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TECHNICAL REPORT

Understanding and Reducing Off-Duty Vehicle Crashes Among Military Personnel

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Prepared for the Defense Safety Oversight Council

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NATIONAL DEFENSE RESEARCH INSTITUTE

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Summary

This report reviews a wide variety of evidence regarding traffic safety in the United States, with specific reference to military personnel. The report has two broad organizing themes: first, who is most at risk for being in a vehicle crash; and second, what measures can be taken to alleviate this risk. In terms of such measures, the report focuses on safety interventions and attempts to change driver behavior and decisions.

General Trends in Vehicle Crash Fatalities

Overall, driving has become safer over the past 20 years. Three common measures—total fatalities, fatalities per 100,000 population, and fatalities per 100 million miles driven—all show substantial decreases since the early 1990s. A variety of factors seem to have contributed to this decline: better vehicle safety features, better road safety features, decreases in teenage drunk driving, more seat belt use, and at least in the past several years, fewer vehicle miles traveled. These impressive trends mean that fewer Americans are killed or injured in vehicle crashes and that, mile for mile, the chance of being in a serious crash are fairly low (between one and two people are killed for every 100 million miles driven).

In contrast, motorcycle riding, a topic of particular interest to the military, is becoming more dangerous. Total motorcycle fatalities and fatalities per mile driven are much higher now than in the mid-1990s. The causes of this trend are less certain, but several factors seem to contribute: increases in motorcycle use; the rising popularity of sport bikes and supersports, which combine powerful engines with lightweight frames; and the trend away from universal to partial helmet laws (under which only riders less than a certain age are required to wear helmets). Fatalities are rising most significantly among men over 40, but all ages and bike types have seen increases.

For military personnel, overall crash fatality rates are generally higher than for the U.S. population, but similar to those of men of comparable ages. Young men are at the highest risk for death in vehicle crashes of any demographic group, largely because of their propensity to take more risks behind the wheel. Indeed, while crash death rates for young women are highest when they are teenagers, for men the risks continue to rise into their early 20s. The main difference between the military and civilian population is the proportion of military crash fatalities on motorcycles—the U.S. rate is currently about 15 percent of fatalities, while in some military branches the rate is on average 35–40 percent.

Drivers at Risk

A number of driver behaviors contribute to both the occurrence and severity of crashes. Both drunk driving and speeding are responsible for about one-third of fatal crashes (crashes may be due to more than one factor), while about half of fatal crashes involve vehicle occupants who were not wearing seat belts. Distracted driving (for example, talking on a cell phone or texting) and driving while fatigued seem to contribute to fewer crashes, but data to study these factors are more limited, so estimates vary about what proportion of crashes they cause.

Young men are more at risk than older men and than women, in part because they take more risks, and in part because young drivers are more vulnerable to certain risks than are more-experienced drivers. Evidence shows that young people are more susceptible to the effects of alcohol, and they are more likely to be in crashes at lower blood alcohol concentration (BAC) levels than are older drivers. Young men are disproportionately likely to be in crashes because of speeding, and they are less likely to wear seat belts.

It is less clear whether young people are also more vulnerable to the effects of distracted driving—while some studies indicate they are, others have cautioned that these studies do not account for the fact that young people are more likely to use cell phones than are older drivers. The research related to distracted driving suggests that the main danger of both using a cell phone and texting is slower reaction time, which increases stopping distance. The research is also clear that hand-held and hands-free phones present equal dangers.

Military populations have many of the same risk factors as do civilian populations: Young people are more likely to be in crashes than are people over 35, motorcycle riders are at higher risk than car drivers, and those who drink heavily and do not regularly wear seat belts are at greater risk. Detailed studies of military vehicle crashes and deaths have found other risk factors as well, although the effects tend to be smaller: People with only a high school education or less are at greater risk than those with some college, unmarried people are at higher risk than married ones, certain military occupations seem to be at higher risk (although these vary among studies), and those who have deployed have a higher risk than those who have not.

The deployment risk, which is corroborated by multiple studies from Vietnam and the first Gulf War and one study of Operation Enduring Freedom/Operation Iraqi Freedom, is not well understood. It is possible that military personnel who deploy are by nature more prone to take risks than are those who do not, meaning that the deployment itself is not the cause of the increased crash risk. The risk has also been attributed to posttraumatic stress disorder, greater risk-taking, heavier drinking, and the possibility that deployment injuries may make it harder to survive a crash. There is not enough information to say definitively whether some of these deaths might be caused by fatigue or attributable to suicide.

Although evidence comes from only one study of enlisted Marines, the profile of who in the military is at greatest risk of being in a car crash seems quite different from who might be in a motorcycle crash. Those in car crashes tended to be fairly young and single, but with little difference by race, gender, or occupation. Those at highest risk for motorcycle crashes were white men, probably in their mid-20s to early 30s, and clustered in certain occupations. Having entered the Marines with a felony waiver was a key predictor of motorcycle crashes.

Many behaviors that are dangerous behind the wheel of a car are more dangerous on a motorcycle. In the general population, drunk driving and speeding are responsible for greater percentages of crashes on motorcycles than in cars, and close to half of single-vehicle fatal motorcycle crashes are due to drinking. Evidence shows that the ability to handle a motorcycle

begins declining before the rider reaches the legal BAC limit of 0.08. Service Safety Center briefs to PMV TF have indicated that drinking-related motorcycle mishaps appear to be lower in the military sport-bike population than among their civilian counterparts, but this conclusion appears to be anecdotal at this point.

Several other factors also pay a role in motorcycle crashes. Lack of helmet use is associated with about half of fatal crashes—a similar percentage to the association between car crashes and lack of seat belt wearing, but fewer motorcyclists wear helmets than car occupants wear seat belts. Motorcyclists without licenses are more likely to crash than those who have them, and better conspicuity of both rider and bike seems to reduce crashes since riders are more visible to cars.

Not all drivers and motorcyclists are equally likely to take risks. Young men engage more often in risky behaviors than older drivers, but there are other ways to identify more specifically those who are likely to be risky drivers. Within both the military and the general population, those who drink heavily are more likely to drive after drinking than those who are light drinkers. This is a particular problem for the military, which has higher rates of heavy drinking than comparable civilian populations. Those rates have also been rising over the past decade. People who have previously driven drunk or been in crashes are more likely to do so again than people who have not.

Certain personality types have also been found to take more risks. Sensation-seekers thrive on exciting experiences, including speeding. Some researchers have theorized that sensation-seekers speed because they love going fast, not because they don't understand the risk. People who are impulsive take actions without heeding the risk. The military has far higher percentages of people who score high on sensation-seeking and impulsiveness than the general population.

Finally, certain beliefs seem to contribute to the propensity to take risks. There is some limited evidence that people who view certain driving behavior to be less risky are more willing to take those risks. People who are less concerned with social norms regarding safe driving, have higher perceptions of their own driving skill, and worry less about the consequences of unsafe driving tend to take more risks. And in one interesting study, young men who were encouraged to think "macho" thoughts tended to drive more recklessly.

Safety Interventions

Because traffic safety has been a concern since Americans first started driving, many policies have been adopted to encourage safer driving. One method has been media campaigns, which spread a particular message in an attempt to get drivers to change their behavior. Some of these, particularly with respect to drunk driving, have been effective, although it is difficult to separate the effects of specific campaigns from larger changes in people's attitudes. Media campaigns work best when exposure is broad, messages are targeted to the audience, the environment supports the change in behavior, the campaigns are based on theory, and the campaign effectiveness can be analyzed. A carefully planned and executed media campaign includes basing the campaign in communication theory, pretesting the campaign to ensure it works with the targeted audience, and ensuring that the message is strategically placed where it reaches that audience repeatedly.

Many campaigns use an approach called a "fear appeal," which tries to scare drivers into changing their behavior by emphasizing the risks and consequences of such behaviors as drinking and driving or speeding. While fear appeals can be effective, one problem is that they tend to backfire when the intended audience is sensation-seeking. An approach called SENTAR (sensation targeting) is relatively new but has been successfully used with sensation-seeking teenagers in an antidrug campaign.

High-visibility enforcement campaigns combine stepped-up enforcement of laws with publicity about enforcement. This method has been quite successful with both drunk driving campaigns and seat belt campaigns, including some applications on military bases.

Several safety measures have shown promise with respect to drinking and driving. Forty-one states have automatic license suspension, under which drivers who fail or refuse breath analysis testing can have their licenses suspended by the police officers who stopped them. Alcohol treatment in general can reduce drunk driving, with the added benefit of identifying other mental health problems (such as posttraumatic stress disorder or depression) that often accompany alcoholism. Finally, teaching bartenders to refuse service to intoxicated patrons has been shown to be effective in a military context.

With respect to initiatives specifically for motorcyclists, helmet laws—which the military already has in place—have been found to reduce fatalities in states where all riders are required to wear helmets. States with partial helmet laws (meaning that only riders under a certain age are required to wear helmets) have fatality rates similar to states with no laws, since partial helmet laws are difficult to enforce and many riders who are legally required to wear helmets do not.

Two other policies—rider training and various types of graduated licensing—have shown mixed results. Rider training has been extensively studied but without reaching any conclusive assessment. Some research has found that training reduces the frequency of crashes, while other research has found no effect or even an uptick in crashes. It is possible that the research has not been designed well enough to eliminate the possibility that riders who voluntarily take training are more motivated to ride safely than those who take it because it is mandatory, or it is possible that the motorcyclists' attitudes about risk-taking are more important than the training.

Study results were also mixed for graduated licensing. Three forms of graduated licensing all provide for some interval and training between starting to ride and getting a full license, or allow the motorcyclist to ride only certain types of motorcycles. Learners' permits allow riding only under supervision, graduated drivers' license programs have a restricted license between the learner's permit and a full license, and tiered licenses allow motorcyclists to ride only a specific type of bike. One study found that certain types of learners' permits reduced fatalities, but that graduated drivers' licenses and tiered licenses had no effect. Studies of graduated drivers' licenses—which are in widespread use for driving a car but are less common for motorcycles—have found that they can be effective by reducing the amount of motorcycle riding.

Finally, protective clothing for motorcyclists is effective in reducing certain types of injuries in lower-speed mishaps—generally abrasions and other soft tissue injuries—but not fractures and other injuries generally seen as a result of ejection-related blunt-force trauma. Helmets remain the most important piece of protective gear.

Findings

This review shows that the following safety interventions, which are not listed in any particular order, tend to help in the reduction of vehicle crashes.

- Better enforcement of underage drinking laws and continuation of alcohol deglamorization campaigns. DoD regulations exist, but underage drinking seems to be relatively common.
- High-visibility enforcement techniques for sobriety checkpoints.
- High-visibility enforcement techniques for seat belt use.
- Adoption of a lower BAC level (such as 0.05) for motorcyclists, since the evidence shows that motorcyclists' ability to drive safely begins declining at lower BAC levels than those for car drivers.
- Screening—perhaps as part of a medical assessment—and brief intervention with a trained counselor for at-risk drinkers, since they are at higher risk for drinking and driving.
- Media campaigns that are paired with community activities that also emphasize driver safety, such as workshops or fairs and with enforcement of driving regulations, and targeted at the drivers at highest risk (men in their teens and early 20s).
- Requirements that motorcyclists be licensed and own their vehicles. Enforcement of those requirements means that motorcyclists found to be lacking a valid license or to be borrowing vehicles would be punished.

This review did not identify any safety interventions that had been effective specifically in reducing speeding, distracted driving, or fatigued driving.

Suggestions for Further Research

The military may wish to conduct additional targeted research in six areas:

- mapping the locations and researching the causes of crashes among military members
- assessing in more detail and in combination the factors that seem to be particularly problematic for military populations, such as deployment, stress, and sensation-seeking
- determining the effectiveness of various types of motorcycle training on rider skill and risk-taking
- assessing ongoing military-specific safety interventions
- developing a systematic service-wide approach to identify the motorcycle rider population, since it is possible that the risk profile of motorcyclists is different than that of car drivers
- determining whether fatigued and distracted driving are major predictors of vehicle crashes for military members.