BEYOND ACCIDENTS AND INJURIES: WORK-SAFETY TENSION AND PHYSICAL HEALTH OF MANUFACTURING EMPLOYEES

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Workplace safety is a primary concern for manufacturing organizations, where risks of accident and injury are significant (Bureau of Labor Statistics, 2012). Beyond physical hazards, attention has increasingly been paid to psychosocial features of the work environment as contributors to worker safety compliance behavior and important safety outcomes such as workplace injuries and lost work days (cf, Hermann, Ibarra, & Hopkins, 2010; Huang et al., 2012). In particular, there is now widespread recognition of the role of work safety climate in contributing to such safety outcomes. There is also growing interest in poor work safety climate as a type of organizational stressor that has implications for other aspects of worker health and well-being, including both physical and psychological health (cf. Abbe, Harvey, Ikuma, & Aghazadeh, 2011; Arcury, O'Hara, Grzywacz, Isom, Chen, & Quandt, 2012). However, these relationships are not well-documented for physical health outcomes; furthermore, findings from safety studies that have included non-accident/injury physical health measures are generally limited by reliance on self-reports of physical health.

Because physical health has implications for functioning in all facets of an employee's life, it is important to understand ramifications of safety climate that extend beyond the sphere of accidents and injuries. The present study aims to contribute to the safety literature on manufacturing workers by examining the association between one particular facet of psychological safety climate -- work safety tension -- and several important stress-linked physical health outcomes. Independent of its implications for safety behavior and direct safety outcomes, such as accidents and injuries, we argue that the facet of safety climate known as work-safety tension acts as a workplace stressor that increases the experience of occupational stress, which mediates indirect effects on other aspects of physical health. For this study, we focused on two aspects of physical health that represent known health issues in the manufacturing sector: cardiovascular issues (represented by clinical assessments of blood pressure and heart rate), and musculoskeletal disorders (represented by clinical assessments of cervical rotation flexibility and self-reported trunk and extremity pain).

Work safety tension refers to workers' perceptions that working safely is at odds with effectively performing one's job duties and meeting organizational standards for performance (Morrow, McGonagle, Dove-Steinkamp, Walker, Marmet, & Barnes-Farrell, 2010). Thus, work safety tension implies high, but conflicting, job demands both on job performance and work safety. Furthermore, when multiple job demands are perceived as incompatible, workers' perceptions of control are weakened (Karasek, 1979). According to Karasek's (1979) demand–control theory, high job demands and low decisional control are joint causes of stress. In sum, we propose that work safety tension will increase perceived work stress; the resulting stress accumulates and impairs workers' physical health.

We collected data from 720 manufacturing workers in New England during the first wave of an ongoing longitudinal study on aging, working conditions and musculoskeletal disorders. Workers were from six manufacturing organizations; they were aged from 20 to 71, and 70.6% of them were male. Work safety tension was measured with 4 items adapted from previous work (cf. Mueller, DaSilva, Townsend, & Tetrick, 1999). Work stress was assessed with 5 items from the Brief Stress in General Scale (Stanton, et al, 2001). Physical health measures included clinically assessed systolic and diastolic blood pressure, resting heart rate, cervical rotation flexibility; and self-reported physical pain (4 items; Punnett,

2007).

Preliminary analysis showed that blood pressure and flexibility were significantly related to age, blood pressure and physical pain were significantly associated with gender, and physical pain was significantly correlated with accident/injury experience. Hence, we included age, gender, and whether employees had any accident or injury in the past 12 months as covariates corresponding to their related outcomes in the model that we tested. The hypothesized model, with gender, age, and accident/injury included, produced acceptable model fit ($\chi 2$=484.122, df=183, CFI=.936, RMSEA=.043) in AMOS 18.0. After controlling for age, gender, and accident/injury, work safety tension remained predictive of workers' physical health, in regard to blood pressure, heart rate, flexibility, and pain. Stress mediated three of the four paths (all except the path from work safety tension to flexibility). Specifically, work safety tension was positively associated with stress, and the latter exhibited positive relationships with blood pressure, and heart rate, and pain.

This is one of the first studies documenting links between work-safety tension and stress-related physical health outcomes (aspects of cardiovascular and musculoskeletal status) among manufacturing sector employees. Our data corroborate the negative impact work safety tension may impose upon employee health beyond its relationships with workplace accidents and injuries. Although the data on which these findings are based are cross-sectional, and thus cannot be used to provide strong causal inferences, the strength of the study is the availability of clinical assessments for most health variables.

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Paper 2 Safety First: A Predictive Model for Selecting Safer Workers

- Erica N. Drew, MS, Florida International University, Miami, FL; Valentina Bruk-Lee, PhD; Sara Gutierrez, PhD

Paper 3 Beyond Accidents and Injuries: Work-Safety Tension and Physical Health of Manufacturing Employees

- Zhuo Chen, BS, University of Connecticut, Storrs, CT; Luye Chang, MA; Janet Barnes-Farrell, PhD; Nicholas Warren, ScD; Martin G. Cherniack, MD, MPH

Paper 4 Job Insecurity and Accident Under-Reporting: Exploring the Moderating Effect of Organizational Safety Climate

- Tahira M. Probst, PhD, Washington State University, Vancouver, WA

Burnout and Work–Life issues (Paper Panel Session)
San Gabriel A/B
Chair: Louise Tourigny, PhD, University of Wisconsin–Whitewater, WI

Paper 1 Towards a Catastrophe-Based Approach of Burnout in Relation to Workload and Work–Family Interference

- Jean-Pierre Neveu, PhD, University of Montpellier 2, France; Mario Veruete, BSc

Paper 2 Emotional Exhaustion and Job Performance: On the Role of Organizational Support and Work-Family Conflict

- Louise Tourigny, PhD, University of Wisconsin–Whitewater, WI; Jian Han, PhD; Vishwanath V. Baba, PhD

Paper 3 Moderation of the Relationship Between Job Strain and Psychological Health of Faculty: Conflict and Facilitation Between Work and Family

- Viviola Gómez, PhD, Universidad de los Andes, Bogotá, Colombia; Angélica Maria Hermosa, MA; Lyria Esperanza Perilla, MA

Paper 4 Job Burnout and Work–Home Interaction in a Mexican Factory

- Anabel Camacho-Ávila, MSc, Universidad Autónoma del Estado de Morelos (UAEM), Morelos, Mexico; Imke Hindrichs, PhD, Fernando Arias-Galicia, PhD

4:30–4:45 p.m. **Break**

4:45–6:00 p.m. **Concurrent Sessions**

Occupational Health & Safety Management in European Enterprises: What Drives and Hinders Action? (Symposium)
San Gabriel C
Chair: Stavroula Leka, PhD, University of Nottingham, UK

Paper 1 What Key Drivers and Barriers to Psychosocial Risk Management Do European Managers Report? A Secondary Analysis of ESENER Data

- Stavroula Leka, PhD, University of Nottingham, UK; Aditya Jain, PhD; Irene Houtman, PhD; Sergio Iavicoli, MD, PhD; Marco Mirabile, PhD; Giuliana Buresti, PhD; Diana Gagliardi, MD, INAIL; Maarit Vartia, PhD; Krista Pahkin, LicSocSci

Paper 2 Factors Influencing the Implementation of Occupational Safety and Health Measures in European Small and Medium Sized Enterprises in Comparison to Large Enterprises?

- Aditya Jain, PhD, University of Nottingham, UK; Stavroula Leka, PhD; Sue Cowan, PhD; Jennie Guise, PhD

Paper 3 Added Value of Employee Risk Awareness in Explaining Psychosocial Risk Management

- Irene Houtman, PhD, TNO, Hoofddorp, The Netherlands; Marianne van Zwieten, MSc; Ernest de Vroome, PhD

Paper 4 Towards a Continuous Monitoring System for Psychosocial Risk Management in Europe: Key Issues for the Development of Policies at the European Level

- Cristina Di Tecco, PhD, INAIL, Department of Occupational Medicine, Rome, Italy; Diana Gagliardi, MD; Matteo Ronchetti; Giuliana Buresti; Marco Mirabile; Sergio Iavicoli, MD, PhD

Discussant: Irene Houtman, PhD, TNO, Hoofddorp, The Netherlands

Worksite Health Promotion Research and Practice: Improving Worker Vitality, Symptom Self-Management, and Work Engagement (Symposium)
Santa Barbara C
Chairs: Cécile R. Boot, PhD, VU University Medical Center, EMGO Institute, Amsterdam, The Netherlands; and William S. Shaw, PhD, Liberty Mutual Center for Disability Research, Hopkinton, MA

Paper 1 A Group Intervention to Improve Job Function in Workers With Chronic Pain: Development and Design

- William S. Shaw, PhD, Liberty Mutual Center for Disability Research, Hopkinton, MA; Torill H. Tveito, PhD; Cecile R.L. Boot, PhD; Robert K. McLellan, MD, MPH

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