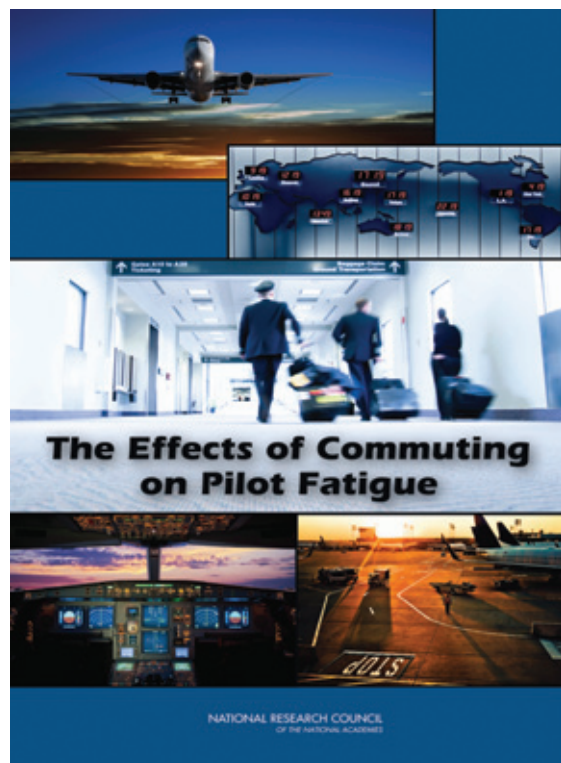


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BOARD ON HUMAN-SYSTEMS INTEGRATION

THE EFFECTS OF COMMUTING ON PILOT FATIGUE



Fatigue has long been recognized as a potential safety risk factor that can contribute to reduced performance for airline pilots. A more recent concern is whether and how pilots' commuting practices may affect their fatigue levels because pilots can live far from their base airports and commute long distances, often by air, before beginning their duty flights.

In summer 2010 Congress directed the Federal Aviation Administration (FAA) to update federal regulations that govern pilot flight and duty time, taking into account recent research on sleep and fatigue. As part of this directive, Congress instructed the FAA to have the National Academy of Sciences conduct a study on the effects of commuting on pilot fatigue. The report from this study, *The Effects of Commuting on Pilot Fatigue*, reviews research and other information related to the prevalence and characteristics of commuting; the science of sleep, fatigue,

and circadian rhythms; airline and regulatory oversight policies; and pilot and airline practices.

PILOTS' COMMUTING PRACTICES: LITTLE IS KNOWN

All pilots commute. Pilot "commuting" refers to the period of time and the activity required for them to travel from home to their base airport and from that airport back home after duty ends. However, there is tremendous variability in the day-to-day practices of individual pi-

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lots. Although many pilots live close to their base airports, other pilots may travel hundreds or, in some cases, thousands of miles, by air, during both day and night, before they begin work. However, given the nature of flight scheduling and duty assignments, pilots do not generally commute on a daily basis; in fact, in some cases, they commute from their homes to their base airports only two or three times a month.

There are no comprehensive data on how frequently or how far pilots commute or the modes of transportation they use. Also lacking is information on the frequency with which pilots change to different base airports and how those changes may affect pilots' choices about commuting. There are also no systematic data about when, how long, or how well pilots sleep before or during their commutes to work.

FATIGUE: A RECOGNIZED RISK FACTOR

Nearly everyone experiences fatigue, but some professions—such as those in aviation, medicine, and the military—demand alert, precise, rapid, and well-informed decision making and communication with little margin for error.

There is extensive evidence on the negative effects of fatigue on the performance of the kind of cognitive tasks required in these professions. Yet fatigue is not an either/or condition in which one is either rested or fatigued. There are degrees of fatigue and degrees to which the performance of complex tasks is impaired by fatigue. Moreover, the effects of fatigue on performance can vary substantially from one person to the next. In addition, many factors affect whether a person becomes fatigued when working including: how many hours a person works within a single day and over time; the time of day at which work occurs; how long a person sleeps on work days and on nonwork days; and the frequency and duration of days off from work.

Fatigue has long been recognized as a potential safety risk factor that can contribute to reduced performance for airline pilots.

COMMUTING, FATIGUE AND SAFETY: AN UNCLEAR LINK

Commuting matters to the extent that it may contribute to fatigue and affect or interfere with a pilot's fitness for duty. Defining what constitutes a fatiguing commute for a pilot is difficult because the length of commute, measured either by distance or time, does not necessarily determine whether a pilot reports for work well rested and fit for duty. A pilot may commute a long distance, for example, but arrive in time to get adequate sleep at a local hotel before duty. Conversely, a pilot could live close to the base airport but sleep poorly for any number of reasons and report to duty fatigued.

The potential safety risk from commuting-induced fatigue is unknown for several reasons. First, because so little is known about specific commuting practices, their actual effects on fatigue cannot be determined. In addition, aircraft design, flight deck procedures, and air traffic control procedures have been developed to catch and correct pilot errors before these errors can degrade safety. Such systems and procedures serve to mitigate the consequences of an individual pilot's fatigue.

IMPLICATIONS

There have been few aviation accidents in which fatigue was cited as a probable cause or contributing factor by the National Transportation Safety Board (NTSB), the agency responsible for investigating U.S. airline accidents. None of the accident investigation reports mentioned commuting as either a probable cause or contributing factor. However, it is important to note that during an accident investigation it can be difficult to determine the extent to which fatigue might have played a role and the extent to which commuting might have contributed to fatigue.

Consequently, although action is warranted to reduce the likelihood that commuting will present a safety risk, there is a lack of evidence to support issuing regulations pertaining to commuting. Additional information is needed to determine if a regulatory approach ultimately would be appropriate. Nonetheless, given that there is some potential for commuting to contribute to fatigue and clear evidence that fatigue can decrease performance, it is important to reduce the likelihood that commuting may contribute to pilot fatigue.

NEXT STEPS: REDUCING THE RISK OF PILOT FATIGUE FROM COMMUTING

Pilots, airlines, and the FAA can and should take steps to lower the likelihood that pilots' commuting practices will pose a safety risk.

- Pilots should plan their commutes and other pre-duty activities so that they will have been awake no more than approximately 16 hours at the time their duty is scheduled to be completed.
- Pilots should try to sleep for at least 6 hours before reporting for duty and should get more than 6 hours of sleep per day whenever possible to prevent cumulative fatigue from chronic sleep restriction.
- Pilots should consider the amount of time they have spent asleep and awake when deciding whether to inform their supervisors that they should not fly due to fatigue.
- Airlines should collect more data on their pilots' commuting practices and educate pilots about the potentially fatiguing effects of commuting.
- Airlines should also consider policies to help pilots plan predictable, non-fatiguing com-

muting and to minimize negative consequences when disrupted commutes lead to fatigue.

- The FAA should fund an independent organization (such as the Flight Safety Foundation) to convene a joint industry, labor, and government working group to assess industry policies and develop best practices regarding pilot commuting, sick leave, attendance, and fatigue.
- The FAA also should commission protocols and materials that train pilots to make decisions about commuting easily and effectively.
- To help develop industry best practices and policies, the FAA should fund research to determine the relationships between pilots' distances from their base airports and risk factors for fatigue.

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In addition to these U.S.-oriented actions, the fatigue risk management systems that are being developed under the auspices of the International Civil Aviation Organization should include a component on understanding the effects of commuting practices on fatigue.

Although commuting-related fatigue has never been cited as a cause or contributing cause to an airline accident, it has the potential to reduce pilots' performance and so should receive serious attention from pilots, airlines, and the FAA. As more data are gathered on pilots' commuting patterns and their possible effects on fatigue, all the parties should reevaluate whether and what additional steps should be taken to help keep the U.S. aviation system one of the safest in the world.

COMMITTEE ON THE EFFECTS OF COMMUTING ON PILOT FATIGUE

Clinton V. Oster, Jr. (*Chair*), School of Public and Environmental Affairs, Indiana University; **Benjamin A. Berman**, Senior Research Associate, Ames Research Center, U.S. National Aeronautics and Space Administration; **J. Lynn Caldwell**, Senior Research Psychologist, Wright-Patterson Air Force Base, OH; **David F. Dinges**, Department of Psychiatry, University of Pennsylvania Perelman School of Medicine; **R. Curtis Graeber**, The Graeber Group, Kirkland, WA; **John K. Lauber** (resigned from the committee in February 2011), Independent Consultant, Vaughn, WA; **David E. Meyer**, Department of Psychology, University of Michigan; **Matthew Rizzo**, Department of Neurology, Mechanical and Industrial Engineering, and the Public Policy Center, University of Iowa; **David J. Schroeder**, Independent Consultant; **J. Frank Yates**, Department of Psychology, University of Michigan

National Research Council Staff: **Toby Warden**, *Study Director*; **Mary Ellen O’Connell**, *Deputy Director*, Board on Human-Systems Integration; **Barbara A. Wanchisen**, *Director*, Board on Human-Systems Integration; **Julie Schuck**, *Senior Program Associate*; **Eric Chen**, *Senior Project Assistant*; **Stephen Godwin**, *Liaison*, Studies and Special Programs, Transportation Research Board

For More Information . . . This brief was prepared by the Board on Human-Systems Integration (BOHSI) based on the report *The Effects of Commuting on Pilot Fatigue* (National Research Council, 2011) that was overseen by BOHSI in collaboration with the National Research Council’s Transportation Research Board. The study was sponsored by the Federal Aviation Administration (FAA). Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect those of FAA. Copies of the report are available from the National Academies Press, 500 Fifth Street, NW, Washington, DC 20001; (800) 624-6242; <http://www.nap.edu> or via the BOHSI web page <http://www.nationalacademies.org/bohsi>.

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