong>Braking Latency (sec)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rested</td>
<td>1.35</td>
<td>0.20</td>
<td>1.30</td>
<td>0.18</td>
<td>1.37</td>
</tr>
<tr>
<td>Fatigued</td>
<td>1.40</td>
<td>0.20</td>
<td>1.34</td>
<td>0.17</td>
<td>1.41</td>
</tr>
<tr>
<td>Difference</td>
<td>0.05</td>
<td></td>
<td>0.04</td>
<td></td>
<td>0.04</td>
</tr>
<tr>
<td><strong>Collisions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rested</td>
<td>0.15</td>
<td>0.45</td>
<td>0.11</td>
<td>0.32</td>
<td>0.15</td>
</tr>
<tr>
<td>Fatigued</td>
<td>0.26</td>
<td>0.50</td>
<td>0.19</td>
<td>0.40</td>
<td>0.19</td>
</tr>
<tr>
<td>Difference</td>
<td>0.11</td>
<td></td>
<td>0.08</td>
<td></td>
<td>0.04</td>
</tr>
</tbody>
</table>

15 KSS Scores (1 = extremely alert, 3 = alert, 5 = neither alert nor sleepy, 7 = sleepy—but no difficulty remaining awake, 9 = extremely sleepy—fighting sleep). Significance levels (*** =<.001, **=<.01, *=<.05)
Prior sleep

While controlling for time-of-day effects, we tested a model containing the average amount of sleep a participant had for the previous 72 hours and how long he or she had been awake at testing. The model significantly predicted probability of a collision ($F=4.00$, $df=3.144$, $p=0.009$). Table 8 below shows the breakdown of this relationship between the four work shifts, which are illustrated in figure 22. As was observed when comparing collisions during rested vs. fatigued conditions, the day-, swing-, and graves-shifts showed significant between-condition differences in the amount of sleep officers obtained prior to the experimental protocol, but the power-shift effect was not significant.

![Figure 22: Average hours of sleep obtained by participants during the 72 hours preceding experiments in each condition.](image-url)
Table 8: Average hours of sleep obtained by participants during the 72 hours preceding experiments in each condition and the significance of the difference between conditions.

<table>
<thead>
<tr>
<th>Sleep (hrs.) in previous 72 hrs.</th>
<th>Rested</th>
<th>Fatigued</th>
<th>Total</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Days (06:00 – 16:40)</td>
<td>23.24</td>
<td>2.62</td>
<td>18.72</td>
<td>2.49</td>
</tr>
<tr>
<td>Power (10:00 – 20:40)</td>
<td>22.88</td>
<td>3.67</td>
<td>21.32</td>
<td>2.49</td>
</tr>
<tr>
<td>Swing (16:00 – 02:40)</td>
<td>23.48</td>
<td>4.52</td>
<td>19.50</td>
<td>3.77</td>
</tr>
<tr>
<td>Graves (20:00 – 06:40)</td>
<td>25.70</td>
<td>4.63</td>
<td>18.49</td>
<td>2.93</td>
</tr>
</tbody>
</table>

Significance levels (*** = <.001, ** = <.01, * = <.05)
Fatigue Predictors

The utility of the objective Psychomotor Vigilance Test (PVT) and the subjective Karolinska Sleepiness Scale (KSS) self-report for use as indicators of fatigue in police officers was assessed by comparing each instrument's ability to predict fatigue-related impairment as calculated from direct measures of the three most important factors causing sleep-related fatigue. A generalized linear mixed effects model was used to analyze PVT results for the four work shifts while controlling for time awake before testing, the amount of sleep participants had obtained during the previous 72 hours, and condition (rested or fatigued). We found that officers on the days shift had significantly faster PVT reaction times (rt) (F=2.87, df=6,140, p=0.011) and fewer lapses of attention (rt>500ms) (F=2.71, df=6,140, p=0.016) than those assigned to the graves shift.

KSS scores for the four work shifts were analyzed using the same method as for the PVT. Time awake before testing, the amount of sleep participants had obtained during the previous 72 hours, and work shift were all significant in the model predicting KSS scores (F=12.6, df=5,144, p<0.001). Officers’ work shifts showed the greatest effect using this statistical model (F=14.0, df=3,144, p<0.001). Given that both PVT and KSS were indicators of fatigue levels, we next assessed their respective abilities to predict officer driving performance.

PVT and KSS as Driving Performance Predictors

As was discussed previously, driving performance was assessed in the experiments using the standard deviation of lane position and braking latency, both of which are well-validated predictors of collisions. Assessing these leading indicators of increasing risk of collision could
make it possible to prevent collisions by intervening before risks exceed some predetermined threshold. However, measuring lane deviation in the field is difficult because lane position requires the ability to measure position relative to constantly changing roadway edges and lane markers. Similarly, braking latency requires knowledge of the time a stimulus to provoke breaking first appeared (e.g., the brake lights of a vehicle ahead or a person or vehicle pulling onto the roadway ahead). Therefore, PVT and KSS would currently be easier measures to implement than either lane deviation or braking latency.

As expected, in our generalized linear mixed effects model analyses greater lane deviation significantly predicted collisions ($F=25.06, df=1,150, p<0.001$). This effect was particularly strong for both the day shift ($F=23.62, df=1,32, p<0.001$) and the graves shift ($F=19.28, df=1,41, p<0.001$). Braking latency also significantly predicted collisions ($F=4.54, df=1,146, p=0.035$), with the strongest effect observed for the swing ($F=6.43, df=1,32, p=0.016$) and graves shifts ($F=7.12, df=1,39, p=0.011$). When considered together, both lane deviation ($F=34.24, df=1,145, p<0.001$) and braking latency ($F=13.65, df=1,145, p<0.001$) significantly predicted collisions ($F=19.58, df=2,145, p<0.001$). All but the power shift showed strong effects between lane deviation, braking latency, and collisions: day shift ($F=11.00, df=2,31, p<.001$), swing shift ($F=5.62, df=2,21, p=0.008$), and once again the strongest effects were found in the graves shift ($F=21.33, df=2,38, p<0.001$).

Using the same method as was used above for lane deviation and braking latency, we found that changes in an officer’s PVT reaction times ($F=14.10, df=1,151, p<0.001$), PVT lapses ($F=5.33, df=1,151, p=0.022$), and KSS scores ($F=4.80, df=1,150, p=0.030$) were all significant predictors of collision.
A generalized linear mixed effects model was then used to analyze the relationship between lane deviation and PVT results. Psychomotor vigilance test scores for reaction time predicted both lane deviation (F=31.48, df=1, 151, p<0.001) and collisions (F=14.10, df=1,151, p<0.001) during the simulated drives. Increased PVT reaction times predicted participants’ increased lane deviation (F=50.83, df=1,150, p<0.001) and more lapses of attention also predicted increased lane deviation (F=25.86, df=1,150, p<0.001). This effect was strongest with the graves shift for both reaction times (F=31.33, df=1,41, p<0.001) and lapses of attention (F=25.86, df=1,41, p<0.001). When controlling for shift, a generalized linear mixed effects model also showed that increased PVT reaction times significantly predicted greater braking latency (F=2.72, df=4,143, p=0.032), as did increased PVT lapses of attention (F=6.48, df=1,146, p=0.12). As before, the graves shift produced the strongest relationships (F=5.05, df=1,39, p=0.030).

KSS also predicted lane deviation using these methods, with higher self-reported fatigue scores predicting greater lane deviation by participants (F=4.10, df=1,149, p=0.045). KSS scores also had greater predictive power in relation to braking latency (F=9.62, df=1,145, p=0.02), with higher KSS scores predicting greater braking latency.
Interaction Effects of Distraction and Fatigue

Participants completed four patrol drives under four different conditions: non-distracted rested, distracted rested, non-distracted fatigued, and distracted fatigued. This allowed for an examination of the interaction effects between distraction and fatigue. The patrol drive was not ideally suited to this purpose due to the relatively short duration of the drive—16 minutes, which is generally not long enough to expect fatigue-related time-on-task effects to emerge (Jackson et al., 2013; NCSDR & NHTSA, n.d.). For this reason a deeper analysis of the drive was required. Within the multi-level model the seven 1-mile zones were considered independently. When faced with a routine task, such as driving, a person can focus attention for a short amount of time even when fatigued. As the individual continues to perform the degradation due to time-on-task may affect their performance. By separating the performance measures for lane deviation and lane departure for the 7 zones from each of the four drives and considering them in an ordinal fashion we can tease apart time-on-task effects from the effects of distraction and fatigue.

A generalized linear mixed model was used to analyze the relationship between lane deviation, distraction, work shift and the interaction between distraction and work shift. The duration the participant was awake (hours) and the average amount of sleep (hours) per 24 hours in the last 72 hours were controlled for within the model. The model was significant (F=32.62, df=9, 1830, p<.001) and all elements of the model, apart from the average amount of sleep per 24 hours in the last 72 hours. This analysis found a significant impact for distraction (F=220.97, df=1, 1830, p<0.001), work shift (F=15.43, df=1, 1968, p<0.001), time awake (F= 4.87, df=1, 1830, p=.028) and the distraction/shift interaction (F=3.19, df=2, 1830, p=0.023). Figure 23 presents the impact of distraction, work shift, and the interaction between distraction and work shift on lane deviation.
A generalized linear mixed model was used to analyze the relationship between lane departures, distraction, work shift and the interaction between distraction and work shift. The duration the participant was awake (hours) and the average amount of sleep (hours) per 24 hours in the last 72 hours were controlled for within the model. The model was significant (F=30.67, \(df=9\), 1830, \(p<.001\)) and all elements of the model, apart from the time awake were significant. This analysis found a significant impact for distraction (F=185.96, \(df=1\), 1830, \(p<0.001\)), work shift (F=15.87, \(df=3\), 1830, \(p<0.001\)), average amount of sleep per 24 hours in the last 72 hours (F= 21.18, \(df=1\), 1830, \(p<.001\)) and the distraction/shift interaction (F=4.08, \(df=3\), 1830, \(p=0.007\)). Figure 24 presents the impact of distraction, work shift, and the interaction between distraction and work shift on lane departures.

Figure 23: Interaction effects of distraction and work shift on lane deviation. Work shift is depicted by line color, mean lane deviation per work shift for non-distracted drives on the left and mean lane deviation per work shift for distracted drives on the right.
There was no significant interaction between distracted driving and work shift of braking latency. When considering the outcome of the drive as a whole, whether or not there was a collision, we again see an interaction effect between distraction and working graves shift. Figure 25 presents the impact of distraction, graves work shift, and the interaction between distraction and graves work shift on number of collisions. This analysis found a significant impact on the probability of a collision for distraction ($F=14.90$, $df=1, 305$, $p<0.001$), graves shift ($f=4.89$, $df=1, 305$, $p=0.028$), and distraction/shift interaction ($F=4.81$, $df=1, 305$, $p=0.029$). The entire corrected fixed-effects model also was highly significant ($F=4.250$, $df=5, 274$, $p<0.001$). The effect of distraction was >3 times stronger than any of the other variables in this model.
Figure 25: Interaction effects of distraction and working graves shift on collisions. The green bars represent officers not assigned to graves shift, the red bars those on graves shift. The bars on the left represent mean collisions for non-distracted driving, the bars on the right represent mean collisions per drive for distracted driving.
DISCUSSION, IMPLICATIONS, LIMITATIONS AND FUTURE RESEARCH

Officer safety is a critically important issue for law enforcement agencies, trainers, researchers, and policy makers. However, vehicle collisions—one of the largest sources of officer injuries and deaths—are often neglected by agency executives, policy makers, and researchers. For example, the largest focus of training resources is on use-of-force and firearms issues, which tended to receive 40% more training time than vehicle operations in U.S. law enforcement academies (Hickman, 2005). Those issues also probably receive the lion’s share of public and policymaker attention.

The lack of attention to officer-involved traffic collisions is critically important. The number of law enforcement officers who die in vehicle collisions is greater than the number who die from felonious assault each year. Many more officers are routinely injured in collisions than are killed. For example, in a large study of all California law enforcement collisions over a 10 year period, the majority (75.6%) were found to be the officer’s fault (Wolfe, Rojek, Alpert, Tiesman, & James, 2015). Many of these collisions (37.2%) involved another vehicle, usually one containing one or more members of the general public. The emotional and financial impact of officer-involved traffic collisions directly adds to the challenges facing law enforcement in the 21st century as stated by former U.S. Attorney General Eric Holder (Vila, 2012):

1. Public perceptions of police
2. Reduced budgets and staffing
3. Health and safety

Law enforcement collisions that injure or kill members of the public degrade public perceptions of police. This is compounded if the cause of the collision is distraction and/or
fatigue because it reduces the public perceptions of fair and just policing. In most states an officer can cite citizens, and in some states judges can add a sentence enhancement, for the very same behaviors that cause law enforcement collisions. Yet officers are exempt from these laws.

Motor vehicle collisions are costly; especially when they involve fatalities. The federal government (through the Public Safety Officers' Benefits Program) pays the survivors or beneficiaries a minimum of $333,605 (BJA, n.d.). In addition, a report by the National Highway Traffic Safety Administration (NHTSA) estimated that the average fatal vehicle collision had an approximate total cost of $1.4 million (Blincoe et al., 2014). This estimate includes such costs as medical care, lost market productivity, legal expenses, emergency services, and property damage. NHTSA estimated that, on average, 9% of these costs would be paid by federal and state governments for collisions that resulted in the death of members of the public. In the case of a law enforcement officer fatality, however, these costs tend to be borne almost entirely by federal, state, and local governments.

The effect of collisions due to distraction and/or fatigue on officer health and safety is plain to see. Officers involved in motor vehicle collisions often suffer injuries that require anything from a single day off work to ending their careers, or even their lives. For the last 15 years, on average, motor vehicle collisions have been the leading cause of on-duty officer deaths.

This study is the largest experimental examination of the effects of distraction, fatigue, and their interaction on law enforcement driving performance and provides an important improvement in our understanding of the risks officers face. It builds on the current distracted driving literature in three important ways. First, the study used current law enforcement officers assigned to their agency’s patrol division. This addresses the question of experience mitigating some of the negative impact of distraction on driving performance. As the results of this study
show law enforcement officers appear to drive significantly worse while distracted, their routine experience with using text-based communication devices while driving does not appear to mitigate the risks associated with doing so. Second, the word-search text-based distraction task used in the patrol drive simulation is an appropriate proxy for the text-based MDC distraction officers are faced with during their normal duty driving. The text is more visible and the buttons for interaction are larger than what is found on a typical MDC screen. The placement of the touch screen is more in-line with the direction of gaze required to see the road in front of the officer than the typical placement of the MDC, which is lower and further right. Third, the protocol required the officer to drive for 15 minutes and then get out of the ‘vehicle’ to perform another task. The short duration of each drive is more congruent with patrol driving.

This dissertation adds to the current drowsy driving literature on the impact of work-shift related fatigue on driving performance. This study is important because it tested actual shift workers, under conditions of fatigue gain in a naturalistic setting, with a population that routinely drives motor vehicles while fatigued. The results of this study can help inform the discussion on shift duration and start times within policing. It could give executives, collective bargaining units, and risk managers a better understanding of the risks associated with driving a motor vehicle while fatigued.

Lastly, prior to this study there had not been an examination of the impact of the interaction effects of distraction and fatigue on driving performance. Understanding this interaction will allow for a more accurate assessment of the risks associated with driving distracted while also fatigued.
Summary of Findings

Our results suggest law enforcement officers’ driving performance is degraded with distraction and continuing to allow officers to drive distracted may place the officer, their passengers, and other road users at greater risk. Law enforcement officers are typically exempt from distracted driving restrictions imposed on the general public, but the mounting research on this topic is moving towards non-distracted driving being the usual and accepted practice. If policing organizations do not modify policies, practices, training, and technologies to reduce the impact of distraction on officers’ driving, they may expose themselves and their officers to legal liabilities and charges of deliberate indifference. Failing to address the issue of distracted driving for law enforcement officers exposes officers and the communities they serve to greater risk of accidents and injuries.

The drive home experiment assessed the likely impact of fatigue on driving immediately after the last shift in a five-day work cycle of 10:40-hr. shifts, making it applicable to both drowsy driving during the commute home and driving during extended work shifts. Because direct prediction of fatigue is complex, we used three approaches to assessing participant's fatigue impairment: (a) lane deviation and braking latency in a high-fidelity police driving simulator, (b) a well-validated instrument for objective measurement of vigilance and reaction time (PVT), and (c) a subjective self-report of sleepiness (KSS). This combination of measurement approaches increases confidence in our results by providing what Campbell referred to as "convergent validity" (Campbell & Fiske, 1959).

We found that our police-officer participants' driving performance was significantly impacted by fatigue. Both the objective PVT and the subjective KSS measures predicted changes in the probability of a collision in the study—-with PVT producing a stronger prediction than
KSS. This indicates that these relatively simple tools could be used in field settings to assess officers’ fatigue levels. However, stopping to take a PVT or fill out the KSS often may be impractical in the field. For this reason, well-established performance measures taken while driving, such as lane deviation and braking latency, could also be used to predict collisions. These measures are important *leading indicators of decay in driving performance* that could provide a basis for in-vehicle early warning systems. These early warning systems could be used to prevent collisions by monitoring performance changes before an officer is too impaired to do more than pull off the road.

Braking latency also can be obtained from the data stream on the patrol vehicle's on-board computer. Although lane deviation is difficult to measure consistently in operational settings, it can be approximated very well by measuring steering-wheel movement variability (Forsman et al. 2013)—which can also be obtained from the on-board computer.

The shifts that officers worked also significantly affected driving performance and the probability of a collision. Officers working night shifts (swing and graves) had more collisions and greater lane deviation than those working day shifts (days and power). Night shift officers also took longer to react to the PVT stimuli and had more lapses of attention.

Finally, we found an interaction effect between fatigue and distraction on lane deviation, lane departures, and lane collisions.

These findings are important because although most policing agencies have policies, practices, and training intended to improve workplace driving safety, drowsy driving on the way home from work has largely been overlooked. Our findings indicate that this may be a critical oversight and that drowsy police officers—especially those working night shifts—are at greater
risk for collisions.

**Implications**

We know that law enforcement agencies perceive MDC usage as a potential risk because so many agencies have adopted policies to restrict their use. If agencies are aware that MDC usage while driving is an issue, simply adding a policy to their policy manual that restricts the use of MDCs is not enough. The policy must be enforced and it must have an impact. If it does not, it will not meet the requirements necessary to protect the municipality from “willful neglect” lawsuits. In that case, even though agencies may have provided a policy, such action may be judged insufficient unless it restricts the actions of their employees.

As was the case with pursuit driving, litigation forced change on the law enforcement community. If a successful law suit under The Public Health and Welfare Act, 42 U.S.C. §1985 is brought against the state, county, or a municipality, they may not be able to protect themselves if they knowingly allow officers to operate MDCs while driving and fail to restrict dangerous actions via policy or training; change may be forced on them again.

**Policy & Training**

Police officers are not immune to the dangers of distracted driving. Agencies should implement policies that restrict distractions to officers while they are driving. This may be in restricting the use of communication, especially text-based communication, while driving. Alternatively the distraction load could be given to another officer. Agencies should explore the option of having two person patrol vehicles.
When assigning communications related distractions to a second officer is not possible other policy, training, and technology solutions should be explored. Policy restricting the use of text based communications while the vehicle is in motion, or over a designated speed, may prove successful if supervision and agency culture are brought into line with the new policy.

Training officers in the dangers of distracted driving may help to reduce the practice of operating text based communications while driving. However policy and expectations of dispatch, supervisors, and executives must also be in line with the behavioral change objectives of the training. Within any law enforcement agencies a holistic approach must be taken to align agency culture, with training objects, policy, and expectations of dispatch, supervisors, and executives.

Another possible solution is to integrate the in-built vehicle diagnostics device and/or GPS devices with text based communications devices. This integration could limit access to text based communications devices in a variety of ways. It could be as simple as turning off the screen while the vehicle is in motion or over a designated speed. More sophisticated integration could restrict access based on location using geo-fencing (e.g. a school zone) or based on traffic density (via onboard sensors or traffic camera data). Other potential solutions include increasing font size in line with increasing vehicle speeds and/or restricting the type and amount of data viewed based on vehicle speed, location, traffic density, etc.

What is central to this discussion is understanding what information an officer needs while on route to a call for service and what is the safest, most efficient way to deliver that information based on the call type, the exigency of the circumstances of the call for service, the
external considerations (e.g. posted road speeds, time of day/lighting, weather, location) and the internal considerations (e.g. fatigue level of the officer).

Policing agencies should develop policies to help ensure that officers are not too tired to drive home safely after shift. Practical measures employed in many operational settings include: establishment of a post-shift napping room, providing a ride home to officers who are likely to be overly drowsy, training officers to manage the challenges associated with shift work and fatigue, and establishing supervisor and peer-based monitoring for post-shift fatigue risks.

Agencies can also consider the fundamentals of their shift scheduling. How long is the shift? When in the 24 hour day does it start and finish? How long have officers been awake/on shift while they are being asked to drive in heavy traffic? Who is being held over for overtime? If graves shift are most impaired due to fatigue should they be held over on overtime or should the power shift, those least fatigued, be brought in early to cover the extra duties?

As two-way data communications between dispatch and police vehicles become more robust and able to handle greater through put of data (e.g. dedicated 4g data networks) real time monitoring of officers driving performance is possible. Once an officer starts to drive outside his or her normal performance envelope a warning can be sent to the officer in the vehicle and/or to dispatch. With such an early warning system protective counter measures can be put in place to limit the risk from either distraction or fatigue.

Until changes in culture, policy, training, or technology can address this problem what is urgently needed is to consider those most at risk; officers with a high distraction load that also work night shift. Agencies should consider the modality of communications systems, such as computer aided dispatch, for night shift officers working alone.
Limitations

The simulated driving tasks presented, both distracted and non-distracted, were generally less challenging than real world patrol driving and likely underestimate the impact of distraction on police driving. As with any experimental research using simulated tasks, it must be acknowledged that the tasks participants are presented with may not illicit the same response as they would in the real word; participants understand that there are no real consequences for poor performance and therefore it is possible that the results of this study overestimate the impact of distraction on police driving.

The patrol drive task may have been too short in duration to accurately assess the impact of the interaction between distraction and fatigue on police officer performance. Although differences in within-individual performance can be observed from the beginning of the patrol drive, a longer drive with a distraction task may have revealed a greater interaction effect.

Future Directions

The study design for this project benefited from incurring fatigue from real world behavior. This aids in the translation of research to practice when engaging with practitioners through publications, workshops, sponsored talks, and conferences. The sacrifice for this benefit is a lack of control over one of the two main independent variables: fatigue. Officers came to the rested and fatigued conditions with differing levels of fatigue as a result of works shifts, family life, and prior sleep. A repeat of the experimental testing process combined with laboratory
controlled sleep/wake cycles prior to testing would allow a more powerful analysis of the impact fatigue has on officer performance.

As stated in the methodology section; officers completed more tasks than were reported here. The deadly force judgment and decision making task was physiologically arousing. Further analysis of the physiological data while preforming the deadly force judgment and decision making task and subsequent driving performance data may give us an insight into the effects of stressful police operations on driver safety. The interaction between arousing behavior and subsequent fatigue related performance degradation is an area that deserves further exploration.

Conclusion

The four goals identified in the statement of purpose in chapter one were: 1) examine the impact of distraction on police driving; 2) assess the impact of operational fatigue associated with shift work and long work hours on police driving; 3) identify fatigue indicators that can be used to warn officers when their driving performance is becoming degraded, and; 4) examine the interaction between distraction and fatigue, and its impact on police driving performance. All four of these goals have been achieved.

The results of this research are consistent with the premise that distraction impairs driving performance, as measured by lane deviation, lane departure, braking latency, distance from lead vehicle, and collisions. Fatigue and night shift work were also found to impair driving performance in the areas of lane deviation, and collisions. Several measures of fatigue were found to predict impaired driving performance that could be used as early warning indicators. Both the PVT and KSS instruments significantly predicted collisions. Furthermore, breaking
latency and lane deviation also significantly predicted collisions, suggesting that these variables could be used as an indicator of risk in the future.

The distraction/fatigue interaction was found to significantly affect lane deviation, lane departures, and collisions. Further research is required to fully understand the nature of this interaction.

Given that motor vehicle collisions are the leading cause of police officer on-duty deaths, it is critically important to understand and mitigate the upstream causes of collisions. This dissertation has advanced the state of knowledge regarding the effects of fatigue and distraction on simulated driving performance in police officers.


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APPENDIX A – LEGISLATIVE TEXT RELATING TO ALL DRIVER BAN ON HAND HELD CELL PHONE USE

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Statutory Language for cellular phone hand-held bans

Updated October 2014

Arkansas


Handheld wireless telephone use when driving
(a) Except as otherwise provided in subsection (b) of this section, a driver of a motor vehicle shall not use a handheld wireless telephone for wireless interactive communication while operating a motor vehicle.

(b)(1) A driver of a motor vehicle may use a handheld wireless telephone for wireless interactive communication in emergencies.

(2) A person performing his or her official duties as a certified law enforcement officer, firefighter, ambulance driver, or emergency medical technician is exempt from the requirements of this section.

California

Vehicle Code Section 23123

Hand-Held Wireless Telephone: Prohibited Use

(a) A person shall not drive a motor vehicle while using a wireless telephone unless that telephone is specifically designed and configured to allow hands-free listening and talking, and is used in that manner while driving.

(b) A violation of this section is an infraction punishable by a base fine of twenty dollars ($20) for a first offense and fifty dollars ($50) for each subsequent offense.

(c) This section does not apply to a person using a wireless telephone for emergency purposes, including, but not limited to, an emergency call to a law enforcement agency, health care provider, fire department, or other emergency services agency or entity.
(d) This section does not apply to an emergency services professional using a wireless telephone while operating an authorized emergency vehicle, as defined in Section 165, in the course and scope of his or her duties.

(e) This section does not apply to a person when using a digital two-way radio that utilizes a wireless telephone that operates by depressing a push-to-talk feature and does not require immediate proximity to the ear of the user, and the person is driving one of the following vehicles:

(1) (A) A motor truck, as defined in Section 410, or a truck tractor, as defined in Section 655, that requires either a commercial class A or class B driver’s license to operate.

(B) The exemption under subparagraph (A) does not apply to a person driving a pickup truck, as defined in Section 471.

(2) An implement of husbandry that is listed or described in Chapter 1 (commencing with Section 36000) of Division 16.

(3) A farm vehicle that is exempt from registration and displays an identification plate as specified in Section 5014 and is listed in Section 36101.

(4) A commercial vehicle, as defined in Section 260, that is registered to a farmer and driven by the farmer or an employee of the farmer, and is used in conducting commercial agricultural operations, including, but not limited to, transporting agricultural products, farm machinery, or farm supplies to, or from, a farm.

(5) A tow truck, as defined in Section 615.
(f) This section does not apply to a person driving a school bus or transit vehicle that is subject to Section 23125.

(g) This section does not apply to a person while driving a motor vehicle on private property.

(h) This section shall become operative on July 1, 2008, and shall remain in effect only until July 1, 2011, and, as of July 1, 2011, is repealed.

Connecticut

Public Act No. 05-159

Section 1. (NEW) (Effective October 1, 2005) (a) For purposes of this section, the following terms have the following meanings:

(1) "Mobile telephone" means a cellular, analog, wireless or digital telephone capable of sending or receiving telephone communications without an access line for service.

(2) "Using" or "use" means holding a hand-held mobile telephone to, or in the immediate proximity of, the user's ear.

(3) "Hand-held mobile telephone" means a mobile telephone with which a user engages in a call using at least one hand.

(4) "Hands-free accessory" means an attachment, add-on, built-in feature, or addition to a mobile telephone, whether or not permanently installed in a motor vehicle, that, when used, allows the vehicle operator to maintain both hands on the steering wheel.
(5) "Hands-free mobile telephone" means a hand-held mobile telephone that has an internal feature or function, or that is equipped with an attachment or addition, whether or not permanently part of such hand-held mobile telephone, by which a user engages in a call without the use of either hand, whether or not the use of either hand is necessary to activate, deactivate or initiate a function of such telephone.

(6) "Engage in a call" means talking into or listening on a hand-held mobile telephone, but does not include holding a hand-held mobile telephone to activate, deactivate or initiate a function of such telephone.

(7) "Immediate proximity" means the distance that permits the operator of a hand-held mobile telephone to hear telecommunications transmitted over such hand-held mobile telephone, but does not require physical contact with such operator's ear.

(b) (1) Except as otherwise provided in this section and section 2 of this act, no person shall operate a motor vehicle upon a highway, as defined in subsection (a) of section 14-1 of the general statutes, while using a hand-held mobile telephone to engage in a call while such vehicle is in motion. (2) An operator of a motor vehicle who holds a hand-held mobile telephone to, or in the immediate proximity of, his or her ear while such vehicle is in motion is presumed to be engaging in a call within the meaning of this section. The presumption established by this subdivision is rebuttable by evidence tending to show that the operator was not engaged in a call. (3) The provisions of this section shall not be construed as authorizing the seizure or forfeiture of a hand-held mobile telephone, unless otherwise provided by law. (4) Subdivision (1) of this subsection does not apply to: (A) The use of a hand-held mobile telephone for the sole purpose of communicating with any of the following regarding an emergency situation: An emergency
response operator; a hospital, physician's office or health clinic; an ambulance company; a fire department; or a police department, or (B) any of the following persons while in the performance of his or her official duties and within the scope of his or her employment: A peace officer, as defined in subdivision (9) of section 53a-3 of the general statutes, a firefighter or an operator of an ambulance or authorized emergency vehicle, as defined in subsection (a) of section 14-1 of the general statutes, or the operator of a taxi cab, tow truck or bus without passengers, or (C) the use of a hands-free mobile telephone.

Sec. 2. (NEW) (Effective October 1, 2005) (a) No person shall use a hand-held mobile telephone or other electronic device, including those with hands-free accessories, while operating a moving school bus that is carrying passengers, except that this section does not apply to (1) a school bus driver who places an emergency call to school officials, or (2) the use of a hand-held mobile telephone as provided in subparagraph (A) of subdivision (4) of subsection (b) of section 1 of this act.

(b) No person who holds a learner's permit or any holder of a motor vehicle license subject to the requirements of subsection (d) of section 14-36 of the general statutes shall use any hand-held mobile telephone, including one with a hands-free accessory, while operating a moving motor vehicle on a public highway except as provided in subparagraph (A) of subdivision (4) of subsection (b) of section 1 of this act.

Sec. 3. (NEW) (Effective October 1, 2005) Any person who violates section 1 of this act shall be fined not more than one hundred dollars, except that the fine shall be suspended for a first time violator who provides proof of acquisition of a hands-free accessory subsequent to the violation but prior to the imposition of a fine.
Sec. 4. (NEW) (Effective October 1, 2005) Any person who violates section 2 of this act shall be fined not more than one hundred dollars.

Sec. 5. (NEW) (Effective October 1, 2005) Except as provided in sections 1 and 2 of this act, no person shall engage in any activity not related to the actual operation of a motor vehicle in a manner that interferes with the safe operation of such vehicle on any highway, as defined in subsection (a) of section 14-1 of the general statutes.

Sec. 6. (NEW) (Effective October 1, 2005) An operator of a motor vehicle who commits a moving violation, as defined in subsection (a) of section 14-111g of the general statutes, while engaged in any activity prohibited under section 5 of this act shall be fined one hundred dollars in addition to any penalty or fine imposed for the moving violation.

Sec. 7. (NEW) (Effective October 1, 2005) Any law enforcement officer who issues a summons for a violation of section 1, 2 or 6 of this act shall record, on any summons form issued in connection with the matter, the specific nature of any distracted driving behavior observed by such officer that contributed to the issuance of such summons.

Sec. 8. Subsection (b) of section 51-164n of the general statutes is repealed and the following is substituted in lieu thereof (Effective October 1, 2005):

### Delaware

Del. Code Ann. § 4176C.

Electronic communication devices; penalties.
“(a) No person shall drive a motor vehicle on any highway while using an electronic communication device while such motor vehicle is in motion.

(b) For the purposes of this section, the following terms shall mean:

(1) ‘cell telephone’ shall mean a cellular, analog, wireless or digital telephone.

(2) ‘electronic communication device’ shall mean a cell telephone, personal digital assistant, electronic device with mobile data access, laptop computer, pager, broadband personal communication device, two-way messaging device, electronic game, or portable computing device.

(3) ‘hands-free electronic communication device’ shall mean an electronic communication device that has an internal feature or function, or that is equipped with an attachment or addition, whether or not permanently part of such electronic communication device, by which a user engages in a call without the use of either hand or both hands.

(4) ‘hands-free equipment’ shall mean the internal feature or function of a hands-free electronic communication device or the attachment or addition to a hands-free electronic communication device by which a user may engage in a call without the use of either hand or both hands.

(5) ‘engages or engaging in a call’ shall mean when a person talks into or listens on an electronic communication device, but shall not mean when a person dials or punches a phone number on an electronic communication device.

(6) ‘using’ shall mean holding in a person’s hand or hands an electronic communication device while:
a. Viewing or transmitting images or data;

b. Playing games;

c. Composing, sending, reading, viewing, accessing, browsing, transmitting, saving or retrieving e-mail, text messages or other electronic data; or

d. Engaging in a call.

(c) Subsection (a) of this section shall not apply to:

(1) a law-enforcement officer, a firefighter, an emergency medical technician, a paramedic or the operator of an authorized emergency vehicle in the performance of their official duties;

(2) a person using an electronic communication device to report to appropriate authorities a fire, a traffic accident, a serious road hazard, or medical or hazardous materials emergency, or to report the operator of another motor vehicle who is driving in a reckless, careless or otherwise unsafe manner or who appears to be driving under the influence of alcohol or drugs, or to report any crime.

(3) a person using a cell telephone who is operating a school bus and covered under §4176B of this title;

(4) a person engaging in a call with a hands-free electronic communication device while utilizing hands-free equipment and such person does not hold the hands-free electronic communication device in such person’s hand or hands; and
(5) the activation or deactivation of hands-free equipment or a function of hands-free equipment.

(6) a person driving or operating an unregistered farm tractor, farm truck or farm equipment.

(7) Use of an amateur radio by an FCC-licensed amateur radio operator during emergency conditions requiring such use.

(d) Whoever violates this section shall for the 1st offense be subject to a civil penalty of $50. For each subsequent offense the person shall be subject to a civil penalty of not less than $100 nor more than $200.

(e) No motor vehicle points shall be assessed for a violation of this section. Additionally, a violation of this section shall not be made a part of a person’s driving record.”.

Section 2. The provisions of this Act shall preempt the provisions of a municipal or county enactment regulating the use of any electronic communication device by a person driving a motor vehicle.

Section 3. This Act shall take effect 180 days after its enactment into law.

Hawaii

Hawaii Rev. Stat. § 291C-137

Mobile electronic devices
(a) No person shall operate a motor vehicle while using a mobile electronic device.

(b) The use of a mobile electronic device for the sole purpose of making a “911” emergency communication shall be an affirmative defense to this law.

(c) No person under eighteen years of age shall operate a motor vehicle while utilizing a hands-free mobile electronic device, except for the sole purpose of making a “911” emergency communication.

(d) The following persons shall be exempt from subsection (a):

1. Emergency responders using a mobile electronic device while in the performance and scope of their official duties;

2. Drivers using a two-way radio or a private Land Mobile Radio System, within the meaning of title 47 Code of Federal Regulations part 90, while in the performance and scope of their work-related duties and who are operating fleet vehicles or who possess a commercial vehicle license;

3. Drivers holding a valid amateur radio operator license issued by the Federal Communications Commission and using a half-duplex two-way radio; or

4. Drivers of vehicles that are at a complete stop, while the engine is turned off, in a safe location by the side of the road out of the way of traffic.

(e) As used in this section:

“Emergency responders” includes firefighters, emergency medical technicians, mobile intensive care technicians, civil defense workers, police officers, and federal and state law enforcement officers.
“Fleet vehicle” means any vehicle validly registered pursuant to section 286-53.5.

“Mobile electronic device” means any handheld or other portable electronic equipment capable of providing wireless or data communication between two or more persons or of providing amusement, including but not limited to a cellular phone, text messaging device, paging device, personal digital assistant, laptop computer, video game, or digital photographic device, but does not include any audio equipment or any equipment installed in a motor vehicle for the purpose of providing navigation, emergency assistance to the operator of the motor vehicle, or video entertainment to the passengers in the rear seats of the motor vehicle.

“Operate” a motor vehicle means to drive or assume actual physical control of the vehicle upon a public way, street, road, or highway, including operation while temporarily stationary because of traffic, a traffic light, or a stop sign.

“Use” or “using means holding a mobile electronic device while operating a motor vehicle.

(f) Every person who violates this section shall be subject to a fine of $250 that shall be deposited into the state highway fund; provided that if a person violates this section while operating a motor vehicle in a school zone or construction area, as defined in section 291C-104, the fine shall be $300, which shall be paid to the director of finance pursuant to section 291C-171.

(g) Any violation as provided in subsections (a) and (c) shall be deemed to be a traffic infraction as defined in section 291D-2.

(h) This section shall supersede any county ordinance regulating the use or utilization of mobile electronic devices while operating a motor vehicle.
Electronic communication devices.

(a) As used in this Section:

“Electronic communication device” means an electronic device, including but not limited to a hand-held wireless telephone, hand-held personal digital assistant, or a portable or mobile computer, but does not include a global positioning system or navigation system or a device that is physically or electronically integrated into the motor vehicle.

(b) A person may not operate a motor vehicle on a roadway while using an electronic communication device.

(b-5) A person commits aggravated use of an electronic communication device when he or she violates subsection (b) and in committing the violation he or she was involved in a motor vehicle accident that results in great bodily harm, permanent disability, disfigurement, or death to another and the violation was a proximate cause of the injury or death.

(c) A second or subsequent violation of this Section is an offense against traffic regulations governing the movement of vehicles. A person who violates this Section shall be fined a maximum of $75 for a first offense, $100 for a second offense, $125 for a third offense, and $150 for a fourth or subsequent offense.

(d) This Section does not apply to:
(1) a law enforcement officer or operator of an emergency vehicle while performing his or her official duties;

(2) a driver using an electronic communication device for the sole purpose of reporting an emergency situation and continued communication with emergency personnel during the emergency situation;

(3) a driver using an electronic communication device in hands-free or voice-operated mode, which may include the use of a headset;

(4) a driver of a commercial motor vehicle reading a message displayed on a permanently installed communication device designed for a commercial motor vehicle with a screen that does not exceed 10 inches tall by 10 inches wide in size;

(5) a driver using an electronic communication device while parked on the shoulder of a roadway;

(6) a driver using an electronic communication device when the vehicle is stopped due to normal traffic being obstructed and the driver has the motor vehicle transmission in neutral or park;

(7) a driver using two-way or citizens band radio services;

(8) a driver using two-way mobile radio transmitters or receivers for licensees of the Federal Communications Commission in the amateur radio service;

(9) a driver using an electronic communication device by pressing a single button to initiate or terminate a voice communication; or
(10) a driver using an electronic communication device capable of performing multiple functions, other than a hand-held wireless telephone or hand-held personal digital assistant (for example, a fleet management system, dispatching device, citizens band radio, or music player) for a purpose that is not otherwise prohibited by this Section.

(e) A person convicted of violating subsection (b-5) commits a Class A misdemeanor if the violation resulted in great bodily harm, permanent disability, or disfigurement to another. A person convicted of violating subsection (b-5) commits a Class 4 felony if the violation resulted in the death of another person.

Maryland
Md. Trans. Code 21-1124.2.

Use of handheld telephone while driving prohibited

2) A DRIVER OF A MOTOR VEHICLE THAT IS IN MOTION MAY NOT USE THE DRIVER’S HANDS TO USE A HANDHELD TELEPHONE OTHER THAN TO INITIATE OR TERMINATE A WIRELESS TELEPHONE CALL OR TO TURN ON OR TURN OFF THE HANDHELD TELEPHONE.

(E) A POLICE OFFICER MAY ENFORCE THIS SECTION ONLY AS A SECONDARY ACTION WHEN THE POLICE OFFICER DETAINS A DRIVER FOR A SUSPECTED VIOLATION OF ANOTHER PROVISION OF THE CODE.
(F) (1) A PERSON CONVICTED OF A VIOLATION OF THIS SECTION IS SUBJECT TO THE FOLLOWING PENALTIES:

(I) FOR A FIRST OFFENSE, A FINE OF NOT MORE THAN $100; AND

(II) FOR A SECOND OR SUBSEQUENT OFFENSE, A FINE OF $250.

(2) FOR A FIRST OFFENSE UNDER THIS SECTION, POINTS MAY NOT BE ASSESSED AGAINST THE INDIVIDUAL UNDER § 16-402 OF THIS ARTICLE UNLESS THE OFFENSE CONTRIBUTES TO AN ACCIDENT.

Nevada

Nev. Rev. Stat. § 484B.165

1. Except as otherwise provided in this section, a person shall not, while operating a motor vehicle on a highway in this State:

   (a) Manually type or enter text into a cellular telephone or other handheld wireless communications device, or send or read data using any such device to access or search the Internet or to engage in nonvoice communications with another person, including, without limitation, texting, electronic messaging and instant messaging.

   (b) Use a cellular telephone or other handheld wireless communications device to engage in voice communications with another person, unless the device is used with an accessory which
allows the person to communicate without using his or her hands, other than to activate, deactivate or initiate a feature or function on the device.

2. The provisions of this section do not apply to:

(a) A paid or volunteer firefighter, emergency medical technician, ambulance attendant or other person trained to provide emergency medical services who is acting within the course and scope of his or her employment.

(b) A law enforcement officer or any person designated by a sheriff or chief of police or the Director of the Department of Public Safety who is acting within the course and scope of his or her employment.

(c) A person who is reporting a medical emergency, a safety hazard or criminal activity or who is requesting assistance relating to a medical emergency, a safety hazard or criminal activity.

(d) A person who is responding to a situation requiring immediate action to protect the health, welfare or safety of the driver or another person and stopping the vehicle would be inadvisable, impractical or dangerous.

(e) A person who is licensed by the Federal Communications Commission as an amateur radio operator and who is providing a communication service in connection with an actual or impending disaster or emergency, participating in a drill, test, or other exercise in preparation for a disaster or emergency or otherwise communicating public information.
(f) An employee or contractor of a public utility who uses a handheld wireless communications device:

(1) That has been provided by the public utility; and

(2) While responding to a dispatch by the public utility to respond to an emergency, including, without limitation, a response to a power outage or an interruption in utility service.

3. The provisions of this section do not prohibit the use of a voice-operated global positioning or navigation system that is affixed to the vehicle.

4. A person who violates any provision of subsection 1 is guilty of a misdemeanor and:

(a) For the first offense within the immediately preceding 7 years, shall pay a fine of $50.

(b) For the second offense within the immediately preceding 7 years, shall pay a fine of $100.

(c) For the third or subsequent offense within the immediately preceding 7 years, shall pay a fine of $250.

5. A person who violates any provision of subsection 1 may be subject to the additional penalty set forth in NRS 484B.130.

6. The Department of Motor Vehicles shall not treat a first violation of this section in the manner statutorily required for a moving traffic violation.
7. For the purposes of this section, a person shall be deemed not to be operating a motor vehicle if the motor vehicle is driven autonomously through the use of artificial-intelligence software and the autonomous operation of the motor vehicle is authorized by law.

**New York**

Vehicle and Traffic Law Section 1225c.

§ 1225-c. Use of mobile telephones. 1. For purposes of this section, the following terms shall mean:

(a) "Mobile telephone" shall mean the device used by subscribers and other users of wireless telephone service to access such service.

(b) "Wireless telephone service" shall mean two-way real time voice telecommunications service that is interconnected to a public switched telephone network and is provided by a commercial mobile radio service, as such term is defined by 47 C.F.R. § 20.3.

(c) "Using" shall mean holding a mobile telephone to, or in the immediate proximity of, the user's ear.

(d) "Hand-held mobile telephone" shall mean a mobile telephone with which a user engages in a call using at least one hand.

(e) "Hands-free mobile telephone" shall mean a mobile telephone that has an internal feature or function, or that is equipped with an attachment or addition, whether or not permanently part of such mobile telephone, by which a user engages in a call without the use of either
hand, whether or not the use of either hand is necessary to activate, deactivate or initiate a function of such telephone.

(f) "Engage in a call" shall mean talking into or listening on a hand-held mobile telephone, but shall not include holding a mobile telephone to activate, deactivate or initiate a function of such telephone.

(g) "Immediate proximity" shall mean that distance as permits the operator of a mobile telephone to hear telecommunications transmitted over such mobile telephone, but shall not require physical contact with such operator's ear.

2. (a) Except as otherwise provided in this section, no person shall operate a motor vehicle upon a public highway while using a mobile telephone to engage in a call while such vehicle is in motion.

(b) An operator of a motor vehicle who holds a mobile telephone to, or in, the immediate proximity of his or her ear while such vehicle is in motion is presumed to be engaging in a call within the meaning of this section. The presumption established by this subdivision is rebuttable by evidence tending to show that the operator was not engaged in a call.

(c) The provisions of this section shall not be construed as authorizing the seizure or forfeiture of a mobile telephone, unless otherwise provided by law.

3. Subdivision two of this section shall not apply to (a) the use of a mobile telephone for the sole purpose of communicating with any of the following regarding an emergency situation: an emergency response operator; a hospital, physician's office or health clinic; an ambulance company or corps; a fire department, district or company; or a police department, (b) any of the following persons while in the performance of their official duties: a police officer or peace officer; a member of a fire department, district or company; or the operator of an authorized
emergency vehicle as defined in section one hundred one of this chapter, or (c) the use of a hands-free mobile telephone.

4. A violation of subdivision two of this section shall be a traffic infraction and shall be punishable by a fine of not more than one hundred dollars.

**New Jersey**

39:4-97.3. Use of hands-free and hand-held wireless communication devices while driving; when permitted; penalty

a. The use of a wireless telephone or electronic communication device by an operator of a moving motor vehicle on a public road or highway shall be unlawful except when the telephone is a hands-free wireless telephone or the electronic communication device is used hands-free, provided that its placement does not interfere with the operation of federally required safety equipment and the operator exercises a high degree of caution in the operation of the motor vehicle. For the purposes of this section, an “electronic communication device” shall not include an amateur radio.

b. The operator of a motor vehicle may use a hand-held wireless telephone while driving with one hand on the steering wheel only if:

(1) The operator has reason to fear for his life or safety, or believes that a criminal act may be perpetrated against himself or another person; or

(2) The operator is using the telephone to report to appropriate authorities a fire, a traffic accident, a serious road hazard or medical or hazardous materials emergency, or to report the
operator of another motor vehicle who is driving in a reckless, careless or otherwise unsafe
manner or who appears to be driving under the influence of alcohol or drugs. A hand-held
wireless telephone user's telephone records or the testimony or written statements from
appropriate authorities receiving such calls shall be deemed sufficient evidence of the existence
of all lawful calls made under this paragraph.

As used in this act, “hands-free wireless telephone” means a mobile telephone that has an
internal feature or function, or that is equipped with an attachment or addition, whether or not
permanently part of such mobile telephone, by which a user engages in a conversation without
the use of either hand; provided, however, this definition shall not preclude the use of either hand
to activate, deactivate, or initiate a function of the telephone.

“Use” of a wireless telephone or electronic communication device shall include, but not be
limited to, talking or listening to another person on the telephone, text messaging, or sending an
electronic message via the wireless telephone or electronic communication device.

c. (Deleted by amendment, P.L.2007, c. 198).

d. A person who violates this section shall be fined $100.

e. No motor vehicle points or automobile insurance eligibility points pursuant to section 26 of
P.L.1990, c. 8 (C.17:33B-14) shall be assessed for this offense.

f. The Chief Administrator of the New Jersey Motor Vehicle Commission shall develop and
undertake a program to notify and inform the public as to the provisions of this act.

g. Whenever this section is used as an alternative offense in a plea agreement to any other
offense in Title 39 of the Revised Statutes that would result in the assessment of motor vehicle
points, the penalty shall be the same as the penalty for a violation of section 1 of P.L.2000, c. 75 (C.39:4-97.2), including the surcharge imposed pursuant to subsection f. of that section, and a conviction under this section shall be considered a conviction under section 1 of P.L.2000, c. 75 (C.39:4-97.2) for the purpose of determining subsequent enhanced penalties under that section.

New Hampshire

N.H. Rev. Stat. § 265:79-c

Use of Mobile Electronic Devices While Driving; Prohibition.

I. (a) No person, while driving a moving motor vehicle upon a way or temporarily halted in traffic for a traffic control device or other momentary delay, shall use any hand-held mobile electronic device capable of providing voice or data communication, including but not limited to: reading, composing, viewing, or posting any electronic message; or initiating, receiving, or conducting a conversation; or initiating a command or request to access the Internet; or inputting information into a global positioning system or navigation device; or manually typing data into any other portable electronic device. An operator of a motor vehicle who holds a cellular telephone or other electronic device capable of voice communication in the immediate proximity of his or her ear while such vehicle is in motion is presumed to be engaging in a call within the meaning of this section.

(b) “Driving,” for the purposes of this section, shall not include when a person is behind the controls of a vehicle that has pulled to the side of or off the road at a location where it is legal to do so and where the vehicle remains stationary.
II. It shall not be an offense under this section for any person driving a motor vehicle upon a way:

(a) To make use of a cellular telephone or other electronic device capable of voice communication to report an emergency to the enhanced 911 system or directly to a law enforcement agency, fire department, or emergency medical provider.

(b) To use one hand to transmit or receive messages on any non-cellular 2-way radio.

(c) To use a Bluetooth enabled or other hands-free electronic device, or a similar device that is physically or electronically integrated into a motor vehicle, for such a purpose to send or receive information provided the driver does not have to divert his or her attention from the road ahead.

As used in this section, “hands-free electronic device” means a mobile electronic device that has an internal feature or function, or that is equipped with an attachment or addition, whether or not permanently part of such mobile electronic device, by which a user engages in conversation without the use of either hand; provided, however, this definition shall not preclude the use of either hand merely to activate, deactivate, or initiate a function of the telephone.

III. Any person who violates this section shall be guilty of a violation and shall be fined $100 plus penalty assessment for a first offense, $250 plus penalty assessment for a second offense, and $500 plus penalty assessment for any subsequent offense within a 24-month period.

IV. No person less than 18 years of age shall use a cellular or mobile telephone or other mobile electronic device, whether hands-free or not, while driving a motor vehicle in motion or temporarily stopped in traffic upon any way, except to report an emergency to the enhanced 911 system or any public safety agency. A person violating this paragraph shall be subject to the fines in paragraph III and license suspension or revocation under RSA 263:14, III.
Oregon

Ore. Rev. Stat. § 811.507

Operating a motor vehicle while using a mobile communication device

(1) As used in this section:

(a) “Hands-free accessory” means an attachment or built-in feature for or an addition to a mobile communication device, whether or not permanently installed in a motor vehicle, that when used allows a person to maintain both hands on the steering wheel.

(b) “Mobile communication device” means a text messaging device or a wireless, two-way communication device designed to receive and transmit voice or text communication.

(2) A person commits the offense of operating a motor vehicle while using a mobile communication device if the person, while operating a motor vehicle on a highway, uses a mobile communication device.

(3) This section does not apply to a person who activates or deactivates a mobile communication device or a function of the device or who uses the device for voice communication if the person:

(a) Is summoning medical or other emergency help if no other person in the vehicle is capable of summoning help;

(b) Is using a mobile communication device for the purpose of farming or agricultural operations;
(c) Is operating an ambulance or emergency vehicle;

(d) Is 18 years of age or older and is using a hands-free accessory;

(e) Is operating a motor vehicle while providing public safety services or emergency services;

(f) Is operating a motor vehicle while acting in the scope of the person's employment as a public safety officer, as defined in ORS 348.270;

(g) Is operating a tow vehicle or roadside assistance vehicle while acting in the scope of the person's employment;

(h) Holds a valid amateur radio operator license issued or any other license issued by the Federal Communications Commission and is operating an amateur radio;

(i) Is operating a two-way radio device that transmits radio communication transmitted by a station operating on an authorized frequency within the citizens' or family radio service bands in accordance with rules of the Federal Communications Commission;

(j) Is operating a vehicle owned or contracted by a utility for the purpose of installing, repairing, maintaining, operating or upgrading utility service, including but not limited to natural gas, electricity, water or telecommunications, while acting in the scope of the person's employment; or

(k) Is using a function of the mobile communication device that allows for only one-way voice communication while the person is:

(A) Operating a motor vehicle in the scope of the person's employment;

(B) Providing transit services; or
(C) Participating in public safety or emergency service activities.

(4) The offense described in this section, operating a motor vehicle while using a mobile communication device, is a Class C traffic violation.

(5) The Department of Transportation shall place signs on state highways to notify drivers that violation of this section is subject to a maximum fine of $500.

**Washington**

RCW 46.61.667

Using a wireless communications device while driving.

(1) Except as provided in subsections (2) and (3) of this section, a person operating a moving motor vehicle while holding a wireless communications device to his or her ear is guilty of a traffic infraction.

(2) Subsection (1) of this section does not apply to a person operating:

(a) An authorized emergency vehicle, or a tow truck responding to a disabled vehicle;

(b) A moving motor vehicle using a wireless communications device in hands-free mode;

(c) A moving motor vehicle using a hand-held wireless communications device to:

(i) Report illegal activity;

(ii) Summon medical or other emergency help;

(iii) Prevent injury to a person or property; or

(iv) Relay information that is time sensitive between a transit or for-hire operator and that operator's dispatcher, in which the device is permanently affixed to the vehicle;
(d) A moving motor vehicle while using a hearing aid.

(3) Subsection (1) of this section does not restrict the operation of an amateur radio station by a person who holds a valid amateur radio operator license issued by the federal communications commission.

(4) For purposes of this section, "hands-free mode" means the use of a wireless communications device with a speaker phone, headset, or earpiece.

(5) The state preempts the field of regulating the use of wireless communications devices in motor vehicles, and this section supersedes any local laws, ordinances, orders, rules, or regulations enacted by a political subdivision or municipality to regulate the use of wireless communications devices by the operator of a motor vehicle.

(6) Infractions that result from the use of a wireless communications device while operating a motor vehicle under this section shall not become part of the driver's record under RCW 46.52.101 and 46.52.120. Additionally, a finding that a person has committed a traffic infraction under this section shall not be made available to insurance companies or employers.

West Virginia


Prohibited use of an electronic communications device driving without handheld features; definitions; exceptions; penalties.

(a) Except as provided in subsection (c) of this section, a person may not drive or operate a motor vehicle on a public street or highway while:
(1) Texting; or

(2) Using a cell phone or other electronic communications device, unless the use is accomplished by hands-free equipment.

(b) For purposes of this section, the following terms shall mean:

(1) "Cell phone" shall mean a cellular, analog, wireless or digital telephone.

(2) "Driving" or "operating a motor vehicle" means operating a motor vehicle, with the motor running, including while temporarily stationary because of traffic, a traffic control device, or other momentary delays, but does not include operating a motor vehicle after the driver has moved the vehicle to the side of, or off, a highway and halted in a location where the vehicle can safely remain stationary.

(3) "Electronic communication device" means a cell telephone, personal digital assistant, electronic device with mobile data access, laptop computer, pager, broadband personal communication device, 2-way messaging device, electronic game, or portable computing device. For the purposes of this section, an "electronic communication device" does not include:

(A) Voice radios, mobile radios, land mobile radios, commercial mobile radios or two way radios with the capability to transmit and receive voice transmissions utilizing a push-to-talk or press-to-transmit function; or

(B) Other voice radios used by a law-enforcement officer, an emergency services provider, an employee or agent of public safety organizations, first responders, Amateur Radio Operators (HAM) licensed by the Federal Communications Commission and school bus operators.
(4) "Engaging in a call" means when a person talks into or listens on an electronic communication device, but shall not include when a person dials or enters a phone number on a pushpad or screen to initiate the call.

(5) "Hands-free electronic communication device" means an electronic communication device that has an internal feature or function, or that is equipped with an attachment or addition, whether or not permanently part of such electronic communication device, by which a user engages in a call without the use of either hand or both hands.

(6) "Hands-free equipment" means the internal feature or function of a hands-free electronic communication device or the attachment or addition to a hands-free electronic communication device by which a user may engage in a call or text without the use of either hand or both hands.

(7) "Texting" means manually entering alphanumeric text into, or reading text from, an electronic communication device, and includes, but is not limited to, short message service, e-mailing, instant messaging, a command or request to access a World Wide Web page or engaging in any other form of electronic text retrieval or entry, for present or future communication. For purposes of this section, "texting" does not include the following actions:

(A) Reading, selecting or entering a telephone number, an extension number, or voicemail retrieval codes and commands into an electronic device by the pressing the device in order to initiate or receive a phone call or using voice commands to initiate or receive a telephone call;

(B) Inputting, selecting or reading information on a global positioning system or navigation system; or
(C) Using a device capable of performing multiple functions, including fleet management systems, dispatching devices, smart phones, citizens band radios or music players, for a purpose that is not otherwise prohibited in this section.

(8) "Using a cell phone or other electronic communication device" means holding in a person's hand or hands an electronic communication device while:

(A) Viewing or transmitting images or data;

(B) Playing games;

(C) Composing, sending, reading, viewing, accessing, browsing, transmitting, saving or retrieving e-mail, text messages or other electronic data; or

(D) Engaging in a call.

c Subsection (a) of this section shall not apply to:

1) A law-enforcement officer, a firefighter, an emergency medical technician, a paramedic or the operator of an authorized emergency vehicle in the performance of their official duties;

2) A person using an electronic communication device to report to appropriate authorities a fire, a traffic accident, a serious road hazard, or a medical or hazardous materials emergencies.

3) The activation or deactivation of hands-free equipment or a function of hands-free equipment.
(d) This section does not supersede the provisions of section three-a, article two, chapter seventeen-b of this code or any more restrictive provisions for drivers of commercial motor vehicles prescribed by the provisions of chapter seventeen-e of this code or federal law or rule.

(e) Any person who violates the provisions of subsection (a) of this section is guilty of a traffic offense and, upon conviction thereof, shall for a first offense be fined $100; for a second offense be fined $200; and for a third or subsequent offense be fined $300. No court costs or other fees shall be assessed for a violation of subsection (a) of this section.

(f) Notwithstanding any other provision of this code to the contrary, points may not be entered on any driver's record maintained by the Division of Motor Vehicles as a result of a violation of this section, except for the third and subsequent convictions of the offense, for which three points shall be entered on any driver's record maintained by the Division of Motor Vehicles.

(g) Driving or operating a motor vehicle on a public street or highway while texting shall be enforced as a primary offense as of July 1, 2012. Driving or operating a motor vehicle on a public street or highway while using a cell phone or other electronic communication device without hands-free equipment shall be enforced as a secondary offense as of July 1, 2012, and as a primary offense as of July 1, 2013 for purposes of citation.

(h) Within ninety days of the effective date of this section, the Department of Transportation shall cause to be erected signs upon any highway entering the state of West Virginia on which a welcome to West Virginia sign is posted, and any other highway where the Division of Highways deems appropriate, posted at a distance of not more than one mile from
each border crossing, each sign to bear an inscription clearly communicating to motorists entering the state that texting, or the use of a wireless communication device without hands-free equipment, is illegal within this state.

(i) Nothing contained in this section shall be construed to authorize seizure of a cell phone or electronic device by any law-enforcement agency.

**Washington D.C.**

DC ST § 50-1731.04

§ 50-1731.04. Restricted use of mobile telephone and other electronic devices.

(a) No person shall use a mobile telephone or other electronic device while operating a moving motor vehicle in the District of Columbia unless the telephone or device is equipped with a hands-free accessory.

(b) The provisions of this section shall not apply to the following:

(1) Emergency use of a mobile telephone, including calls to 911 or 311, a hospital, an ambulance service provider, a fire department, a law enforcement agency, or a first-aid squad;

(2) Use of a mobile telephone by law enforcement and emergency personnel or by a driver of an authorized emergency vehicle, acting within the scope of official duties; or

(3) Initiating or terminating a telephone call, or turning the telephone on or off.
Section 1. (a) For purposes of this act, the following words have the following meanings:

(1) WIRELESS TELECOMMUNICATION DEVICE. A handheld cellular telephone, a text-messaging device, a personal digital assistant, a stand alone computer, or any other similar wireless device that is readily removable from a vehicle and is used to write, send, or read text or data through manual input. The term "wireless telecommunication device" does not include a device which is voice-operated and which allows the user to send or receive a text-based
communication without the use of either hand except to activate or deactivate a feature or function.

(2) WRITE, SEND, OR READ A TEXT-BASED COMMUNICATION. Using a wireless telecommunication device to manually communicate with any person using text-based communication, including, but not limited to, communications referred to as a text message, instant message, or electronic mail. The term does not include reading, selecting, or entering a telephone number or name in a cell or wireless telephone or communication device for the purpose of making a telephone call.

(b) A person may not operate a motor vehicle on a public road, street, or highway in Alabama while using a wireless telecommunication device to write, send, or read a text-based communication.

(c) A person who violates subsection (b) is subject to fines as follows:

(1) Twenty-five dollars ($25) for a first violation.

(2) Fifty dollars ($50) for a second violation.

(3) Seventy-five dollars ($75) for a third or subsequent violation.

(d) Law enforcement officers enforcing this section may treat a violation of this section as the primary or sole reason for issuing a citation to a driver.

(e) The following uses of wireless communication devices shall not be subject to the restrictions in this section:
(1) An individual using a wireless communication device to obtain emergency services including, but not limited to, an emergency call to a law enforcement agency, health care provider, fire department, or other emergency services agency or entity.

(2) An individual using a wireless communication device while the motor vehicle is parked on the shoulder of the highway, road, or street.

(3) An individual using a wireless communication device as a global positioning or navigation system to receive driving directions which has been pre-programmed with the desired coordinates. The programming of coordinates while operating a vehicle remains a violation of this section.

Section 2. A conviction of this act shall be entered on the driving record of any individual charged under this act as a two-point violation.

Section 3. (a) In any case brought by a law enforcement officer employed by the Department of Public Safety all fines shall be allocated to the State General Fund.

(b) Each state, county, and municipal law enforcement agency shall maintain statistical information on traffic stops made pursuant to this act on minority groups and report that information monthly to the Department of Public Safety.

Section 4. Although this bill would have as its purpose or effect the requirement of a new or increased expenditure of local funds, the bill is excluded from further requirements and application under Amendment 621, now appearing as Section 111.05 of the Official
Recompilation of the Constitution of Alabama of 1901, as amended, because the bill defines a new crime or amends the definition of an existing crime.

Section 5. This act shall become effective on the first day of the third month following its passage and approval by the Governor, or its otherwise becoming law.

Sec. 28.35.161. Driving a motor vehicle with a screen device operating unlawful installation of television, monitor, or similar device.

(a) A person commits the crime of driving with a screen device operating if (1) the person is driving a motor vehicle (2) the vehicle has a television, video monitor, portable computer, or any other similar means capable of providing a visual display that is in full view of a driver in a normal driving position while the vehicle is in motion; and (3) the monitor or visual display is operating while the person is driving.

(b) A person may not install or alter equipment described in (a)(2) of this section that allows the images to be viewed by the driver in a normal driving position while the vehicle is in motion.

(c) Subsections (a) and (b) of this section do not apply to (1) portable cellular telephones or personal data assistants being used for verbal communication or displaying caller identification information; (2) equipment that is displaying only (A) audio equipment information, functions, and controls; (B) vehicle information or controls related to speed, fuel level, battery charge, and
other vehicle safety or equipment information; (C) navigation or global positioning; (D) maps; (E) visual information to (i) enhance or supplement the driver's view forward, behind, or to the sides of the motor vehicle for the purpose of maneuvering the vehicle; or (ii) allow the driver to monitor vehicle occupants seated behind the driver; (F) vehicle dispatching and response information for motor vehicles providing emergency road service or roadside assistance; (G) vehicle dispatching information for passenger transport or freight or package delivery; or (H) information for use in performing highway construction, maintenance, or repair or data acquisition by the Department of Transportation and Public Facilities or a municipality.

(d) Subsections (a) and (b) of this section do not apply to devices and equipment installed in an emergency vehicle. In this subsection, "emergency vehicle means a police, fire, or emergency medical service vehicle."

(e) It is an affirmative defense to a prosecution under (b) of this section that the equipment installed or altered includes a device that, when the motor vehicle is being driven, disables the equipment for all uses except those described in (c) of this section.

(f) A person who violates (a) of this section is guilty of (1) a class A misdemeanor, unless any of the circumstances described

(2) - (4) of this subsection apply;

(2) a class C felony if the person's driving causes physical injury to another person; (3) a class B felony if the person's driving causes serious physical injury to another person; (4) a class A felony if the person's driving causes the death of another person.

(g) A person who violates (b) of this section is guilty of a class A misdemeanor. *Sec. 2. AS 28.90.990 (a) is amended by adding a new paragraph to read: (30) "physical injury" has the meaning given in AS 11.81.900.

*Sec. 3. This Act takes effect September 1, 2008.
27-51-1501. Title.

This subchapter is known and may be cited as "Paul's Law: To Prohibit Drivers of Motor Vehicles from Using Handheld Wireless Telephones to Engage in Text Messaging.

27-51-1502. Purpose.

The purpose of this subchapter is to:

(1) Improve the safety of the roads for all drivers and passengers by prohibiting drivers of motor vehicles from engaging in text messaging;

(2) Prevent accidents caused by the distractive practice of text messaging while operating a motor vehicle;

(3) Preserve human life and maintain the safety of the citizens of the State of Arkansas and visitors to our state by taking steps to reduce motor vehicle accidents, injuries, and deaths;

(4) Reduce health care costs, health insurance rates, and automobile insurance rates by attempting to reduce the number of motor vehicle accidents that cause injury, death, and property damage; and

(5) Reduce the amount of time that law enforcement and the court system work on accidents and offenses arising out of motor vehicle accidents caused by drivers who are distracted by sending or reading text messages.


As used in this subchapter:

(1)(A) "Handheld wireless telephone" means a wireless interactive communication device with which a user can engage in a text-based communication using at least one hand or by reading a text-based communication.
(B) "Handheld wireless telephone" does not include:

(i) A hands-free wireless telephone or device;

(ii) Citizens band radio; or

(iii) Citizens band radio hybrid; and

(2)(A) "Hands-free wireless telephone or device" means a wireless telephone or other wireless communication device that allows a user to engage in text-based communication without the use of either hand either with:

(i) An internal feature or function; or

(ii) An attachment or additional device.

(B) A hands-free wireless telephone or device may be a permanent or temporary part of the wireless telephone or other wireless communication device.

(C) A hands-free wireless telephone or device may require the use of either hand to activate, deactivate, or initiate a function of the wireless telephone or other communication device;

(3) "Wireless interactive communication" means typing, text messaging, emailing, or accessing information on the Internet with a handheld wireless telephone.

27-51-1504. Handheld wireless telephone use when driving.

(a) Except as otherwise provided in this section, the driver of a motor vehicle shall not use a handheld wireless telephone for wireless interactive communication while operating a motor vehicle.

(b) A driver of a motor vehicle may use a handheld wireless telephone for wireless interactive communication in emergencies.

(c) A person performing his or her official duties as a certified law enforcement officer, firefighter, ambulance driver, or emergency medical technician is exempt from the requirements

This subchapter supersedes and preempts all county or municipal ordinances regarding the use of a handheld wireless telephone for wireless interactive communication while operating a motor vehicle.

27-51-1506. Penalties.

A person who pleads guilty or nolo contendere to, or has been found guilty of, violating this section commits a violation.

SECTION 2. This act applies to all violations committed on and after October 1, 2009.

California

An act to amend Section 12810.3 of, and to add Section 23123.5 to, the Vehicle Code, relating to vehicles.

The people of the State of California do enact as follows:

SECTION 1. Section 12810.3 of the Vehicle Code is amended to read:

12810.3. (a) Notwithstanding subdivision (f) of Section 12810, a violation point shall not be given for a conviction of a violation of subdivision (a) of Section 23123, subdivision (a) of Section 23123.5, or subdivision (b) of Section 23124.
(b) This section shall become operative on July 1, 2008.

SEC. 2. Section 23123.5 is added to the Vehicle Code, to read:

23123.5. (a) A person shall not drive a motor vehicle while using an electronic wireless communications device to write, send, or read a text-based communication.

(b) As used in this section “write, send, or read a text-based communication” means using an electronic wireless communications device to manually communicate with any person using a text-based communication, including, but not limited to, communications referred to as a text message, instant message, or electronic mail.

(c) For purposes of this section, a person shall not be deemed to be writing, reading, or sending a text-based communication if the person reads, selects, or enters a telephone number or name in an electronic wireless communications device for the purpose of making or receiving a telephone call.

(d) A violation of this section is an infraction punishable by a base fine of twenty dollars ($20) for a first offense and fifty dollars ($50) for each subsequent offense.

(e) This section does not apply to an emergency services professional using an electronic wireless communications device while operating an authorized emergency vehicle, as defined in Section 165, in the course and scope of his or her duties.

SEC. 3. No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution because the only costs that may be incurred by a local agency or school district will be incurred because this act creates a new crime or infraction, eliminates a crime or
infraction, or changes the penalty for a crime or infraction, within the meaning of Section 17556 of the Government Code, or changes the definition of a crime within the meaning of Section 6 of Article XIII B of the California Constitution.

**Colorado**

42-4-239. Misuse of a wireless telephone - definitions - penalty - preemption. (1) as used in this section, unless the context otherwise requires:

(a) "emergency" means a situation in which a person:

(i) Has reason to fear for such person's life or safety or believes that a criminal act may be perpetrated against such person or another person, requiring the use of a wireless telephone while the car is moving; or

(ii) Reports a fire, a traffic accident in which one or more injuries are apparent, a serious road hazard, a medical or hazardous materials emergency, or a person who is driving in a reckless, careless, or otherwise unsafe manner.

(b) "operating a motor vehicle" means driving a motor vehicle on a public highway, but "operating a motor vehicle" shall not mean maintaining the instruments of control while the motor vehicle is at rest in a shoulder lane or lawfully parked.

(c) "use" means talking on or listening to a wireless telephone or engaging the wireless telephone for text messaging or other similar forms of manual data entry or transmission.

(d) "wireless telephone" means a telephone that operates without a physical, wireline connection to the provider's equipment. The term includes, without limitation, cellular and mobile telephones.
(2) A person under eighteen years of age shall not use a wireless telephone while operating a motor vehicle.

(3) A person eighteen years of age or older shall not use a wireless telephone for the purpose of engaging in text messaging or other similar forms of manual data entry or transmission while operating a motor vehicle.

(4) subsection (2) or (3) of this section shall not apply to a person who is using the wireless telephone:

(a) to contact a public safety entity; or

(b) during an emergency.

(5) (a) A person who operates a motor vehicle in violation of subsection (2) or (3) of this section commits a class a traffic infraction as defined in section 42-4-1701 (3), and the court or the department of revenue shall assess a fine of fifty dollars.

(b) a second or subsequent violation of subsection (2) or (3) of this section shall be a class a traffic infraction as defined in section 42-4-1701 (3), and the court or the department of revenue shall assess a fine of one hundred dollars.

(6) (a) an operator of a motor vehicle shall not be cited for a violation of subsection (2) of this section unless the operator was under eighteen years of age and a law enforcement officer saw the operator use, as defined in paragraph (c) of subsection (1) of this section, a wireless telephone.

(b) an operator of a motor vehicle shall not be cited for a violation of subsection (3) of this section unless the operator was eighteen years of age or older and a law enforcement officer saw the operator use a wireless telephone for the purpose of engaging in text messaging or other similar forms of manual data entry or transmission.
(7) the provisions of this section shall not be construed to authorize the seizure and forfeiture of a wireless telephone, unless otherwise provided by law.

(8) this section does not restrict operation of an amateur radio station by a person who holds a valid amateur radio operator license issued by the federal communications commission.

(9) the general assembly finds and declares that use of wireless telephones in motor vehicles is a matter of statewide concern.

Connecticut

Section 14-296aa

Sec. 37. Section 14-296aa of the general statutes is repealed and the following is substituted in lieu thereof (Effective October 1, 2013):

(a) For purposes of this section, the following terms have the following meanings:

(1) "Mobile telephone" means a cellular, analog, wireless or digital telephone capable of sending or receiving telephone communications without an access line for service.

(2) "Using" or "use" means holding a hand-held mobile telephone to, or in the immediate proximity of, the user's ear.

(3) "Hand-held mobile telephone" means a mobile telephone with which a user engages in a call using at least one hand.
(4) "Hands-free accessory" means an attachment, add-on, built-in feature, or addition to a mobile telephone, whether or not permanently installed in a motor vehicle, that, when used, allows the vehicle operator to maintain both hands on the steering wheel.

(5) "Hands-free mobile telephone" means a hand-held mobile telephone that has an internal feature or function, or that is equipped with an attachment or addition, whether or not permanently part of such hand-held mobile telephone, by which a user engages in a call without the use of either hand, whether or not the use of either hand is necessary to activate, deactivate or initiate a function of such telephone.

(6) "Engage in a call" means talking into or listening on a hand-held mobile telephone, but does not include holding a hand-held mobile telephone to activate, deactivate or initiate a function of such telephone.

(7) "Immediate proximity" means the distance that permits the operator of a hand-held mobile telephone to hear telecommunications transmitted over such hand-held mobile telephone, but does not require physical contact with such operator's ear.

(8) "Mobile electronic device" means any hand-held or other portable electronic equipment capable of providing data communication between two or more persons, including a text messaging device, a paging device, a personal digital assistant, a laptop computer, equipment that is capable of playing a video game or a digital video disk, or equipment on which digital photographs are taken or transmitted, or any combination thereof, but does not include any audio equipment or any equipment installed in a motor vehicle for the purpose of providing navigation,
emergency assistance to the operator of such motor vehicle or video entertainment to the passengers in the rear seats of such motor vehicle.

(b) (1) Except as otherwise provided in this subsection and subsections (c) and (d) of this section, no person shall operate a motor vehicle upon a highway, as defined in section 14-1, as amended by this act, while using a hand-held mobile telephone to engage in a call or while using a mobile electronic device while such vehicle is in motion. An operator of a motor vehicle who types, sends or reads a text message with a hand-held mobile telephone or mobile electronic device while such vehicle is in motion shall be in violation of this section, except that if such operator is driving a commercial motor vehicle, as defined in section 14-1, as amended by this act, such operator shall be charged with a violation of subsection (e) of this section.

(2) An operator of a motor vehicle who holds a hand-held mobile telephone to, or in the immediate proximity of, his or her ear while such vehicle is in motion is presumed to be engaging in a call within the meaning of this section. The presumption established by this subdivision is rebuttable by evidence tending to show that the operator was not engaged in a call.

(3) The provisions of this subsection shall not be construed as authorizing the seizure or forfeiture of a hand-held mobile telephone or a mobile electronic device, unless otherwise provided by law.

(4) Subdivision (1) of this subsection shall not apply to: (A) The use of a hand-held mobile telephone for the sole purpose of communicating with any of the following regarding an emergency situation: An emergency response operator; a hospital, physician's office or health clinic; an ambulance company; a fire department; or a police department, or (B) any of the
following persons while in the performance of their official duties and within the scope of their employment: A peace officer, as defined in subdivision (9) of section 53a-3, a firefighter or an operator of an ambulance or authorized emergency vehicle, as defined in section 14-1, as amended by this act, or a member of the armed forces of the United States, as defined in section 27-103, while operating a military vehicle, or (C) the use of a hand-held radio by a person with an amateur radio station license issued by the Federal Communications Commission, or (D) the use of a hands-free mobile telephone.

(c) No person shall use a hand-held mobile telephone or other electronic device, including those with hands-free accessories, or a mobile electronic device while operating a moving school bus that is carrying passengers, except that this subsection shall not apply to (1) a school bus driver who places an emergency call to school officials, or (2) the use of a hand-held mobile telephone as provided in subparagraph (A) of subdivision (4) of subsection (b) of this section.

(d) No person under eighteen years of age shall use any hand-held mobile telephone, including one with a hands-free accessory, or a mobile electronic device while operating a moving motor vehicle on a public highway, except as provided in subparagraph (A) of subdivision (4) of subsection (b) of this section.

(e) No person shall use a hand-held mobile telephone or other electronic device or type, read or send text or a text message with or from a mobile telephone or mobile electronic device while operating a commercial motor vehicle, as defined in section 14-1, as amended by this act, except for the purpose of communicating with any of the following regarding an emergency situation: An emergency response operator; a hospital; physician's office or health clinic; an ambulance company; a fire department or a police department.
(f) Except as provided in subsections (b) to (e), inclusive, of this section, no person shall engage in any activity not related to the actual operation of a motor vehicle in a manner that interferes with the safe operation of such vehicle on any highway, as defined in section 14-1, as amended by this act.

(g) Any law enforcement officer who issues a summons for a violation of this section shall record on such summons the specific nature of any distracted driving behavior observed by such officer.

(h) Any person who violates this section shall be fined one hundred fifty dollars for a first violation, three hundred dollars for a second violation and five hundred dollars for a third or subsequent violation.

(i) An operator of a motor vehicle who commits a moving violation, as defined in subsection (a) of section 14-111g, while engaged in any activity prohibited by this section shall be fined in accordance with subsection (h) of this section, in addition to any penalty or fine imposed for the moving violation.

(j) The state shall remit to a municipality twenty-five per cent of the fine amount received for a violation of this section with respect to each summons issued by such municipality. Each clerk of the Superior Court or the Chief Court Administrator, or any other official of the Superior Court designated by the Chief Court Administrator, shall, on or before the thirtieth day of January, April, July and October in each year, certify to the Comptroller the amount due for the previous quarter under this subsection to each municipality served by the office of the clerk or official.
(k) A record of any violation of this section shall appear on the driving history record or motor vehicle record, as defined in section 14-10, of any person who commits such violation, and the record of such violation shall be available to any motor vehicle insurer in accordance with the provisions of section 14-10.

Delaware

Title 21 §4176C

"§ 4176C. Electronic communication devices; penalties.

"(a) No person shall drive a motor vehicle on any highway while using an electronic communication device while such motor vehicle is in motion.

(b) For the purposes of this section, the following terms shall mean:

1. 'cell telephone' shall mean a cellular, analog, wireless or digital telephone.

2. 'electronic communication device' shall mean a cell telephone, personal digital assistant, electronic device with mobile data access, laptop computer, pager, broadband personal communication device, two-way messaging device, electronic game, or portable computing device.

3. 'hands-free electronic communication device' shall mean an electronic communication device that has an internal feature or function, or that is equipped with an attachment or addition,
whether or not permanently part of such electronic communication device, by which a user engages in a call without the use of either hand or both hands.

(4) 'hands-free equipment' shall mean the internal feature or function of a hands-free electronic communication device or the attachment or addition to a hands-free electronic communication device by which a user may engage in a call without the use of either hand or both hands.

(5) 'engages or engaging in a call' shall mean when a person talks into or listens on an electronic communication device, but shall not mean when a person dials or punches a phone number on an electronic communication device.

(6) 'using' shall mean holding in a person's hand or hands an electronic communication device while:

a. Viewing or transmitting images or data;

b. Playing games;

c. Composing, sending, reading, viewing, accessing, browsing, transmitting, saving or retrieving e-mail, text messages or other electronic data; or

d. Engaging in a call.

(c) Subsection (a) of this section shall not apply to:

(1) a law-enforcement officer, a firefighter, an emergency medical technician, a paramedic or the operator of an authorized emergency vehicle in the performance of their official duties;
(2) a person using an electronic communication device to report to appropriate authorities a fire, a traffic accident, a serious road hazard, or medical or hazardous materials emergency, or to report the operator of another motor vehicle who is driving in a reckless, careless or otherwise unsafe manner or who appears to be driving under the influence of alcohol or drugs, or to report any crime.

(3) a person using a cell telephone who is operating a school bus and covered under §4176B of this title;

(4) a person engaging in a call with a hands-free electronic communication device while utilizing hands-free equipment and such person does not hold the hands-free electronic communication device in such person's hand or hands; and

(5) the activation or deactivation of hands-free equipment or a function of hands-free equipment.

(6) a person driving or operating an unregistered farm tractor, farm truck or farm equipment.

(7) Use of an amateur radio by an FCC-licensed amateur radio operator during emergency conditions requiring such use.

(d) Whoever violates this section shall for the 1st offense be subject to a civil penalty of $50. For each subsequent offense the person shall be subject to a civil penalty of not less than $100 nor more than $200.
(e) No motor vehicle points shall be assessed for a violation of this section. Additionally, a violation of this section shall not be made a part of a person's driving record.

Florida

Section 1. Section 316.305, Florida Statutes, is created to read:

316.305 Wireless communications devices; prohibition. --

(1) This section may be cited as the "Florida Ban on Texting While Driving Law."

(2) It is the intent of the Legislature to:

(a) Improve roadway safety for all vehicle operators, vehicle passengers, bicyclists, pedestrians, and other road users.

(b) Prevent crashes related to the act of text messaging while driving a motor vehicle.

(c) Reduce injuries, deaths, property damage, health care costs, health insurance rates, and automobile insurance rates related to motor vehicle crashes.

(d) Authorize law enforcement officers to stop motor vehicles and issue citations as a secondary offense to persons who are texting while driving.

(3)(a) A person may not operate a motor vehicle while manually typing or entering multiple letters, numbers, symbols, or other characters into a wireless communications device or while sending or reading data in such a device for the purpose of nonvoice interpersonal
communication, including, but not limited to, communication methods known as texting, e-mailing, and instant messaging. As used in this section, the term "wireless communications device" means any handheld device used or capable of being used in a handheld manner, that is designed or intended to receive or transmit text or character-based messages, access or store data, or connect to the Internet or any communications service as defined in s. 812.15 and that allows text communications. For the purposes of this paragraph, a motor vehicle that is stationary is not being operated and is not subject to the prohibition in this paragraph.

(b) Paragraph (a) does not apply to a motor vehicle operator who is:

1. Performing official duties as an operator of an authorized emergency vehicle as defined in s. 322.01, a law enforcement or fire service professional, or an emergency medical services professional.

2. Reporting an emergency or criminal or suspicious activity to law enforcement authorities.

3. Receiving messages that are:
   a. Related to the operation or navigation of the motor vehicle;
   b. Safety-related information, including emergency, traffic, or weather alerts;
   c. Data used primarily by the motor vehicle; or
   d. Radio broadcasts.

4. Using a device or system for navigation purposes.
5. Conducting wireless interpersonal communication that does not require manual entry of multiple letters, numbers, or symbols, except to activate, deactivate, or initiate a feature or function.

6. Conducting wireless interpersonal communication that does not require reading text messages, except to activate, deactivate, or initiate a feature or function.

7. Operating an autonomous vehicle, as defined in s. 316.003, in autonomous mode.

(c) Only in the event of a crash resulting in death or personal injury, a user's billing records for a wireless communications device or the testimony of or written statements from appropriate authorities receiving such messages may be admissible as evidence in any proceeding to determine whether a violation of paragraph (a) has been committed.

(4)(a) Any person who violates paragraph (3)(a) commits a noncriminal traffic infraction, punishable as a nonmoving violation as provided in chapter 318.

(b) Any person who commits a second or subsequent violation of paragraph (3)(a) within 5 years after the date of a prior conviction for a violation of paragraph (3)(a) commits a noncriminal traffic infraction, punishable as a moving violation as provided in chapter 318.

(5) Enforcement of this section by state or local law enforcement agencies must be accomplished only as a secondary action when an operator of a motor vehicle has been detained for a suspected violation of another provision of this chapter, chapter 320, or chapter 322.
40-6-241.1.

(a) As used in the Code section, the term 'wireless telecommunications device' means a cellular telephone, a text messaging device, a personal digital assistant, a stand alone computer, or any other substantially similar wireless device that is used to initiate or receive a wireless communication with another person. It does not include citizens band radios, citizens band radio hybrids, commercial two-way radio communication devices, subscription based emergency communications, in-vehicle security, navigation devices, and remote diagnostics systems, or amateur or ham radio devices.

(b) No person who is 18 years of age or older or who has a Class C license shall operate a motor vehicle on any public road or highway of this state while using a wireless telecommunications device to write, send, or read any text based communication, including but not limited to a text message, instant message, e-mail, or Internet data.

(c) The provisions of this Code section shall not apply to:

(1) A person reporting a traffic accident, medical emergency, fire, serious road hazard, or a situation in which the person reasonably believes a person's health or safety is in immediate jeopardy;

(2) A person reporting the perpetration or potential perpetration of a crime;

(3) A public utility employee or contractor acting within the scope of his or her employment when responding to a public utility emergency;
(4) A law enforcement officer, firefighter, emergency medical services personnel, ambulance driver, or other similarly employed public safety first responder during the performance of his or her official duties; or

(5) A person engaging in wireless communication while in a motor vehicle which is lawfully parked.

(d) Any conviction for a violation of the provisions of this Code section shall be a misdemeanor punishable by a fine of $150.00. The provisions of Chapter 11 of Title 17 and any other provision of law to the contrary notwithstanding, the costs of such prosecution shall not be taxed nor shall any additional penalty, fee, or surcharge to a fine for such offense be assessed against a person for conviction thereof. The court imposing such fine shall forward a record of the disposition to the Department of Driver Services. Any violation of this Code section shall constitute a separate offense."

Hawaii

"§ 291C- Mobile electronic devices. (a) No person shall operate a motor vehicle while using a mobile electronic device. (b) The use of a mobile electronic device for the sole purpose of making a "911" emergency communication shall be an affirmative defense to this law.

(c) No person under eighteen years of age shall operate a motor vehicle while utilizing a hands-free mobile electronic device, except for the sole purpose of making a "911" emergency communication.
(d) The following persons shall be exempt from subsection (a):

(1) Emergency responders using a mobile electronic device while in the performance and scope of their official duties;

(2) Drivers using a two-way radio or a private Land Mobile Radio System, within the meaning of title 47 Code of Federal Regulations part 90, while in the performance and scope of their work-related duties and who are operating fleet vehicles or who possess a commercial vehicle license; or

(3) Drivers holding a valid amateur radio operator license issued by the Federal Communications Commission and using a half-duplex two-way radio.

(e) As used in this section:

"Emergency responders" include firefighters, emergency medical technicians, mobile intensive care technicians, civil defense workers, police officers, and federal and state law enforcement officers.

"Fleet vehicle" means any vehicle validly registered pursuant to section 286-53.5.

"Mobile electronic device" means any handheld or other portable electronic equipment capable of providing wireless or data communication between two or more persons or of providing amusement, including but not limited to a cellular phone, text messaging device, paging device, personal digital assistant, laptop computer, video game, or digital photographic device, but does not include any audio equipment or any equipment installed in a motor vehicle.
for the purpose of providing navigation, emergency assistance to the operator of the motor vehicle, or video entertainment to the passengers in the rear seats of the motor vehicle.

"Operate" a motor vehicle means the same as is defined in section 291E-1.

"Use" or "using" means holding a mobile electronic device while operating a motor vehicle.

(f) Every person who violates this section shall be subject to the following penalties:

(1) For a first violation, or any violation not preceded within one year by a prior violation of this section, a fine of not less than $100 and not more than $200;

(2) For a violation that occurs within one year of a prior violation of this section, a fine of not less than $200 and not more than $300; and

(3) For a violation that occurs within two years of two prior violations of this section, and for the fourth and each subsequent violation of this section, regardless of when committed, a fine of not less than $300 and not more than $500.

If a person violates this section while operating a motor vehicle in a school zone or construction area, as defined in section 291C-104, the fines imposed pursuant to this subsection shall be doubled.

(g) Any violation as provided in subsections (a) and (c) shall not be deemed to be a traffic infraction as defined in section 291D-2.

(h) This section shall supersede any county ordinance regulating the use or utilization of mobile electronic devices while operating a motor vehicle."
Idaho

49-1401A. TEXTING WHILE DRIVING. (1) As used in this section, "texting" means engaging in the review of, or manual preparation and transmission of, written communications via handheld wireless devices. This definition does not include voice-operated or hands free devices that allow the user to review, prepare and transmit a text message without the use of either hand except to activate, deactivate or initiate a feature or function.

(2) Texting, as that term is defined in subsection (1) of this section, while driving a moving motor vehicle shall constitute an infraction provided this does not apply to voice-operated or hands free devices that allow the user to review, prepare and transmit a text message without the use of either hand except to activate, deactivate or initiate a feature or function. Every person who violates this section shall be guilty of an infraction. A conviction under this section shall not result in violation point counts as prescribed in section 49-326, Idaho Code. In addition, a conviction under this section shall not be deemed to be a moving traffic violation for the purpose of establishing rates of motor vehicle insurance charged by a casualty insurer.

Illinois

(625 ILCS 5/12-610.2)

Sec. 12-610.2. Electronic communication devices.

(a) As used in this Section:
"Electronic communication device" means an electronic device, including but not limited to a wireless telephone, personal digital assistant, or a portable or mobile computer while being used for the purpose of composing, reading, or sending an electronic message, but does not include a global positioning system or navigation system or a device that is physically or electronically integrated into the motor vehicle.

"Electronic message" means a self-contained piece of digital communication that is designed or intended to be transmitted between physical devices. "Electronic message" includes, but is not limited to electronic mail, a text message, an instant message, or a command or request to access an Internet site.

(b) A person may not operate a motor vehicle on a roadway while using an electronic communication device to compose, send, or read an electronic message.

(c) A violation of this Section is an offense against traffic regulations governing the movement of vehicles.

(d) This Section does not apply to:

(1) a law enforcement officer or operator of an emergency vehicle while performing his or her official duties;

(2) a driver using an electronic communication device for the sole purpose of reporting an emergency situation and continued communication with emergency personnel during the emergency situation;

(3) a driver using an electronic communication device in hands-free or voice-activated mode; or
(4) a driver of a commercial motor vehicle reading a message displayed on a permanently installed communication device designed for a commercial motor vehicle with a screen that does not exceed 10 inches tall by 10 inches wide in size;

(5) a driver using an electronic communication device while parked on the shoulder of a roadway; or

(6) a driver using an electronic communication device when the vehicle is stopped due to normal traffic being obstructed and the driver has the motor vehicle transmission in neutral or park.

Indiana

SECTION 4. IC 9-21-8-59 IS ADDED TO THE INDIANA CODE AS A NEW SECTION TO READ AS FOLLOWS [EFFECTIVE JULY 1, 2011]:

Sec. 59. (a) A person may not use a telecommunications device to:

(1) type a text message or an electronic mail message;

(2) transmit a text message or an electronic mail message; or

(3) read a text message or an electronic mail message;

while operating a moving motor vehicle unless the device is used in conjunction with hands free or voice operated technology, or unless the device is used to call 911 to report a bona fide emergency.
(b) A police officer may not confiscate a telecommunications device for the purpose of determining compliance with this section or confiscate a telecommunications device and retain it as evidence pending trial for a violation of this section.

**Iowa**

Sec. 6. **NEW SECTION.** 321.276 Use of electronic communication device while driving -- text-messaging.

1. For purposes of this section:

   a. "Engage in a call" means talking or listening on a mobile telephone or other portable electronic communication device.

   b. "Hand-held electronic communication device" means a mobile telephone or other portable electronic communication device capable of being used to write, send, or read a text message. "Hand-held electronic communication device" does not include a voice-operated or hands-free device which allows the user to write, send, or read a text message without the use of either hand except to activate or deactivate a feature or function. "Hand-held electronic communication device" does not include a wireless communication device used to transmit or receive data as part of a digital dispatch system. "Hand-held electronic communication device" includes a device which is temporarily mounted inside the motor vehicle, unless the device is a voice-operated or hands-free device.

   c. "Text message" includes a text-based message, an instant message, and electronic mail.
d. The terms "write", "send", and "read", with respect to a text message, mean the manual entry, transmission, and retrieval of a text message, respectively, to communicate with any other person or device.

2. A person shall not use a hand-held electronic communication device to write, send, or read a text message while driving a motor vehicle unless the motor vehicle is at a complete stop off the traveled portion of the roadway.

   a. A person does not violate this section by using a global positioning system or navigation system or when, for the purpose of engaging in a call, the person selects or enters a telephone number or name in a hand-held mobile telephone or activates, deactivates, or initiates a function of a hand-held mobile telephone.

   b. The provisions of this subsection relating to reading a text message do not apply to the following persons:

      (1) A member of a public safety agency, as defined in section 34.1, performing official duties.

      (2) A health care professional in the course of an emergency situation.

      (3) A person receiving safety-related information including emergency, traffic, or weather alerts.

3. Nothing in this section shall be construed to authorize a peace officer to confiscate a portable electronic communication device from the driver or occupant of a motor vehicle.
4. a. A person convicted of a violation of this section is guilty of a simple misdemeanor punishable as a scheduled violation under section 805.8A, subsection 14, paragraph "k".

   b. A violation of this section shall not be considered a moving violation for purposes of this chapter or rules adopted pursuant to this chapter.

5. a. A peace officer shall not stop or detain a person solely for a suspected violation of this section. This section is enforceable by a peace officer only as a secondary action when the driver of a motor vehicle has been stopped or detained for a suspected violation of another provision of this chapter, a local ordinance equivalent to a provision of this chapter, or other law.

   b. For the period beginning July 1, 2010, through June 30, 2011, peace officers shall issue only warning citations for violations of this section. The department, in cooperation with the department of public safety, shall establish educational programs to foster compliance with the requirements of this section.

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**Kansas**

2010 SB 300

New Sec. 2. (a) As used in this section:

(1) "Wireless communication device" means any wireless electronic communication device that provides for voice or data communication between two or more parties, including, but not limited to, a mobile or cellular telephone, a text messaging device, a personal digital assistant
that sends or receives messages, an audio-video player that sends or receives messages or a laptop computer. "Wireless communication device" does not include a device which is voice-operated and which allows the user to send or receive a text based communication without the use of either hand, except to activate or deactivate a feature or function.

(2) "Write, send or read a written communication" means using a wireless communication device to manually type, send or read a written communication, including, but not limited to, a text message, instant message or electronic mail.

(b) Except as provided in subsections (c) and (d), no person shall operate a motor vehicle on a public road or highway while using a wireless communications device to write, send or read a written communication.

(c) The provisions of subsection (b) shall not apply to:

(1) A law enforcement officer or emergency service personnel acting within the course and scope of the law enforcement officer's or emergency service personnel's employment;

(2) a motor vehicle stopped off the regular traveled portion of the roadway;

(3) a person who reads, selects or enters a telephone number or name in a wireless communications device for the purpose of making or receiving a phone call;

(4) a person who receives an emergency, traffic or weather alert message; or

(5) a person receiving a message related to the operation or navigation of the motor vehicle.
(d) The provisions of subsection (b) shall not prohibit a person from using a wireless communications device while operating a moving motor vehicle to:

(1) Report current or ongoing illegal activity to law enforcement;

(2) prevent imminent injury to a person or property; or

(3) relay information between transit or for-hire operator and the operator's dispatcher, in which the device is permanently affixed to the motor vehicle.

(e) From and after the effective date of this act and prior to January 1, 2011, a law enforcement officer shall issue a warning citation to anyone violating subsection (b).

(f) This section shall be part of and supplemental to the uniform act regulating traffic on highways.

Kentucky

KRS CHAPTER 189

(1) As used in this section, "personal communication device" means a device capable of two-way audio or text communication that emits an audible signal, vibrates, displays a message, or otherwise summons or delivers communication to the possessor, including but not limited to a paging device and a cellular telephone.

(2) Except as provided in subsection (3) of this section, no person shall, while operating a motor vehicle that is in motion on the traveled portion of a roadway, write, send, or read text-
based communication using a personal communication device to manually communicate with any person using text-based communication, including but not limited to communications referred to as a text message, instant message, or electronic mail.

(3) Subsection (2) of this section shall not apply to:

(a) The use of a global positioning system feature of a personal communication device;

(b) The reading, selecting, or entering of a telephone number or name in a personal communication device for the purpose of making a phone call;

(c) An operator of an emergency or public safety vehicle, when the use of a personal communication device is an essential function of the operator's official duties; or

(d) The operator of a motor vehicle who writes a text message on a personal communication device to:

1. Report illegal activity;

2. Summon medical help;

3. Summon a law enforcement or public safety agency; or

4. Prevent injury to a person or property.
A.(1) Except as provided in Subsection B of this Section, no person shall operate any motor vehicle upon any public road or highway of this state while using a wireless telecommunications device to write, send, or read a text-based communication. For purposes of this Section, a person shall not be deemed to be writing, reading, or sending a text message if the person reads, selects, or enters a telephone number or name in a wireless telecommunications device for the purpose of making a telephone call.

(2)(a) "Wireless telecommunications device" means a cellular telephone, a text-messaging device, a personal digital assistant, a stand alone computer, or any other substantially similar wireless device that is readily removable from the vehicle and is used to write, send, or read text or data through manual input. A "wireless telecommunications device" shall not include any device or component that is permanently affixed to a motor vehicle. It does not include citizens band radios, citizens band radio hybrids, commercial two-way radio communication devices, or electronic communication devices with a push-to-talk function.

(b) "Write, send, or read a text-based communication" means using a wireless telecommunications device to manually communicate with any person by using a text-based communication referred to as a text message, instant message, or electronic mail.

B. The provisions of this Section shall not apply to the following:

(1) Any law enforcement officer, firefighter, or operator of an authorized emergency vehicle while engaged in the actual performance of his official duties.

(2) An operator of a moving motor vehicle using a wireless telecommunications device to:

(a) Report illegal activity.
(b) Summon medical or other emergency help.

(c) Prevent injury to a person or property.

(d) Relay information between a transit or for-hire operator and that operator's dispatcher, in which the device is permanently affixed to the vehicle.

(e) Navigate using a global positioning system.

(3) A physician or other health care provider using a wireless telecommunications device to communicate with a hospital, health clinic or the office of the physician, or to otherwise provide for the health care of an individual or medical emergency through a text-based communication.

C.(1) The first violation of the provisions of this Section shall be punishable by a fine of not more than one hundred seventy-five dollars.

(2) Each subsequent violation shall be punishable by a fine of not more than five hundred dollars.

(3) If the person is involved in a crash at the time of violation, then the fine shall be equal to double the amount of the standard fine imposed in this Subsection and the law enforcement officer investigating the crash shall indicate on the written accident form that the person was using a wireless telecommunications device at the time of the crash.

(4) Any violation of this Section shall constitute a moving violation. A law enforcement officer shall enforce the provisions of this Section only as a secondary action when the officer detains a driver for an alleged violation of another provision of this Chapter.
§300.6. Use of wireless telecommunications devices by certain drivers prohibited; exceptions

A.(1)(a) Except in a driver emergency and as provided in Subsection B of this Section, no person who holds a Class "E" learner's license or intermediate license shall operate a motor vehicle on any public road or highway of this state while using any wireless telecommunications device to engage in a call, unless the wireless telecommunications device is a hands-free wireless telephone.

(b) "Engage in a call" means talking or listening on a wireless telecommunications device.

"Hands-free wireless telephone" means a wireless telecommunications device that has an internal feature or function, or that is equipped with an attachment or addition, whether or not permanently part of such telephone, by which a user engages in a conversation without the use of either hand, provided, however, this definition shall not preclude the use of either hand to activate, deactivate, or initiate a function of the telephone.

(2) Any violation of this Section shall constitute a moving violation. A law enforcement officer shall enforce the provisions of this Section only as a secondary action when the officer detains a driver for an alleged violation of another provision of this Chapter.

B. The provisions of this Section shall not apply to a person holding a Class "E" learner's license or intermediate license who uses a wireless telecommunications device to do any of the following:

(1) Report a traffic crash, medical emergency, or serious road hazard.

(2) Report a situation in which the person believes his or her personal safety is in jeopardy.
(3) Report or avert the perpetration or potential perpetration of a criminal act against the driver or another person.

(4) Engage in a call while the motor vehicle is lawfully parked.

C.(1) A first violation of the provisions of this Section shall be punishable by a fine of not more than one hundred seventy-five dollars.

(2) Each subsequent violation shall be punishable by a fine of not more than five hundred dollars.

(3) If the person is involved in a crash at the time of violation, then the fine shall be equal to double the amount of the standard fine imposed in this Subsection and the law enforcement officer investigating the crash shall indicate on the written accident form that the person was using a wireless telecommunications device at the time of the crash.

* * *

§398.10. Collection and reporting of statistical information relating to traffic stops

A. All law enforcement officers as defined as a peace officer in R.S. 40:2402 shall record and retain the following information:

* * *

(6) The number of persons stopped for violations of R.S. 32:300.5 and 300.6.

* * *
Section 2. The Louisiana Highway Safety Commission shall collect and compile statistical information on the number of crashes as well as the number of fatalities and injuries incurred in crashes which involve the use of a cellular telephone or other wireless telecommunications device to engage in a call or send, receive, or read any text message.

Section 3. This Act shall become effective on July 1, 2008; if vetoed by the governor and subsequently approved by the legislature, this Act shall become effective on July 1, 2008, or on the day following such approval by the legislature, whichever is later.

Maine

Sec. 1. 29-A MRSA Section 2119 is enacted to read:

Section 2119. Text messaging while operating motor vehicle; prohibition

1. Definitions. As used in this section, unless the context otherwise indicates, the following terms have the following meanings.

A. "Cellular telephone" means a device used to access wireless telephone service.

B. "Portable electronic device" means any portable electronic device that is not part of the operating equipment of a motor vehicle, including but not limited to an electronic game, device for sending or receiving e-mail, text messaging device, cellular telephone and computer.

C. "Text messaging" means reading or manually composing or sending electronic communications, including text messages, instant messages and e-mails, using a portable
electronic device. "Text messaging" does not include using a global positioning or navigation system.

2. Prohibition. A person may not operate a motor vehicle while engaging in text messaging.

Penalties. The following penalties apply to a violation of this section.

A. A person who violates this section commits a traffic infraction for which a fine of not less than $250 may be adjudged.

B. A person who violates this section after previously having been adjudicated as violating this section within a 3-year period commits a traffic infraction for which a fine of not less than $500 may be adjudged, and the Secretary of State shall suspend the license of that person without right to hearing. The minimum periods of license suspension are:

(1) Thirty days, if the person has 2 adjudications for a violation of this section within a 3-year period;

(2) Sixty days, if the person has 3 adjudications for a violation of this section within a 3-year period; and

(3) Ninety days, if the person has 4 or more adjudications for a violation of this section within a 3-year period.
For the purposes of this paragraph, an adjudication has occurred within a 3-year period if the date of the new conduct is within 3 years of the date of a docket entry of adjudication of a violation of this section.

Maryland

§ 21-1124.1. Text messaging prohibited

(a) Definitions. --

(1) In this section the following words have the meanings indicated.

(2) "9-1-1 system" has the meaning stated in § 1-301 of the Public Safety Article.

(3) "Text messaging device" means a handheld device used to send a text message or an electronic message via a short message service, wireless telephone service, or electronic communication network.

(b) In general. -- Subject to subsection (c) of this section, an individual may not use a text messaging device to write, send, or read a text message or an electronic message while operating a motor vehicle in the travel portion of the roadway.

(c) Exceptions. -- This section does not apply to the use of:
(1) A global positioning system; or

(2) A text messaging device to contact a 9-1-1 system.

(d) Sanctions. --

(1) If the Administration receives satisfactory evidence that an individual who is under the age of 18 years has violated this section, the Administration:

   (i) May suspend the individual's driver's license for not more than 90 days; and

   (ii) May issue a restricted license for the period of suspension that is limited to driving a motor vehicle:

       1. In the course of the individual's employment;

       2. For the purpose of driving to or from a place of employment; or

       3. For the purpose of driving to or from school.

(2) An individual may request a hearing as provided for a suspension or revocation under Title 12, Subtitle 2 of this article.
§ 21-1124.2. Communications Traffic Safety Act

(a) Definitions. --

(1) In this section the following words have the meanings indicated.

(2) "Handheld telephone" means a handheld device used to access wireless telephone service.

(3) "9-1-1 system" has the meaning stated in § 1-301 of the Public Safety Article.

(b) Exceptions to applicability of section. -- This section does not apply to:

(1) Emergency use of a handheld telephone, including calls to:

   (i) A 9-1-1 system;

   (ii) A hospital;

   (iii) An ambulance service provider;

   (iv) A fire department;

   (v) A law enforcement agency; or

   (vi) A first aid squad;

(2) Use of a handheld telephone by the following individuals when acting within the scope of official duty:

   (i) Law enforcement personnel; and

   (ii) Emergency personnel;

(3) Use of a handheld telephone as a text messaging device as defined in § 21-1124.1 of this subtitle; and

(4) Use of a handheld telephone as a communication device utilizing push-to-talk technology by an individual operating a commercial motor vehicle, as defined in 49 C.F.R. Part 390.5 of the Federal Motor Carrier Safety Regulations.

(c) Persons prohibited from use of handheld telephone while driving. -- The following
individuals may not use a handheld telephone while operating a motor vehicle:

(1) A driver of a Class H (school) vehicle that is carrying passengers and in motion; and

(2) A holder of a learner's instructional permit or a provisional driver's license who is 18 years of age or older.

(d) Prohibited use of handheld telephone while vehicle is in motion. --

(1) This subsection does not apply to an individual specified in subsection (c) of this section.

(2) A driver of a motor vehicle that is in motion may not use the driver's hands to use a handheld telephone other than to initiate or terminate a wireless telephone call or to turn on or turn off the handheld telephone.

(e) Penalties. --

(1) A person convicted of a violation of this section is subject to the following penalties:

   (i) For a first offense, a fine of not more than $75;

   (ii) For a second offense, a fine of not more than $125; and

   (iii) For a third or subsequent offense, a fine of not more than $175.

(2) Points may not be assessed against the individual under § 16-402 of this article unless the offense contributes to an accident.

(f) Penalties -- Waiver. -- The court may waive a penalty under subsection (e) of this section for a person who:

   (1) Is convicted of a first offense under this section; and

   (2) Provides proof that the person has acquired a hands-free accessory, an attachment or add-on, a built-in feature, or an addition for the person's handheld telephone that will allow the person to operate a motor vehicle in accordance with this section.
Massachusetts

Chapter 90 of the General Laws, 13b

Section 13B. (a) No operator of a motor vehicle shall use a mobile telephone, or any handheld device capable of accessing the internet, to manually compose, send or read an electronic message while operating a motor vehicle. For the purposes of this section, an operator shall not be considered to be operating a motor vehicle if the vehicle is stationary and not located in a part of the public way intended for travel.

(b) A violation of this section shall be punishable by a fine of $100 for a first offense, by a fine of $250 for a second offense and by a fine of $500 for a third or subsequent offense.

(c) A penalty under this section shall not be a surchargeable offense under section 113B of chapter 175.

Michigan

MCL 257.1 to 257.923

Sec. 602b. (1) Except as otherwise provided in this section, a person shall not read, manually type, or send a text message on a wireless 2-way communication device that is located in the person's hand or in the person's lap, including a wireless telephone used in cellular telephone service or personal communication service, while operating a motor vehicle that is moving on a highway or street in this state. As used in this subsection, a wireless 2-way
communication device does not include a global positioning or navigation system that is affixed to the motor vehicle.

(2) Subsection (1) does not apply to an individual who is using a device described in subsection (1) to do any of the following:

(a) Report a traffic accident, medical emergency, or serious road hazard.

(b) Report a situation in which the person believes his or her personal safety is in jeopardy.

(c) Report or avert the perpetration or potential perpetration of a criminal act against the individual or another person.

(d) Carry out official duties as a police officer, law enforcement official, member of a paid or volunteer fire department, or operator of an emergency vehicle.

(3) An individual who violates this section is responsible for a civil infraction and shall be ordered to pay a civil fine as follows:

(a) For a first violation, $100.00.

(b) For a second or subsequent violation, $200.00.

(4) This section supersedes all local ordinances regulating the use of a communications device while operating a motor vehicle in motion on a highway or street, except that a unit of local government may adopt an ordinance or enforce an existing ordinance substantially corresponding to this section.
Enacting section 1. This amendatory act takes effect July 1, 2010.

Sec. 38. [169.475] USE OF WIRELESS COMMUNICATIONS DEVICE.

Subdivision 1. Definition. For purposes of this section, "electronic message" means a self-contained piece of digital communication that is designed or intended to be transmitted between physical devices. An electronic message includes, but is not limited to, e-mail, a text message, an instant message, a command or request to access a World Wide Web page, or other data that uses a commonly recognized electronic communications protocol. An electronic message does not include voice or other data transmitted as a result of making a phone call, or data transmitted automatically by a wireless communications device without direct initiation by a person.

Subd. 2. Prohibition on use. No person may operate a motor vehicle while using a wireless communications device to compose, read, or send an electronic message, when the vehicle is in motion or a part of traffic.

Subd. 3. Exceptions. This section does not apply if a wireless communications device is used:

1. solely in a voice-activated or other hands-free mode;

2. for making a cellular phone call;

3. for obtaining emergency assistance to (i) report a traffic accident, medical emergency, or serious traffic hazard, or (ii) prevent a crime about to be committed;
(4) in the reasonable belief that a person's life or safety is in immediate danger; or

(5) in an authorized emergency vehicle while in the performance of official duties.

Nebraska

60-601

Sec. 3. (1) Except as otherwise provided in subsection (2) of this section, no person shall use a handheld wireless communication device to read a written communication, manually type a written communication, or send a written communication while operating a motor vehicle which is in motion.

(2) The prohibition in subsection (1) of this section does not apply to:

(a) A person performing his or her official duties as a law enforcement officer, a firefighter, an ambulance driver, or an emergency medical technician; or

(b) A person operating a motor vehicle in an emergency situation.

(3) Enforcement of this section by state or local law enforcement agencies shall be accomplished only as a secondary action when a driver of a motor vehicle has been cited or charged with a traffic violation or some other offense.

(4) Any person who violates this section shall be guilty of a traffic infraction. Any person who is found guilty of a traffic infraction under this section shall be assessed points on his or her motor vehicle operator's license pursuant to section 60-4,182 and shall be fined:
(a) Two hundred dollars for the first offense;

(b) Three hundred dollars for a second offense; and

(c) Five hundred dollars for a third and subsequent offense.

(5) For purposes of this section:

(a)(i) Handheld wireless communication device means any device that provides for written communication between two or more parties and is capable of receiving, displaying, or transmitting written communication.

(ii) Handheld wireless communication device includes, but is not limited to, a mobile or cellular telephone, a text messaging device, a personal digital assistant, a pager, or a laptop computer.

(iii) Handheld wireless communication device does not include an electronic device that is part of the motor vehicle or permanently attached to the motor vehicle or a handsfree wireless communication device; and

(b) Written communication includes, but is not limited to, a text message, an instant message, electronic mail, and Internet web sites.
Section 1. Chapter 484B of NRS is hereby amended by adding thereto a new section to read as follows:

1. Except as otherwise provided in this section, a person shall not, while operating a motor vehicle on a highway in this State:

   (a) Manually type or enter text into a cellular telephone or other handheld wireless communications device, or send or read data using any such device to access or search the Internet or to engage in nonvoice communications with another person, including, without limitation, texting, electronic messaging and instant messaging.

   (b) Use a cellular telephone or other handheld wireless communications device to engage in voice communications with another person, unless the device is used with an accessory which allows the person to communicate without using his or her hands, other than to activate, deactivate or initiate a feature or function on the device.

2. The provisions of this section do not apply to:

   (a) A paid or volunteer firefighter, emergency medical technician, ambulance attendant or other person trained to provide emergency medical services who is acting within the course and scope of his or her employment.

   (b) A law enforcement officer or any person designated by a sheriff or chief of police or the Director of the Department of Public Safety who is acting within the course and scope of his or her employment.
(c) A person who is reporting a medical emergency, a safety hazard or criminal activity or who is requesting assistance relating to a medical emergency, a safety hazard or criminal activity.

(d) A person who is responding to a situation requiring immediate action to protect the health, welfare or safety of the driver or another person and stopping the vehicle would be inadvisable, impractical or dangerous.

(e) A person who is licensed by the Federal Communications Commission as an amateur radio operator and who is providing a communication service in connection with an actual or impending disaster or emergency, participating in a drill, test, or other exercise in preparation for a disaster or emergency or otherwise communicating public information.

(f) An employee or contractor of a public utility who uses a handheld wireless communications device:

(1) That has been provided by the public utility; and

(2) While responding to a dispatch by the public utility to respond to an emergency, including, without limitation, a response to a power outage or an interruption in utility service.

3. The provisions of this section do not prohibit the use of a voice-operated global positioning or navigation system that is affixed to the vehicle.

4. A person who violates any provision of subsection 1 is guilty of a misdemeanor and:

(a) For the first offense within the immediately preceding 7 years, shall pay a fine of $50.
(b) For the second offense within the immediately preceding 7 years, shall pay a fine of $100.

(c) For the third or subsequent offense within the immediately preceding 7 years, shall pay a fine of $250.

5. A person who violates any provision of subsection 1 may be subject to the additional penalty set forth in NRS 484B.130.

6. The Department of Motor Vehicles shall not treat a first violation of this section in the manner statutorily required for a moving traffic violation.

7. For the purposes of this section, a person shall be deemed not to be operating a motor vehicle if the motor vehicle is driven autonomously through the use of artificial-intelligence software and the autonomous operation of the motor vehicle is authorized by law.

New Jersey

C.39:4-97.3 Use of wireless telephone, electronic communication device in moving vehicles; definitions; enforcement.

1. a. The use of a wireless telephone or electronic communication device by an operator of a moving motor vehicle on a public road or highway shall be unlawful except when the telephone is a hands-free wireless telephone or the electronic communication device is used hands-free, provided that its placement does not interfere with the operation of federally required safety
equipment and the operator exercises a high degree of caution in the operation of the motor
vehicle. For the purposes of this section, an "electronic communication device" shall not include
an amateur radio.

Nothing in P.L.2003, c.310 (C.39:4-97.3 et seq.) shall apply to the use of a citizen's band
radio or two-way radio by an operator of a moving commercial motor vehicle or authorized
emergency vehicle on a public road or highway.

b. The operator of a motor vehicle may use a hand-held wireless telephone while driving
with one hand on the steering wheel only if:

(1) The operator has reason to fear for his life or safety, or believes that a criminal act may
be perpetrated against himself or another person; or

(2) The operator is using the telephone to report to appropriate authorities a fire, a traffic
accident, a serious road hazard or medical or hazardous materials emergency, or to report the
operator of another motor vehicle who is driving in a reckless, careless or otherwise unsafe
manner or who appears to be driving under the influence of alcohol or drugs. A hand-held
wireless telephone user's telephone records or the testimony or written statements from
appropriate authorities receiving such calls shall be deemed sufficient evidence of the existence
of all lawful calls made under this paragraph.

As used in this act:
"Citizen's band radio" means a mobile communication device designed to allow for the transmission and receipt of radio communications on frequencies allocated for citizen's band radio service use.

"Hands-free wireless telephone" means a mobile telephone that has an internal feature or function, or that is equipped with an attachment or addition, whether or not permanently part of such mobile telephone, by which a user engages in a conversation without the use of either hand; provided, however, this definition shall not preclude the use of either hand to activate, deactivate, or initiate a function of the telephone.

"Two-way radio" means two-way communications equipment that uses VHF frequencies approved by the Federal Communications Commission.

"Use" of a wireless telephone or electronic communication device shall include, but not be limited to, talking or listening to another person on the telephone, text messaging, or sending an electronic message via the wireless telephone or electronic communication device.

c. (Deleted by amendment, P.L.2007, c.198).

d. A person who violates this section shall be fined as follows:

(1) for a first offense, not less than $200 or more than $400;

(2) for a second offense, not less than $400 or more than $600; and

(3) for a third or subsequent offense, not less than $600 or more than $800 .
For a third or subsequent violation, the court, in its discretion, may order the person to forfeit the right to operate a motor vehicle over the highways of this State for a period of 90 days. In addition, a person convicted of a third or subsequent violation shall be assessed three motor vehicle penalty points pursuant to section 1 of P.L.1982, c.43 (C.39:5-30.5).

A person who has been convicted of a previous violation of this section need not be charged as a second or subsequent offender in the complaint made against him in order to render him liable to the punishment imposed by this section on a second or subsequent offender, but if the second offense occurs more than 10 years after the first offense, the court shall treat the second conviction as a first offense for sentencing purposes and if a third offense occurs more than 10 years after the second offense, the court shall treat the third conviction as a second offense for sentencing purposes.

e. Except as provided in subsection d. of this section, no motor vehicle penalty points or automobile insurance eligibility points pursuant to section 26 of P.L.1990, c.8 (C.17:33B-14) shall be assessed for this offense.

f. The Chief Administrator of the New Jersey Motor Vehicle Commission shall develop and undertake a program to notify and inform the public as to the provisions of this act. Notwithstanding the provisions of R.S.39:5-41, the fines assessed pursuant to subsection d. of this section shall be collected by the court and distributed as follows: 50 percent of the fine imposed shall be paid to the county and municipality wherein the violation occurred, to be divided equally, and 50 percent of the fine imposed shall be paid to the State Treasurer, who shall allocate the fine monies to the chief administrator to be used for this public education program, which shall include informing motorists of the dangers of texting while driving.
g. Whenever this section is used as an alternative offense in a plea agreement to any other
offense in Title 39 of the Revised Statutes that would result in the assessment of motor vehicle
points, the penalty shall be the same as the penalty for a violation of section 1 of P.L.2000, c.75
(C.39:4-97.2), including the surcharge imposed pursuant to subsection f. of that section, and a
conviction under this section shall be considered a conviction under section 1 of P.L.2000, c.75
(C.39:4-97.2) for the purpose of determining subsequent enhanced penalties under that section.

2. This act shall take effect on the first day of the thirteenth month following enactment.

New Hampshire

265:105-a Prohibited Text Messages and Device Usage While Operating a Motor Vehicle.

I. A person operating a moving motor vehicle who writes a text message or uses 2 hands to
type on or operate an electronic or telecommunications device, is guilty of a violation. A person
does not write a text message when he or she reads, selects, or enters a phone number or name in
a wireless communications device for the purpose of making a phone call.

II. The fine for a violation of this section shall be $100.

291:2 Effective Date. This act shall take effect January 1, 2010.

New Mexico

SECTION 1. A new section of the Motor Vehicle Code is enacted to read:

"TEXTING WHILE DRIVING.--
A. A person shall not read or view a text message or manually type on a handheld mobile communication device for any purpose while driving a motor vehicle, except to summon medical or other emergency help or unless that device is an amateur radio and the driver holds a valid amateur radio operator license issued by the federal communications commission.

B. The provisions of this section shall not be construed as authorizing the seizure or forfeiture of a handheld mobile communication device. Unless otherwise provided by law, the handheld mobile communication device used in the violation of the provisions of this section is not subject to search by a law enforcement officer during a traffic stop made pursuant to the provisions of this section.

C. As used in this section:

(1) "driving" means being in actual physical control of a motor vehicle on a highway or street and includes being temporarily stopped because of traffic, a traffic light or stop sign or otherwise, but "driving" excludes operating a motor vehicle when the vehicle has pulled over to the side of or off of an active roadway and has stopped at a location in which it can safely remain stationary;

(2) "handheld mobile communication device" means a wireless communication device that is designed to receive and transmit text or image messages, but "handheld mobile communication device" excludes global positioning or navigation systems, devices that are physically or electronically integrated into a motor vehicle and voice-operated or hands-free devices that allow the user to compose, send or read a text message without the use of a hand except to activate, deactivate or initiate a feature or function; and
(3) "text message" means a digital communication transmitted or intended to be transmitted between communication devices and includes electronic mail, an instant message, a text or image communication and a command or request to an internet site; but "text message" excludes communications through the use of a computer-aided dispatch service by law enforcement or rescue personnel.

SECTION 2. Section 66-8-116 NMSA 1978 (being Laws 1978, Chapter 35, Section 524, as amended) is amended to read:

"66-8-116. PENALTY ASSESSMENT MISDEMEANORS-- DEFINITION--SCHEDULE OF ASSESSMENTS.--

A. As used in the Motor Vehicle Code, "penalty assessment misdemeanor" means violation of any of the following listed sections of the NMSA 1978 for which, except as provided in Subsections D and E of this section, the listed penalty assessment is established:

B. The term "penalty assessment misdemeanor" does not include a violation that has caused or contributed to the cause of an accident resulting in injury or death to a person.

C. When an alleged violator of a penalty assessment misdemeanor elects to accept a notice to appear in lieu of a notice of penalty assessment, a fine imposed upon later conviction shall not exceed the penalty assessment established for the particular penalty assessment misdemeanor and probation imposed upon a suspended or deferred sentence shall not exceed ninety days.
D. The penalty assessment for speeding in violation of Paragraph (4) of Subsection A of Section 66-7-301 NMSA 1978 is twice the penalty assessment established in Subsection A of this section for the equivalent miles per hour over the speed limit.

E. Upon a second conviction for operation without a permit for excessive size or weight pursuant to Section 66-7-413 NMSA 1978, the penalty assessment shall be two hundred fifty dollars ($250). Upon a third or subsequent conviction, the penalty assessment shall be five hundred dollars ($500).

F. Upon a second conviction for transport of a reducible load with a permit for excessive size or weight pursuant to Subsection N of Section 66-7-413 NMSA 1978 more than six miles from a port-of-entry facility on the border with Mexico, the penalty assessment shall be five hundred dollars ($500). Upon a third or subsequent conviction, the penalty assessment shall be one thousand dollars ($1,000)."

New York

Section 1225-d. Use of portable electronic devices. 1. Except as otherwise provided in this section, no person shall operate a motor vehicle while using any portable electronic device while such vehicle is in motion.

2. For the purposes of this section, the following terms shall have the following meanings:

(a) "portable electronic device" shall mean any hand-held mobile telephone, as defined by subdivision one of section twelve hundred twenty-five-c of this article, personal digital assistant
(pda), handheld device with mobile data access, laptop computer, pager, broadband personal communication device, two-way messaging device, electronic game, or portable computing device.

(b) "using" shall mean holding a portable electronic device while viewing, taking or transmitting images, playing games, or composing, sending, reading, viewing, accessing, browsing, transmitting, saving or retrieving e-mail, text messages, or other electronic data.

3. Subdivision one of this section shall not apply to (a) the use of a portable electronic device for the sole purpose of communicating with any of the following regarding an emergency situation: an emergency response operator; a hospital; a physician's office or health clinic; an ambulance company or corps; a fire department, district or company; or a police department, (b) any of the following persons while in the performance of their official duties: a police officer or peace officer; a member of a fire department, district or company; or the operator of an authorized emergency vehicle as defined in section one hundred one of this chapter.

4. A person who holds a portable electronic device in a conspicuous manner while operating a motor vehicle is presumed to be using such device. The presumption established by this subdivision is rebuttable by evidence showing that the operator was not using the device within the meaning of this section.

5. The provisions of this section shall not be construed as authorizing the seizure or forfeiture of a portable electronic device, unless otherwise provided by law.

6. A violation of this section shall be a traffic infraction and shall be punishable by a fine of not more than one hundred fifty dollars. Provided, however, that a summons for operating a
motor vehicle in violation of this section shall only be issued when there is reasonable cause to believe that the person operating such motor vehicle has committed a violation of the laws of this state other than a violation of this section.

North Carolina

Section 20-137.4A. Unlawful use of mobile telephone for text messaging or electronic mail.

(a) Offense. – It shall be unlawful for any person to operate a vehicle on a public street or highway or public vehicular area while using a mobile telephone to:

(1) Manually enter multiple letters or text in the device as a means of communicating with another person; or

(2) Read any electronic mail or text message transmitted to the device or stored within the device, provided that this prohibition shall not apply to any name or number stored in the device nor to any caller identification information.

(b) Exceptions. – The provisions of this section shall not apply to:

(1) The operator of a vehicle that is lawfully parked or stopped.

(2) Any of the following while in the performance of their official duties: a law enforcement officer; a member of a fire department; or the operator of a public or private ambulance.
(3) The use of factory-installed or aftermarket global positioning systems (GPS) or wireless communications devices used to transmit or receive data as part of a digital dispatch system.

(4) The use of voice operated technology.

(c) Penalty. – A violation of this section while operating a school bus, as defined in G.S. 20-137.4(a)(4), shall be a Class 2 misdemeanor and shall be punishable by a fine of not less than one hundred dollars ($100.00). Any other violation of this section shall be an infraction and shall be punishable by a fine of one hundred dollars ($100.00) and the costs of court.

No drivers license points or insurance surcharge shall be assessed as a result of a violation of this section. Failure to comply with the provisions of this section shall not constitute negligence per se or contributory negligence per se by the operator in any action for the recovery of damages arising out of the operation, ownership, or maintenance of a vehicle.

North Dakota Century Code Section 39-08

Use of a wireless communications device prohibited.

1. The operator of a motor vehicle that is part of traffic may not use a wireless communications device to compose, read, or send an electronic message.

2. Under this section:
a. "Electronic message" means a self-contained piece of digital communication that is designed or intended to be transmitted between physical devices. The term includes e-mail, a text message, an instant message, a command or request to access a world wide web page, or other data that uses a commonly recognized electronic communications protocol. The term does not include:

(1) Reading, selecting, or entering a telephone number, an extension number, or voice mail retrieval codes and commands into an electronic device for the purpose of initiating or receiving a telephone or cellular phone call or using voice commands to initiate or receive a telephone or cellular phone call;

(2) Inputting, selecting, or reading information on a global positioning system device or other navigation system device;

(3) Using a device capable of performing multiple functions, such as fleet management systems, dispatching devices, smart phones, citizen band radios, music players, or similar devices, for a purpose that is not otherwise prohibited;

(4) Voice or other data transmitted as a result of making a telephone or cellular phone call; or

(5) Data transmitted automatically by a wireless communication device without direct initiation by an individual.
b. "Traffic" means operation of a motor vehicle while in motion or for the purposes of travel on any street or highway and includes a temporary stop or halt of motion, such as at an official traffic-control signal or sign. The term does not include a motor vehicle that is lawfully parked.

3. This section does not apply if a wireless communications device is used for obtaining emergency assistance to report a traffic accident, medical emergency, or serious traffic hazard or to prevent a crime about to be committed, in the reasonable belief that an individual's life or safety is in immediate danger, or in an authorized emergency vehicle while in the performance of official duties.

Ohio

Sec. 4511.204. (A) No person shall drive a motor vehicle, trackless trolley, or streetcar on any street, highway, or property open to the public for vehicular traffic while using a handheld electronic wireless communications device to write, send, or read a text-based communication.

(B) Division (A) of this section does not apply to any of the following:

(1) A person using a handheld electronic wireless communications device in that manner for emergency purposes, including an emergency contact with a law enforcement agency, hospital or health care provider, fire department, or other similar emergency agency or entity;

(2) A person driving a public safety vehicle who uses a handheld electronic wireless communications device in that manner in the course of the person's duties;
(3) A person using a handheld electronic wireless communications device in that manner whose motor vehicle is in a stationary position and who is outside a lane of travel;

(4) A person reading, selecting, or entering a name or telephone number in a handheld electronic wireless communications device for the purpose of making or receiving a telephone call;

(5) A person receiving wireless messages on a device regarding the operation or navigation of a motor vehicle; safety-related information, including emergency, traffic, or weather alerts; or data used primarily by the motor vehicle;

(6) A person receiving wireless messages via radio waves;

(7) A person using a device for navigation purposes;

(8) A person conducting wireless interpersonal communication with a device that does not require manually entering letters, numbers, or symbols or reading text messages, except to activate, deactivate, or initiate the device or a feature or function of the device;

(9) A person operating a commercial truck while using a mobile data terminal that transmits and receives data;

(10) A person using a handheld electronic wireless communications device in conjunction with a voice-operated or hands-free device feature or function of the vehicle.

(C) Notwithstanding any provision of law to the contrary, no law enforcement officer shall cause an operator of an automobile being operated on any street or highway to stop the
automobile for the sole purpose of determining whether a violation of division (A) of this section has been or is being committed or for the sole purpose of issuing a ticket, citation, or summons for a violation of that nature or causing the arrest of or commencing a prosecution of a person for a violation of that nature, and no law enforcement officer shall view the interior or visually inspect any automobile being operated on any street or highway for the sole purpose of determining whether a violation of that nature has been or is being committed.

(D) Whoever violates division (A) of this section is guilty of a minor misdemeanor.

(E) This section shall not be construed as invalidating, preempting, or superseding a substantially equivalent municipal ordinance that prescribes penalties for violations of that ordinance that are greater than the penalties prescribed in this section for violations of this section.

(F) As used in this section:

(1) "Electronic wireless communications device" includes any of the following:

(a) A wireless telephone;

(b) A text-messaging device;

(c) A personal digital assistant;

(d) A computer, including a laptop computer and a computer tablet;

(e) Any other substantially similar wireless device that is designed or used to communicate text.
(2) "Voice-operated or hands-free device" means a device that allows the user to vocally compose or send, or to listen to a text-based communication without the use of either hand except to activate or deactivate a feature or function.

(3) "Write, send, or read a text-based communication" means to manually write or send, or read a text-based communication using an electronic wireless communications device, including manually writing or sending, or reading communications referred to as text messages, instant messages, or electronic mail.

Sec. 4511.205. (A) No holder of a temporary instruction permit who has not attained the age of eighteen years and no holder of a probationary driver's license shall drive a motor vehicle on any street, highway, or property used by the public for purposes of vehicular traffic or parking while using in any manner an electronic wireless communications device.

(B) Division (A) of this section does not apply to either of the following:

(1) A person using an electronic wireless communications device for emergency purposes, including an emergency contact with a law enforcement agency, hospital or health care provider, fire department, or other similar emergency agency or entity;

(2) A person using an electronic wireless communications device whose motor vehicle is in a stationary position and the motor vehicle is outside a lane of travel;

(3) A person using a navigation device in a voice-operated or hands-free manner who does not manipulate the device while driving.
(C)(1) Except as provided in division (C)(2) of this section, whoever violates division (A) of this section shall be fined one hundred fifty dollars. In addition, the court shall impose a class seven suspension of the offender's driver's license or permit for a definite period of sixty days.

(2) If the offender previously has been convicted of a violation of this section, whoever violates this section shall be fined three hundred dollars. In addition, the court shall impose a class seven suspension of the offender's driver's license or permit for a definite period of one year.

(D) As used in this section, "electronic wireless communications device" includes any of the following:

(1) A wireless telephone;

(2) A personal digital assistant;

(3) A computer, including a laptop computer and a computer tablet;

(4) A text-messaging device;

(5) Any other substantially similar electronic wireless device that is designed or used to communicate via voice, image, or written word.

Oregon

811.507.
(1) As used in this section:

(a) 'Hands-free accessory' means an attachment or built-in feature for or an addition to a mobile communication device, whether or not permanently installed in a motor vehicle, that when used allows a person to maintain both hands on the steering wheel.

(b) 'Mobile communication device' means a text messaging device or a wireless, two-way communication device designed to receive and transmit voice or text communication.

(2) A person commits the offense of operating a motor vehicle while using a mobile communication device if the person, while operating a motor vehicle on a highway, uses a mobile communication device.

(3) This section does not apply:

(a) To a person who is summoning medical or other emergency help if no other person in the vehicle is capable of summoning help;

(b) To a person using a mobile communication device for the purpose of farming or agricultural operations;

(c) To a person operating an ambulance or emergency vehicle;

(d) To a person 18 years of age or older who is using a hands-free accessory;

(e) To a person operating a motor vehicle while providing public safety services or emergency services as a volunteer;

(f) To a person operating a motor vehicle while acting in the scope of the person's employment as a public safety officer, as defined in ORS 348.270;

(g) To a person operating a motor vehicle in the scope of the person’s employment if operation of the motor vehicle is necessary for the person’s job;

(h) To a person activating or deactivating the mobile communication device or a function of
(i) To a person who holds a valid amateur radio operator license issued or any other license issued by the Federal Communications Commission and is operating an amateur radio;

(j) To a person who operates a two-way radio device that transmits radio communication transmitted by a station operating on an authorized frequency within the citizens' or family radio service bands in accordance with rules of the Federal Communications Commission; or

(k) To a person using a function of the mobile communication device that allows for only one-way voice communication while the person is:

(A) Operating a motor vehicle in the scope of the person's employment;

(B) Providing transit services to persons with disabilities or to senior citizens; or

(C) Participating in public safety or emergency service activities.

(4) The offense described in this section, operating a motor vehicle while using a mobile communication device, is a Class D traffic violation.

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Title 75

§ 3316. Prohibiting text-based communications.

(a) Prohibition.--No driver shall operate a motor vehicle on a highway or trafficway in this Commonwealth while using an interactive wireless communications device to send, read or write a text-based communication while the vehicle is in motion. A person does not send, read or write
a text-based communication when the person reads, selects or enters a telephone number or name in an interactive wireless communications device for the purpose of activating or deactivating a voice communication or a telephone call.

(b) (Reserved).

(c) Seizure.--The provisions of this section shall not be construed as authorizing the seizure or forfeiture of an interactive wireless communications device, unless otherwise provided by law.

(d) Penalty.--A person who violates subsection (a) commits a summary offense and shall, upon conviction, be sentenced to pay a fine of $50.

(e) Preemption of local ordinances.--In accordance with section 6101 (relating to applicability and uniformity of title), this section supersedes and preempts all ordinances of any municipality with regard to the use of an interactive wireless communications device by the driver of a motor vehicle.

(f) Definition.--As used in this section, the term "text-based communication" means a text message, instant message, electronic mail or other written communication composed or received on an interactive wireless communications device.

Rhode Island

31-22-30. Text messaging while operating a motor vehicle. -- (a) For purposes of this section, the following terms shall have the following meanings:
(1) "Hands Free" means the manner in which a wireless handset is operated for the purpose of composing, reading or sending text messages, by using an internal feature or function, or through an attachment or addition, including but not limited to, an earpiece, headset, remote microphone or short range wireless connection, thereby allowing the user to operate said device without the use of hands.

(2) "Inoperability" means a motor vehicle that is incapable of being operated or being operated in a safe and prudent manner due to mechanical failure, including but not limited to, engine overheating or tire failure.

(3) "Motor Vehicle" means any vehicle that is self-propelled by a motor, including but not limited to, automobiles, trucks, vans, construction vehicles, etc.

(4) "Person" means any natural person, corporation, unincorporated association, firm, partnership, joint venture, joint stock association or other entity or business organization of any kind.

(5) "Stopped" means not in motion.

(6) "Text Message", also referred to as short messaging service (SMS) means the process by which users send, read, or receive messages on a wireless handset, including but not limited to, text messages, instant messages, electronic messages or e-mails, in order to communicate with any person or device.

(7) "Use" means to hold a wireless handset in one's hands.
(8) "Wireless Handset" means a portable electronic or computing device, including cellular telephones and digital personal assistants (PDAs), capable of transmitting data in the form of a text message.

(b) No person shall use a wireless handset to compose, read or send text messages while operating a motor vehicle on any public street or public highway within the state of Rhode Island.

(c) Notwithstanding the provisions of subsection (b), this section shall not be construed to prohibit the use of any wireless handset by:

(1) Any law enforcement, public safety or police officers, emergency services officials, first aid, emergency medical technicians and personnel, and fire safety officials in the performance of duties arising out of and in the course of their employment as such;

(2) A person using a wireless handset to contact an individual listed in subsection (c)(1); or

(3) A person using a wireless handset inside a motor vehicle while such motor vehicle is parked, standing or stopped and is removed from the flow of traffic, in accordance with applicable laws, rules or ordinances, or is stopped due to the inoperability of such motor vehicle.

(d) Nothing in this section shall be construed to prohibit a person operating a motor vehicle from utilizing a hands-free wireless handset.

(e) Any person who violates any of the provisions of this section shall, upon conviction, be subject to a fine of eighty-five dollars ($85.00), or a license suspension for up to thirty (30) days, or both; for a second conviction shall be subject to a fine of one hundred dollars ($100), or a
license suspension for up to three (3) months, or both; and for a third or subsequent conviction a person shall be subject to a fine of one hundred twenty-five dollars ($125), or a license suspension for up to six (6) months, or both. All violations arising out of this section shall be heard in the Rhode Island Traffic Tribunal.

SECTION 2. This act shall take effect upon passage and apply to violations occurring on or after July 1, 2013.

South Dakota

32-26 be amended by adding thereto a NEW SECTION to read as follows:

No person may operate a motor vehicle on a highway while using a handheld electronic wireless communication device to write, send, or read a text-based communication. This section does not apply to a person who is using a handheld electronic wireless communication device:

(1) While the vehicle is lawfully parked;

(2) To contact any emergency public safety answering point or dispatch center;

(3) To write, read, select, or enter a telephone number or name in an electronic wireless communications device for the purpose of making or receiving a telephone call; or

(4) When using voice operated or hands free technology.
State or local law enforcement agencies shall enforce this section as a secondary action. A violation of this section is a petty offense with a fine of one hundred dollars.

Section 2. That chapter 32-26 be amended by adding thereto a NEW SECTION to read as follows:

Terms used in this Act mean:

(1) "Electronic wireless communication device," a mobile communication device that uses short-wave analog or digital radio transmissions or satellite transmissions between the device and a transmitter to permit wireless telephone communications to and from the user of the device within a specified area;

(2) "Voice operated or hands free technology," technology that allows a user to write, send, or listen to a text-based communication without the use of either hand except to activate, deactivate, or initiate a feature or function; and

(3) "Write, send, or read a text-based communication," using an electronic wireless communications device to manually communicate with any person using text-based communication including communications referred to as a text message, instant message, or electronic mail.

Section 3. That chapter 32-26 be amended by adding thereto a NEW SECTION to read as follows:

The Department of Public Safety shall expend lawfully appropriated funds to develop and communicate a distracted drivers public awareness campaign.
Section 4. That chapter 32-26 be amended by adding thereto a NEW SECTION to read as follows:

No handheld electronic wireless communication device used in violation of this Act may be seized by a law enforcement officer to establish a violation of this Act. However, a handheld electronic wireless communication device may be seized upon compliance with the search and seizure requirements in chapter 23A-35.

Tennessee

Section 55-8-19_.

(a) For the purpose of this section, unless the context otherwise requires:

(1) "Mobile telephone" means a cellular, analog, wireless or digital device that provides for voice communication and for data communication other than by voice; and

(2) "Personal digital assistant" means a wireless electronic communication device that provides for data communication other than by voice.

(b) No person while driving a motor vehicle on any public road or highway shall use a hand-held mobile telephone or a hand-held personal digital assistant to transmit or read a written message; provided, that a driver does not transmit or read a written message for the purpose of this subsection (b) if such driver reads, selects or enters a telephone number or name in a hand-held mobile telephone or a personal digital assistant for the purpose of making or receiving a telephone call.

(c) The provisions of this section shall only apply to a person driving a motor vehicle that is in motion at the time a written message from a mobile telephone or hand-held personal digital
(d) A violation of any provision of this section is a Class C misdemeanor, subject only to imposition of a fine, not to exceed fifty dollars ($50.00), and court costs, not to exceed ten dollars ($10.00), including, but not limited to, any statutory fees of officers. No state or local litigation taxes shall be applicable to a case prosecuted under this section.

(e) The provisions of this section shall not apply to the following persons:

(1) Officers of the state, or of any county, city or town, charged with the enforcement of the laws of the state, when in the actual discharge of their official duties;

(2) Campus police officers and public safety officers, as defined by Section 49-7-118, when in the actual discharge of their official duties;

(3) Emergency medical technicians, emergency medical technician-paramedics, and firefighters, both volunteer and career, when in the actual discharge of their official duties; and

(4) Emergency management agency officers of the state, or of any county, city or town, when in the actual discharge of their official duties.

(f) A traffic citation that is based solely upon a violation of this act shall be considered a nonmoving traffic violation and no points shall be added to a driver record for such violation.

SECTION 2. The Department of Transportation is directed to utilize the department's permanent electronic overhead informational displays located throughout this state to provide periodic messages to the motoring public as to the provisions of this act.
41-6a-1716. Prohibition on using a handheld wireless communication device for text messaging communication while operating a moving motor vehicle -- Penalties.

(1) As used in this section:

(a) (i) "Handheld wireless communication device" means a handheld device used for the transfer of information without the use of electrical conductors or wires.

(ii) "Handheld wireless communication device" includes a:

(A) wireless telephone;

(B) personal digital assistant;

(C) pager; or

(D) text messaging device.

(b) "Text messaging" has the same meaning as defined in Section 76-4-401.

(2) Except as provided in Subsection (3), a person may not use a handheld wireless communication device for text messaging or electronic mail communication while operating a moving motor vehicle on a highway in this state.

(3) Subsection (2) does not prohibit a person from using a handheld wireless communication device while operating a moving motor vehicle:

(a) during a medical emergency;

(b) when reporting a safety hazard or requesting assistance relating to a safety hazard;

(c) when reporting criminal activity or requesting assistance relating to a criminal activity;

(d) when providing roadside or medical assistance; or

(e) when used by a law enforcement officer or emergency service personnel acting within the course and scope of the law enforcement officer's or emergency service personnel's employment.
(4) A person convicted of a violation of this section is guilty of a:

(a) class C misdemeanor; or

(b) class B misdemeanor if the person:

(i) has also inflicted serious bodily injury upon another as a proximate result of using a handheld wireless communication device for text messaging or electronic mail communication while operating a moving motor vehicle on a highway in this state; or

(ii) has a prior conviction under this section, that is within three years of:

(A) the current conviction under this section; or

(B) the commission of the offense upon which the current conviction is based.

Vermont

23 V.S.A. § 1099:

§ 1099. Texting prohibited

(a) As used in this section, "texting" means the reading or the manual composing or sending of electronic communications, including text messages, instant messages, or e-mails, using a portable electronic device as defined in subdivision 4(82) of this title, but shall not be construed to include use of a global positioning or navigation system.

(b) A person shall not engage in texting while operating a moving motor vehicle on a highway.
(c) A person who violates this section commits a traffic violation as defined in section 2302 of this title and shall be subject to a penalty of not less than $100.00 and not more than $200.00 upon adjudication of a first violation, and of not less than $250.00 and not more than $500.00 upon adjudication of a second or subsequent violation within any two-year period. (Added 2009, No. 150 (Adj. Sess.), § 2, eff. June 1, 2010; amended 2013, No. 57, § 24.)

§ 2502. POINT ASSESSMENT; SCHEDULE

(a) Any person operating a motor vehicle shall have points assessed against his or her driving record for convictions for moving violations of the indicated motor vehicle statutes in accord with the following schedule: (All references are to Title 23 of the Vermont Statutes Annotated.)

(1) Two points assessed for:

(LL) § 1095. Operating with television set installed;

(MM) § 1099. Texting prohibited—first offense;

(4) Five points assessed for:

(A) § 1050. Failure to yield to emergency vehicles;

(B) § 1075. Illegal passing of school bus;

(C) § 1099. Texting prohibited—second and subsequent offenses;

(D) § 676. Operating after suspension, revocation or refusal—civil violation
Section 46.2-1078.1. Use of handheld personal communications devices in certain motor vehicles; exceptions; penalty.

A. It is unlawful for any person to operate a moving motor vehicle on the highways in the Commonwealth while using any handheld personal communications device to:

1. Manually enter multiple letters or text in the device as a means of communicating with another person; or

2. Read any email or text message transmitted to the device or stored within the device, provided that this prohibition shall not apply to any name or number stored in the device nor to any caller identification information.

B. The provisions of this section shall not apply to:

1. The operator of any emergency vehicle while he is engaged in the performance of his official duties;

2. An operator who is lawfully parked or stopped;

3. The use of factory-installed or aftermarket global positioning systems (GPS) or wireless communications devices used to transmit or receive data as part of a digital dispatch system; or

4. Any person using a handheld personal communications device to report an emergency.
A violation of this section is a traffic infraction punishable, for a first offense, by a fine of $125 and, for a second or subsequent offense, by a fine of $250.

For the purposes of this section, "emergency vehicle" means:

1. Any law-enforcement vehicle operated by or under the direction of a federal, state, or local law-enforcement officer
2. Any regional detention center vehicle operated by or under the direction of a correctional officer responding to an emergency call or operating in an emergency situation;

3. Any vehicle used to fight fire, including publicly owned state forest warden vehicles, when traveling in response to a fire alarm or emergency call;

4. Any ambulance, rescue, or life-saving vehicle designed or used for the principal purpose of supplying resuscitation or emergency relief where human life is endangered;

5. Any Department of Emergency Management vehicle or Office of Emergency Medical Services vehicle, when responding to an emergency call or operating in an emergency situation;

6. Any Department of Corrections vehicle designated by the Director of the Department of Corrections, when (i) responding to an emergency call at a correctional facility, (ii) participating in a drug-related investigation, (iii) pursuing escapees from a correctional facility, or (iv) responding to a request for assistance from a law-enforcement officer; and

7. Any vehicle authorized to be equipped with alternating, blinking, or flashing red or red and white secondary warning lights pursuant to Section 46.2-1029.2.
2. That the Department of Criminal Justice Services shall make training on the implementation and enforcement of this act available to state and local law-enforcement agencies.

West Virginia

§17C-14-15. Prohibited use of an electronic communications device driving without handheld features; definitions; exceptions; penalties.

(a) Except as provided in subsection (c) of this section, a person may not drive or operate a motor vehicle on a public street or highway while:

(1) Texting; or

(2) Using a cell phone or other electronic communications device, unless the use is accomplished by hands-free equipment.

(b) For purposes of this section, the following terms shall mean:

(1) "Cell phone" shall mean a cellular, analog, wireless or digital telephone.

(2) "Driving" or "operating a motor vehicle" means operating a motor vehicle, with the motor running, including while temporarily stationary because of traffic, a traffic control device, or other momentary delays, but does not include operating a motor vehicle after the driver has moved the vehicle to the side of, or off, a highway and halted in a location where the vehicle can safely remain stationary.
(3) "Electronic communication device" means a cell telephone, personal digital assistant, electronic device with mobile data access, laptop computer, pager, broadband personal communication device, 2-way messaging device, electronic game, or portable computing device. For the purposes of this section, an "electronic communication device" does not include:

(A) Voice radios, mobile radios, land mobile radios, commercial mobile radios or two way radios with the capability to transmit and receive voice transmissions utilizing a push-to-talk or press-to-transmit function; or

(B) Other voice radios used by a law-enforcement officer, an emergency services provider, an employee or agent of public safety organizations, first responders, Amateur Radio Operators (HAM) licensed by the Federal Communications Commission and school bus operators.

(4) "Engaging in a call" means when a person talks into or listens on an electronic communication device, but shall not include when a person dials or enters a phone number on a pushpad or screen to initiate the call.

(5) "Hands-free electronic communication device" means an electronic communication device that has an internal feature or function, or that is equipped with an attachment or addition, whether or not permanently part of such electronic communication device, by which a user engages in a call without the use of either hand or both hands.

(6) "Hands-free equipment" means the internal feature or function of a hands-free electronic communication device or the attachment or addition to a hands-free electronic communication device by which a user may engage in a call or text without the use of either hand or both hands.
(7) "Texting" means manually entering alphanumeric text into, or reading text from, an
electronic communication device, and includes, but is not limited to, short message service, e-
mailing, instant messaging, a command or request to access a World Wide Web page or
engaging in any other form of electronic text retrieval or entry, for present or future
communication. For purposes of this section, "texting" does not include the following actions:

(A) Reading, selecting or entering a telephone number, an extension number, or voicemail
retrieval codes and commands into an electronic device by the pressing the device in order to
initiate or receive a phone call or using voice commands to initiate or receive a telephone call;

(B) Inputting, selecting or reading information on a global positioning system or navigation
system; or

(C) Using a device capable of performing multiple functions, including fleet management
systems, dispatching devices, smart phones, citizens band radios or music players, for a purpose
that is not otherwise prohibited in this section.

(8) "Using a cell phone or other electronic communication device" means holding in a
person's hand or hands an electronic communication device while:

(A) Viewing or transmitting images or data;

(B) Playing games;

(C) Composing, sending, reading, viewing, accessing, browsing, transmitting, saving or
retrieving e-mail, text messages or other electronic data; or
(D) Engaging in a call.

(c) Subsection (a) of this section shall not apply to:

1. A law-enforcement officer, a firefighter, an emergency medical technician, a paramedic or the operator of an authorized emergency vehicle in the performance of their official duties;

2. A person using an electronic communication device to report to appropriate authorities a fire, a traffic accident, a serious road hazard, or a medical or hazardous materials emergencies;

3. The activation or deactivation of hands-free equipment or a function of hands-free equipment.

(d) This section does not supersede the provisions of section three-a, article two, chapter seventeen-b of this code or any more restrictive provisions for drivers of commercial motor vehicles prescribed by the provisions of chapter seventeen-e of this code or federal law or rule.

(e) Any person who violates the provisions of subsection (a) of this section is guilty of a traffic offense and, upon conviction thereof, shall for a first offense be fined $100; for a second offense be fined $200; and for a third or subsequent offense be fined $300. No court costs or other fees shall be assessed for a violation of subsection (a) of this section.

(f) Notwithstanding any other provision of this code to the contrary, points may not be entered on any driver's record maintained by the Division of Motor Vehicles as a result of a violation of this section, except for the third and subsequent convictions of the offense, for which three points shall be entered on any driver's record maintained by the Division of Motor Vehicles.
(g) Driving or operating a motor vehicle on a public street or highway while texting shall be enforced as a primary offense as of July 1, 2012. Driving or operating a motor vehicle on a public street or highway while using a cell phone or other electronic communication device without hands-free equipment shall be enforced as a secondary offense as of July 1, 2012, and as a primary offense as of July 1, 2013 for purposes of citation.

(h) Within ninety days of the effective date of this section, the Department of Transportation shall cause to be erected signs upon any highway entering the state of West Virginia on which a welcome to West Virginia sign is posted, and any other highway where the Division of Highways deems appropriate, posted at a distance of not more than one mile from each border crossing, each sign to bear an inscription clearly communicating to motorists entering the state that texting, or the use of a wireless communication device without hands-free equipment, is illegal within this state.

(i) Nothing contained in this section shall be construed to authorize seizure of a cell phone or electronic device by any law-enforcement agency.

Washington

Sec. 1. A new section is added to chapter 46.61 RCW to read as follows:

(1) Except as provided in subsection (2) of this section, a person operating a moving motor vehicle who, by means of an electronic wireless communications device, other than a voice-activated global positioning or navigation system that is permanently affixed to the vehicle, sends, reads, or writes a text message, is guilty of a traffic infraction. A person does not send,
read, or write a text message when he or she reads, selects, or enters a phone number or name in a wireless communications device for the purpose of making a phone call.

(2) Subsection (1) of this section does not apply to a person operating:

(a) An authorized emergency vehicle;

(b) A moving motor vehicle while using an electronic wireless communications device to:

(i) Report illegal activity;

(ii) Summon medical or other emergency help;

(iii) Prevent injury to a person or property; or

(iv) Relay information between a transit or for-hire operator and that operator's dispatcher, in which the device is permanently affixed to the vehicle.

(3) Enforcement of this section by law enforcement officers may be accomplished only as a secondary action when a driver of a motor vehicle has been detained for a suspected violation of this title or an equivalent local ordinance or some other offense.

(4) Infractions under this act shall not become part of the 14 driver's record under RCW 46.52.101 and 46.52.120. Additionally, a finding that a person has committed a traffic infraction under this section shall not be made available to insurance companies or employers.
346.89 (3) (a) No person may drive, as defined in s. 343.305 (1) (b), any motor vehicle while composing or sending an electronic text message or an electronic mail message.

(b) This subsection does not apply to any of the following:

1. The operator of an authorized emergency vehicle. 2. The use of any device whose primary function is transmitting and receiving emergency alert messages and messages related to the operation of the vehicle or an accessory that is integrated into the electrical system of a vehicle, including a global positioning system device.

3. An amateur radio operator who holds a valid amateur radio operator's license issued by the federal communications commission when he or she is using dedicated amateur radio 2-way radio communication equipment and observing proper amateur radio operating procedures.

4. The use of a voice-operated or hands-free device if the driver of the motor vehicle does not use his or her hands to operate the device, except to activate or deactivate a feature or function of the device.

SECTION 2m. 346.95 (2) of the statutes is amended to read:

346.95 (2) Any person violating s. 346.89 (1) or (3)(a) or 346.94 (2), (4), or (7) may be required to forfeit not less than $20 nor more than $400.

SECTION 3. Effective date.

(1) This act takes effect on the first day of the 7th month beginning after publication.
31-5-237. Use of handheld electronic wireless communication devices for electronic messaging prohibited; exceptions; penalties.

(a) No person shall operate a motor vehicle on a public street or highway while using a handheld electronic wireless communication device to write, send or read a text-based communication. This section shall not apply to a person who is using a handheld electronic wireless communication device:

(i) While the vehicle is lawfully parked;

(ii) To contact an emergency response vehicle;

(iii) To write, read, select or enter a telephone number or name in an electronic wireless communications device for the purpose of making or receiving a telephone call; or

(b) This section shall not apply to a person operating an emergency response vehicle while making communications necessary to the performance of his official duties as an emergency responder.

(iv) When using voice operated or hands free technology.

(c) Any person who operates a motor vehicle in violation of this section is guilty of a misdemeanor punishable by a fine of not more than seventy-five dollars ($75.00).

(d) As used in this section:
(i) "Electronic wireless communication device" means a mobile communication device that uses short-wave analog or digital radio transmissions or satellite transmissions between the device and a transmitter to permit wireless telephone communications to and from the user of the device within a specified area;

(ii) "Emergency response vehicle" means any ambulance, fire department, law enforcement or civil defense vehicle or other vehicle used primarily for emergency purposes;

(iii) "Voice operated or hands free technology" means technology that allows a user to write, send or read a text based communication without the use of either hand except to activate, deactivate or initiate a feature or function;

(iv) "Write, send or read a text-based communication" means using an electronic wireless communications device to manually communicate with any person using text-based communication including, but not limited to, communications referred to as a text message, instant message or electronic mail.

Section 2. This act is effective July 1, 2010.
GENERAL INFORMATION

Study: Impact of Work-Related Fatigue on Deadly Force Judgment and Decision Making Performance and Driving Performance Among Day vs. Night Sleeps

Principal Investigator: Bryan Vila, PhD
Study Manager: Stephen James, MA
Study Coordinator: Brigitta Jozeefowski, MPA
Physician of Record: Dr. Belenky, MD

Supervisor (01): Liz
Supervisor (02):
Research Assistant (01): Nick
Research Assistant (02):
Recover Sleep RA: Emma

Study Run: 190
Start Date: Fri, Jul 12 2013
Start Time: 17:00

LIST OF PARTICIPANTS:

Subject: ID: Session: Actigraph S/N:
Subject: ID: Session: Actigraph S/N:

RANDOMIZATION INFORMATION

<table>
<thead>
<tr>
<th>ID:</th>
<th>Lab Side:</th>
<th>Holster:</th>
<th>Belt:</th>
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<tbody>
<tr>
<td>Patrol Drives</td>
<td>Distracted Driving Task</td>
<td>Deadly Force Scenarios</td>
<td>IAT</td>
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</tbody>
</table>

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:
<table>
<thead>
<tr>
<th>Time</th>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:00</td>
<td>Fri, Jul 12</td>
<td>Supervisor prepares Deadly Force Decision Making simulators for testing</td>
</tr>
</tbody>
</table>

Refer to Start DFDM Sim in Supervisor SOP binder

<table>
<thead>
<tr>
<th>Time</th>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:15</td>
<td>Fri, Jul 12</td>
<td>Supervisor prepares Driving simulators for testing</td>
</tr>
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ID:

ID:

Refer to Start Driving Sim in Supervisor SOP binder

<table>
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<tr>
<th>Time</th>
<th>Date</th>
<th>Event Description</th>
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<tbody>
<tr>
<td>16:00</td>
<td>Fri, Jul 12</td>
<td>Research Assistant prepares PVT laptops for testing</td>
</tr>
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Turn on PVT laptop by pressing the power button (upper right above keyboard)
Ensure that the laptop boots correctly

<table>
<thead>
<tr>
<th>Time</th>
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<th>Event Description</th>
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</thead>
<tbody>
<tr>
<td>16:05</td>
<td>Fri, Jul 12</td>
<td>Research Assistant prepares cognitive task computers for testing</td>
</tr>
</tbody>
</table>

Open the door on the large black computer cabinet by turning the key to the left
Open the glass drop down door on the cognitive task computer by turning the nob to the right
Press the power button on cognitive task computer (system will take a little time to boot)
Close both doors.
Log in to cognitive task computer (username: ONR CA POST Phase 1, password: sprc)
Check that green network cable is plugged in
Check that the camera mounted on the cubicle wall is pointed in the right direction
Make sure the headphones on the desk are plugged into the amplifier
Ensure there is a blue light on the amplifier
Set amplifier to level 3

<table>
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<th>Date</th>
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<tbody>
<tr>
<td>16:10</td>
<td>Fri, Jul 12</td>
<td>Research Assistant prepares questionnaires for testing</td>
</tr>
</tbody>
</table>

Retrieve 6 blank Karolinska Sleepiness Scale (KSS) questionnaires from filing cabinet
Retrieve 2 blank Scale of Positive and Negative Experiences (PANAS) questionnaires from filing cabinet
Fill out participant number and date (MM/DD/YY) on each form
Being the 8 questionnaires to the cognitive work station and place on top of black box

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

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ONR CA POST PROTOCOL

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16:15  Fri, Jul 12  Supervisor calibrates eye gaze devices

Supervisor refer to Eye Gaze Calibration in Supervisor SOP binder

16:20  Fri, Jul 12  Research Assistant prepares Holter monitor and exam room table

If not already on turn on Study Prep computer and log in (username: RA, password: sprc)
Collect Holter monitors and ECG supplies from the black cabinet drawer
RA refer to Holter Setup in RA SOP binder

17:00  Fri, Jul 12  Research Assistant ensures participants are parked correctly

RA fill out pink parking pass with correct date
NOTE: Dates on parking permits must be MM/DD/YY format (e.g. 01/01/12)
RA wait in the conference area for participant to arrive
NOTE: If participants have caffeinated beverages or tobacco present upon arrival, alert Supervisor
Make sure that the participants are parked in a green zone behind the South Campus facility
RA give participant a pink parking pass
Instruct participants to hang pass on their rear-view mirror with the date facing out
Wait in the conference area for participants and supervisors

Supervisors will come get participants when lab is ready for testing

17:05  Fri, Jul 12  ID:  Supervisor secures all weapons

Supervisor leads participant to simulation lab through the conference area

Participants who are armed (guns, tasers, AND knives) MUST lock away any weapons
Instruct participant to lock up all weapons including knives in one of the gun lockers
Ask participant if they have any backup weapons
Ensure all weapons are locked up safely by the participants
Instruct participant to lock up other valuables (watches, cell phones, wallets, keys, etc.) in their locker
Double check that participant locked up cell phones and pagers
NO cell phones, pagers, or watches are allowed in the simulation or sleep labs
Participants will keep their gun locker key

Once guns and valuables have been locked up, walk participants into the simulation lab
Overnight bags can be put in corresponding locker

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

Version 1.7

CONFIDENTIAL

Supervisor/RA : Emma

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ONR CA POST PROTOCOL

CONFIDENTIAL

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17:10 Fri, Jul 12 ID: Admit participants to study

RA record arrival time for participant:
ID:
ID:
RA walks participant to corresponding cubicle in simulation lab
RA collects actigraphs from each participant
Ensure the participant number on actigraph matches participant's number in the protocol
NOTE: If participant number is not on actigraph, give actigraph to supervisor
RA collects sleep diary from each participant
Ensure that participant number on sleep diary matches participant's number in the protocol
Place sleep diary and actigraph on Study Prep Table
RA orients participants to the study, refer to Orientation in RA SOP binder
Instruct participants to spit out any gum or candy they may have in their mouth
Remind participants they cannot chew gum/candy AT ANY TIME during the study
Instruct participants to go to the bathroom if they want before testing
Remind participants they won't be able to use the bathroom until a scheduled break (approx. 20 min)

17:15 Fri, Jul 12 ID: Participants eat a light snack

RA asks participant which flavor of protein shake they would like to drink
NOTE: Options for shake flavors are: strawberry, chocolate or vanilla
REMEMBER participant that this will be the only snack until the end of testing (approximately 6 hours)
NOTE: If participant does not want a shake, do not force them to drink it
Retrieve protein shake from mini-fridge
Give participant the protein shake to drink
Once participant is finished, RA disposes container in recycle bin
Walk participant into exam room

17:35 Fri, Jul 12 ID: Participants put on Holter monitors

RA refer to Holter Hookup in RA SOP binder
Walk participant to their corresponding driving simulator for eye-gaze setup

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

Version 1.7

Supervisor/RA: Emma
ONR CA POST PROTOCOL

17:45 Fri, Jul 12 ID: 

Participant specific eye-gaze set up 

Supervisor instructs participant to sit in the simulator by entering from the left side
Instruct participant to adjust seat to comfortably reach pedals, and touch screen
NOTE: This seat adjustment must remain the same for the duration of the study
Tell participant the seat adjustment cannot be changed once it is set - due to eye gaze tracking
Tell participants to put on their seatbelt
Ensure participants are seated comfortably and can reach pedals and touch screen
Supervisor sets participant model and calibrates world model, refer to Eye Gaze Setup in Supervisor SOP binder
Have participants exit driving simulator from the left side
Walk participants to their corresponding cubicle

18:00 Fri, Jul 12 ID: 

Participants put on belts and holsters 

RA asks participant if they have a belt they wish to use
Give participants appropriate holster

Verify participant is familiar with model of holster and is able to operate it
Note if they are familiar (yes) or unfamiliar (no) with this type of holster

Participants may use own holster if it is the same model: Safariland ALS Molded Level II
Instruct participant to slide holster onto belt and then thread belt through belt loops
Tell participant to check if their belt is tight enough to pull a weapon out of the holster

Walk participant to corresponding DFDM range for familiarization

18:05 Fri, Jul 12 ID: 

Familiarization of DFDM 

Supervisor instruct participant to put on safety glasses and enter the range
Supervisor puts on a pair of safety glasses and enters range with participant
Supervisor reads familiarization script to participant, refer to DFDM Familiarization in Supervisor SOP binder
Supervisor leads participant out of the range
Tell participant to take off safety glasses and place them on the table outside the range

Walk participant back to corresponding cubicle in the simulation lab

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

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Supervisor/RA : Emma

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18:20 Fri, Jul 12 ID: 5 minute break

RA tell participant they have a 5 minute break
Tell participant that they may go to the bathroom or walk around
If needed, use the bathroom in the exam room and wait in the exam room for the participant
Remind participants they may have water
Monitor participants during break time ensuring that they remain awake and in lab area!
NOTE: If participants are sitting still, place yourself where you can see their eyes
RAs use stopwatch at each cubicle to time break
RAs record break start and end times for each participant:

ID:

ID:

Duration of break may be no more or less than 5 minutes
Participants MAY NOT nap or leave the laboratory during break
Once break time is over, walk participant to their corresponding cognitive testing station

18:25 Fri, Jul 12 ID: Behavioral Questionnaires

RA make sure all distractions are removed from the cognitive testing station
Make sure participant's chair is positioned to reach the desk comfortably
Make sure the participant has a pen to fill out the questionnaires
Tell participant they will be filling out a series of questionnaires
Retrieve blank Karolinska Sleepiness Scale (KSS) questionnaire from top of the black box
Write the date (MM/DD/YY) and time (HH:MM) in the appropriate place on the KSS questionnaire
Check that the participant number on the questionnaire matches the participant's ID number
Place KSS on the desk in front of participant
Instruct participant to read and follow all written instructions on the questionnaire carefully
Tell participant to rate their present sleepiness by marking the corresponding box on the scale
Collect the KSS once participant is finished and place it face down on black box

Retrieve blank Scale of Positive and Negative Experiences (PANAS) from top of the black box
Write the date (MM/DD/YY) and time (HH:MM) in the appropriate place on the PANAS questionnaire
Check that the participant number on the questionnaire matches the participant's ID number
Place PANAS in front of participant
Instruct participant to read the written instructions and fill out questionnaire accordingly
Collect PANAS once participant has finished and place it face down on the black box
Place pen in pen holder once all questionnaires have been filled out

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

Version 1.7

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Supervisor/RA : Emma

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RA instruct participant to adjust their chair so that they can reach the PVT laptop comfortably
Select [PVT] icon to open the Pulsar PVT software
Two options will appear, select [Run PVT Test] (top option)
Enter participant number in box using the keyboard on the laptop
DOUBLE CHECK that the participant number and iteration are correct before proceeding
Select [Begin Test]
Instruct participant to read and follow the on-screen instructions
Remind participants they must maintain properly seated posture, and not lean on the desk
Return to operators computer to monitor participant during PVT
Continuously monitor participants’ compliance during the performance testing
Take remedial action if a participant is non-compliant or falls asleep
Once participant is finished, return to PVT laptop
If nessesarily, press the [Space bar] to complete task
Select [Done]
Select [Close]

NOTE: You may load the scenario for the 1st drive while the participant is completing the PVT

RA Refer to Drive 1 Load in RA SOP binder

RA as soon as PVT is finished, take participant to their driving simulator
RA ensure the participant is seated in their driving simulator
RA refer to Drive 1 Start in RA SOP binder

*NOTE: No seat adjustments are allowed*

Return to operator console

Supervisor selects [Restart Logging] on faceLAB Link 2.0 and records file time below (faceLAB Start)

RA records start time of ignition for participant

If a distracted drive ensure that distraction task starts after 30 seconds
If a distracted drive record the start time of the distraction task

RA records end time of driving scenario

Supervisor selects [Restart Logging] on faceLAB Link 2.0 and record new file time above (faceLAB End)

RA refer to Drive 1 Initial Save in RA SOP binder

As soon as scenario is finished, take participant to their cognitive testing station

**NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):**

RA Name / Time:
ONR CA POST PROTOCOL

19:05 Fri, Jul 12 ID: KSS/PVT

RA make sure participant's chair is positioned to reach the desk comfortably
Give participant a pen to fill out KSS
Instruct participant to read and follow all written instructions on the questionnaire carefully
Retrieve blank Karolinska Sleepiness Scale (KSS) questionnaire from top of the black box
Write the date (MM/DD/YY) and time (HH:MM) in the appropriate place on the KSS questionnaire
Check that the participant number on the questionnaire matches the participant's ID number
Place KSS on the desk in front of participant
Tell participant to rate their present sleepiness by marking the corresponding box on the scale
Collect the KSS once participant is finished and place it face down on black box

Instruct participant to adjust their chair so that they can reach the PVT laptop comfortably
Once participant is comfortable, select [PVT] icon to open the Pulsar PVT software
Two options will appear, select [Run PVT Test] (top option)
Enter participant number (e.g. 1000) in box using the keyboard on the laptop
DOUBLE CHECK that the participant number is correct before proceeding
Select [Begin Test]
Instruct participant to read and follow the on-screen instructions
Return to operators computer to monitor participant during PVT
Continuously monitor participants' compliance during the performance testing
Participants must maintain properly seated posture, and not lean on the desk
Take remedial action if a participant is non-compliant or falls asleep
Once participant is finished, return to PVT laptop
If necessary, press the [space bar]
Select [Done]
Select [Close]

NOTE: You may load the next scenario for the 2nd drive while the participant is completing the PVT

RA Refer to Drive 2 Load in RA SOP binder

RA as soon as PVT is finished, take participant to their driving simulator

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:
RA ensure the participant is seated in their driving simulator
RA refer to Drive 2 Start binder in RA SOP binder.

*NOTE: NO seat adjustments are allowed*

Return to operator console

Supervisor selects [Restart Logging] on faceLAB Link 2.0 and records file time below (faceLAB Start)

RA records start time of ignition for participant

If a distracted drive ensure that distraction task starts after 30 seconds
If a distracted drive record the start time of the distraction task

RA records end time of driving scenario

Supervisor selects [Restart Logging] on faceLAB Link 2.0 and record new file time above (faceLAB End)

RA refer to Drive 2 Initial Save in RA SOP binder

As soon as scenario is finished, take participant to their cognitive testing station

**NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):**

RA Name / Time:
ONR CA POST PROTOCOL

19:40 Fri, Jul 12 ID: KSS/PVT

RA make sure participant's chair is positioned to reach the desk comfortably
Give participant a pen to fill out KSS
Instruct participant to read and follow all written instructions on the questionnaire carefully
Retrieve blank Karolinska Sleepiness Scale (KSS) questionnaire from top of the black box
Write the date (MM/DD/YY) and time (HH:MM) in the appropriate place on the KSS questionnaire
Check that the participant number on the questionnaire matches the participant's ID number
Place KSS on the desk in front of participant
Tell participant to rate their present sleepiness by marking the corresponding box on the scale
Collect the KSS once participant is finished and place it face down on black box

Instruct participant to adjust their chair so that they can reach the PVT laptop comfortably
Once participant is comfortable, select [PVT] icon to open the Pulsar PVT software
Two options will appear, select [Run PVT Test] (top option)
Enter participant number (e.g. 1000) in box using the keyboard on the laptop
DOUBLE CHECK that the participant number is correct before proceeding
Select [Begin Test]
Instruct participant to read and follow the on-screen instructions
Return to operators computer to monitor participant during PVT
Continuously monitor participants' compliance during the performance testing
Participants must maintain properly seated posture, and not lean on the desk
Take remedial action if a participant is non-compliant or falls asleep
Once participant is finished, return to PVT laptop
If necessary, press the [space bar]
Select [Done]
Select [Close]

20:00 Fri, Jul 12 ID: Deadly Force Simulation

RA walk participant to corresponding range
Turn on microphone, checks battery level and checks channel corresponds with range
Hook microphone transmitter to participant's belt
Clip microphone close to participant's mouth
Tell participant to put on safety glasses
Tell participant to enter the range and wait for instructions
Close the range door

Sit down at operator's console and put on headphones
Using the microphone on desk, ask participant "can you hear me?"
Adjust headphone volume, if you CANNOT hear the participant
Check that PRISim screen is set to start running simulations (the scenario list is showing)

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

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Supervisor/RA: Emma
Using the touch screen monitor (left):

- Touch [ Subject Enters Range ]
- Touch [ Pick up the weapon ]
- Listen to ensure the recording said “pick up the weapon” & observe participant
- Touch [ Insert the magazine into the weapon ]
- Listen to ensure the recording said “insert the magazine into the weapon” & observe participant
- Touch [ Allow the slide to go forward ]
- Listen to ensure the recording said “allow the slide to go forward” & observe participant
- Touch [ Holster the weapon ]
- Listen to ensure the recording said “holster the weapon” & observe the participant
- Touch [ Please stand under the projector ]
- Listen to ensure the recording said “please stand under the projector” & observe participant

On the PRISim computer:

- Using the mouse, select [ Run Slide Show ]
- Select “Rules of Engagement”

Using the touch screen monitor (left):

- Touch [ Please read the Rules of Engagement ]
- Listen to ensure the recording said “please read the Rules of Engagement” & observe participant
- Touch [ Can you confirm you understand these rules? ]
- Listen to ensure the recording said “can you confirm you understand these rules?”
- Listen for the participant to respond with “Yes” or “No”
- Touch green back arrow (bottom right corner of screen)

On the PRISim computer:

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:
Deadly Force Judgment and Decision Making (DFJDM) Simulation 1

ID:

ID:

Using the touch screen monitor (left):

- Touch [ Subject Starts Scenario ]
- Touch [ Scenario Description ]
- Touch corresponding scenario (see below):

ID:

ID:

- Touch green back arrow (bottom right corner of screen)
- Touch [ Do you understand? ]
- Listen for participant to respond with “Yes” or “No”

If response is “Yes”:
- Touch [ Stand by ]

If response is “No”, using the microphone do the following:
- Read the corresponding scenario description above

Read "do you understand?"
- Listen for response from participant
  - If response is “Yes”, continue through checklist
    - If response is “No”, using the microphone read: “please wait patiently for a moment”
    - Go and get the supervisor

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:
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On PRISim computer:

Visually confirm that “on” button (bottom right corner of screen) is highlighted

ID:

ID:

☐ Select [ Start Training ]
☐ Check that the correct scenario is loaded
☐ Select [ Play ] (flashing arrow on screen)
☐ Let the video play to completion, it will fade to black
☐ Select [ Set Up ] option
☐ Select back arrow on the grey bar to the left of scenario list

Using the touch screen monitor (left):

☐ Touch [ Take a deep breath ]
☐ Touch [ Please take a seat ]
☐ Touch [ Relax and wait for a few minutes ]
☐ Start timer
☐ Wait 1 full minute
☐ Stop timer
☐ Clear timer

Using the touch screen monitor (left):

☐ Touch [ Please stand under the projector ]

NOTE: You may complete load step 1 to 3 for the next scenario during the minute the participant is seated (see page 16)

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

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Supervisor/RA: Emma

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Deadly Force Judgment and Decision Making (DFJDM) Simulation 2

ID:

ID:

Using the touch screen monitor (left):

☐ Touch   [ Subject Starts Scenario ]
☐ Touch   [ Scenario Description ]
☐ Touch corresponding scenario (see below):

ID:

ID:

☐ Touch green back arrow (bottom right corner of screen)
☐ Touch   [ Do you understand? ]
☐ Listen for participant to respond with “Yes” or “No”

If response is “Yes”:

☐ Touch   [ Stand by ]

If response is "No", using the microphone do the following:

☐ Read the corresponding scenario description above

Read "do you understand?"

☐ Listen for response from participant
   If response is "Yes", continue through checklist
   If response is "No", using the microphone read: "please wait patiently for a moment"
   Go and get the supervisor

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

Version 1.7
On PRISim computer:

Visually confirm that “on” button (bottom right corner of screen) is highlighted

ID:

ID:

☐ Select [ Start Training ]
☐ Check that the correct scenario is loaded
☐ Select [ Play ] (flashing arrow on screen)
☐ Let the video play to completion, it will fade to black
☐ Select [ Set Up ] option
☐ Select back arrow on the grey bar to the left of scenario list

Using the touch screen monitor (left):

☐ Touch [ Take a deep breath ]
☐ Touch [ Please take a seat ]
☐ Touch [ Relax and wait for a few minutes ]
☐ Start timer
☐ Wait 1 full minute
☐ Stop timer
☐ Clear timer

Using the touch screen monitor (left):

☐ Touch [ Please stand under the projector ]

NOTE: You may complete load step 1 to 3 for the next scenario during the minute the participant is seated (see page 18)

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

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Supervisor/RA : Emma
Deadly Force Judgment and Decision Making (DFJDM) Simulation 3

ID:

Using the touch screen monitor (left):

- Touch [ Subject Starts Scenario ]
- Touch [ Scenario Description ]
- Touch corresponding scenario (see below):

ID:

- Touch green back arrow (bottom right corner of screen)
- Touch [ Do you understand? ]
- Listen for participant to respond with “Yes” or “No”

If response is “Yes”:
- Touch [ Stand by ]

If response is “No”, using the microphone do the following:
- Read the corresponding scenario description above

Read “do you understand?“
- Listen for response from participant
  - If response is ”Yes”, continue through checklist
  - If response is ”No”, using the microphone read: ”please wait patiently for a moment”
  - Go and get the supervisor

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:
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On PRISim computer:

Visually confirm that “on” button (bottom right corner of screen) is highlighted

ID:

ID:

☐ Select [ Start Training ]
☐ Check that the correct scenario is loaded
☐ Select [ Play ] (flashing arrow on screen)
☐ Let the video play to completion, it will fade to black
☐ Select [ Set Up ] option
☐ Select back arrow on the grey bar to the left of scenario list

Using the touch screen monitor (left):

☐ Touch [ Take a deep breath ]
☐ Touch [ Please take a seat ]
☐ Touch [ Relax and wait for a few minutes ]

☐ Start timer
☐ Wait 1 full minute
☐ Stop timer
☐ Clear timer

Using the touch screen monitor (left):

☐ Touch [ Please stand under the projector ]

NOTE: You may complete load step 1 to 3 for the next scenario during the minute the participant is seated (see page 20)

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

Version 1.7

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Supervisor/RA : Emma
Deadly Force Judgment and Decision Making (DFJDM) Simulation 4

ID:

ID:

Using the touch screen monitor (left):

- Touch [ Subject Starts Scenario ]
- Touch [ Scenario Description ]
- Touch corresponding scenario (see below):

ID:

ID:

- Touch green back arrow (bottom right corner of screen)
- Touch [ Do you understand? ]
- Listen for participant to respond with “Yes” or “No”

If response is “Yes”:

- Touch [ Stand by ]

If response is "No", using the microphone do the following:

- Read the corresponding scenario description above

Read "do you understand?"

- Listen for response from participant

  - If response is "Yes", continue through checklist

  - If response is "No", using the microphone read: "please wait patiently for a moment"

  Go and get the supervisor

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NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

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Supervisor/RA : Emma

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On PRISim computer:

Visually confirm that “on” button (bottom right corner of screen) is highlighted

ID:

ID:

☐ Select  [ Start Training ]
☐ Check that the correct scenario is loaded
☐ Select  [ Play ] (flashing arrow on screen)
☐ Let the video play to completion, it will fade to black
☐ Select  [ Set Up ] option
☐ Select back arrow on the grey bar to the left of scenario list

Using the touch screen monitor (left):

☐ Touch  [ Take a deep breath ]
☐ Touch  [ Please take a seat ]
☐ Touch  [ Relax and wait for a few minutes ]
☐ Start timer
☐ Wait 1 full minute
☐ Stop timer
☐ Clear timer

Using the touch screen monitor (left):

☐ Touch  [ Please stand under the projector ]

NOTE: You may complete load step 1 to 3 for the next scenario during the minute the participant is seated (see page 22)

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

Version 1.7
Deadly Force Judgment and Decision Making (DFJDM) Simulation 5

ID:

ID:

Using the touch screen monitor (left):

☐ Touch [ Subject Starts Scenario ]
☐ Touch [ Scenario Description ]
☐ Touch corresponding scenario (see below):

ID:

☐ Touch green back arrow (bottom right corner of screen)
☐ Touch [ Do you understand? ]
☐ Listen for participant to respond with “Yes” or “No”

If response is “Yes”:
☐ Touch [ Stand by ]

If response is “No”, using the microphone do the following:
☐ Read the corresponding scenario description above

Read "do you understand?"
☐ Listen for response from participant
  If response is "Yes", continue through checklist
  
  If response is "No", using the microphone read: "please wait patiently for a moment"
  Go and get the supervisor

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

Version 1.7
On PRISim computer:

Visually confirm that “on” button (bottom right corner of screen) is highlighted

ID:

ID:

☐ Select [Start Training]
☐ Check that the correct scenario is loaded
☐ Select [Play] (flashing arrow on screen)
☐ Let the video play to completion, it will fade to black
☐ Select [Set Up] option
☐ Select back arrow on the grey bar to the left of scenario list

Using the touch screen monitor (left):

☐ Touch [Take a deep breath]
☐ Touch [Please take a seat]
☐ Touch [Relax and wait for a few minutes]
☐ Start timer
☐ Wait 1 full minute
☐ Stop timer
☐ Clear timer

Using the touch screen monitor (left):

☐ Touch [Please stand under the projector]

NOTE: You may complete load step 1 to 3 for the next scenario during the minute the participant is seated (see page 24)

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

Version 1.7
Deadly Force Judgment and Decision Making (DFJDM) Simulation 6

ID:

ID:

Using the touch screen monitor (left):

☐ Touch [ Subject Starts Scenario ]
☐ Touch [ Scenario Description ]
☐ Touch corresponding scenario (see below):

ID:

☐ Touch green back arrow (bottom right corner of screen)
☐ Touch [ Do you understand? ]
☐ Listen for participant to respond with “Yes” or “No”

If response is “Yes”:

☐ Touch [ Stand by ]

If response is "No", using the microphone do the following:

☐ Read the corresponding scenario description above

Read "do you understand?"

☐ Listen for response from participant
   If response is "Yes", continue through checklist
   If response is "No", using the microphone read: "please wait patiently for a moment"
   Go and get the supervisor

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:
On PRISim computer:

Visually confirm that “on” button (bottom right corner of screen) is highlighted

ID: 

ID:

☐ Select [ Start Training ]
☐ Check that the correct scenario is loaded
☐ Select [ Play ] (flashing arrow on screen)
☐ Let the video play to completion, it will fade to black
☐ Select [ Set Up ] option
☐ Select back arrow on the grey bar to the left of scenario list

Using the touch screen monitor (left):

☐ Touch [ Take a deep breath ]
☐ Touch [ Please take a seat ]
☐ Touch [ Relax and wait for a few minutes ]

☐ Start timer

Using the touch screen monitor (left):

☐ Touch green back arrow (bottom right corner of screen)
☐ Wait 1 full minute
☐ Stop timer
☐ Clear timer

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time: 

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Using the touch screen monitor (left):

☐ Touch [ Subject Leaves the Range ]
☐ Touch [ Please step up to the range table ]
☐ Touch [ Un-holster weapon ]
☐ Touch [ Place the weapon on the table - with the barrel pointing at the screen ]
☐ Touch [ Leave the range ]

Meet participant at the range door
Ask the participant to take off their safety glasses and place on table outside range door
Remove the microphone and microphone transmitter from participant's belt
Turn off microphone and place it on the table outside of the range door
Walk participant to their corresponding cubicle

20:20 Fri, Jul 12 ID: KSS/PVT

RA make sure participant's chair is positioned to reach the desk comfortably
Give participant a pen to fill out KSS
Instruct participant to read and follow all written instructions on the questionnaire carefully
Retrieve blank Karolinska Sleepiness Scale (KSS) questionnaire from top of the black box
Write the date (MM/DD/YY) and time (HH:MM) in the appropriate place on the KSS questionnaire
Check that the participant number on the questionnaire matches the participant's ID number
Place KSS on the desk in front of participant
Tell participant to rate their present sleepiness by marking the corresponding box on the scale
Collect the KSS once participant is finished and place it face down on black box

Instruct participant to adjust their chair so that they can reach the PVT laptop comfortably
Once participant is comfortable, select [ PVT ] icon to open the Pulsar PVT software
Two options will appear, select [ Run PVT Test ] (top option)
Enter participant number (e.g. 1000) in box using the keyboard on the laptop
DOUBLE CHECK that the participant number is correct before proceeding
Select [ Begin Test ]
Instruct participant to read and follow the on-screen instructions
Return to operators computer to monitor participant during PVT
Continuously monitor participants' compliance during the performance testing
Participants must maintain properly seated posture, and not lean on the desk
Take remedial action if a participant is non-compliant or falls asleep
Once participant is finished, return to PVT laptop
If necessary, press the [ space bar]
Select [ Done]
Select [ Close ]

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

Version 1.7
RA tell participant they have a 5 minute break
Tell participant that they may go to the bathroom or walk around
If needed, use the bathroom in the exam room and wait in the exam room for the participant
Remind participants they may have water
Monitor participants during break time ensuring that they remain awake and in lab area!
*NOTE: If participants are sitting still, place yourself where you can see their eyes
RAs use stopwatch at each cubicle to time break
RAs record break start and end times for each participant:

ID:

ID:

ID:

Duration of break must be no more or less than 5 minutes
Participants MAY NOT nap or leave the laboratory during break
Once break time is over, walk participant to their corresponding cognitive testing station

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**NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):**

RA Name / Time:

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Version 1.7

Supervisor/RA: Emma
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ID:

ID:

Make sure all distractions are removed from the cognitive testing station
Make sure the participant's chair is positioned to reach the keyboard and mouse comfortably

Unplug the green network cable
Plug in the red network cable into the white block already connected to red network cable and wait 30 seconds

Read the following script:

"This is a simple computer-based task called the IAT, or Implicit Association Test. It tests how you associate concepts such as race and threat. You will be presented with images of Black and White faces, and with images of weapons and harmless objects. You will be asked to press assigned buttons based on the images that appear on the screen. Please follow the instructions on the screen until the task is complete."

Select corresponding icon for participant
Enter participant number and select [ Enter ] button
Select [ Begin the Test ]
Maximize the testing window

Tell participants to read and follow the instructions on the screen

Return to the operator's computer to monitor the participant during the test
Continuously monitor participant's compliance during the performance testing
Participants must maintain properly seated posture, and not lean on the desk
Take remedial action if a participant is non-compliant or falls asleep

When test is complete, return to cognitive testing station and close all open windows
NOTE: No saving is required for this task

Unplug the red network cable
Plug in the green network cable into the white block already connected to green network cable

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

Version 1.7

CONFIDENTIAL

Supervisor/RA: Emma
Ensure desktop wallpaper on Cognitive Task computer says Phase 1

**NOTE:** If not, log out of Cognitive Task computer and log in as user: ONC CA POST Phase 1

Make sure that all distractions are removed from the cubicle
Make sure the participant's chair is positioned to reach the keyboard and mouse comfortably
Select corresponding icon on the computer screen (see above)
Enter participant number
Enter session number (below)

Click OK
When asked to "Continue with this information?", click OK

Return to the operator's computer to monitor the participant during the test
Continuously monitor participants' compliance during the performance testing
Participants must maintain properly seated posture, and not lean on the desk
Take remedial action if a participant is non-compliant or falls asleep
Press the [space bar] to exit to main screen when participant finished

---

**NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):**

RA Name / Time:
Make sure that all distractions are removed from the cubicle
Make sure the participant's chair is positioned to reach the keyboard and mouse comfortably
Select corresponding icon on the computer screen (see above)
Enter participant number
Enter session number (below)
ID:
ID:
Click OK
When asked to "Continue with this information?", click OK
ID:
ID:
Return to the operator's computer to monitor the participant during the test
Continuously monitor participants' compliance during the performance testing
Participants must maintain properly seated posture, and not lean on the desk
Take remedial action if a participant is non-compliant or falls asleep
Press the [space bar] to exit to main screen when participant finished

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

Version 1.7
Make sure that all distractions are removed from the cubicle  
Make sure the participant's chair is positioned to reach the keyboard and mouse comfortably  
Select corresponding icon on the computer screen (see above)  
Enter participant number  
Enter session number (below)  

Click OK  
When asked to "Continue with this information?", click OK  

Return to the operator's computer to monitor the participant during the test  
Continuously monitor participants' compliance during the performance testing  
Participants must maintain properly seated posture, and not lean on the desk  
Take remedial action if a participant is non-compliant or falls asleep  
Press the [space bar] to exit to main screen when participant finished

---

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

Version 1.7
RA make sure participant's chair is positioned to reach the desk comfortably
Give participant a pen to fill out KSS
Instruct participant to read and follow all written instructions on the questionnaire carefully
Retrieve blank Karolinska Sleepiness Scale (KSS) questionnaire from top of the black box
Write the date (MM/DD/YY) and time (HH:MM) in the appropriate place on the KSS questionnaire
Check that the participant number on the questionnaire matches the participant's ID number
Place KSS on the desk in front of participant
Tell participant to rate their present sleepiness by marking the corresponding box on the scale
Collect the KSS once participant is finished and place it face down on black box

Instruct participant to adjust their chair so that they can reach the PVT laptop comfortably
Once participant is comfortable, select [PVT] icon to open the Pulsar PVT software
Two options will appear, select [Run PVT Test] (top option)
Enter participant number (e.g. 1000) in box using the keyboard on the laptop
DOUBLE CHECK that the participant number is correct before proceeding
Select [Begin Test]
Instruct participant to read and follow the on-screen instructions
Return to operators computer to monitor participant during PVT
Continuously monitor participants' compliance during the performance testing
Participants must maintain properly seated posture, and not lean on the desk
Take remedial action if a participant is non-compliant or falls asleep
Once participant is finished, return to PVT laptop
If necessary, press the [space bar]
Select [Done]
Select [Close]

NOTE: You may load the FMCSA scenario for the last drive while the participant is completing the PVT

RA Refer to Drive 3 Load in RA SOP binder

As soon as PVT is finished, take each participant to their driving simulator

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:
RA: ensure the participant is seated in their driving simulator
RA: refer to Drive 3 Start in RA SOP binder

NOTE: NO seat adjustments are allowed

Return to operator console

Supervisor selects "restart logging" on faceLAB Link 2.0
Supervisor records time on file for faceLAB:

RA records start time of ignition for participant

RA records end time of driving scenario

Supervisor selects "restart logging" on faceLAB Link 2.0 and records new file time (faceLAB End time)

RA refer to Drive 3 Initial Save in RA SOP binder
As soon as scenario is finished, rapidly take participant to corresponding cognitive testing station
Be sure to keep participant moving, do NOT allow for any down time

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:
ONR CA POST PROTOCOL

22:25 Fri, Jul 12 ID:

Psychomotor Vigilance Test (PVT)

RA instruct participant to adjust their chair so that they can reach the PVT laptop comfortably
Select [PVT] icon to open the Pulsar PVT software
Two options will appear, select [Run PVT Test] (top option)
Enter participant number in box using the keyboard on the laptop
DOUBLE CHECK that the participant number and iteration are correct before proceeding
Select [Begin Test]
Instruct participant to read and follow the on-screen instructions
Remind participants they must maintain properly seated posture, and not lean on the desk
Return to operators computer to monitor participant during PVT
Continuously monitor participants' compliance during the performance testing
Take remedial action if a participant is non-compliant or falls asleep
Once participant is finished, return to PVT laptop
If necessary, press the [Space bar] to complete task
Select [Done]
Select [Close]

22:40 Fri, Jul 12 ID:

Behavioral Questionnaires

Make sure all distractions are removed from the cognitive testing station
Make sure participant's chair is positioned to reach the desk comfortably
Make sure the participant has a pen to fill out the questionnaires
Tell participant they will be filling out a series of questionnaires
Retrieve blank Karolinska Sleepiness Scale (KSS) questionnaire from top of the black box
Write the date and time in the appropriate place on the KSS questionnaire
Check that the participant number on the questionnaire matches the participant's ID number
Place KSS on the desk in front of participant
Instruct participant to read and follow all written instructions on the questionnaire carefully
Tell participant to rate their present sleepiness by marking the corresponding box on the scale
Collect the KSS once participant is finished and place it face down on black box

Retrieve blank Scale of Positive and Negative Experiences (PANAS) from top of the black box
Write the date and time in the appropriate place on the PANAS questionnaire
Check that the participant number on the questionnaire matches the participant's ID number
Place PANAS in front of participant
Instruct participant to read the written instructions and fill out questionnaire accordingly
Collect PANAS once participant has finished and place it face down on the black box
Place pen in pen holder once all questionnaires have been filled out

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

Version 1.7

CONFIDENTIAL

Supervisor/RA: Emma

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Study Run: 190
ONR CA POST PROTOCOL

Participants remove Holter monitors

Walk participants to exam room for removal of Holter monitors
RA refer to Holter Removal in the RA SOP binder

Participants remove belts and holsters

Walk participants to their corresponding cubicle in the simulation lab
Instruct participants to remove their belt and holster
Take holster off of the belt and lay it on the cubicle desk

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

Version 1.7

Supervisor/RA : Emma
## Discharge Procedures

### ID: Recover Sleep - SPRC

Participants are offered a meal or protein shake, once finished.
RA takes participants to sleep lab bedroom corresponding with lab side.
Participants must be in bed and remain sleeping or resting until awakened as per protocol.
Keep door between hallway and suite as well as observation room door closed.

### ID: Recover Sleep - SPRC - Lights On

Precisely on time, research assistants knock on bedroom doors to wake up participants.
Open bedroom doors and announce that lights will go on, then turn on lights.

### ID:

Allow participants to perform morning routine (e.g., shower, dress, brush teeth etc.).

**NOTE** - After participant has left the sleep lab complete the following task list:
1. Remove bedding from all rooms used, wash all bedding used.
2. Ensure all rooms are prepared for next participant (e.g., make bed using clean bedding).
3. Swap signs on doors back to “Not in Use” (from offices to sleep lab and from exam room to sleep lab).
4. Turn off all lights in sleep lab (inc. sleep lab bathroom lights).

**NOTES** (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

**RA Name / Time:**

---

**Version 1.7**

**CONFIDENTIAL**

**Supervisor/RA : Emma**
<table>
<thead>
<tr>
<th>ID:</th>
<th>Recover Sleep - Hotel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants are offered a meal or protein shake, once finished</td>
<td></td>
</tr>
<tr>
<td>Supervisor takes participants to hotel</td>
<td></td>
</tr>
<tr>
<td>RA note departure time</td>
<td></td>
</tr>
</tbody>
</table>

| ID: | |
|-----| |

| ID: | |
|-----| |

Do Not give participants back weapons before taking them to hotel |
NOTE: If participant insists they are to have their weapon back, do return it to them |
Instruct participants to call Supervisor when they are ready to be picked up (or Steve James @ 509-385-9385) |
REMIND participants that they must remain at the hotel resting for at least 6 hours |
Supervisor record time of return to the lab after drop off |

| ID: | |
|-----| |
| ID: | |

Supervisor annotate wake time in the pick up box below (NOTE: 6 hours from check in) |

<table>
<thead>
<tr>
<th>ID:</th>
<th>Pick up participants from hotel</th>
</tr>
</thead>
</table>

NOTE: Participants can be picked up no earlier than the times listed below |

| ID: | |
|-----| |
| ID: | |

Supervisor to collect participants from the hotel |
Return to the lab with participants to start discharge |
Record time the participants returned to the lab |

| ID: | |
|-----| |
| ID: | |

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:
RA administer End-of-Study Questionnaire at the conference table in main office
End-of-Study Questionnaires can be found in the left black filing cabinet in the 2nd draw
Give participant a pen to fill out the questionnaire
Place End-of-Study Questionnaire in front of participant
Instruct participant to follow the written instructions and fill out the questions
Ensure participant IDs are on questionnaires
Collect questionnaire once participant finishes and place it face down on the black box

Instruct participants to gather all their belongings in the lab area
Walk participant to the gun lockers
RA instruct participant to unlock their gun locker and collect their belongings
Ensure that participants have emptied their lockers
Be sure to get locker key back from participants once belongings are removed
NOTE: DO NOT let ARMED participants enter back into the simulation lab
RA ask if participants have all their belongings (incl. cell phones etc.)
Walk participants out of the lab through the conference area
Record departure times for each participant:

ID:

ID:

Supervisor moves and backs up data
Supervisor moves and backs up driving data from both drives
Supervisor moves and backs up cognitive test battery data
Supervisor moves and backs up all PVT data

Supervisor saves the Holter monitor data
Supervisor shuts down the Study Prep computer
Supervisor refer to Holter Save in Supervisor SOP binder

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:

Version 1.7

Supervisor/RA : Emma
<table>
<thead>
<tr>
<th>Time</th>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>23:20</td>
<td>Fri, Jul 12</td>
<td>Shut down deadly force simulators</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supervisor shuts down shooting simulators</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supervisor locks up weapons</td>
</tr>
<tr>
<td>23:25</td>
<td>Fri, Jul 12</td>
<td>Shut down driving simulators</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supervisor shuts down driving simulators</td>
</tr>
<tr>
<td>23:30</td>
<td>Fri, Jul 12</td>
<td>Shut down PVT computers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RA shuts down PVT computer stations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Using the mouse, select [Start] (bottom left corner of the screen)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Select [Shutdown]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ensure that computer powers down completely</td>
</tr>
<tr>
<td>23:35</td>
<td>Fri, Jul 12</td>
<td>Shut down cognitive testing computers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RA shuts down cognitive testing computers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Using the mouse, select [Start] (bottom left corner of the screen)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Select [Shutdown]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ensure the system powers down completely</td>
</tr>
<tr>
<td>23:40</td>
<td>Fri, Jul 12</td>
<td>Clean up Holter monitor and exam room</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RA cleans up Holter monitors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RA cleans up exam room</td>
</tr>
<tr>
<td>23:45</td>
<td>Fri, Jul 12</td>
<td>Clean up lab</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RA cleans up simulation lab</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RA cleans HR monitors</td>
</tr>
</tbody>
</table>

NOTES (e.g., bathroom visits, deviations from protocol, trains, noises, etc.):

RA Name / Time:
APPENDIX D – IRB-APPROVED RECRUITMENT FLYER

2-DAY POLICE PERFORMANCE STUDY

Washington State University Spokane
Sleep and Performance Research Center

Seeking paid participants for a 2-day in-laboratory performance study

Must be a currently sworn police officer with the Spokane Police Department who is working a patrol assignment on night shift.

Pays up to $600

Contact the Sleep and Performance Research Center at Washington State University Spokane
(509) 358-7751
sleepcenter@wsu.edu

Washington State University’s Institutional Review Board reviewed and approved the study for human subject participation. Participants must meet inclusion/exclusion criteria to be enrolled.

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APPENDIX E - TELEPHONE SCREENING SCRIPT
Impact of Work-Related Fatigue on Deadly Force Judgment and Decision Making and Driving Performance Among Day versus Night Sleepers

Subject ID: __________  Date: __________

Subject Enrollment and Demographic Information Form

“Impact of Work-Related Fatigue on Deadly Force Judgment and Decision Making and Driving Performance Among Day vs Night Sleepers”

Principal Investigator: Bryan Vila, Ph.D.

Welcome to the Sleep and Performance Research Center at Washington State University Spokane. The following questions will help us understand more about you and your sleep/wake behavior. Your honesty and accuracy are counted on in completing this form. All information will be kept strictly confidential and will be used for research purposes only.

General/Background Information

1. Name (first, middle initial, last): ________________________________
2. Telephone: ________________________________
3. Mailing Address: ________________________________
4. E-mail: ________________________________
5. Emergency contact:
   Name: ________________________________
   Relationship: ________________________________
   Phone: ________________________________
6. Age: ________________________________
7. Date of birth: ________________________________
8. Sex (circle one): Male  Female
9. Height: ____ feet ____ inches
10. Weight: ________ lbs.
11. Collar size (if known): ________ inches
12. Which hand do you write with (circle one)?: right  left  ambidextrous

Subject Enrollment and Demographic Information Form version 03/01/12
13. Which hand do you shoot with (circle one)?:  right  left  ambidextrous

14. What race do you consider yourself to be? Select one or more of the following:
   - **American Indian or Alaska Native**: A person having origins in any of the original peoples of North, Central, or South America, and who maintains tribal affiliation or community attachment.
   - **Asian**: A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent, including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.
   - **Black or African American**: A person having origins in any of the black racial groups of Africa.
   - **Native Hawaiian or Other Pacific Islander**: A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.
   - **White**: A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.
   - Check here if you do not know, or do not wish to provide this information.

15. Do you consider yourself to be Hispanic or Latino (a person of Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race)? Select one:
   - **Hispanic or Latino**.
   - **Not Hispanic or Latino**.
   - Check here if you do not know, or do not wish to provide this information.

16. Highest level of education completed:
   - Grade school: ___
   - Middle school: ___
   - Junior high school: ___
   - High school: ___
   - 2 years college: ___
   - 4 years college: ___
   - Graduate school: ___

**Work History/Hours Worked**

17. Where did you complete your police academy training?

18. When did you complete your police academy training? ____________________________

19. How many years have you worked as a sworn law enforcement officer? ___________________

20. How many years have you worked as a sworn officer for your current department? ____________

Subject Enrollment and Demographic Information Form version 03/01/12
Impact of Work-Related Fatigue on Deadly Force Judgment and Decision Making and Driving Performance Among Day versus Night Sleepers

21. Which of the following best describes your primary activities or current assignment (circle one)?
   a. Patrol officer in car
   b. Motorcycle officer
   c. Detective
   d. Desk job at the police station
   e. Training officer
   f. Bicycle officer
   g. Walking on a foot beat
   h. Canine officer
   i. Other (not listed above)
      specify:

22. Do you have a special assignment or call out responsibility for your department (circle one)? Yes  
    No
    Type of assignment:

23. How long have you been working your current assignment for your department? ____________

24. What shift are you currently working for your department? ____________

25. How long have you been working this shift? ____________

26. What time of day does your current shift typically start? ____________

27. What time of day does your current shift typically end? ____________

28. How long are your current shifts for your department? ____________

29. On average, how long does it take for you to travel to and from work? ____________

30. Are you currently working a second job in addition to your job as a sworn officer (circle one)? Yes  No

31. Have you ever worked a second job in addition to your job as a sworn officer (circle one)? Yes  No

In the past 6 months:

32. How many times are you required to switch or change shifts? ____________

33. How many hours a week do you usually work for your department? ____________

34. Have you worked overtime for your department (circle one)? Yes  No

35. During an average week, how many hours of overtime are you working for your department? ____________

36. Have you done any paid work outside of your department (circle one)? Yes  No

37. During an average week, how many hours of work do you do outside your department? ____________
**General Health**

38. In general, would you say your health is:  
   ____ excellent  
   ____ very good  
   ____ good  
   ____ fair  
   ____ poor

39. Do you currently smoke (circle one)?  
   Yes  No  
   How long have you been smoking? ____________________________
   On average, how many cigarettes do you smoke in a day? ____________________________

40. Have you ever smoked in the past (circle one)?  
   Yes  No  
   a. How many years ago did you quit smoking? ____________________________

41. Do you drink alcohol?  
   ____ Never  
   ____ Rarely  
   ____ Sometimes  
   ____ Often

42. On average, how many alcoholic drinks do you have in a week? ____________________________
43. How often did you have six or more drinks on one occasion in the past year? ____________________________

Note: for the next three questions caffeine-containing drinks include: coffee, tea, sodas, energy drinks, or other forms of ingesting caffeine.

44. How many caffeine-containing drinks do you have on average per day when you are on duty? ________
45. How many caffeine-containing drinks do you have on average per day when you are off duty? ________
46. Do you use caffeine as a fatigue management tool when on duty (to stay awake)? ________

47. Do you exercise regularly (circle one)?  
   Yes  No
48. On average, how many times a week are you able to exercise? ____________________________

49. What types of activities are you doing for exercise (running, lifting, biking, yoga, etc.)? ____________________________

50. During your on-duty periods (5 consecutive days/nights on duty), on average, how many hours of sleep are
Impact of Work-Related Fatigue on Deadly Force Judgment and Decision Making and Driving Performance Among Day versus Night Sleepers

you getting a night (or during the day if you work nights)?

51. During your off-duty periods (4-5 days off duty) on average, how many hours of sleep are you getting a night?

52. How do you feel about the amount of sleep you normally get between successive shifts (check one)?
   ___ nowhere near enough
   ___ could do with a lot more
   ___ could do with a bit more
   ___ get the right amount
   ___ get plenty
   ___ does not apply

53. Please describe any allergies you have:

Accident/Incident History

We would like to ask you some questions about your traffic safety habits.

54. In general, how often do you wear a seat belt when operating a personal vehicle (excluding motorcycles)?
   ___ always
   ___ usually
   ___ sometimes
   ___ rarely
   ___ never

55. In general, how often do you wear a seat belt when operating a law enforcement vehicle?
   ___ always
   ___ usually
   ___ sometimes
   ___ rarely
   ___ never

With regard to your time inside a law enforcement vehicle:

56. Are there situations when you are LESS likely to wear your seat belt?
57. Are there situations in which you are MORE likely to wear your seat belt?

58. During your field training, what was your field training officer’s position on seat belt use?____

59. What advice or instructions did your field training officer’s give you regarding seat belt use?____

60. Do you know your department’s official policy regarding the use of the radio, mobile data terminals, and cellphones while the vehicle is in use or in motion (circle one)? Yes No

61. What are the policies regarding the use of two-way radios, mobile data terminals, and cellphones?

We would like to know if you have had any accidents or injuries within the past 3 years either on-duty or off-duty.

62. Within the past 3 years, have you had a traffic accident while on duty (circle one)? Yes No
   a. How many times has this occurred?____________

Accident Details:

<table>
<thead>
<tr>
<th>On-Duty Accident</th>
<th>What shift were you on?</th>
<th>Date mm/dd/yyyy</th>
<th>Time of day</th>
<th>Personal Injury</th>
<th>Property Damage</th>
<th>Wearing Seat Belt?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accident 1</td>
<td>(1) Morning</td>
<td>i/i</td>
<td>1:00</td>
<td>(0) No</td>
<td>(0) No</td>
<td>(0) Yes</td>
</tr>
<tr>
<td></td>
<td>(2) Afternoon</td>
<td>i/i</td>
<td>1:00</td>
<td>(1) Yes</td>
<td>(0) No</td>
<td>(0) Yes</td>
</tr>
<tr>
<td></td>
<td>(3) Night</td>
<td>i/i</td>
<td>1:00</td>
<td>(0) No</td>
<td>(0) No</td>
<td>(1) Yes</td>
</tr>
<tr>
<td></td>
<td>(4) Other</td>
<td>i/i</td>
<td>1:00</td>
<td>(1) Yes</td>
<td>(0) No</td>
<td>(0) Yes</td>
</tr>
<tr>
<td>Accident 2</td>
<td>(1) Morning</td>
<td>i/i</td>
<td>1:00</td>
<td>(0) No</td>
<td>(0) No</td>
<td>(0) Yes</td>
</tr>
<tr>
<td></td>
<td>(2) Afternoon</td>
<td>i/i</td>
<td>1:00</td>
<td>(1) Yes</td>
<td>(0) No</td>
<td>(0) Yes</td>
</tr>
<tr>
<td></td>
<td>(3) Night</td>
<td>i/i</td>
<td>1:00</td>
<td>(0) No</td>
<td>(1) Yes</td>
<td>(0) Yes</td>
</tr>
<tr>
<td></td>
<td>(4) Other</td>
<td>i/i</td>
<td>1:00</td>
<td>(1) Yes</td>
<td>(0) No</td>
<td>(0) Yes</td>
</tr>
<tr>
<td>Accident 3</td>
<td>(1) Morning</td>
<td>i/i</td>
<td>1:00</td>
<td>(0) No</td>
<td>(0) No</td>
<td>(0) Yes</td>
</tr>
<tr>
<td></td>
<td>(2) Afternoon</td>
<td>i/i</td>
<td>1:00</td>
<td>(1) Yes</td>
<td>(0) No</td>
<td>(0) Yes</td>
</tr>
<tr>
<td></td>
<td>(3) Night</td>
<td>i/i</td>
<td>1:00</td>
<td>(0) No</td>
<td>(1) Yes</td>
<td>(0) Yes</td>
</tr>
</tbody>
</table>
Impact of Work-Related Fatigue on Deadly Force Judgment and Decision Making and Driving Performance Among Day versus Night Sleepers

| Accident 4 | □ (1) Morning □ (2) Afternoon □ (3) Night □ (4) Other | □/□/□ | □ am □ pm | □ (0) No □ (1) Yes □ (0) No □ (1) Yes □ (0) No □ (1) Yes |
|------------|-------------------------------------------------------|--------|---------|-------------------|-------------------|-------------------|-------------------|

63. Within the past 3 years, have you had a traffic accident on your way home from work or immediately following a work shift (circle one)?

Yes  No

a. How many times has this occurred? _________________

Accident Details:

<table>
<thead>
<tr>
<th>After Work Accident</th>
<th>What shift were you on?</th>
<th>Date mm/dd/yyyy</th>
<th>Time of day</th>
<th>Personal Injury</th>
<th>Property Damage</th>
<th>Wearing Seat Belt?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accident 1</td>
<td>□ (1) Morning □ (2) Afternoon □ (3) Night □ (4) Other</td>
<td>□/□/□</td>
<td>□ am □ pm</td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
</tr>
<tr>
<td>Accident 2</td>
<td>□ (1) Morning □ (2) Afternoon □ (3) Night □ (4) Other</td>
<td>□/□/□</td>
<td>□ am □ pm</td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
</tr>
<tr>
<td>Accident 3</td>
<td>□ (1) Morning □ (2) Afternoon □ (3) Night □ (4) Other</td>
<td>□/□/□</td>
<td>□ am □ pm</td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
</tr>
<tr>
<td>Accident 4</td>
<td>□ (1) Morning □ (2) Afternoon □ (3) Night □ (4) Other</td>
<td>□/□/□</td>
<td>□ am □ pm</td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
</tr>
</tbody>
</table>
64. In the past 3 years, have you ever had any of the following injuries **while on-duty**?

<table>
<thead>
<tr>
<th>Injury</th>
<th>Ever had while on duty</th>
<th>If yes, number of times</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Strains</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>2. Sprains</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>3. Cuts or lacerations</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>4. Punctures</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>5. Burns</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>6. Bruises or contusions</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>7. Fractured bones</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>8. Dislocated joints</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>9. Concussions</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>10. Gunshot wounds</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>Other injuries. Specify</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>11. 1st ________________</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>12. 2nd ________________</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>13. 3rd ________________</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
</tbody>
</table>
65. For each on-duty injury mentioned above, please fill in the chart below. If the same type of on-duty injury has occurred more than once, please answer the questions for each occurrence.

<table>
<thead>
<tr>
<th>Injury</th>
<th>Type of injury—please specify category number or name from above list</th>
<th>What shift were you on?</th>
<th>Who caused the injury?</th>
<th>Date mm/dd/yyyy</th>
<th>Time of day Use approximate time if exact time is not known.</th>
<th>Did you seek medical attention?</th>
<th>Did you miss any work due to this injury?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury 1</td>
<td>□ (1) Morning □ (2) Afternoon □ (3) Night □ (4) Other</td>
<td>□ (1) Other person □ (2) Self □ (3) It just happened</td>
<td><em>/<strong>/</strong></em></td>
<td><em>:</em> am pm</td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>Injury 2</td>
<td>□ (1) Morning □ (2) Afternoon □ (3) Night □ (4) Other</td>
<td>□ (1) Other person □ (2) Self □ (3) It just happened</td>
<td><em>/<strong>/</strong></em></td>
<td><em>:</em> am pm</td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>Injury 3</td>
<td>□ (1) Morning □ (2) Afternoon □ (3) Night □ (4) Other</td>
<td>□ (1) Other person □ (2) Self □ (3) It just happened</td>
<td><em>/<strong>/</strong></em></td>
<td><em>:</em> am pm</td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>Injury 4</td>
<td>□ (1) Morning □ (2) Afternoon □ (3) Night □ (4) Other</td>
<td>□ (1) Other person □ (2) Self □ (3) It just happened</td>
<td><em>/<strong>/</strong></em></td>
<td><em>:</em> am pm</td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>Injury 5</td>
<td>□ (1) Morning □ (2) Afternoon □ (3) Night □ (4) Other</td>
<td>□ (1) Other person □ (2) Self □ (3) It just happened</td>
<td><em>/<strong>/</strong></em></td>
<td><em>:</em> am pm</td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
<td></td>
</tr>
</tbody>
</table>
66. Have you ever been in an on-duty incident that required the use of force (circle one)? Yes  No
67. Have you ever been in an on-duty incident that required the use of deadly force (circle one)? Yes  No
   a. How many incidents involving the use of deadly force have you been involved in? _______
   b. How many of those incidents involved YOU firing your weapon?

68. Is there anything you would like to let us know about yourself, about this study, about your participation in this study, or any other important fact or thought you believe we should be aware of? __________________________

   __________________________

   __________________________

   __________________________

   __________________________

Thank You!
APPENDIX F - SIMULATOR ADAPTATION SYNDROME SCREENING TOOL
Post-exposure Simulator Questionnaire

ID Number: 1

Date: 

For each symptom below, circle one word which best describes how you feel now:

<table>
<thead>
<tr>
<th>SYMPTOM LIST</th>
<th>No</th>
<th>Slight</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. General Discomfort</td>
<td>No</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>2. Fatigue</td>
<td>No</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>3. Headache</td>
<td>No</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>4. Eye Strain</td>
<td>No</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>5. Difficulty Focusing</td>
<td>No</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>6. Salivation Increase</td>
<td>No</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>7. Sweating</td>
<td>No</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>8. Nausea</td>
<td>No</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>9. Difficulty Concentrating</td>
<td>No</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>10. &quot;Fullness of the Head&quot;</td>
<td>No</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>11. Blurry Vision</td>
<td>No</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>12. Dizziness Eyes Open</td>
<td>No</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>13. Dizziness Eyes Closed</td>
<td>No</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>14. Vertigo</td>
<td>No</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>15. Stomach Awareness</td>
<td>No</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>16. Burping</td>
<td>No</td>
<td>Slight</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
</tbody>
</table>

Version 4/5/2011
Post-Exposure Simulator Questionnaire (PESQ) Scoring

Method
To score the PESQ, take the screening subject’s completed questionnaire and this scoring sheet and place them side by side. For each symptom, the participant will have indicated either ‘No’, ‘Slight’, ‘Moderate’ or ‘Severe’. In the table below, enter the number 0 for ‘No’, 1 for ‘Slight’, 2 for ‘Moderate’, and 3 for ‘Severe’ corresponding with each symptom. For General Discomfort, Difficulty Focusing, Nausea, Difficulty Concentrating and Blurred Vision, multiply the score by 2 to get a new total. If a participant indicated ‘No’ for any of the symptoms to be multiplied by 2, the score will still be 0. Add all of the scores (after multiplying by 2 where indicated) and multiply the total by 3.74 to get the total score for the screening subject. If the total score is greater than 22.5, inform Dr. Belenky immediately in order to further assess the screening subject. If he is unavailable, contact Dr. Van Dongen.

‘No’=0, ‘Slight’=1, ‘Moderate’=2, ‘Severe’=3

<table>
<thead>
<tr>
<th>General Discomfort</th>
<th></th>
<th>(*)2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headache</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eye Strain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty Focusing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salivation Increase</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nausea</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty Concentrating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“Fullness of the Head”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blurry Vision</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dizziness Eyes Open</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dizziness Eyes Closed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertigo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stomach Awareness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burping</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total (*)3.74 = Total

Score
If your total score is >22.5 inform Dr. Belenky immediately. Staple this sheet to the screening subject’s PESQ.

Scoring Research Assistant__________________________

Participant ID [Redacted]

Version 4/5/2011
APPENDIX G – DEMOGRAPHIC QUESTIONNAIRES
Impact of Work-Related Fatigue on Deadly Force Judgment and Decision Making and Driving Performance Among Day versus Night Sleepers

Subject ID: ___________________________  Date: ___________________________

Subject Enrollment and Demographic Information Form

“Impact of Work-Related Fatigue on Deadly Force Judgment and Decision Making and Driving Performance Among Day vs Night Sleepers”

Principal Investigator: Bryan Vila, Ph.D.

Welcome to the Sleep and Performance Research Center at Washington State University Spokane. The following questions will help us understand more about you and your sleep/wake behavior. Your honesty and accuracy are counted on in completing this form. All information will be kept strictly confidential and will be used for research purposes only.

General/Background Information

1. Name (first, middle initial, last): ____________________________________________

2. Telephone: _______________________________________________________________

3. Mailing Address: __________________________________________________________

4. E-mail: ________________________________________________________________

5. Emergency contact:
   Name: _________________________________________________________________
   Relationship: ____________________________________________________________
   Phone: _________________________________________________________________

6. Age: __________

7. Date of birth: ____________________________________________________________

8. Sex (circle one):  Male  Female

9. Height: ____feet ____inches

10. Weight: _______ lbs.

11. Collar size (if known): _______ inches

12. Which hand do you write with (circle one)?:  right  left  ambidextrous

Subject Enrollment and Demographic Information Form version 03/01/12
13. Which hand do you shoot with (circle one?): right, left, ambidextrous

14. What race do you consider yourself to be? Select one or more of the following:
   - **American Indian or Alaska Native:** A person having origins in any of the original peoples of North, Central, or South America, and who maintains tribal affiliation or community attachment.
   - **Asia:** A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent, including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.
   - **Black or African American:** A person having origins in any of the black racial groups of Africa.
   - **Native Hawaiian or Other Pacific Islander:** A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.
   - **White:** A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.
   - Check here if you do not know, or do not wish to provide this information.

15. Do you consider yourself to be Hispanic or Latino (a person of Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race)? Select one:
   - **Hispanic or Latino.**
   - **Not Hispanic or Latino.**
   - Check here if you do not know, or do not wish to provide this information.

16. Highest level of education completed:
   - Grade school: __
   - Middle school: __
   - Junior high school: __
   - High school: __
   - 2 years college: __
   - 4 years college: __
   - Graduate school: __

**Work History/Hours Worked**

17. Where did you complete your police academy training?

_________________________________________________________

18. When did you complete your police academy training? ________________________________

19. How many years have you worked as a sworn law enforcement officers? ______________

20. How many years have you worked as a sworn officer for your current department? __________
21. Which of the following best describes your primary activities or current assignment (circle one)?  
   a. Patrol officer in car  
   b. Motorcycle officer  
   c. Detective  
   d. Desk job at the police station  
   e. Training officer  
   f. Bicycle officer  
   g. Walking on a foot beat  
   h. Canine officer  
   i. Other (not listed above)  
      specify: ____________________________________________

22. Do you have a special assignment or call out responsibility for your department (circle one)? Yes  
      No  
      Type of assignment: _______________________________________

23. How long have you been working your current assignment for your department? __________________________

24. What shift are you currently working for your department? ____________________________________________

25. How long have you been working this shift? ____________________________________________

26. What time of day does your current shift typically start? __________________________

27. What time of day does your current shift typically end? __________________________

28. How long are your current shifts for your department? __________________________

29. On average, how long does it take for you to travel to and from work? __________________________

30. Are you currently working a second job in addition to your job as a sworn officer (circle one)? Yes  
      No

31. Have you ever worked a second job in addition to your job as a sworn officer (circle one)? Yes  
      No

In the past 6 months:

32. How many times are you required to switch or change shifts? __________________________

33. How many hours a week do you usually work for your department? __________________________

34. Have you worked overtime for your department (circle one)? Yes  
      No

35. During an average week, how many hours of overtime are you working for your department?  
      __________________________

36. Have you done any paid work outside of your department (circle one)? Yes  
      No

37. During an average week, how many hours of work do you do outside your department?  
      __________________________
General Health

38. In general, would you say your health is: ___ excellent  __ very good ___ good ___ fair ___ poor

39. Do you currently smoke (circle one)? Yes No
   How long have you been smoking?
   On average, how many cigarettes do you smoke in a day?

40. Have you ever smoked in the past (circle one)? Yes No
   a. How many years ago did you quit smoking?

41. Do you drink alcohol? ___ Never ___ Rarely ___ Sometimes ___ Often

42. On average, how many alcoholic drinks do you have in a week?

43. How often did you have six or more drinks on one occasion in the past year?

Note: for the next three questions caffeine-containing drinks include: coffee, tea, sodas, energy drinks, or other forms of ingesting caffeine.

44. How many caffeine-containing drinks do you have on average per day when you are on duty?

45. How many caffeine-containing drinks do you have on average per day when you are off duty?

46. Do you use caffeine as a fatigue management tool when on duty (to stay awake)?

47. Do you exercise regularly (circle one)? Yes No

48. One average, how many times a week are you able to exercise?

49. What types of activities are you doing for exercise (running, lifting, biking, yoga, etc.)?

50. During you on-duty periods (5 consecutive days/night on duty), on average, how many hours of sleep are
you getting a night (or during the day if you work nights)?

51. During your off-duty periods (4-5 days off duty) on average, how many hours of sleep are you getting a night?

52. How do you feel about the amount of sleep you normally get between successive shifts (check one)?
   — nowhere near enough
   — could do with a lot more
   — could do with a bit more
   — get the right amount
   — get plenty
   — does not apply

53. Please describe any allergies you have:

54. In general, how often do you wear a seat belt when operating a personal vehicle (excluding motorcycles)?
   — always
   — usually
   — sometimes
   — rarely
   — never

55. In general, how often do you wear a seat belt when operating a law enforcement vehicle?
   — always
   — usually
   — sometimes
   — rarely
   — never

With regard to your time inside a law enforcement vehicle:

56. Are there situations when you are LESS likely to wear your seat belt?

57. Are there situations in which you are MORE likely to wear your seat belt?

58. During your field training, what was your field training officer’s position on seat belt use?

59. What advice or instructions did your field training officer’s give you regarding seat belt use?

60. Do you know your department’s official policy regarding the use of the radio, mobile data terminals, and cellphones while the vehicle is in use or in motion (circle one)? Yes No

61. What are the policies regarding the use of two-way radios, mobile data terminals, and cellphones?

We would like to know if you have had any accidents or injuries within the past 3 years either on-duty or off-duty.

62. Within the past 3 years, have you had a traffic accident while on duty (circle one)? Yes No
   a. How many times has this occurred?

<table>
<thead>
<tr>
<th>Accident Details:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accident 1</td>
</tr>
<tr>
<td>Date</td>
</tr>
<tr>
<td>Accident 2</td>
</tr>
<tr>
<td>Accident 3</td>
</tr>
</tbody>
</table>

Subject Enrollment and Demographic Information Form version 03/01/12  page 6 of 10
63. Within the past 3 years, have you had a traffic accident on your way home from work or immediately following a work shift (circle one)?
   □ Yes □ No
   a. How many times has this occurred?

Accident Details:

<table>
<thead>
<tr>
<th>After Work Accident</th>
<th>What shift were you on?</th>
<th>Date mm/dd/yyyy</th>
<th>Time of day</th>
<th>Personal Injury</th>
<th>Property Damage</th>
<th>Wearing Seat Belt?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accident 1</td>
<td>□ (1) Morning</td>
<td>/ / /</td>
<td>: am</td>
<td>□ (0) No</td>
<td>□ (0) No</td>
<td>□ (0) No</td>
</tr>
<tr>
<td></td>
<td>□ (2) Afternoon</td>
<td></td>
<td>pm</td>
<td>□ (1) Yes</td>
<td>□ (1) Yes</td>
<td>□ (1) Yes</td>
</tr>
<tr>
<td></td>
<td>□ (3) Night</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ (4) Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accident 2</td>
<td>□ (1) Morning</td>
<td>/ / /</td>
<td>: am</td>
<td>□ (0) No</td>
<td>□ (0) No</td>
<td>□ (0) No</td>
</tr>
<tr>
<td></td>
<td>□ (2) Afternoon</td>
<td></td>
<td>pm</td>
<td>□ (1) Yes</td>
<td>□ (1) Yes</td>
<td>□ (1) Yes</td>
</tr>
<tr>
<td></td>
<td>□ (3) Night</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ (4) Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accident 3</td>
<td>□ (1) Morning</td>
<td>/ / /</td>
<td>: am</td>
<td>□ (0) No</td>
<td>□ (0) No</td>
<td>□ (0) No</td>
</tr>
<tr>
<td></td>
<td>□ (2) Afternoon</td>
<td></td>
<td>pm</td>
<td>□ (1) Yes</td>
<td>□ (1) Yes</td>
<td>□ (1) Yes</td>
</tr>
<tr>
<td></td>
<td>□ (3) Night</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ (4) Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accident 4</td>
<td>□ (1) Morning</td>
<td>/ / /</td>
<td>: am</td>
<td>□ (0) No</td>
<td>□ (0) No</td>
<td>□ (0) No</td>
</tr>
<tr>
<td></td>
<td>□ (2) Afternoon</td>
<td></td>
<td>pm</td>
<td>□ (1) Yes</td>
<td>□ (1) Yes</td>
<td>□ (1) Yes</td>
</tr>
<tr>
<td></td>
<td>□ (3) Night</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ (4) Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
64. In the past 3 years, have you ever had any of the following injuries **while on-duty**?

<table>
<thead>
<tr>
<th>Injury</th>
<th>Ever had while on duty</th>
<th>If yes, number of times</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Strains</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>2. Sprains</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>3. Cuts or lacerations</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>4. Punctures</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>5. Burns</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>6. Bruises or contusions</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>7. Fractured bones</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>8. Dislocated joints</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>9. Concussions</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>10. Gunshot wounds</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>Other injuries. Specify</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. 1st</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>12. 2nd</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
<tr>
<td>13. 3rd</td>
<td>☐ (0) No ☐ (1) Yes</td>
<td></td>
</tr>
</tbody>
</table>
65. For each on-duty injury mentioned above, please fill in the chart below. If the same type of on-duty injury has occurred more than once, please answer the questions for each occurrence.

<table>
<thead>
<tr>
<th>Injury</th>
<th>Type of injury</th>
<th>What shift were you on?</th>
<th>Who caused the injury?</th>
<th>Date mm/dd/yyyy</th>
<th>Time of day</th>
<th>Did you seek medical attention?</th>
<th>Did you miss any work due to this injury?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury 1</td>
<td>□ (1) Morning □ (2) Afternoon □ (3) Night □ (4) Other</td>
<td></td>
<td>□ (1) Other person □ (2) Self □ (3) It just happened</td>
<td></td>
<td></td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
</tr>
<tr>
<td>Injury 2</td>
<td>□ (1) Morning □ (2) Afternoon □ (3) Night □ (4) Other</td>
<td></td>
<td>□ (1) Other person □ (2) Self □ (3) It just happened</td>
<td></td>
<td></td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
</tr>
<tr>
<td>Injury 3</td>
<td>□ (1) Morning □ (2) Afternoon □ (3) Night □ (4) Other</td>
<td></td>
<td>□ (1) Other person □ (2) Self □ (3) It just happened</td>
<td></td>
<td></td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
</tr>
<tr>
<td>Injury 4</td>
<td>□ (1) Morning □ (2) Afternoon □ (3) Night □ (4) Other</td>
<td></td>
<td>□ (1) Other person □ (2) Self □ (3) It just happened</td>
<td></td>
<td></td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
</tr>
<tr>
<td>Injury 5</td>
<td>□ (1) Morning □ (2) Afternoon □ (3) Night □ (4) Other</td>
<td></td>
<td>□ (1) Other person □ (2) Self □ (3) It just happened</td>
<td></td>
<td></td>
<td>□ (0) No □ (1) Yes</td>
<td>□ (0) No □ (1) Yes</td>
</tr>
</tbody>
</table>
66. Have you ever been in an on-duty incident that required the use of force (circle one)? Yes  No

67. Have you ever been in an on-duty incident that required the use of deadly force (circle one)? Yes  No
   a. How many incidents involving the use of deadly force have you been involved in? _______
   b. How many of those incidents involved YOU firing your weapon? ______________________

68. Is there anything you would like to let us know about yourself, about this study, about your participation in this study, or any other important fact or thought you believe we should be aware of? ____________________________________________
                                                                                           ____________________________________________
                                                                                           ____________________________________________
                                                                                           ____________________________________________
                                                                                           ____________________________________________

Thank You!
APPENDIX H – PITTSBURG SLEEP QUALITY INDEX
Subject ID: 

Date: 

**Pittsburgh Sleep Quality Index (PSQI)**

Instructions: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions. 

During the past month,

1. When have you usually gone to bed? 
2. How long (in minutes) has it taken you to fall asleep each night? 
3. When have you usually gotten up in the morning? 
4. How many hours of actual sleep did you get that night? (This may be different than the number of hours you spend in bed.)

<table>
<thead>
<tr>
<th>Question</th>
<th>Not during the past month (0)</th>
<th>Less than once a week (1)</th>
<th>Once or twice a week (2)</th>
<th>Three or more times a week (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Cannot get to sleep within 30 minutes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Wake up in the middle of the night or early morning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Have to get up to use the bathroom</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Cannot breathe comfortably</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Cough or snore loudly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Feel too cold</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. Feel too hot</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. Have bad dreams</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Have pain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>j. Other reason(s), please describe, including how often you have had trouble sleeping because of this reason(s)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. During the past month, how often have you taken medicine (prescribed or “over the counter”) to help you sleep?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?</td>
<td>Very good (6)</td>
<td>Fairly good (1)</td>
<td>Fairly bad (2)</td>
<td>Very bad (3)</td>
</tr>
<tr>
<td>9. During the past month, how would you rate your sleep quality overall?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Component 1: #2 Score
Component 2: #2 Score + (.5 min 60), 16-30 min (1), 31-60 min (2), >60 min (3)
Component 3: #4 Score (≥70), 6-7 (1), 5-6 (2), <5 (3)
Component 4: (total # of hours asleep / total # of hours in bed) x 100
Component 5: sum of scores 5b to 5j (8-0), 1-9 (1), 10-18 (2), 19-27 (3)
Component 6: #6 Score
Component 7: #7 score + #8 score 80=0; 1-2=1; 3-4=2; 5-6=3

Add the seven component scores together: **Global PSQI Score**


**PSQI version 1989**
APPENDIX I – EPWORTH SLEEPINESS SCALE
EPWORTH SLEEPINESS SCALE

Subject ID: __________ Date: __/__/____

How likely are you to doze off or fall asleep in the following situations, in contrast to feeling just tired? This refers to your usual way of life in recent times. Even if you have not done some of these things recently try to work out how they would have affected you. Use the following scale to choose the most appropriate number for each situation:

0 = no chance of dozing
1 = slight chance of dozing
2 = moderate chance of dozing
3 = high chance of dozing

<table>
<thead>
<tr>
<th>SITUATION</th>
<th>CHANCE OF DOZING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting and reading</td>
<td>__________</td>
</tr>
<tr>
<td>Watching TV</td>
<td>__________</td>
</tr>
<tr>
<td>Sitting inactive in a public place (e.g. a theater or a meeting)</td>
<td>__________</td>
</tr>
<tr>
<td>As a passenger in a car for an hour without a break</td>
<td>__________</td>
</tr>
<tr>
<td>Lying down to rest in the afternoon when circumstances permit</td>
<td>__________</td>
</tr>
<tr>
<td>Sitting and talking to someone</td>
<td>__________</td>
</tr>
<tr>
<td>Sitting quietly after a lunch without alcohol</td>
<td>__________</td>
</tr>
<tr>
<td>In a car, while stopped for a few minutes in traffic</td>
<td>__________</td>
</tr>
</tbody>
</table>
APPENDIX J – MULTIVARIABLE APNEA PREDICTION
We would like to ask you some questions about your sleep

During the last month, have you had, or have you been told about the following symptoms: (show the frequency by putting a cross in one box)

<table>
<thead>
<tr>
<th>Symptoms:</th>
<th>(0) never</th>
<th>(1) rarely, less than once a week</th>
<th>(2) 1-2 times a week</th>
<th>(3) 3-4 times a week</th>
<th>(4) 5-7 times a week</th>
<th>( ) don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. snorting or gasping</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2. loud snoring</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. breathing stops, choke or struggle for breath</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4. frequent awakenings</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>5. tossing, turning or thrashing</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>6. difficulty falling asleep</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>7. legs feel jumpy or jerky</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>8. morning headaches</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
We would like to ask you some further questions about your sleep and daytime sleepiness

During the last month, have you had, or have you been told about the following symptoms: (show the frequency by putting a cross in one box)

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>(0) never</th>
<th>(1) rarely, less than once a week</th>
<th>(2) 1-2 times a week</th>
<th>(3) 3-4 times a week</th>
<th>(4) 5-7 times a week</th>
<th>( ) don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. falling asleep when at work or school</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. falling asleep when driving</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. excessive sleepiness during the day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. awaken feeling paralysed, unable to move for short period’s</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. find yourself in a vivid dreamlike state when falling asleep or awakening even though you know you’re awake</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. falling asleep during the day, particularly when you are not busy (not including planned naps)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. morning fatigue (on awakening)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. constant unexplained fatigue?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX K – COOK-MEDLEY QUESTIONNAIRE
**Cook-Medley Questionnaire**

*Instructions: For the following statements:*

- if you think that a statement is True or Mostly True, **circle the T (True)**
- if you think that a statement is False or Mostly False, **circle the F (False)**.

<table>
<thead>
<tr>
<th></th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>When I take a new job, I like to be tipped off on who should be gotten next to.</td>
<td>T</td>
</tr>
<tr>
<td>2</td>
<td>When someone does me a wrong I feel I should pay him back if I can, just for the principle of the thing.</td>
<td>T</td>
</tr>
<tr>
<td>3</td>
<td>I prefer to pass by school friends, or people I know but have not seen for a long time, unless they speak to me first.</td>
<td>T</td>
</tr>
<tr>
<td>4</td>
<td>I have often had to take orders from someone who did not know as much as I did.</td>
<td>T</td>
</tr>
<tr>
<td>5</td>
<td>I think a great many people exaggerate their misfortunes in order to gain the sympathy and help of others.</td>
<td>T</td>
</tr>
<tr>
<td>6</td>
<td>It takes a lot of argument to convince most people of the truth.</td>
<td>T</td>
</tr>
<tr>
<td>7</td>
<td>I think most people would lie to get ahead.</td>
<td>T</td>
</tr>
<tr>
<td>8</td>
<td>Someone has it in for me.</td>
<td>T</td>
</tr>
<tr>
<td>9</td>
<td>Most people are honest chiefly through fear of being caught.</td>
<td>T</td>
</tr>
<tr>
<td>10</td>
<td>Most people will use somewhat unfair means to gain profit or an advantage rather than to lose it.</td>
<td>T</td>
</tr>
<tr>
<td>11</td>
<td>I commonly wonder what hidden reason another person may have for doing something nice for me.</td>
<td>T</td>
</tr>
<tr>
<td>12</td>
<td>It makes me impatient to have people ask my advice or otherwise interrupt me when I am working on something important.</td>
<td>T</td>
</tr>
<tr>
<td>13</td>
<td>I feel that I have often been punished without cause.</td>
<td>T</td>
</tr>
<tr>
<td>14</td>
<td>I am against giving money to beggars.</td>
<td>T</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>15</td>
<td>Some of my family have habits that bother and annoy me very much.</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>My relatives are nearly all in sympathy with me.</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>My way of doing things is apt to be misunderstood by others.</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>I don't blame anyone for trying to grab everything he can get in this world.</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>No one cares much what happens to you.</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>I can be friendly with people who do things which I consider wrong.</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>It is safer to trust nobody.</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>I do not blame a person for taking advantage of someone who lays himself open to it.</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>I have often felt that strangers were looking at me critically.</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Most people make friends because friends are likely to be useful to them.</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>I am sure I am being talked about.</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>I am likely not to speak to people until they speak to me.</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Most people inwardly dislike putting themselves out to help other people.</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>I tend to be on my guard with people who are somewhat more friendly than I had expected.</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>I have sometimes stayed away from another person because I feared doing or saying something that I might regret afterwards.</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>People often disappoint me.</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>I like to keep people guessing what I'm going to do next.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>True</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>------</td>
</tr>
<tr>
<td>32</td>
<td>I frequently ask people for advice.</td>
<td>T</td>
</tr>
<tr>
<td>33</td>
<td>I am not easily angered.</td>
<td>T</td>
</tr>
<tr>
<td>34</td>
<td>I have often met people who were supposed to be experts who were no better than I.</td>
<td>T</td>
</tr>
<tr>
<td>35</td>
<td>I would certainly enjoy beating a crook at his own game.</td>
<td>T</td>
</tr>
<tr>
<td>36</td>
<td>It makes me feel like a failure when I hear of the success of someone I know well.</td>
<td>T</td>
</tr>
<tr>
<td>37</td>
<td>I have at times had to be rough with people who were rude or annoying.</td>
<td>T</td>
</tr>
<tr>
<td>38</td>
<td>People generally demand more respect for their own rights than they are willing to allow for others.</td>
<td>T</td>
</tr>
<tr>
<td>39</td>
<td>There are certain people who I dislike so much that I am inwardly pleased when they are catching it for something they have done.</td>
<td>T</td>
</tr>
<tr>
<td>40</td>
<td>I am often inclined to go out of my way to win a point with someone who has opposed me.</td>
<td>T</td>
</tr>
<tr>
<td>41</td>
<td>I am quite often not in on the gossip and talk of the group I belong to.</td>
<td>T</td>
</tr>
<tr>
<td>42</td>
<td>The man who had most to do with me when I was a child (such as my father, stepfather, etc.) was very strict with me.</td>
<td>T</td>
</tr>
<tr>
<td>43</td>
<td>I have often found people jealous of my good ideas, just because they had not thought of them first.</td>
<td>T</td>
</tr>
<tr>
<td>44</td>
<td>When a man is with a woman he is usually thinking about things related to her sex.</td>
<td>T</td>
</tr>
<tr>
<td>45</td>
<td>I do not try to cover up my poor opinion or pity of a person so that he won't know how I feel.</td>
<td>T</td>
</tr>
<tr>
<td>46</td>
<td>I have frequently worked under people who seem to have things arranged so that they get credit for good work but are able to pass off mistakes onto those under them.</td>
<td>T</td>
</tr>
<tr>
<td>47</td>
<td>I strongly defend my own opinions as a rule.</td>
<td>T</td>
</tr>
<tr>
<td>48</td>
<td>People can pretty easily change me even though I thought that my mind was already made up on a subject.</td>
<td>T</td>
</tr>
<tr>
<td></td>
<td>Sometimes I am sure that other people can tell what I am thinking.</td>
<td>True</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>49</td>
<td>T</td>
<td>F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>A large number of people are guilty of bad sexual conduct.</th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>T</td>
<td>F</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX L – ATHENS INSOMNIA SCALE
Impact of Work-Related Fatigue of DFIDM Performance and Driving Performance Among Day vs. Night Sleepers

Subject ID: ___________  Date: ____________

Athens Insomnia Scale

Instructions: This scale is intended to record your own assessment of any sleep difficulty you might have experienced. Please, check (by circling the appropriate number) the items below to indicate your estimate of any difficulty, provided that it occurred **at least three times per week during the last month**.

1. Sleep induction (time it takes you to fall asleep after turning off the lights):
   - no problem
   - slightly delayed
   - markedly delayed
   - very delayed/did not sleep at all

2. Awakenings during the night:
   - no problem
   - minor problem
   - considerable problem
   - serious problem/did not sleep at all

3. Final awakening earlier than desired:
   - not earlier
   - a little earlier
   - markedly earlier
   - much earlier/did not sleep at all

4. Total sleep duration:
   - sufficient
   - slightly insufficient
   - markedly insufficient
   - very insufficient/did not sleep at all

5. Overall quality of sleep (no matter how long you slept):
   - satisfactory
   - slightly unsatisfactory
   - markedly unsatisfactory
   - very unsatisfactory/did not sleep at all

6. Sense of well-being during the day:
   - normal
   - slightly decreased
   - markedly decreased
   - very decreased

7. Functioning (physical and mental) during the day:
   - normal
   - slightly decreased
   - markedly decreased
   - very decreased

8. Sleepiness during the day:
   - none
   - mild
   - considerable
   - intense
APPENDIX M – SLEEP/WAKE DIARY
CONFIDENTIAL SLEEP/WAKE DIARY

For questions call (509) 358-7968

Please bring this with you to the laboratory on your testing day!
Complete the sleep diary as best you can.

Please bring this with you to the laboratory on your testing day!
For questions call (509) 358-7968

Note: If the diary is not complete, your study condition will need to be rescheduled.

**FATIGUE RATING:**
1 = fully alert, wide awake
2 = very lively, responsive, but not at peak
3 = okay, somewhat refreshed
4 = a little tired, less than fresh
5 = moderately tired, let down
6 = extremely tired, very difficult to concentrate
7 = completely exhausted, unable to function effectively

**SLEEPINESS RATING:**
1 = extremely alert
2
3 = alert
4
5 = neither sleepy nor alert
6
7 = sleepy, but no difficulty remaining awake
8
9 = extremely sleepy, fighting sleep

**Standard Dosage of Alcoholic Drinks:**
12 oz. of beer, 5 oz. of wine, 1.5 oz. shot of distilled spirits
SLEEP DIARY   _____ / _____ / _____   DAY 1

PRIOR to this SLEEP period, you were:   ON DUTY     OFF DUTY
circle one)

ANSWER BEFORE GOING TO BED

Did you take any naps today?   YES     NO   Total # of naps: _____

Time of day (24hr)   _____:_____   Duration   _____ Hr   _____ Min

Amount (#) consumed:   caffeinated drinks   _____   alcoholic drinks   _____

tobacco products   _____ type:   __________

Medications taken during this day:   __________

Medications taken before sleep:   __________

Time to bed (24hr)   _____:_____   __________

Fatigue Rating:   (circle one)   Sleepiness Rating:   (circle one)

1 2 3 4 5 6 7 1 2 3 4 5 6 7 8

ANSWER WHEN YOU FIRST AWAKEN FOR THIS DAY

Time Awakened (24hr)   _____:_____   __________

Fatigue Rating:   (circle one)   Sleepiness Rating:   (circle one)

1 2 3 4 5 6 7 1 2 3 4 5 6 7 9

Did you awaken at all during the sleep period?   YES     NO

Total # of awakenings:   __________   Duration   _____ Hr   _____ Min

Cause?   __________

Other comments/notes:   __________

__________________________

327
WAKE DIARY  _____ / _____ / _____  DAY 1

TODAY you are:  ON DUTY or OFF DUTY  ➡️

ON DUTY (complete only if on duty this day)

Shift Start Time (24hr)  :  ________

Fatigue Rating:  (circle one)    Sleepiness Rating:  (circle one)

1  2  3  4  5  6  7
1  2  3  4  5  6  7  8  9

Were you involved in any of the following during your shift?  (check all that apply)

☐ Non-lethal use of force        if yes, how many?  ________
☐ Arresting a suspect           if yes, how many?  ________
☐ Motor vehicle accident        if yes, how many?  ________
☐ Motor vehicle pursuit         if yes, how many?  ________
☐ Foot pursuit                  if yes, how many?  ________
☐ Officer involved shooting     ________

What tasks did you perform?  __________________________

__________________________

What percentage of your shift involved response to calls?  ______%  

How many calls were “in-progress” calls?  ________

General level of activity:  ☐ Mild  ☐ Moderate  ☐ High

Shift End Time (24hr)  :  ________

Fatigue Rating:  (circle one)    Sleepiness Rating:  (circle one)

1  2  3  4  5  6  7
1  2  3  4  5  6  7  8  9

Other comments/notes:  ____________________________

__________________________
WAKE DIARY   ____ / ____ / ____    DAY 1

**TODAY you are:**  ON DUTY  ↓  or  OFF DUTY  ⇔

**ON DUTY** (complete only if on duty this day)

**Shift Start Time (24hr)**  ____ :  ____

Fatigue Rating: (circle one)  Sleepiness Rating: (circle one)

1 2 3 4 5 6 7  1 2 3 4 5 6 7 8 9

Were you involved in any of the following during your shift? (check all that apply)

☐ Non-lethal use of force  if yes, how many?  ____
☐ Arrester a suspect  if yes, how many?  ____
☐ Motor vehicle accident  if yes, how many?  ____
☐ Motor vehicle pursuit  if yes, how many?  ____
☐ Foot pursuit  if yes, how many?  ____
☐ Officer involved shooting

What tasks did you perform? ______________________________________

__________________________

What percentage of your shift involved response to calls?  ____ %

How many calls were “in-progress” calls?  ____

General level of activity:  ☐Mild  ☐Moderate  ☐High

**Shift End Time (24hr)**  ____ :  ____

Fatigue Rating: (circle one)  Sleepiness Rating: (circle one)

1 2 3 4 5 6 7  1 2 3 4 5 6 7 8 9

Other comments/notes: ______________________________________

__________________________
**OFF DUTY** (complete only if off duty this day)

<table>
<thead>
<tr>
<th>Daily Activities Start Time (24hr)</th>
<th>:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Fatigue Rating: (circle one)</th>
<th>Sleepiness Rating: (circle one)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
</tbody>
</table>

What activities did you do today? _________________________________________

Were you scheduled for court today?    Yes    No
If yes, did you testify?            Yes    No

Were you scheduled for other work related duties today?    Yes    No
If yes, what types of work related activities? ____________________________

Were you serving in any sort of “on call” capacity?    Yes    No

General level of activity: □ Mild □ Moderate □ High

<table>
<thead>
<tr>
<th>Daily Activities End Time (24hr)</th>
<th>:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Fatigue Rating: (circle one)</th>
<th>Sleepiness Rating: (circle one)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
</tbody>
</table>

Other comments/notes: ___________________________________________
SLEEP DIARY   ____ / ____ / ____  DAY 2

PRIOR to this SLEEP period, you were:  ON DUTY  OFF DUTY
(circle one)

ANSWER BEFORE GOING TO BED

Did you take any naps today?  YES  NO  Total # of naps: ____

Time of day (24hr)  ____ : ____  Duration  ____ Hr  ____ Min

Amount (#) consumed:  caffeinated drinks  ____  alcoholic drinks  ____
  tobacco products  ____  type:  __________

Medications taken *during* this day:  ______________________________________

Medications taken *before sleep*:  ______________________________________

  Time to bed (24hr)  ____ : ____

Fatigue Rating:  (circle one)  Sleepiness Rating:  (circle one)
1 2 3 4 5 6 7  1 2 3 4 5 6 7 8

ANSWER WHEN YOU FIRST AWAKEN FOR THIS DAY

Time Awakened (24hr)  ____ : ____

Fatigue Rating:  (circle one)  Sleepiness Rating:  (circle one)
1 2 3 4 5 6 7  1 2 3 4 5 6 7 9

Did you awaken at all during the sleep period?  YES  NO

Total # of awakenings:  __________  Duration  ____ Hr  ____ Min

Cause?  __________________________________________________________

Other comments/notes:  ____________________________________________

____________________________________________________________
WAKE DIARY  ____ / ____ / ____  DAY 2

TODAY you are:  ON DUTY ↓  or OFF DUTY ⇒

ON DUTY (complete only if on duty this day)

Shift Start Time (24hr) : ______

Fatigue Rating: (circle one)  Sleepiness Rating: (circle one)

1 2 3 4 5 6 7 1 2 3 4 5 6 7 8 9

Were you involved in any of the following during your shift?  (check all that apply)

☐ Non-lethal use of force  ☐ if yes, how many?  _____
☐ Arresting a suspect  ☐ if yes, how many?  _____
☐ Motor vehicle accident  ☐ if yes, how many?  _____
☐ Motor vehicle pursuit  ☐ if yes, how many?  _____
☐ Foot pursuit  ☐ if yes, how many?  _____
☐ Officer involved shooting

What tasks did you perform?  ___________________________________________________

_________________________________________________

What percentage of your shift involved response to calls?  _____ %

How many calls were “in-progress” calls?  ______

General level of activity:  ☐ Mild  ☐ Moderate  ☐ High

Shift End Time (24hr) : ______

Fatigue Rating: (circle one)  Sleepiness Rating: (circle one)

1 2 3 4 5 6 7 1 2 3 4 5 6 7 8 9

Other comments/notes:  ___________________________________________________

_________________________________________________
**OFF DUTY** (complete only if off duty this day)

**Daily Activities Start Time (24hr) :**

<table>
<thead>
<tr>
<th>Fatigue Rating: (circle one)</th>
<th>Sleepiness Rating: (circle one)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
</tbody>
</table>

What activities did you do today? ______________________________________

---

Were you scheduled for court today? Yes No

If yes, did you testify? Yes No

Were you scheduled for other work related duties today? Yes No

If yes, what types of work related activities? ________________________________

---

Were you serving in any sort of “on call” capacity? Yes No

General level of activity: □ Mild □ Moderate □ High

**Daily Activities End Time (24hr) :**

<table>
<thead>
<tr>
<th>Fatigue Rating: (circle one)</th>
<th>Sleepiness Rating: (circle one)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
</tbody>
</table>

Other comments/notes: _________________________________________________

---
Complete the sleep diary as best you can.

Please bring this with you to the laboratory on your testing day!
For questions call (509) 358-7968

*Note: If the diary is not complete, your study condition will need to be rescheduled.*

<table>
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<tr>
<th>FATIGUE RATING:</th>
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<td>5 = moderately tired, let down</td>
</tr>
<tr>
<td>6 = extremely tired, very difficult to concentrate</td>
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<td>7 = completely exhausted, unable to function effectively</td>
</tr>
</tbody>
</table>

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<tr>
<th>SLEEPINESS RATING:</th>
</tr>
</thead>
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</tr>
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<td>5 = neither sleepy nor alert</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7 = sleepy, but no difficulty remaining awake</td>
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<tr>
<td>8</td>
</tr>
<tr>
<td>9 = extremely sleepy, fighting sleep</td>
</tr>
</tbody>
</table>

**Standard Dosage of Alcoholic Drinks:**
12 oz. of beer, 5 oz. of wine, 1.5 oz. shot of distilled spirits
SLEEP DIARY _____ / _____ / _____  DAY 3

PRIOR to this SLEEP period, you were: ON DUTY OFF DUTY
(circle one)

ANSWER BEFORE GOING TO BED

Did you take any naps today? YES NO Total # of naps: _____

Time of day (24hr) _____:_____ Duration _____ Hr _____ Min

Amount(#) consumed: caffeinated drinks _____ alcoholic drinks _____
tobacco products _____ type: ____________

Medications taken during this day: ____________________________

Medications taken before sleep: ______________________________

Time to bed (24hr) _____:_____  

Fatigue Rating: (circle one) Sleepiness Rating: (circle one)
1 2 3 4 5 6 7 1 2 3 4 5 6 7 8

ANSWER WHEN YOU FIRST AWAKEN FOR THIS DAY

Time Awakened (24hr) _____:_____  

Fatigue Rating: (circle one) Sleepiness Rating: (circle one)
1 2 3 4 5 6 7 1 2 3 4 5 6 7 9

Did you awaken at all during the sleep period? YES NO

Total # of awakenings: __________ Duration _____ Hr _____ Min

Cause? ____________________________

Other comments/notes: ______________________________
WAKE DIARY   _____ / _____ / _____  DAY 3  

TODAY you are: ON DUTY or OFF DUTY →

ON DUTY (complete only if on duty this day)

Shift Start Time (24hr) : ___

Fatigue Rating: (circle one)  Sleepiness Rating: (circle one)

1 2 3 4 5 6 7  1 2 3 4 5 6 7 8 9

Were you involved in any of the following during your shift? (check all that apply)

☐ Non-lethal use of force  if yes, how many? ____
☐ Arresting a suspect  if yes, how many? ____
☐ Motor vehicle accident  if yes, how many? ____
☐ Motor vehicle pursuit  if yes, how many? ____
☐ Foot pursuit  if yes, how many? ____
☐ Officer involved shooting

What tasks did you perform? ____________________________

_________________________________________________

What percentage of your shift involved response to calls? ____ %

How many calls were “in-progress” calls? ______

General level of activity:  ☐ Mild  ☐ Moderate  ☐ High

Shift End Time (24hr) : ___

Fatigue Rating: (circle one)  Sleepiness Rating: (circle one)

1 2 3 4 5 6 7  1 2 3 4 5 6 7 8 9

Other comments/notes: _______________________________

_________________________________________________
OFF DUTY (complete only if off duty this day)

Daily Activities Start Time (24hr) : 

Fatigue Rating: (circle one)  
1 2 3 4 5 6 7

Sleepiness Rating: (circle one)  
1 2 3 4 5 6 7 8 9

What activities did you do today? _______________________________

Were you scheduled for court today? Yes  No

If yes, did you testify? Yes  No

Were you scheduled for other work related duties today? Yes  No

If yes, what types of work related activities? ______________________

Were you serving in any sort of “on call” capacity? Yes  No

General level of activity: □ Mild  □ Moderate  □ High

Daily Activities End Time (24hr) : 

Fatigue Rating: (circle one)  
1 2 3 4 5 6 7

Sleepiness Rating: (circle one)  
1 2 3 4 5 6 7 8 9

Other comments/notes: __________________________________________
Complete the sleep diary as best you can.

Please bring this with you to the laboratory on your testing day!
For questions call (509) 358-7968

Note: If the diary is not complete, your study condition will need to be rescheduled.

<table>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SLEEPINESS RATING:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = extremely alert</td>
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<tr>
<td>2 = alert</td>
</tr>
<tr>
<td>3 = neither sleepy nor alert</td>
</tr>
<tr>
<td>4 = sleepy, but no difficulty remaining awake</td>
</tr>
<tr>
<td>5 = extremely sleepy, fighting sleep</td>
</tr>
</tbody>
</table>

**Standard Dosage of Alcoholic Drinks:**
12 oz. of beer, 5 oz. of wine, 1.5 oz. shot of distilled spirits
SLEEP DIARY  _____ / _____ / _____  DAY 4

PRIOR to this SLEEP period, you were:  ON DUTY   OFF DUTY  
(circle one)

**ANSWER BEFORE GOING TO BED**

<table>
<thead>
<tr>
<th>Did you take any naps today?</th>
<th>YES</th>
<th>NO</th>
<th>Total # of naps:  _____</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of day (24hr)</td>
<td></td>
<td></td>
<td>Duration _____ Hr _____ Min</td>
</tr>
<tr>
<td>Amount (#) consumed:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>caffeinated drinks</td>
<td></td>
<td></td>
<td>alcoholic drinks _____</td>
</tr>
<tr>
<td>tobacco products</td>
<td></td>
<td></td>
<td>type:</td>
</tr>
</tbody>
</table>

Medications taken *during* this day: ____________________________________________

Medications taken *before sleep*: ____________________________________________

<table>
<thead>
<tr>
<th>Time to bed (24hr)</th>
<th></th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Fatigue Rating: (circle one)</th>
<th>Sleepiness Rating: (circle one)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  2  3  4  5  6  7</td>
<td>1  2  3  4  5  6  7  8</td>
</tr>
</tbody>
</table>

**ANSWER WHEN YOU FIRST AWAKEN FOR THIS DAY**

<table>
<thead>
<tr>
<th>Time Awakened (24hr)</th>
<th></th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Fatigue Rating: (circle one)</th>
<th>Sleepiness Rating: (circle one)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  2  3  4  5  6  7</td>
<td>1  2  3  4  5  6  7  9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Did you awaken at all during the sleep period?</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total # of awakenings:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration _____ Hr _____ Min</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cause?</th>
<th></th>
</tr>
</thead>
</table>

Other comments/notes: ________________________________
WAKE DIARY  _____ / _____ / _____  DAY 4

TODAY you are:  ON DUTY # or OFF DUTY #

ON DUTY (complete only if on duty this day)

Shift Start Time (24hr) ______ :

Fatigue Rating: (circle one)  Sleepiness Rating: (circle one)

1 2 3 4 5 6 7         1 2 3 4 5 6 7 8 9

Were you involved in any of the following during your shift? (check all that apply)

☐ Non-lethal use of force  if yes, how many? _____
☐ Arresting a suspect  if yes, how many? _____
☐ Motor vehicle accident  if yes, how many? _____
☐ Motor vehicle pursuit  if yes, how many? _____
☐ Foot pursuit  if yes, how many? _____
☐ Officer involved shooting

What tasks did you perform? _____________________________________________________

____________________________________________________________________________

What percentage of your shift involved response to calls? _____ %

How many calls were “in-progress” calls? _____

General level of activity: ☐Mild ☐Moderate ☐High

Shift End Time (24hr) ______ :

Fatigue Rating: (circle one)  Sleepiness Rating: (circle one)

1 2 3 4 5 6 7         1 2 3 4 5 6 7 8 9

Other comments/notes: __________________________________________________________

____________________________________________________________________________
**OFF DUTY** (complete only if off duty this day)

**Daily Activities Start Time (24hr)**

Fatigue Rating: (circle one)  
1 2 3 4 5 6 7  
Sleepiness Rating: (circle one)  
1 2 3 4 5 6 7 8 9

What activities did you do today? ____________________________

__________________________________________________________

Were you scheduled for court today?  Yes  No

If yes, did you testify?  Yes  No

Were you scheduled for other work related duties today?  Yes  No

If yes, what types of work related activities? ____________________

__________________________________________________________

Were you serving in any sort of “on call” capacity?  Yes  No

General level of activity:  □ Mild  □ Moderate  □ High

**Daily Activities End Time (24hr)**

Fatigue Rating: (circle one)  
1 2 3 4 5 6 7  
Sleepiness Rating: (circle one)  
1 2 3 4 5 6 7 8 9

Other comments/notes: ____________________________

__________________________________________________________
Complete the sleep diary as best you can.

Please bring this with you to the laboratory on your testing day!
For questions call (509) 358-7968

Note: If the diary is not complete, your study condition will need to be rescheduled.

| FATIGUE RATING: | 1 = fully alert, wide awake |
|                | 2 = very lively, responsive, but not at peak |
|                | 3 = okay, somewhat refreshed |
|                | 4 = a little tired, less than fresh |
|                | 5 = moderately tired, let down |
|                | 6 = extremely tired, very difficult to concentrate |
|                | 7 = completely exhausted, unable to function effectively |

| SLEEPINESS RATING: | 1 = extremely alert |
|                   | 2 |
|                   | 3 = alert |
|                   | 4 |
|                   | 5 = neither sleepy nor alert |
|                   | 6 |
|                   | 7 = sleepy, but no difficulty remaining awake |
|                   | 8 |
|                   | 9 = extremely sleepy, fighting sleep |

Standard Dosage of Alcoholic Drinks:
12 oz. of beer, 5 oz. of wine, 1.5 oz. shot of distilled spirits
SLEEP DIARY    ____ / ____ / ____    DAY 5

PRIOR to this SLEEP period, you were:  ON DUTY     OFF DUTY
(circle one)

**ANSWER BEFORE GOING TO BED**

Did you take any naps today?  YES    NO  Total # of naps:  ____

Time of day (24hr)  ____ : ____  Duration  ____ Hr  ____ Min

Amount (#) consumed:  caffeinated drinks  ____  alcoholic drinks  ____
                       tobacco products  ____  type:  ________

Medications taken *during* this day:  ______________________________________

Medications taken *before sleep*:  ______________________________________

Time to bed (24hr)  ____ : ____

Fatigue Rating: (circle one)  Sleepiness Rating: (circle one)
1 2 3 4 5 6 7 1 2 3 4 5 6 7 8

**ANSWER WHEN YOU FIRST AWAKENED FOR THIS DAY**

Time Awakened (24hr)  ____ : ____

Fatigue Rating: (circle one)  Sleepiness Rating: (circle one)
1 2 3 4 5 6 7 1 2 3 4 5 6 7 9

Did you awaken at all during the sleep period?  YES    NO

Total # of awakenings:  ________ Duration  ____ Hr  ____ Min

Cause?:  ______________________________________

Other comments/notes:  ______________________________________
WAKE DIARY ______ / ______ / ______

DAY 5

TODAY you are: __ON DUTY__ or __OFF DUTY__

ON DUTY (complete only if on duty this day)

Shift Start Time (24hr) : __________

Fatigue Rating: (circle one)  Sleepiness Rating: (circle one)
1 2 3 4 5 6 7 1 2 3 4 5 6 7 8 9

Were you involved in any of the following during your shift? (check all that apply)

☐ Non-lethal use of force  if yes, how many? ______
☐ Arresting a suspect  if yes, how many? ______
☐ Motor vehicle accident  if yes, how many? ______
☐ Motor vehicle pursuit  if yes, how many? ______
☐ Foot pursuit  if yes, how many? ______
☐ Officer involved shooting

What tasks did you perform? __________________________________________

__________________________________________

What percentage of your shift involved response to calls? ______ %

How many calls were “in-progress” calls? ______

General level of activity: ☐ Mild ☐ Moderate ☐ High

Shift End Time (24hr) : __________

Fatigue Rating: (circle one)  Sleepiness Rating: (circle one)
1 2 3 4 5 6 7 1 2 3 4 5 6 7 8 9

Other comments/notes: ___________________________________________

__________________________________________
OFF DUTY (complete only if off duty this day)

Daily Activities Start Time (24hr) : 

Fatigue Rating: (circle one) Sleepiness Rating: (circle one)

1 2 3 4 5 6 7 1 2 3 4 5 6 7 8 9

What activities did you do today? ________________________________

_____________________________________________________________

Were you scheduled for court today? Yes No

If yes, did you testify? Yes No

Were you scheduled for other work related duties today? Yes No

If yes, what types of work related activities? ______________________

____________________________________________________________

____________________________________________________________

Were you serving in any sort of “on call” capacity? Yes No

General level of activity: □ Mild □ Moderate □ High

Daily Activities End Time (24hr) : 

Fatigue Rating: (circle one) Sleepiness Rating: (circle one)

1 2 3 4 5 6 7 1 2 3 4 5 6 7 8 9

Other comments/notes: ________________________________________

____________________________________________________________
APPENDIX N – KAROLINSKA SLEEPINESS SCALE (KSS)
Karolinska Sleepiness Scale

The following is a 9 point scale to describe sleepiness. Put a cross in the box next to the point that describes how SLEEPY you feel RIGHT NOW.

1. □ extremely alert
2. □
3. □ alert
4. □
5. □ neither alert nor sleepy
6. □
7. □ sleepy-but no difficulty remaining awake
8. □
9. □ extremely sleepy-fighting sleep