

# COMMERCIAL TRUCK DRIVERS' HEALTH: IMPLICATIONS FOR DRIVING PERFORMANCE AND FATIGUE

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*Driving Transportation with Technology*

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# Fatigue as a Contributing Factor to Incidents

- **100-Car Study** (Dingus et al., 2006)
  - 20% of 82 crashes
  - 16% of 761 near-crashes
- **Local/Short-haul Study** (Hanowski et al., 2000)
  - 21% of 249 critical incidents

# Drowsy Driver Warning System FOT

- ~ 2.3 million miles of driving data
- ~ 12 terabytes of data
- 46 Trucks; 103 Drivers
- 16 months
- Great potential exists to reanalyze the data to explore various issues

# Fatigue in DDWS FOT

Contributing Factor:	Crashes (n = 14)		Crash: Tire Strike (n = 15)		Near-Crashes (n = 120)		Crash-Relevant Conflicts (n = 1068)		Total Safety Critical Events (n = 1217)	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Drowsy, sleepy, asleep, fatigued, other reduced alertness	3	21.4%	0	0.0%	19	19.4%	109	13.8%	131	14.3%

# Measures of Fatigue

## 1. Observer Rating of Drowsiness

(ORD): Overall appearance/behavior of driver in the 60 seconds before a trigger (0-100 scale)

**$\geq 40$  indicate fatigue** (Hanowski, Wierwille, Garness, & Dingus, 2000)

## 2. Estimated Manual PERCLOS (EMP): % of time eyes are closed in the 3 minutes, 10 seconds before a trigger (0 – 100% scale)

**$\geq 12\%$  indicate fatigue** (Wierwille, Hanowski, Olson et al., 2003)

# ORD Below/Above Threshold

ORD	Total Safety Critical Events (n=952)	Baseline Epochs (n=1736)
0-39	73.6%	59.1%
≥ 40	26.4%	40.9%
Total	100.0%	100.0%

ORD	Crash/Near Crash (n=112)	Baseline Epochs (n=1736)
0-39	77.7%	59.1%
≥ 40	22.3%	40.9%
Total	100.0%	100.0%



# PERCLOS Below/Above Threshold

PERCLOS	Total Safety Critical Events (n=807)	Baseline Epochs (n=1530)
0 - 3.9	57.5%	43.7%
4 - 7.9	21.5%	27.8%
8 - 11.9	11.0%	12.7%
≥ 12	9.9%	15.8%
Total	100.0%	100.0%

PERCLOS	Crash/Near Crash (n=97)	Baseline Epochs (n=1530)
0 - 3.9	60.8%	43.7%
4 - 7.9	15.5%	27.8%
8 - 11.9	7.2%	12.7%
≥ 12	16.5%	15.8%
Total	100.0%	100.0%



# Health & Fatigue

- Being overweight/obese is linked with multiple sleep problems (e.g., Vgontzas, Bixler, & George, 2006)
  - Excessive Daytime Sleepiness
  - Poor Nighttime Sleep
- Commercial truck drivers have a 28.1% prevalence of Sleep Apnea (FMCSA, 2002)
- Research indicates truck drivers live 10-15 years less than average North American males (Roemers Report, 2008)
  - There is skepticism about this recent finding – more research is needed to verify

# BMI Classifications of 103 Drivers

*Body Mass Index* (BMI) is a measure of body fat based on an individual's height and weight

- **Normal** (18.5 – 24.9 BMI):  
**19 drivers (18.4%)**
- **Overweight** (25 – 29.9 BMI):  
**29 drivers (28.2%)**
- **Obese** ( $\geq 30$  BMI):  
**55 drivers (53.4%)**

# Fatigue: ORD Scores Per BMI Classification

ORD	Normal Weight (n=369)	Overweight (n=625)	Obese (n=1579)
0-39.9	93.8%	58.4%	64.4%
$\geq 40$	6.2%	41.6%	35.6%
Total	100%	100%	100%

- Overweight/obese drivers were at **8.95** times (CI = 5.82 – 13.77) greater relative risk than normal BMI individuals for being rated over the ORD threshold for fatigue (i.e.,  $\text{ORD} \geq 40$ )

# Fatigue: EMP Scores Per BMI Classification

EMP	Normal Weight (n=431)	Overweight (n=552)	Obese (n=1355)
0 - 3.9	54.5%	49.5%	46.1%
4 - 7.9	26.7%	28.4%	24.2%
8 - 11.9	9.5%	11.1%	13.4%
$\geq 12$	9.3%	11.1%	16.2%
Total	100%	100%	100%

- Overweight/obese drivers were at **1.69** times (CI = 1.19 – 2.40) greater relative risk than normal BMI individuals for being rated as over the EMP threshold for fatigue (i.e., EMP  $\geq 12\%$ )

# Safety Critical Events: Frequency Per BMI Classification

BMI Classification	Total Safety Critical Events (n=1217)	Baseline Epochs (n=2053)
Healthy	17.8%	17.4%
Overweight	18.7%	26.8%
Obese	63.4%	55.8%
Total	100%	100%

- There was **no greater relative risk** when comparing normal weight vs. overweight/obese individuals (OR = 1.03; CI = 0.86 – 1.24)
- Obese individuals were at **1.37** times greater risk (CI = 1.19 – 1.59) than non-obese individuals

# Safety-Belt Use by BMI Classification

Seatbelt	Normal Weight (n=573)	Overweight (n=778)	Obese (n=1914)
Yes	80.8%	57.7%	56.2%
No	19.2%	42.3%	43.8%
Total	100%	100%	100%

- Overweight/obese individuals were at **3.23** times greater relative risk (CI = 2.59 – 4.03) than normal weight individuals



# Focus Groups

- “Lazy” mindset
- Lack of healthy food alternatives
- Irregular eating schedules
- Irregular schedules overall – no exercise routine



# Focus Groups: What Will Help?

- Educate & motivate drivers
- Intervene on truck stops to change menus or cooking preparation

# Summary

- Fatigue is a contributing factor in 16-26% of incidents
- Overweight/obese individuals are at greater risk for driving while fatigued
- Overweight/obesity is a serious issue in commercial driving
- Outreach is needed

THANK YOU!



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