Safety Incentives, Safety Climate, and Total Worker Health® in the Dynamic Environment of Commercial Construction

Jack Dennerlein, PhD

@JackDennerlein  @HSPHCenterWork  #OHP16SI
Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance.

- Systems
- Design
- Two outcomes
  - Human Well-Being
  - System Performance

Three domains of modern ergonomics

International Ergonomics Association, 2000
Take home message(s)

• It’s tough being a construction worker.
• Emphasis in the industry to improve safety culture
• Challenges exist to improve safety culture and to measure it.
• Innovation (and adaptation) can overcome these challenges.
In 2010, 34% of non-fatal injuries with days away from work were associated with strains and sprains, three-quarters of which were related to overexertion.

CPWR (2013) Chartbook
Most workers work in pain

- 70% of workers reported musculoskeletal pain in the 3 months prior to their interview,
  - 54% pain 2 or more anatomical sites
  - 65% pain interfered with their work from “a little bit” to “quite a lot.”

- “have no choice but to work through pain and discomfort [as the worker] needs to do anything to get the job done.”

- “the job beats you up and there’s not much you can do to avoid it.”


www.centerforworkhealth.sph.harvard.edu
Direct measures of physical activity of 53 Construction workers for seven days

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plumber</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Carpenter</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>Demolition</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Electrician</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Operator</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Foreman</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Pipe Fitter</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Iron Worker</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Laborer</td>
<td>19</td>
<td>42</td>
</tr>
<tr>
<td>Pile Driver</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Welder</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Male</td>
<td>55</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>40</td>
<td>11</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>29</td>
<td>4</td>
</tr>
</tbody>
</table>

- “it’s not heavy cardio, but at least [I am] moving around.”
- “moving all the time and not sitting behind a desk.”

# LTPA and OPA in construction workers

<table>
<thead>
<tr>
<th>Minutes</th>
<th>Self Report</th>
<th>Measured</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>LTPA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>489</td>
<td>612</td>
</tr>
<tr>
<td>Vigorous</td>
<td>244</td>
<td>455</td>
</tr>
</tbody>
</table>

| OPA     |      |    |      |    |
|---------|      |    |      |    |
| Moderate| 1032 | 935| 247* | 128|
| Vigorous|  536 | 752|   2  |  6 |

- * Moderate OPA was negatively correlated with Fatigue
- LTPA, Self-report of moderate minutes is 3.8 times larger
- OPA, Self-report of moderate minutes is 4.2 times larger

40 hours = 2400 minutes

Commercial construction workers have high prevalence
• smoking (39%)
• heavy alcohol use (17%)
• mental distress (16%)

Lee et al JOEM 2007;49(1):75-81
Mental Health in Construction workers

• Surveyed 172 construction workers on 4 work sites
• 16% had mental distress
  • 2x the prevalence in general male population
• Associated with injury & Pain

<table>
<thead>
<tr>
<th>Substantial Mental Distress Models</th>
<th>OR [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 or more injuries</td>
<td>4.8 [1.4-17.2]</td>
</tr>
<tr>
<td>Any Low Back Pain</td>
<td>2.6 [1.0 – 6.6]</td>
</tr>
<tr>
<td>Pain 2 or more body parts</td>
<td>3.1 [1.2 – 7.9]</td>
</tr>
</tbody>
</table>

Our Center’s Total Worker Health® conceptual framework

“Workers respond to the work environment”

Enterprise Characteristics

Workplace Policies, Programs, & Practices
• Degree of Integration
• Indicators of Integration

Worker / Work Force Characteristics

Conditions of work
• Physical Environment
• Organization of Work
• Psychosocial Factors
• Job Tasks & Demands

Worker Proximal Outcomes
• Health & Safety Behaviors
• Engagement in Programs
• Beliefs
• Knowledge
• Skills

Worker Outcomes
• Injury
• Illness
• Wellbeing

Enterprise Outcomes
• Productivity & Quality
• Turnover & Absence
• Health Care Costs

Sorensen et al Under review

www.centerforworkhealth.sph.harvard.edu
How do construction workers respond?

• Evaluate the response of construction workers to the work environment.
  • Independent variables:
    Physical demand and ergonomics practices
  • Dependent variables: MSK Pain, Smoking, and Diet

Work Environment
  • Physical Demand
  • Ergonomic practices

Worker Outcomes
  • Pain

Worker Proximal Outcomes
  (Health Behaviors)
  • Diet
  • Tobacco Use

Enterprise (worker) Outcomes
  • Work Limitations

Dennerlein, PREMUS 2016 Toronto, Canada
The Job Demands-Resources model: state of the art

Arnold B. Bakker
Erasmus University Rotterdam, Institute of Psychology, Department of Work and Organizational Psychology, Rotterdam, The Netherlands, and
Evangelia Demerouti
Utrecht University, Department of Social and Organizational Psychology, Utrecht, The Netherlands

Bakker and Demerouti J. Managerial Psychology 2007: 22(3): 309-328
### Pearson Correlations Coefficients

<table>
<thead>
<tr>
<th>658 baseline surveys from 10 construction sites</th>
<th>Pain interferes with work</th>
<th>WLQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain interferes with work</td>
<td>1</td>
<td>0.41</td>
</tr>
<tr>
<td>Weekly Severe Pain</td>
<td>0.40</td>
<td>0.34</td>
</tr>
<tr>
<td>Current Smoker</td>
<td>0.08</td>
<td>0.04</td>
</tr>
<tr>
<td>Unhealthy Diet</td>
<td>0.12</td>
<td>0.08</td>
</tr>
<tr>
<td>Leisure Time Physical Activity</td>
<td>0.10</td>
<td>0.04</td>
</tr>
<tr>
<td>Ergonomics</td>
<td>0.09</td>
<td>0.07</td>
</tr>
<tr>
<td>Physical Demands</td>
<td>0.09</td>
<td>0.17</td>
</tr>
</tbody>
</table>

WLQ = Short version of the Work Limitations Questionnaire

Dennerlein, PREMUS 2016 Toronto, Canada

www.centerforworkhealth.sph.harvard.edu
## Associations with physical demands

<table>
<thead>
<tr>
<th>658 baseline surveys from 10 construction sites</th>
<th>Physically Demanding Work (binary)</th>
<th>Ergonomic Environment (continuous)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Binary Outcomes:</strong></td>
<td><strong>OR (95%CI)</strong></td>
<td><strong>OR (95%CI)</strong></td>
</tr>
<tr>
<td><strong>12 Month Pain</strong></td>
<td>1.74 (0.82, 1.07)</td>
<td>0.82 (0.62, 1.07)</td>
</tr>
<tr>
<td><strong>3 Month Pain</strong></td>
<td>1.32 (0.74, 1.01)</td>
<td>0.74 (0.54, 1.01)</td>
</tr>
<tr>
<td><strong>3 Month Multiple Pain</strong></td>
<td>2.03 (0.89, 1.14)</td>
<td>0.89 (0.69, 1.14)</td>
</tr>
<tr>
<td><strong>3 Month Pain Interference</strong></td>
<td>1.40 (0.77, 1.04)</td>
<td>0.77 (0.58, 1.04)</td>
</tr>
<tr>
<td><strong>Weekly Severe Pain</strong></td>
<td>1.74 (0.80, 1.03)</td>
<td>0.80 (0.62, 1.03)</td>
</tr>
<tr>
<td><strong>Current Smoker</strong></td>
<td>1.46 (1.50, 1.98)</td>
<td>1.50 (1.15, 1.98)</td>
</tr>
<tr>
<td><strong>Continuous Outcomes:</strong></td>
<td><strong>β (95%CI)</strong></td>
<td><strong>β (95%CI)</strong></td>
</tr>
<tr>
<td><strong>Work Limitations</strong></td>
<td>0.25 (-0.07, 0.16)</td>
<td>-0.07 (-0.16, 0.01)</td>
</tr>
<tr>
<td><strong>Daily Physical Activity</strong></td>
<td>12.66 (-4.36, 10.37)</td>
<td>4.36 (-1.64, 10.37)</td>
</tr>
<tr>
<td><strong>Unhealthy Diet</strong></td>
<td>-0.06 (-0.03, 0.14)</td>
<td>-0.03 (-0.20, 0.14)</td>
</tr>
</tbody>
</table>

Adjusted for possible confounding variables include: age, gender, race, title, and trade

Dennerlein, PREMUS 2016 Toronto, Canada
Within the context of work, there are many interactions between work and health outcomes. Only beginning to understand how the conditions of work effect these workers within this framework.
Take home message(s)

- It’s tough being a construction worker.
- Emphasis in the industry to improve safety culture
- Challenges exist to improve safety culture and to measure it.
- Innovation (and adaptation) can overcome these challenges.
Meijer Core Values

As the world around us evolves and changes, one thing remains constant at Meijer – our core values. They inform everything we do, from how we’ve developed our culture to how we approach everyday challenges.

1. Customers: Fred Meijer always said, “Customers don't need us, we need them.” At Meijer, we focus on our customers and thrive by meeting their needs and exceeding their expectations.

2. Competition: Retail is a fast-paced business that demands continuous improvement. Meijer is committed to keeping our competitive spirit strong and staying nimble and flexible to win in the marketplace.

3. Family: Meijer is a family business. We believe in treating each other with dignity and respect. We are committed to strengthening the communities we serve.

4. Freshness: Meijer is known for freshness. A focus on fresh food, fresh thinking and innovation makes us better at serving our customers.

5. Safety & health: Meijer provides a safe and healthy environment for our team members. We create a safe shopping experience for our customers and offer products and services to help our customers lead healthier lives.
Safety Culture in Construction

Men at lunch, RCA Building NYC 29
September 1932
2013 – The Center for Construction Research and Training (CPWR) held a workshop to define safety culture and climate within the industry.

Huge push in the industry for improving safety culture – needed to define it.
(Organizational) Safety Culture: Deeply held but often unspoken safety-related beliefs, attitudes, and values that interact with an organization’s systems, practices, people, and leadership to establish norms about how things are done in the organization. Safety culture is a subset of, and clearly influenced by, organizational culture. Organizations often have multiple cultures or subcultures, and this may be particularly true in construction.

(Organizational) Safety Climate: The shared perceptions of safety policies and procedures by members of an organization at a given point in time, particularly regarding the adequacy of safety and consistency between actual conditions compared to espoused safety policies and procedures. Homogeneous subgroups tend to develop shared perceptions while between-group differences are not uncommon within an organization.

Project Safety Climate: Perceptions of occupational safety and health on a particular construction project at a given point in time. It is a product of the multiple safety climates from the different organizations involved in the project including the project owner, construction manager/general contractor, and subcontractors. Project safety climate may be heavily influenced by local conditions such as project delivery method, schedule and planning, and incentives.
Strengthening Jobsite Safety Climate

Eight Worksheets to Help You Use and Improve Leading Indicators

Uninformed → Reactive → Compliant → Proactive → Exemplary

Indicators
1. Management commitment
2. Aligning and integrating safety as a value
3. Ensuring accountability at all levels
4. Improving safety leadership
5. Empowering and involving workers
6. Improving Communication
7. Training at all levels
8. Encouraging Owner/Client Involvement
Sound Familiar?

Themes

• Safety Culture has parallels with Integrated Approaches and Total Worker Health®
• Builds upon fundamental safety systems.
• Recognition and control of job hazards is implicit at best
• Theory?
Defining integrated approaches to worker health

“A strategic and operational coordination of policies, programs & practices designed to simultaneously prevent work-related injuries & illnesses & enhance overall workforce health & well-being”

- Coordination and linkage of separate policies, practices & programs
- Continuum of approaches exists

Indicators of integration

• Organizational leadership and commitment
• Collaboration between health protection and worksite health promotion and others, (HR, EH, etc..)
• Supportive Organizational Polices and Practices
  – Accountability and Training
  – Management and Employee Engagement
  – Benefits and Incentives to Support Workplace Health Promotion and protection
  – Integrated Evaluation and Surveillance
• Comprehensive program content
Integration of Health Protection and Health Promotion
Rationale, Indicators, and Metrics

Glorian Sorensen, PhD, MPH, Deborah McLellan, PhD, MHS, Jack T. Dennerlein, PhD,
Successful health and safety management programs

Management leadership and employee involvement
Sets up culture and communications channels

Hazard Identification and Assessment
Recognizing energy sources

Hazard Prevention and Control
Eliminating and/or controlling sources

Information and Training
Supervisor, recognition of active & passive controls

Evaluation of the Program Effectiveness
Injury surveillance, process evaluations

Essential Elements of Effective Workplace Programs and Policies for Improving Worker Health and Wellbeing

20 Elements in four groups

• **Organizational Culture and Leadership**
  – Human centered culture, demonstrate leadership, engage mid-level management

• **Program Design**
  – Recognize and control known hazards, clear and consistent principles, employee involvement, adjust and sustain the program,

• **Program Implementation and Resources**
  – Start small and build, adequate resources, communication systems and accountability

• **Program Evaluation**
  – (Measure and Adjust)
Theory? Sociotechnical systems and Safety Climate

- Safety Climate is based on the functional construct of organizational climate where workers understand what is being rewarded (and penalized) within complex and ambivalent organization.

- Organizations are complex and ambivalent

- Climate perceptions require detection from multiple cues in the presence of competing demand and inconsistent policies

Take home message(s)

- It’s tough being a construction worker.
- Emphasis in the industry to improve safety culture
- Challenges exist to improve safety culture/climate and to measure it.
- Innovation (and adaptation) can overcome these challenges.
Many system components!

Owner/General Contractor
Site supervisor, site safety manager,

Other Contractors
Foreman, Coworkers

Subcontractor (Trade) Employer
Foreman, Coworkers, (Safety manager)
Union Steward

Worker - Employee
Trade, Age, Gender

Trade (Union)
Training, benefits

Follows worker

Zohar and Polachek 2014 (J. Appl Psychol)
Project Safety Climate: Perceptions of occupational safety and health on a particular construction project at a given point in time. It is a product of the multiple safety climates from the different organizations involved in the project including the project owner, construction manager/general contractor, and subcontractors. Project safety climate may be heavily influenced by local conditions such as project delivery method, schedule and planning, and incentives.
Correlation Between Safety Climate and Contractor Safety Assessment Programs in Construction

Emily H. Sparer, MS, ¹ Lauren A. Murphy, PhD, ¹ ² Kathryn M. Taylor, MS, ¹ and Jack T. Dennerlein, PhD ¹ ³ *

Background Contractor safety assessment programs (CSAPs) measure safety performance by integrating multiple data sources together; however, the relationship between these measures of safety performance and safety climate within the construction industry is unknown.

Methods Four hundred and one construction workers employed by 68 companies on 26 sites and 11 safety managers employed by 11 companies completed brief surveys containing a nine-item safety climate scale developed for the construction industry. CSAP scores from ConstructSecure, Inc., an online CSAP database, classified these 68 companies as high or low scorers, with the median score of the sample population as the threshold. Spearman rank correlations evaluated the association between the CSAP score and the safety climate score at the individual level, as well as with various grouping methodologies.
### ABC Company Profile Page

**PROFILE COMPLETE:** [Download Certificate](#), [Download Logo](#)

Select Trade Category: Fireproofing

<table>
<thead>
<tr>
<th>TRADE CATEGORY</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIREPROOFING</td>
<td>74.77 / 100</td>
</tr>
<tr>
<td>Injury/Illness/Insurance</td>
<td>39/45</td>
</tr>
<tr>
<td>EMR</td>
<td>10/10</td>
</tr>
<tr>
<td>FATALITIES</td>
<td>0: 5 points awarded</td>
</tr>
<tr>
<td>RECORDABLE CASES</td>
<td>14/15</td>
</tr>
<tr>
<td>DART</td>
<td>10/15</td>
</tr>
<tr>
<td>OSHA Experience</td>
<td>10/10</td>
</tr>
<tr>
<td>Safety Management Systems</td>
<td>24.71/30</td>
</tr>
<tr>
<td>Safety Program Elements</td>
<td>9.06/10</td>
</tr>
<tr>
<td>Special Elements</td>
<td>5/5</td>
</tr>
<tr>
<td>Safety Manual Document</td>
<td>-13 points deducted</td>
</tr>
<tr>
<td>OSHA 300 Summary Form</td>
<td>Uploaded</td>
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<tr>
<td>Insurance EMR Rating</td>
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<tr>
<td>General Liability Cases</td>
<td>5 / $1504000</td>
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<tr>
<td>MITIGATION</td>
<td>COMPLETE</td>
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</tbody>
</table>

### COMPANIES ABLE TO VIEW YOUR PROFILE

- Harvard University
- Intel Corporation
- The Graham Company
- Suffolk Construction
- Turner
- Gilbane
- Kenny Construction
- Hoffman Construction

[Add More](#)

### ABC COMPANY INFORMATION

Address: 46 Blackstone Street  
City: Cambridge  
State: MA  
Zip Code: 02138  
Main Telephone #: 617-495-3055  
Main Fax #: 617-495-0593  
Primary Contact: Garrett Burke  
Email: skiriienko@live.com  
Date of Enrollment: 9/10/2009  
Date of Last Update: 6/2/2011  
Renewal date: 9/10/2011
FIGURE 4. Scatter plot analyzing the linear relationship between safety climate and CSAP scores, at the company level.
Length of Time Spent Working on a Commercial Construction Site and the Associations With Worker Characteristics

Emily H. Sparer, ScD,1 Cassandra A. Okechukwu, ScD,2 Justin Manjourides, PhD,3 Robert F. Herrick, ScD,1 Jeffrey N. Katz, MD,1,4,5 and Jack T. Dennerlein, PhD1,3*
6. **Temporary Workers on construction sites**

- **B** = baseline (new workers)
- **F#** = follow up number (returning workers)

**Graph Description:**
- The graph shows the number of workers who left the site and those still on-site for follow up over different months.
- The color codes represent different months:
  - **Month 1:** Orange, **Month 2:** Blue, **Month 3:** Purple, **Month 4:** Green, **Month 5:** Red.
- The graph includes a legend indicating the colors for each month.

Safety Climate and Conditions of Work

Organizational Policies & Practices
- Management values
- Work Organization

Physical Working Conditions
- Hazards
- Controls

Worker Outcomes
- Injury & Illness

Worker Proximal Outcomes
- Safety Climate
- Knowledge Skill Motivation
- Safety Performance

Table 2.2. Results of repeated measures analysis.

<table>
<thead>
<tr>
<th></th>
<th>Effect Estimate</th>
<th>N</th>
<th>Standard Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate/Safety Inspection</td>
<td>0.3689</td>
<td>79</td>
<td>0.0704</td>
<td>&lt; 0.0001*</td>
</tr>
<tr>
<td>Lagged one week</td>
<td>0.0311</td>
<td>73</td>
<td>0.0925</td>
<td>0.7376</td>
</tr>
</tbody>
</table>
REVIEW

Defining and Measuring Safety Climate: A Review of the Construction Industry Literature

Natalie V. Schwatka¹ *, Steven Hecker² and Linda M. Goldenhar³

• Transience of the industry
• Subcontracting

• Work organization (‘cultural unit’?)
• Induction / acculturation process (training through the trades)
Take home message(s)

• It’s tough being a construction worker.
• Emphasis in the industry to improve safety culture
• Challenges exist to improve safety culture and to measure it.
• Innovation (and adaptation) can overcome these challenges.
Innovation can overcome challenges

Components that improve culture include:

• *Communications*
• *Incentives*
• *Leadership*
• *Integrating*
• *Adapting*
Communication: Safety Performance Feedback

Inspection (Identifying Controls and Hazards)

Superintendent mitigates hazard

Hazards Reported Super/SM/PM

Site and subs Scores to workers

Controls & Hazards Foremen Reports

Incentive:
Lunch and Raffle

Sparer et al., 2013, Safety Science 51: 77–84
Evaluated
Cluster Randomized Trial on 8 (4 pairs) sites

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>DR</td>
<td>Aug</td>
<td>Sept</td>
<td>Oct</td>
<td>Nov</td>
</tr>
<tr>
<td>PI</td>
<td>Jan</td>
<td>Feb</td>
<td>Mar</td>
<td>Apr</td>
</tr>
<tr>
<td>PC</td>
<td>May</td>
<td>Jun</td>
<td>Jul</td>
<td>Aug</td>
</tr>
<tr>
<td></td>
<td>Sep</td>
<td>Oct</td>
<td>Nov</td>
<td>Dec</td>
</tr>
</tbody>
</table>

**Key:**
- DR = Dry run of intervention
- PI = Pilot of intervention
- PC = Pilot of control
- A-H = Full scale RCT sites A-H

Each color represents a matched pair

Sparer et al, *Scand J Work Environ Health*, Accepted!
Sociotechnical concept of Safety Climate for construction (Incentive)

- Safety Climate is based on the functional construct of organizational climate where workers understand what is being rewarded (and penalized) within complex and ambivalent organization.

Safety Climate Improved!
Amount of improvement varied across pairs

<table>
<thead>
<tr>
<th></th>
<th>Effect estimate</th>
<th>SE</th>
<th>Effect Size</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1 – Simple</td>
<td>1.54</td>
<td>0.80</td>
<td>3.1%</td>
<td>0.06</td>
</tr>
<tr>
<td>Model 2 – Adjusted for pair/block</td>
<td>1.58</td>
<td>0.59</td>
<td>3.2%</td>
<td>0.01</td>
</tr>
<tr>
<td>Model 3 – Adjusted for baseline differences</td>
<td>1.64</td>
<td>0.63</td>
<td>3.3%</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Qualitative Results

Safety communication:
"It helped safety wise definitely, to be cautious of other people and what’s around you, and that's huge. “
“Communication is key between the trades..“

Teambuilding:
“The trades were working together with the program, and other trades were watching out for everyone else. Normally they would never do that, but now I see talking amongst the trades—this came from the program.”

Positive reinforcement of safe work practices:(intervention)
"It felt good to finally get a report in a meeting to say I did something right"

Incorporating hazards into the Sociotechnical systems

- Climate perceptions require detection from multiple cues in the presence of competing demand and inconsistent policies
Innovation can overcome challenges

Components that improve culture include:

• Communications
• Incentives
• Leadership
• Integrating
• Adapting
Arnold Bakker, PhD
Erasmus University Rotterdam,
The Netherlands
Day 1, 12 July

**Transformational Leadership**

**Transformational Theory** (Bass & Avolio, 1994)

- Leaders inspire individuals, develop trust, and encourage creativity and personal growth.
- Individuals develop a sense of purpose to benefit the group, organisation or society. This goes beyond their own self-interests and an exchange of rewards or recognition for effort or loyalty.

**Idealized influence:** followers identify with their leaders and respect and trust them.

**Inspirational motivation:** creating and communicating an appealing vision of the future and leaders’ own optimism about this future.
Foundations for Safety Leadership
The Center for Construction Research and Training (CPWR) Project

- **PI:** Linda Goldenhar
  - CPWR

- **Co-PI:** Stephanie Johnson
  - University of Colorado

- **Natalie Schwatka**
  - University of Denver

- **John Rosecrance**
  - Colorado State

- **Jack Dennerlein**
  - Northeastern University

- **National evaluation**
  - Colorado
  - Georgia
  - Ohio
  - Kentucky
  - West Virginia
  - Massachusetts
5 **LEADER**ship Skills

- Foreman are required to take 30 OSHA Safety Training
- Developed and adding a Safety Leadership Module/elective
- OSHA Has approved adding the developed curriculum

<table>
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<tr>
<th>LEADS by example</th>
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<td>Engages and empowers team members</td>
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<td>Actively listens and practices three-way communication</td>
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<tr>
<td>Develops team members through teaching, coaching, &amp; feedback</td>
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<td>Recognizes team members for a job well done</td>
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Who are Safety Leaders?

- Foremen – frontline managers
- Experienced workers
- Trainees/apprentices
- Superintendents
- Owners
- **Anyone....Everyone**
Innovation can overcome challenges

Components that improve culture include:

• Communications
• Incentives
• Leadership
• Integrating
• Adapting
Lessons learned: What works?

Collaborative engagement in planning and vetting of ideas/components of integrated programs

Customization to setting, population and needs

Augmentation of existing program should occur as much as possible

Okechukwu 2014 Total Worker Health Symposium
All the Right Moves

Aim 1: Develop a worksite-based, multi-component, and integrated musculoskeletal disorders prevention and health promotion intervention for workers in commercial construction

Aim 2: Complete a feasibility study of the developed worksite based intervention on six sites, randomly assigned to either intervention (five sites) or controls (five sites) with 420 workers total (70 per site) measured at baseline and at six-month follow up
PROPOSED PROGRAM OVERVIEW

Integrated program for worker health and productivity

**Supervisor training:** Integrated program management

**Worker training:** Toolbox talk · Safety orientations

**Musculoskeletal health**

**Ergonomics**

- **Task pre-planning:**
  - Checklist for the *Ergo 4*
  - *Ergo 4* Simple Solutions
  - Database of solutions
  - Posted *Ergo 4* solutions
  - Employee feedback
- **Inspections:**
  - Including *Ergo 4*

- **Supervisor training:**
  - *Ergo 4* risk (1 hr)
  - *Ergo 4* solutions (1 hr)

- **Worker training:**
  - Toolbox talk on *Ergo 4*

**Physical Activity**

- **Physical activity:**
  - Daily 10 min warm up (stretch & flex/ walk)
  - Integrated with daily task pre-planning activities
  - Local walking routes posted
  - Simple facilities, eg hoops
  - Challenges (competitions)
- **Inspections:**
  - Posted routes / activities

- **Worker training:**
  - Toolbox talk on PA

**Cardiovascular Health**

**Tobacco Cessation**

- **Safety orientations:**
  - CO measurements with Toolbox talk
- **Tobacco cessation referral:**
  - 1-800 QUIT NOW
  - NRT
  - DIY kits
- **Inspections:**
  - Posted policies and cessation activities

- **Worker training:**
  - Toolbox talk on CO
  - Toolbox talk on TC
• Key informant, focus groups, and pilot testing.
  • Can’t do many Physical Activity activities on site
  • Physical Activity of construction work is already high
  • Best intervention for construction workers is health coaching
All the Right Moves

Musculoskeletal health
Cardiovascular Health

StIPP
Soft Tissue Injury Prevention Program

Health Week
(get workers signed up for Health Coaching)

Task pre-planning:
- Checklist for the Ergo 4
- Ergo Simple Solutions
- Database of solutions
- Posted Ergo 4 solutions
- Employee feedback

Inspections:
- Including Ergo 4
- Reports to Foremen and workers

Supervisor training:
- StIPP (1/2 hr)
- Adding Ergo to pre-task planning workshop (1/2 hr)

Worker training:
- Toolbox talk on Ergo and Health

Monday:
- What is health coaching

Tuesday:
- StIPP Program – the components

Wednesday:
- Tobacco cessation
- CO measurements

Thursday:
- Food and Activity

Friday:
- Questions and Health Coaching sign up

Health Coaching:
- 4 sessions
- No cost to worker
- PA/Diet, Tobacco Cessation

Tobacco cessation referral:
- NRT
Augmentation: Pre-task planning

Consider overexertion hazards and ergonomic solutions in your pre-task planning

**Identify Overexertion Hazards:**
- Overhead work
  - Duration: __________________
  - # of Workers: ____________
- Ground work
  - Duration: __________________
  - # of Workers: ____________
- Manual materials handling
  - Duration: __________________
  - # of Workers: ____________
- Repetitive work
- Awkward/ uncomfortable postures

**Identify Ergonomic Solutions:**
- Work in the “Strike Zone”:
  - __________________________________________
- Store materials at waist height:
  - __________________________________________
- Use of material handling equipment:
  - __________________________________________
- Job rotation/ break up work
- Other: ______________________________________

Keep work in the “Strike Zone”

Bring work off the floor

Use tool extensions

www.centerforworkhealth.sph.harvard.edu
Health week (education & engagement)
Innovation can overcome challenges

Components that improve culture include:

• Communications
• Incentives
• Leadership
• Integrating
• Adapting

• Still a lot to do!
• Model for other industries
Take home message(s)

- It’s tough being a construction worker.
- Emphasis in the industry to improve safety culture
- Challenges exist to improve safety culture and to measure it.
- Innovation (and adaptation) can overcome these challenges.
Total Worker Health® Theme

• Safety Culture and climate can have similar systems frameworks and components as Indicators of Total Worker Health and Integrated approaches.
• Conditions of Work should not be lost within the culture and climate framework
Thank you!

Funding sources include but are not limited to grants from the National Institute for Occupational Safety and Health (R01 OH003997, R01 OH008373, R01 OH008781, R01 OH01009, T42 OH008416, U19 OH008861, U60 OH009762).