

2011

# Effects of Commuting on Crewmember Fatigue: a Comprehensive Study in Support of Risk Management

Lori J. Brown

Geoff Whitehurst

Follow this and additional works at: [https://corescholar.libraries.wright.edu/isap\\_2011](https://corescholar.libraries.wright.edu/isap_2011)

 Part of the [Other Psychiatry and Psychology Commons](#)

---

## Repository Citation

Brown, L. J., & Whitehurst, G. (2011). Effects of Commuting on Crewmember Fatigue: a Comprehensive Study in Support of Risk Management. *16th International Symposium on Aviation Psychology*, 422-427.  
[https://corescholar.libraries.wright.edu/isap\\_2011/44](https://corescholar.libraries.wright.edu/isap_2011/44)

This Article is brought to you for free and open access by the International Symposium on Aviation Psychology at CORE Scholar. It has been accepted for inclusion in International Symposium on Aviation Psychology - 2011 by an authorized administrator of CORE Scholar. For more information, please contact [corescholar@www.libraries.wright.edu](mailto:corescholar@www.libraries.wright.edu), [library-corescholar@wright.edu](mailto:library-corescholar@wright.edu).

# EFFECTS OF COMMUTING ON CREWMEMBER FATIGUE: A COMPREHENSIVE STUDY IN SUPPORT OF RISK MANAGEMENT

Lori J. Brown

Western Michigan University, College of Aviation  
Kalamazoo, USA

Geoff Whitehurst

Western Michigan University, College of Aviation  
Kalamazoo, USA

The need to reduce accidents and incidents caused by human fatigue in the aviation industry remains on the National Transportation Safety Boards' (NTSB), most wanted list. At many airlines, crewmembers are forced to work to the point of exhaustion because of: poorly scheduled duty time; lengthened duty days; minimum scheduled rest requirements; working the backside of the clock, multiple short-haul legs; and long commutes to work. Although, commuting, in the context of aviation, has yet to be defined, the U.S. Census Bureau defines an 'extreme commute' as a travel 90 minutes or more, each way to work. Americans who endure a daily "extreme commute" of 90 minutes or more each way to work, is a rapidly increasing number which is now in excess of 3.4 million (Alexander, 2009). A recent pilot study by Western Michigan University, the NTSB report following the Colgan Air crash (NTSB, 2010; pp. 47-48) and information from Airtran Airways in a workers' compensation case (WC, 07-00328, 2008) suggest that this could include a significant number of commuters from the aviation industry.

In a NTSB safety study of US major airline accidents involving flight crews from 1978 to 1990, one finding directly addressed the concern about how time since awake may contribute to fatigue. The study stated; "Half the captains for whom data were available had been awake for more than 12 hours prior to their accidents. Half the first officers had been awake for more than 11 hours. Crews comprising captains and first officers whose time since awake was above the median for their crew position made more errors overall and significantly more procedural and tactical decision errors" (NTSB, 1994).

Unfortunately, in some instances aircraft accidents with fatigue causation factors can prove to be fatal for all onboard, as in the crash of Colgan Air flight 3407, which crashed in Buffalo, New York, on February 12, 2009. According to the NTSB report, the probable cause of the accident was "the captain's inappropriate response" to a low speed condition (NTSB, 2010, p.155). The report cited several contributing factors; however commuting was not cited as a contributing factor. A pilot, who commutes, has to travel from the city or country in which they reside before checking in for duty at their base domicile.

According to the NTSB report (2010), "the pilots' performance was likely impaired because of fatigue" (NTSB, 2010, p. 108). This has raised a concern about the potential contribution to fatigue from time spent commuting to a domicile, which has been a safety concern- since both of the pilots flying the Colgan Air flight 3407, were 'commuting' pilots.

For most commuters in America, economic necessity can push them to the extremes of commuting such lengthy distances (Howlett, 2005). Typically, Americans commute via automobile- despite the rising fuel costs. People make these lengthy commutes for many reasons. A few may want a rural lifestyle, some are accommodating a spouse who works closer to home, housing prices, quality of schools, or economic reasons (Pisarski, 2006).

Several studies regarding automobile commutes have shown that long-distance commuters (90 minutes to 3 hours) suffer from psychosomatic disorders at a much higher rate. "Commuters who drive have it especially hard--bad weather, traffic jams and accidents all cause stress" (Schaefer,

2005). "The psychosomatic condition of these people was terrible," says Steffen Haefner, who led the study. The proportion who complained of symptoms such as pain, dizziness, exhaustion, and severe sleep deprivation was twice as high as in a control group of non-commuters. According to the study, (Schaefer, 2005), the mental ills of long distance automotive commuters, include sleep disturbances, fatigue and concentration problems.

Although commuting in the aviation context has not been clearly defined, the FAA recently published a notice of proposed rulemaking (NPRM) which incorporates the suggestion that a "local area" be defined as an area within a two-hour travel period- regardless of mode of transportation. Early studies, such as, "The Journey to Work" (Liepmann, 1944), offer an alternative view.

In the work "The Journey to Work", Liepmann (1944) notes: "It would be naive to assume that the magnitude of the commute to work can be measured by geographical distance alone- without any qualifications being made as to the mode of transportation"

. Crewmembers which transport via an automobile have to pay for fuel and depreciation of the car, whereas the crewmembers traveling on a jumpseat have no such expense. Therefore, we can include the measure of monetary cost. In addition, time spent commuting and time away from a family- is a hidden cost. There is no exact measure available for these costs, but they are important. This may cost the employee personal cost due to loss of personal and family time. Complicating the analysis is the fact that there may be hidden benefits as well as, costs in the commute. There is also comfort and convenience. For example, an aircraft may be inconvenient, no matter how fast it travels- as it may leave at the wrong time, or incur a delay.

A sufficiently attractive wage may compensate for a long commute, which the crewmember sacrifices time away from family and personal days off. This wage differential need not necessarily be a monetary one; it may be in terms of pleasant working conditions, retirement benefits, and the numerous factors, which make up 'job satisfaction (Liepman, 1944).'" The current industry trend has been plagued with salary, benefit, and retirement reductions, which can make it difficult to recruit and retain the best and the brightest new hires.

As noted by the Airline Pilots Association, International: "The economics of the industry and the transient locations of crew bases and locations at airports in costly major cities necessitate the ability for pilots, particularly those with less seniority, to commute from less expensive communities" (ALPA, 2010). Airline mergers, base closures, and reductions can also necessitate the need to commute and often require an unpaid move for the crewmember to retain employment. Some airlines have commuting policies currently in place to assist the crewmembers when traveling to work at their domicile. A review of these policies is beyond of the scope of this paper; however, this is a crucial element surrounding commuting practices.

Regardless of whether the crewmembers' commute to work is personal choice or company imposed, it can be difficult to obtain 8 hours of restorative sleep in a given 24-hour period, with a 14 hour duty period-with or without a lengthy commute.

Although the table below allows minimal time for family and personal obligations, the 30-minute commute would not be realistic for most crewmembers. Most large airports have employee parking lots with shuttle service to the terminal building. Crewmembers would likely need at least 30 minutes to park their car, take the parking lot shuttle, and walk to the check-in area. This does not leave more than a few minutes to drive to work.

**Table 1**

*Time calculated for routine activities following a 14-hr FDP getting less than 8 hr. of sleep.*

<b>Time</b>	<b>Activity</b>
30 min	Wake-up, groom and dress
1.0 hr	Get Children off to school, take care of pets, etc.
30 min	Make and eat breakfast
30 min	Commute to work – drop kids at school/daycare on the way
14.0	Duty Period
30 min	Commute home – pick-up kids on the way home
1.0 hr	Family activities or household responsibilities
1.0 hr	Dinner
1.0 hr	Clean kitchen, check homework assignments, put kids to bed
1.0 hr	Unwind, read, pay bills, etc
30 min	Prepare for bed; brush teeth, hair, wash face, shower, etc.
21 30	Total hr of activities
<b>2 30 Number of hr left for sleep in a 24 hour period</b>	

*Note.* Table is adapted from the Flight Attendant Fatigue, Part V: A Comparative Study of International Flight Attendant Fatigue Regulations and Collective Bargaining Agreements (FAA, 2009)

If we remove, all of the personal time from the table above, we can dramatically reduce activities to allow for 8 hours of sleep (FAA, 2009). This is without eating dinner, and assuming that the crewmember could fall asleep immediately- with no interaction with his or her family. A layover at a hotel would only change the scenario slightly, as the travel time used to ride to the crewmembers home residence would be replaced with a hotel shuttle and check-in period.

Commuting responsibly and arriving fit for duty is the responsibility of the crewmember. Many crewmembers sleep in hotels and commuter apartments the night before checking in for duty at their domicile, allowing them to arrive well rested. This expense is generally the responsibility of the crewmember, which can be very difficult for a crewmember earning a low salary.

We must also consider the duty time may be extended to 16 hours under the current regulations. The FAA is proposing to amend its existing flight, duty, and rest regulations applicable to certificate holders and their flightcrew members. On August 1, 2010, the President signed the Airline Safety and Federal Aviation Administration Extension Act of 2010, P.L. 111-216 (the Act). In section 212 of the Act, Congress directed the FAA to issue regulations no later than August 1, 2011 to “specify limitations on the hours of flight and duty time allowed for pilots to address problems relating to pilot fatigue”. The Act directed the FAA to consider several factors that could affect pilot alertness including time of day, number of takeoffs and landings, crossing multiple time zones, and the effects of commuting (P.L. 111-216, 2010).

Preliminary data from a pilot study conducted by Western Michigan University, funded by a research development award, (Brown, 2011), entitled “Effects of Commuting on Pilot Fatigue: A Comprehensive study in Support of Risk Management” contributes findings from the crewmembers perspective. In the study (Brown, 2011), preliminary findings, show that 42% of the professional pilot participants indicated that they have changed pilot domiciles 3-4 times in their career, and 17% have changed domiciles (unpaid) over six times throughout their career. Additionally, over 55% of the participants reported commuting to their current domicile, with 67% of the commuting crewmembers reporting travel over 4 hours and crossing multiple times zones, to get to their assigned domicile.

There is very little scientific data suggesting how many pilots and flight attendants commute on a whole.

In the WMU pilot study (2011), all of the participants indicated they have experienced unforeseen delays during their commute to work, which increased their travel time. Delays caused by weather, diversions, mechanical problems, flight delays, flight cancellations, and difficulty obtaining a jumpseat or standby seat were reported. All of the participants indicated that a mandatory move to a new domicile would cause hardships such as:

- Economic pressures, family stability, possible safety hazards
- Loss of relationships and decreased quality of life
- Added travel expenses not covered by airline, difficulty selling home
- Increased time away from family, increased risk of not being able to commute to work, spouse may lose their job
- Higher expenses, family turmoil, possible safety issues, general reduction in quality of life
- Move children out of schools

None of the participants in the WMU preliminary study indicated that the time spent commuting to their base domicile, would affect their ability to perform their duties safely.

The factors, which participants indicated, most affect their ability to perform their duties safely (Brown, 2011 ) include: inadequate crew rest; length of duty day; operations during the ‘backside of the clock’; trip pairing check-in times; construction of schedules; quality of rest prior to and during the trip; cumulative sleep debt; operations in various time zones; and lack of time for sustenance and hydration.

Congress has directed the FAA to contract the National Academy of Sciences (NAS) to conduct a study of the effects of pilot commuting on fatigue (NAS report 13097, 2011). The NAS study will review available information on: the prevalence of pilots commuting; characteristics of commuting by pilots; and the impact of commuting on pilot fatigue, sleep, and circadian rhythms; commuting policies of commercial air carriers (including passenger and all cargo air carriers), including pilot check-in requirements and sick leave and fatigue policies.

The NAS study will also:

- Define “commuting” in the context of pilot alertness and fatigue;
- Discuss the relationship between the available science on alertness, fatigue, sleep and circadian rhythms, cognitive and physiological performance, and safety;
- Discuss the policy, economic, and regulatory issues that affect pilot commuting;
- Discuss the commuting policies of commercial air carriers and to the extent possible, identify practices that are supported by the available research; and
- Outline potential next steps, including to the extent possible, recommendations for regulatory or administrative actions, or further research, by the FAA.

This has raised a salient point, which has caused industry and media uproar, which is the suggestion of regulating or administrative actions surrounding commuting. This controversial discussion has raised the questions of “how can the FAA regulate a crewmembers personal time?” The Federal Aviation regulations (FARs’) currently regulate drug and alcohol use prior to duty. Although, commuting, is generally a conducted during ‘the crewmembers time off, by their individual choice, and there is no compensation for this time. It is important to note that commuting to a pilot domicile, even while traveling on a different airline, has been considered “work related” in a recent workers compensation case. One example of this was the Airtran Airways case, in which a pilot commuting to work on another carrier was killed during the commute.

As stated in the Workers Compensation, case (2009-SC-000429-WC and No. 2008-CA-001223-WC, 07-00328):

Clarence Fortney was a pilot employed by Airtran Airways, Inc. and a commuting pilot riding as a passenger on Comair Flight 5191, when he was killed when the plane crashed on takeoff in Lexington, Kentucky on August 27, 2006. Fortney resided in Lexington to be near his family. Airtran employed about 1450 pilots who resided throughout the United States in August 2006 and was required to know and follow the income tax laws of numerous states and localities' because 70% of the pilots resided outside the state of Georgia. Airtran incurred additional expense due to participating in a nationwide Transportation Security Administration database that was updated every 24 hours and due to verifying the identity of pilots seeking to fly free or at a reduced fare on Airtran flights.

Fortney indicated when applying for employment with Airtran that he would be willing to relocate and that there were no restrictions on where he would locate, but Airtran never dictated where he or other pilots must reside. Consistent with industry practice, Airtran provided employees and their families with free or reduced-fare travel on Airtran flights and participated in reciprocal conveyance agreements with other airlines, which also provided free or reduced-fare travel on aircraft operated by those airlines. Nothing required Airtran pilots to fly when commuting to and from work, but those who lived outside Georgia generally used the free or reduced fare arrangements in order to be able to afford to commute. Pilots performed no work while commuting by air; were not paid until they checked in at the Atlanta hub for an assigned flight; and were not reimbursed for commuting expenses. Klaus Goersch, Vice-President of Flight Operations for Airtran, testified that any Airtran employee could choose where to live.

Airtran did not operate in Kentucky in August 2006, but had a reciprocal arrangement with Comair, which permitted pilots to travel free or at a reduced fare in a cockpit jumpseat on a "Space Available' basis".

Fortney was commuting to Atlanta under Airtran's arrangement with Comair when he was killed. Evidence that the arrangement made it possible to do so financially while working for Airtran, which enabled Fortney to live where he chose, compelled legal conclusions that it was an inducement to Fortney to accept the employment, and that it benefited Airtran by accomplishing its purpose. The report concluded that his death was work-related because he was making such a trip when it occurred.

## **Summary**

Although further study is required, the WMU pilot study (2011) suggests that long range commuting is more the "norm" than the exception for today's aviation industry, and that the current 14-16 hour flight duty periods, make it difficult for crewmembers to achieve 8 hours of restorative sleep in a 24 hour period-regardless of how one may travel to work. In addition, the time spent commuting to work, regardless of the mode of transportation, comes at a price. It is important to understand that many crewmembers commute responsibly, and have so for decades. Careful thought needs to be put into schedules, fatigue risk management plans, the use of models, and commuting policies- so that we can give our next generation of pilots and flight attendants the tools necessary to operate safely, and enable business productivity.

## **Acknowledgements**

The Western Michigan University, pilot study is funded by Western Michigan Universities' Research Development Award, and approved under HSIRB 09-11-20 protocol. A special thanks to Captain John Gadzinski, Captain Steve Sevier, and all of the professionals who participated in the industry feedback group. Full study results will be published when data collection is completed.

## References

- Avers, K., King, J., Nesthes, T. , Thomas, S. , & Banks, J. (2009). Flight Attendant Fatigue, Part V: A Comparative Study of International Flight Attendant Fatigue Regulations and Collective Bargaining Agreements. (Final Report DOT/FAA/AM-09/22 DOT). Washington, DC: Federal Aviation Administration Office of Aerospace Medicine, (2009).
- Alexander, C. H. (2009).The American Community Survey Issues and Initial Test Results. United States Census Bureau. Retrieved from <http://factfinder.census.gov/home>.
- Howlett D, Overberg P., (2005). Extreme Commuting Illustrates Tradeoffs and Opportunity Cost. USA Today, 2005.
- Liepmann, Kate K., *Journey to Work*, Oxford University Press, New York: 1944, p. 35.
- National Research Council (2011). Issues in Commuting and Pilot Fatigue: Interim Report. Committee on Commuting and Pilot Fatigue, Board on Human-Systems Integration, Division of Behavioural and Social Sciences and Education. Washington, DC: The National Academies Press. Retrieved from <http://www.nap.edu/catalog/13097.html>.
- National Transportation Safety Board. (1994). *A Review of Flightcrew-Involved, Major Accidents of U.S. Air Carriers, 1978 Through 1990*. Safety Study NTSB/SS-94/01. Retrieved from <http://libraryonline.erau.edu/online-full-text/nstb/safety-studies/5594-01.pdf>.
- National Transportation Safety Board. (2010). *Loss of Control on Approach, Colgan Air, Inc. Operating as Continental Connection Flight 3407, Bombardier DHC-8-400, N200WQ, Clarence Center, New York, February 12, 2009*. Accident Report NTSB/AAR-10/01, PB2010-910401. Washington, DC: National Transportation Safety Board.
- Pisarski, A.E. (2006). Commuting in America III: The Third National Report on Commuting Patterns and Trends. Transit Cooperative Research Program (TCRP) Report 110/NCHRP Report 550, published by the Transportation Research Board, Washington.
- Public Law 111-216 (2010.) Airline Safety and Federal Aviation Administration Extension Act of 2010. Retrieved from <http://www.gpo.gov/fdsys/pkg/PLAW-111publ216/pdf/PLAW-111publ216.pdf>.
- Schaefer, A., (2005). Workers are traveling ever longer to attain the job or home life they want, but the daily stress may outweigh the gains, Scientific American Mind (October 2005).
- United States Department of Transportation. (2010). Federal Aviation Administration 14 CFR, Parts 117 and 121 Flightcrew Member Duty and Rest Requirements: Proposed Rule Federal Register/ Vol.75. No. 177/ Tuesday, September 14, 2010/Proposed Rules. (NPRM).