Safety & Security Research

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NCIT Activities

- Policy
- Safety and Security
- Workforce & Leadership Development
- Economic Impact and Development
- Performance Modeling and Assessment
- Terminal Operation
- Transportation System Design
Safety

Employee vs Passenger

Human Factors
  - Human Fatigue
  - Behavioral Approaches
  - Technology

Grade Crossing and Trespasser Accidents

Organizational Culture
  - Safety Culture

Technology
The Approach

- Using the FAST Batch model
  - Submitted the work histories to the batch program
  - Matched the time of incident to the work schedule and the individual
  - Examined the effectiveness scores associated with the incident
  - Compared the probability of the occurrence of HF Non-HF incident and the probability of working at that effectiveness level for the company
  - Examined data that was not an accident sample
Third Shift Dispatcher
12h night shift – 6 hr sleep
Swing Shift
RR1 Percentage of HF vs Non-HF by Effectiveness Levels

- 95-100
- 90-95
- 85-90
- 80-85
- 75-80
- 70-75
- 65-70
- 60-65
- 55-60
- 50-55

HF% vs NonHF%
RR1 Probability of Accidents and Exposure Levels

The probability of actually having a HF caused accident at various Effectiveness levels is very low as is the probability of working at those levels.

Very little going on at lower levels.
Risk Ratio of HF Accidents at Effectiveness Levels

Divide 2.6% by 1.1% and obtain the 2.4 to 1.0 odds ratio.

Greater risk of HF caused accidents at lower levels of effectiveness. In this case NOT a great difference at the 60-70 level.
Percentage of HF vs Non HF by Effectiveness Levels

Note: Zero accidents below 70!!!!!! Why is this????
Actigraph Results:
Ranked Hours of Sleep by Participant
Actigraph/Sleep Watch
Typical Actigraph Output
Compared to Normals

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<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
<th>DB Mean</th>
<th>Z-Score</th>
<th>Percentile</th>
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<td>Duration</td>
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<td>Activity SD</td>
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Results of Self Report Measures

Average Hours of Sleep in Last 3 Days

Average Hours of Sleep in Last 3 Days
Comparison to Railroad samples

Epworth Clinical Cutoffs

- Garrett
- Galesburg
- Denver
- St. Paul
- Des Moines
- San Antonio
Actigraph Results:
Ranked Hours of Sleep by Participant
Individualized Feedback

- Participants receive results of actigraph study plus
- List of recommendations for fatigue countermeasures
- Additional educational material on sleep hygiene performance and fatigue
Effects of GC and Trespasser Incidents

✓ 64.3% reported involvement in a grade crossing or trespasser incident and an average of 3.4 incidents per respondent.

✓ A total of 61% of those involved in an event reported that a person had been killed.

✓ 72% of respondents indicated that the person killed was not known to them.

✓ Significant negative relationship between number of incidents and sleep problems.

✓ Significantly more sleep related difficulties in persons who scored high on the PCL-C.
Career Choice & Retention

- Persons most interested in a career in the transportation are:
  - Conventional interest style (RIASEC),
  - have an interest in employer programs, such as employee assistance and wellness programs, where there was possibility of career advancement and opportunities for leadership, travel, a secure and stable career, and knowledge of management and support.
- The predictive model discussed accounted for approximately 22% of the variance, $R^2 = .222$. 
Future Research

- On board safety monitoring technology
- Operational activities
- Identification of high risk situations
- Improve safety technology
- Improve safety culture
- Identify additional ways to change behavior
- Improve selection and retention of
Security & Disaster Issues

- Mr. Arne Hook, Director of Development, LSU, Homeland Security Center