



Findings from a systematic literature review of the effectiveness of occupational health and safety regulatory enforcement

Presenter: Emile Tompa

Co-Authors: Christina Kalcevich, Mike Foley, Chris McLeod, Sheilah Hogg-Johnson, Kim Cullen, Ellen MacEachen, Quenby Mahood , Emma Irvin

Presentation Forum: WorkSafeBC

Date: March 7, 2025

Who We Are

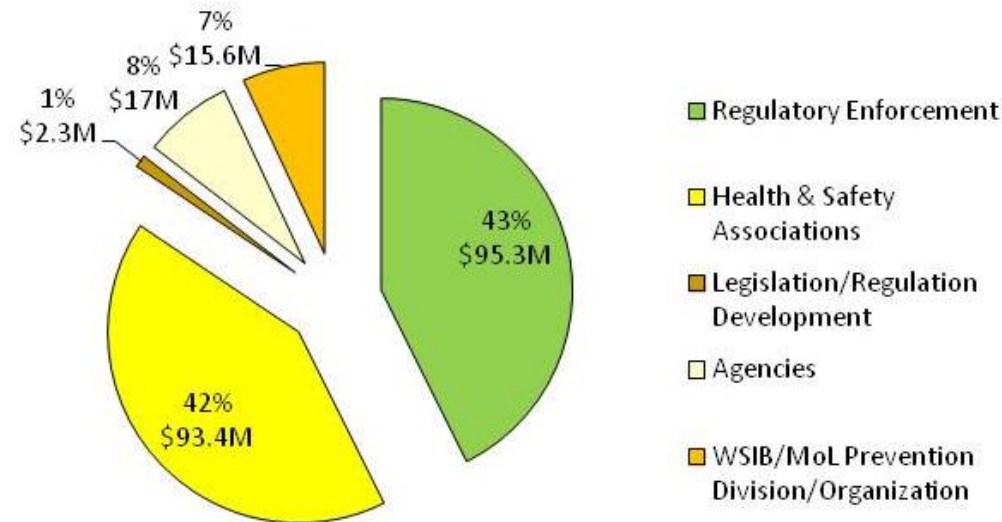
- The Institute for Work & Health is a not-for-profit research organization based in Toronto, Canada
- We conduct and share research to protect and improve the health of working people. Our research is carried out in two broad domains:
 1. preventing work-related injury and illness through studies of workplace programs and practices, prevention policies and the health of workers at a population level, and
 2. improving the health and recovery of injured workers through research on treatment, return to work, disability prevention and management, and compensation policies
- Our research is valued by policy-makers, workers and workplaces, clinicians, and occupational health, safety and disability management professionals

Land Acknowledgment

The land on which the Institute for Work & Health operates, has for thousands of years, been the traditional land of the Huron-Wendat, the Seneca and the Mississaugas of the Credit River. Today, this land is still home to many Indigenous people from across Turtle Island, and we are grateful to have the opportunity to conduct our work on it.

Overview and Rationale

- Regulation takes different forms across jurisdictions & over time
- Current context—competitive global markets, contingent employment contracts, limited public resources
- Cost of regulatory enforcement is substantial, so gathering evidence on effectiveness is critical
- In Ontario, approximately 43% of the cost of the OHS system



Ontario OHS System Costs in 2013

Complexity of Regulatory Enforcement

- Multiple reasons regulation and enforcement may be ineffective:
- Regulation may not address root causes of injuries
- Regulator's ability to detect non-compliance may not be sufficient
- Regulator may be restricted in ability to enforce compliance or punish non-compliance
- ***Threat of punishment may not be an effective deterrent***
- Firms may not always act rationally or focus on long-term issues
- Punishment might create antagonism
- Punishment may divert attention from important H&S concerns to compliance



What mix of enforcement activities are ideal?

- Implementation of regulation can take many forms:
- Education, assistance, persuasion, promotion, economic incentives, monitoring, enforcement and sanctions
- Each activity contributes towards some aspect of mission accomplishment
- Identifying the optimal mix of activities is a challenge
- Tangled web of causes and effects make linking specific actions to specific outcomes difficult



On the research side...

- How to parse out the marginal impact of a specific policy lever:
- Conceptual understanding of behaviours of stakeholders
- Need good data
- Appropriate study design
 - Statistical methodology to control for context
 - Opportunity of natural experiment
 - Randomized controlled trial
- Sufficient measurement time frame to detect an effect
- Deep understanding what results mean for real world phenomena



Overarching Question of this Review

- “What is the strength of evidence on the effectiveness of OHS policy levers in creating incentives for organizations to improve occupational health and safety processes and outcomes.”
- **Expanded scope from a previous review**
 - Intermediate outcomes (compliance)
 - Smoke-free workplace legislation
 - Awareness campaigns
 - Nature of enforcement

Methods

- International Advisory Committee
- Provided guidance at front end on framing and tail end on interpretation of findings
- Search Strategy
- Quantitative review undertaken in conjunction with qualitative review—two had common search and initial selection process
- Quality Assessment and Evidence Synthesis
- Drew on methods and tools from previous quantitative review
- Best evidence synthesis approach



Search Strategy (1)

- Four category modified PICO search
 - 1) Regulatory Focus
 - 2) Setting
 - 3) Policy Levers
 - 4) Context (Conditions + Outcomes)
- First level screening
 - Studies had to consider directives related to OHS legislation and/or regulation made by a government authority
 - Studies had to evaluate OHS legislation and/or regulations using quantitative and/or qualitative methods



Search Strategy (2)

- Screening for quantitative review
 1. Study had a temporal element (i.e., used data from multiple points in time, or asked respondents about past experiences);
 2. Study design was rigorous (i.e., used multiple regression modeling methods or had a quasi-experimental design); and
 3. Study considered final outcomes, such as injuries and illnesses, or intermediate outcomes, such as compliance

Quality Assessment Tool

Tompa et al., 2007

Overall study quality	
1.	Does the study specify a theoretically correct relationship between the policy feature (explanatory variable) and the outcome variable (dependent variable)?
2.	Are the characteristics of the study population properly well-defined, measured and described?
3.	Was the statistical methodology appropriate for the research question and study design?
4.	Does the study establish an empirically correct relationship between the outcome and independent variables?
5.	Was there adjustment made for important covariates?
6.	Are the results interpreted correctly?
Quality of regulatory evidence	
7.	How strongly would you rate the measurement validity of this policy lever?
8.	How strongly would you rate the statistical validity?
9.	How strongly would you rate the internal validity?
10.	How strongly would you rate the external validity?

*High = $\geq 70\%$ quality assessment in both categories; Medium = 50-70% quality assessment in both categories

Evidence Synthesis Algorithm

Level of Evidence	Minimum Quality*	Minimum Quantity	Consistency	Strength of Messages
Strong	High (H)	3	3H agree; If 3+ studies, 3/4 of the M & H agree	Recommendations
Moderate	Medium (M)	2H or 2M & 1H	2H agree or 2M & 1H agree; If 3+, >2/3 of the M & H agree	Practice Considerations
Limited		1H or 2M or 1M & 1H	2 (M and/or H) agree; If 2+, >1/2 of the M & H agree	Not enough evidence to make recommendations or practice considerations
Mixed		2	Findings from M & H are contradictory	
Insufficient	Medium quality studies that do not meet the above criteria			

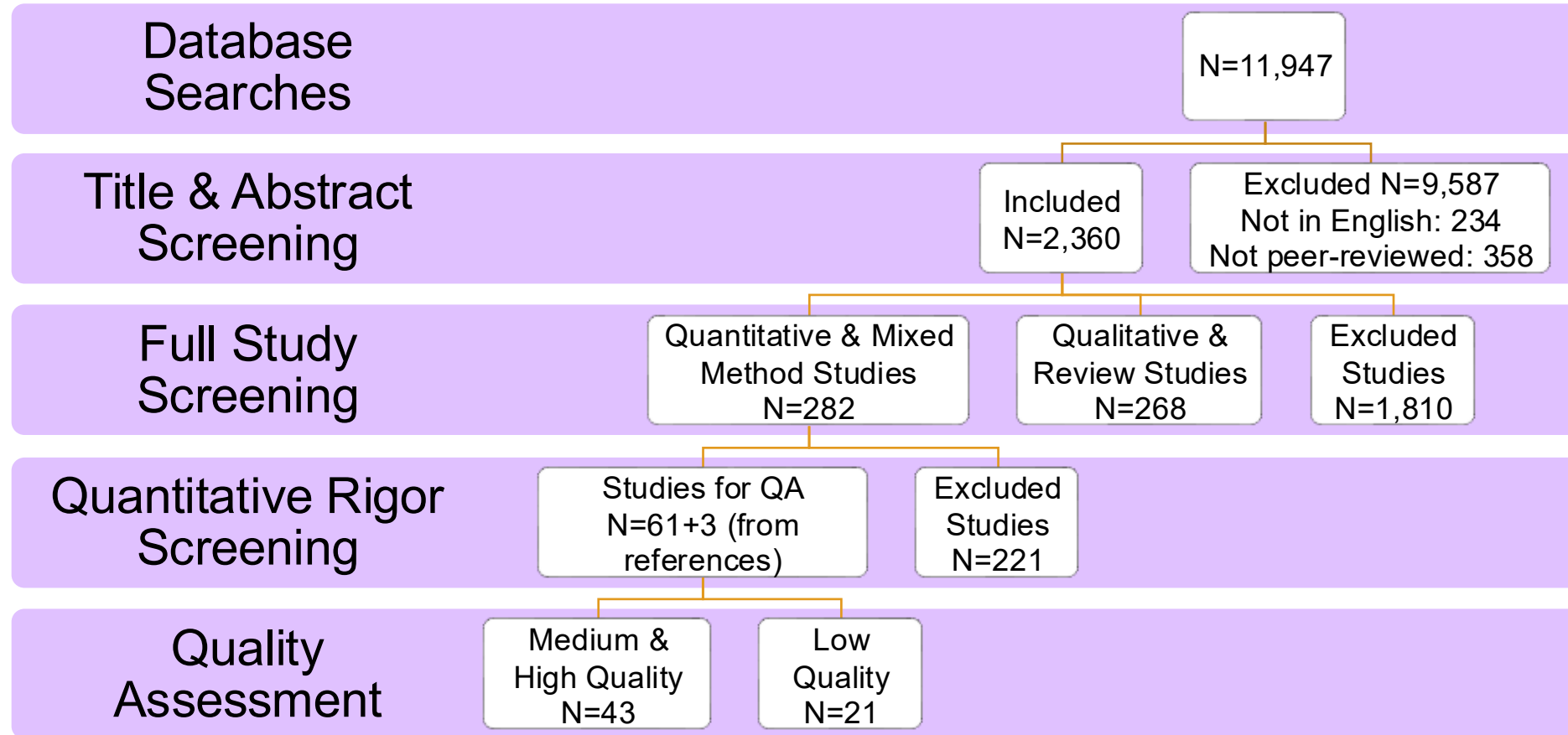
*High = $\geq 70\%$ in quality assessment; Medium = 50-70% in quality assessment

Titles and Abstracts Identified by Source

SOURCE	N	SOURCE	N
Medline	3450	Sociological Abstracts	195
EMBASE	4190	Wilson Social Science Abstracts	184
PsycINFO	733	Index to Legal Periodicals	149
ABI Inform	4000	Hand-search: Policy and Practice in Health and Safety	19
Health & Safety Science Abstracts	1181	Hand-search: SafeWork Australia/ RegNet	35
ASSIA	85	Content Experts	19
EconLit	279		

Total of 11,947 Titles and Abstracts

Flow Chart of Studies Retained at Each Stage



Comparison with Previous Review

	Previous Review	This Review
	1970-2003	1990-2013
	Peer-reviewed and Grey Literature	Peer-reviewed Literature
Cluster	No. of Studies	No. of Studies
Introduction of OHS Legislation	2 studies	9 studies
Introduction of Smoke-free workplace Legislation	--	6 studies
Inspections Sequence	--	4 studies
General and Specific Deterrence of Inspections and Penalties	21 studies	16 studies
Nature of Enforcement	--	6 studies
Awareness Campaigns	--	4 studies

**noteworthy
improvement in
quality of studies**

Evidence Synthesis: Introduction of OHS Legislation

- Nine studies retained in this cluster (1H & 8M)
- Mix of different legislations—hearing conservation, chemical exposure mitigation, universal precautions for blood borne pathogens, ergonomics regulation, lockout/tagout requirements...
- Some considered final outcomes—injuries, illnesses and fatalities
- Others considered intermediate outcomes—exposure and compliance
- **Moderate evidence** that the introduction of legislation has **no effect** on injuries (1H & 5M)
- **Limited evidence** that the introduction of legislation improved intermediate outcomes (3M)

Evidence Synthesis: Introduction of Smoke-free Workplace Legislation

- Six studies retained in this cluster (5H & 1M)
- Introduction of different forms of smoke-free workplace legislation in North America and Europe
- Some studies considered final outcomes—respiratory and sensory symptoms
- Others considered intermediate outcomes—reductions in smoke exposure and reductions in cigarette consumption
- **Strong evidence** that the introduction of smoke-free legislation reduces exposure to smoke (3H & 1M)
- **Moderate evidence** that the introduction of smoke-free legislation reduces respiratory and/or sensory symptoms (2H & 2M)

Evidence Synthesis: **Inspection Sequence**

- Four studies retained in this cluster (2H & 2M)
- All studies undertaken in US jurisdictions
- Considered how inspection sequence influences compliance rates based on changes in compliance violations cited
- **Moderate evidence** that the first inspection has the largest impact on compliance (2H & 2M)

Evidence Synthesis: General Deterrence of Inspections and Penalties

- Three studies retained in this cluster (3M)
- Studies considered the impact of the probability of inspections through aggregate/industry levels inspection activity
- Final outcomes included lost-time injury rate, lost workdays, and the fatality rate
- **Limited evidence** that general deterrence has **no effect** on lost-time injuries at the aggregate level (3M)
- **Limited evidence** that general deterrence reduces fatalities and lost workdays (1M for each outcome)

Evidence Synthesis: **Specific Deterrence of Inspections and Penalties**

- 13 studies retained in this cluster (8H & 5M)
- Most considered specific deterrence in the form of inspections with/without penalties
- Some considered other enforcement activities such as consultations or details of the inspection activity
- **Strong evidence** inspections with penalties reduce injuries (6H & 3M)
- **Moderate evidence** inspections without penalties have **no effect** on injuries (6H & 3M)
- **Limited evidence** that a compliance review of motor safety performance reduced truck crashes (1H)

Evidence Synthesis: Nature of Enforcement

- Six studies retained in this cluster (4H & 2M)
- Divided into of two groups: 1) consultative activity (4H studies), and 2) state- versus federal-level enforcement (2 M studies)
- **Strong/limited evidence** consultations have **no effect** on injuries (3H)
- **Limited evidence** that an autonomy-supportive style reduces the number of visits to achieve compliance (1H)
- **Limited evidence** that state enforcement results in lower fatality rates compared to federal enforcement (2M)

Evidence Synthesis: Awareness Campaigns

- Four studies retained in this cluster (4M)
- Studies in different sectors and focused on different OHS risks—noise regulations, guidelines on childhood labour in agriculture, eye injury campaign, managerial training program
- Two considered final outcomes and two considered intermediate outcomes
- **Limited evidence** that campaigns reduce injuries (2M)
- **Moderate evidence** that campaigns improve compliance (2M)

Discussion/Questions/Advice/Comments

- Introduction of legislation—what can we learn from the introduction of smoke-free workplace legislation?
- Specific deterrence—findings reinforce the importance of being in the field citing/fining non-compliance
- Consultations appear to have no effect on injury outcomes—what are the implications for the move towards voluntary guidelines?
- Compliance outcomes
 - First inspection has the largest impact on compliance
 - Awareness campaigns improve compliance
 - What is the relationship between compliance and injury outcomes?
- Need to create more opportunities to understand what works best, when and why!!



Thank you

Emile Tompa

Senior Scientist, Institute for Work

Executive Director, Inclusive Design for Employment Access (IDEA)

Associate Professor, McMaster University

etompa@iwh.on.ca

www.vraie-idea.ca



This document/slide is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License: <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

Funding Acknowledgement

Inclusive Design for Employment Access (IDEA) is supported by generous funding from the Government of Canada's New Frontiers in Research Fund (NFRF).

Le Vision Radicale Pour L'Accès Inclusif à l'Emploi (VRAIE) est financé par le fonds Nouvelles frontières en recherche du gouvernement du Canada.



Government
of Canada

Gouvernement
du Canada



Keep up on evidence-based practices from IWH



Sign up online for our monthly e-alerts, our quarterly newsletter, event notifications and more: iwh.on.ca/subscribe



Follow @iwhresearch on X:
x.com/iwhresearch



Connect with us on LinkedIn:
linkedin.com/company/institute-for-work-and-health



Subscribe to our YouTube channel:
youtube.com/iwhresearch