Disclaimer

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Local and global perspective on how to move the needle on worker fatigue

Stephen Popkin, PhD
Donald Fisher, PhD
May 19, 2021
The current environment: Radically complex

- **COVID-19 Cases**: 100,032,461
  - **Death Toll**: 2,149,818
  - **Top 3 Countries by Death Toll**:
    - US: 423,010
    - Brazil: 273,544
    - India: 133,467

- **Sleep Duration**

- **Economy Terms**: Temps, Independent Workers, Gig Jobs, Millennials, Remote Work, E-commerce, Business

- **Income Level and Sleep Duration**
  - Income Levels: 1, 2, 3, 4, 5, 6, 7
  - Sleep Duration: 4, 4.5, 5, 5.5, 6, 6.5, 7 hours
Problems are worldwide

High / Middle / Low Income Countries
“Fatigue is a biological drive for recuperative rest”

Operator reaches point of FATIGUE

Factors contributing to fatigue
- Time of Day
- Time Awake
- Task-related Factors

Operator rests

Impaired Performance

Operator continues work

Safe
<table>
<thead>
<tr>
<th>Abilities</th>
<th>Problem Solving</th>
<th>Complex Problem Solving</th>
<th>Judgment &amp; Decision Making</th>
<th>Critical Thinking</th>
<th>Operation Monitoring</th>
<th>Operation &amp; Control</th>
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<tbody>
<tr>
<td>Fatigue Tolerant</td>
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<td>Web-Based Skills &amp; Abilities</td>
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Reference: Occupational Information Network (O*NET)
Still not getting it right
So what to do?

• Belief
  • Incredible breakthroughs in our understanding of fatigue and fatigue management.
  • All too often our systems fail to deliver those breakthroughs to operators.

• Hope for international reach
  • Promote simple, scalable solutions.
  • Pioneer an innovation and research pathway that produces transformative, globally scalable solutions both tactically in the short run and strategically in the long run.
“Developing an ‘optimal’ work schedule to provide adequate opportunities for sleep requires consideration of many factors such as hours of work, rest breaks between and within-shifts, shift sequences, work demands, workforce demographics and culture. As such, scheduling is unique to each industry, occupation and workplace.”

Wong, Popkin and Folkard (2019)
Europe, North America, Australia, Asia
Variations in regulatory environment: Types of rules

<table>
<thead>
<tr>
<th>Types of rules</th>
<th>Focus of regulation</th>
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</thead>
<tbody>
<tr>
<td><strong>Prescriptive rules regarding FEATURES</strong> (e.g., maximum number of hours per day is 10)</td>
<td><strong>SAFETY</strong> (e.g., accident risks)</td>
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<td><strong>RESULT related rules</strong> (e.g., the obligatory fatigue management systems helps to assess the consequences of long shifts)</td>
<td><strong>WELL BEING &amp; SOCIAL ISSUES</strong> (e.g., Sunday work, labour market related aims)</td>
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<td><strong>Rules regarding the PROCESS</strong> (e.g., 12 hours are only allowed if a consensus between the company and the workers representatives could be reached; proper planning of hours to be controlled by an authority)</td>
<td><strong>HEALTH</strong> (e.g., avoiding long term problems)</td>
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<td><strong>INCOME / COSTS</strong> (e.g., overtime payment)</td>
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(Gartner, Rosa, Roach, Kubo, & Takahashi, 2019)
Variations in regulatory environment: Focus of regulation

**Types of rules**

- **Prescriptive rules regarding FEATURES** (e.g., maximum number of hours per day is 10)
- **RESULT related rules** (e.g., the obligatory fatigue management systems helps to asses the consequences of long shifts)
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**Focus of regulation**

- **SAFETY** (e.g., accident risks)
- **WELL BEING & SOCIAL ISSUES** (e.g., Sunday work, labour market related aims)
- **HEALTH** (e.g., avoiding long term problems)
- **INCOME / COSTS** (e.g., overtime payment)

(Gartner, Rosa, Roach, Kubo, & Takahashi, 2019)
5-3 5-4 5-3 Ten Hour Rotating Shift Schedule
# Focus: Income and costs

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Players in the regulatory chain

- **EU** — council, commission, parliament, supreme courts...
  - Influences positions & personnel decisions...
  - Sets EU-frames, fines... supports

- **National Level**: parties, government, supervisory structures, courts, ...
  - Support in elections, support or opposition regarding specific topics
  - Sets national/sectoral frames, fines... Supports/reacts upon specific wishes

- **National & sector level**: unions, employers organisations, ...
  - Support in elections, support or opposition regarding specific topics
  - Sets sectoral frames, ... Supports/reacts upon specific wishes

- **Company/organisational level**, employee representatives, managers
  - Elects / works for or against somebody
  - Sets frames, ... Supports/reacts upon specific wishes

- **Individual & organisational unit**
Regulatory chain as a funnel

- National
- State
- Industry
Three dimensional matrix

- **Focus Health**
- **Focus: Safety**

- **Rules: Prescriptive**
  - Federal
  - State

- **Rules: Results**
  - Regulatory Chain
Australian Regulatory Environment

- **Labor relations**
  - National

- **Workplace Health & Safety**
  - State

- **Agency-based jurisdictions**
  - Industry Regulator

  - Truck and Bus Drivers: SH, BFM, AFM
  - Train: Prescriptive, FRMS
  - Airline pilots: Prescriptive, FRMS
Australia: Truck Drivers (SH)

- Maximum work limits.
  - All drivers can work for a maximum of 5.25 h in any 5.5-h period, 7.5 h in any 8-h period, 10 h in any 11-h period, and 12 h in any 24-h period.

- Cumulative work limits.
  - Solo truck drivers can work for a maximum of 72 h in any 7-d period and 144 h in any 14-d period.
  - Two-up drivers can work for a maximum of 60 h in any 7-d period and 120 h in any 14-d period.

- Minimum rest limits.
  - All drivers must have a minimum of 15 continuous minutes of rest in any 5.5-h period, 30 continuous minutes of rest in any 8-h period, and 60 min of rest in blocks of 15 continuous minutes in any 11-h period. In any 24-h period,
  - Solo drivers must have a minimum of 7 continuous hours of stationary rest, and two-up drivers must have a minimum of 5 continuous hours of rest either stationary or in an approved sleeper berth in a moving vehicle.

- Cumulative rest limits.
  - Solo truck drivers must have a minimum of 24 continuous hours of stationary rest in any 7-d period, and a minimum of 2 night rest breaks and 2 night rest breaks on consecutive days in any 14-d period.
  - Two-up drivers must have a minimum of 10 continuous hours of stationary rest in any 52-h period, 24 continuous hours of stationary rest and 24 h of stationary rest in blocks of 7 continuous hours in any 7-d period, and a minimum of 2 night rest breaks and 2 night rest breaks on consecutive days in any 14-d period.
NIOSH: Strategies – behavior change

"An utterly fascinating read that will challenge some of your core assumptions about how social change happens." — Adam Grant, author of *Originals*

*Change*
*How to Make Big Things Happen*

Damon Centola
Director, Network Dynamics Group, Annenberg School for Communication
Behavior change: Sleep

- Workers
- Workers and management
Behavior change: Sleep - workers

• Social networks on the periphery
  • Facebook users in a given locale

• Influencers in the networks
  • “Mom, Dad, I am worried when you drive while distracted” vs “Mom, Dad, texting while driving is dangerous”
Behavior change: Sleep – labor and management

• Egalitarian networks

• Tipping point
NIOSH, social networks and fatigue management

Influencers

Egalitarian Networks

Tipping Point
Dreams: Simple, scalable solutions