

# **A scoping review of musculoskeletal injuries in firefighters: Epidemiology, and primary/secondary prevention**

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**FIREWELL**

# Background

Firefighting is inherently dangerous <sup>1,2</sup>

- Heavy loads <sup>1,2</sup>
- High temperatures <sup>1,2</sup>
- Unpredictable environment <sup>1,2,3</sup>
- Overexertion <sup>1,2,3</sup>
- Accidents <sup>1,2,3</sup>
- High potential for workplace injury <sup>1,2,3</sup>

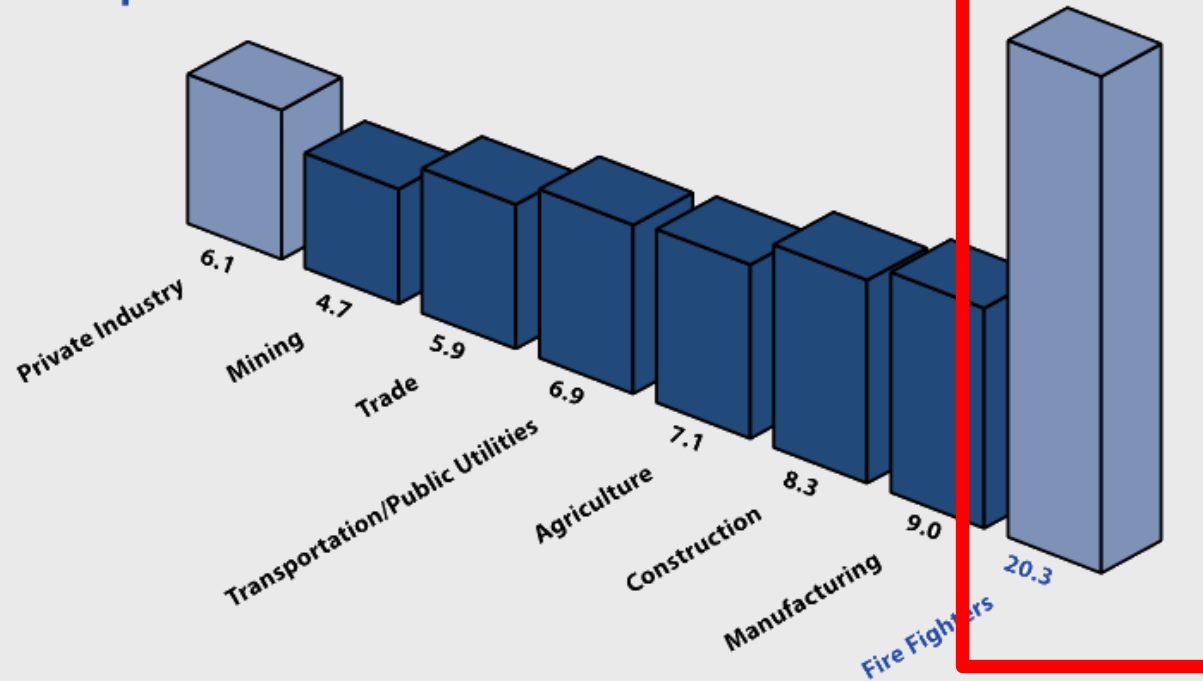


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# Background

Number of Job Related Injuries/Illnesses per 100 Workers



International Association of Firefighters (2000)



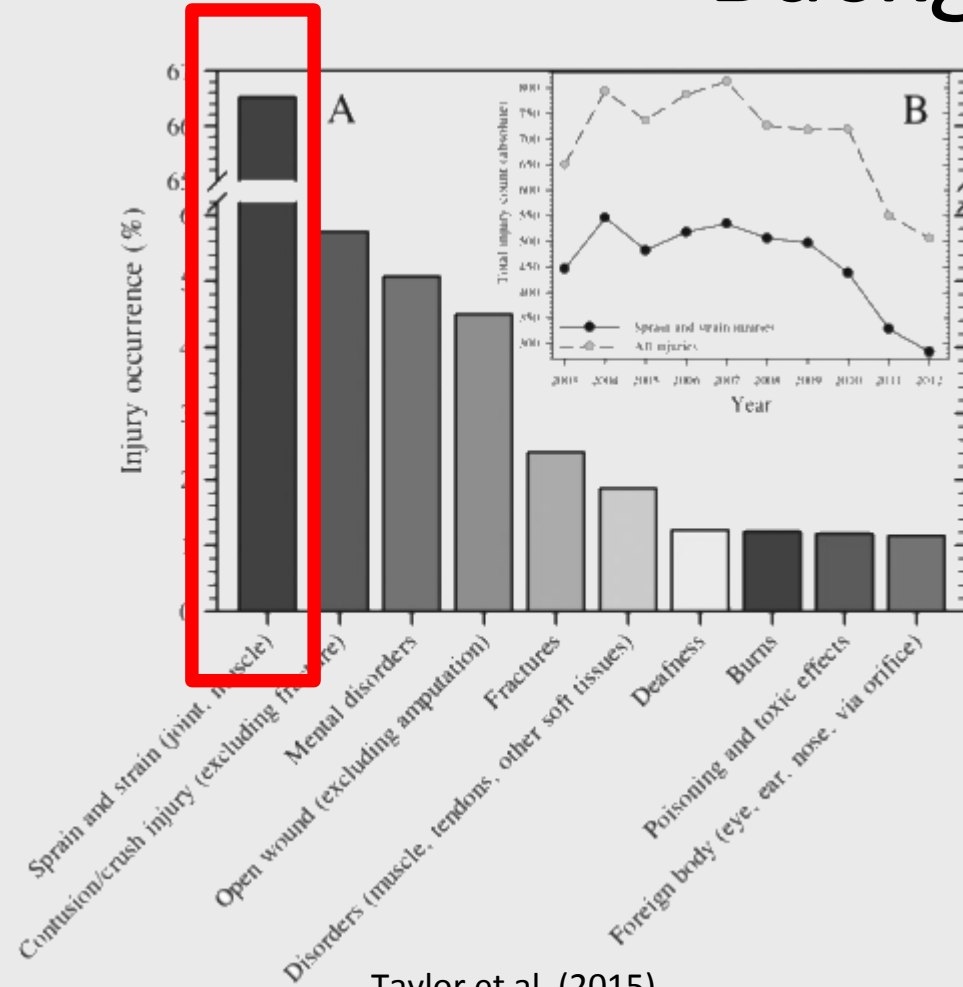
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# Background

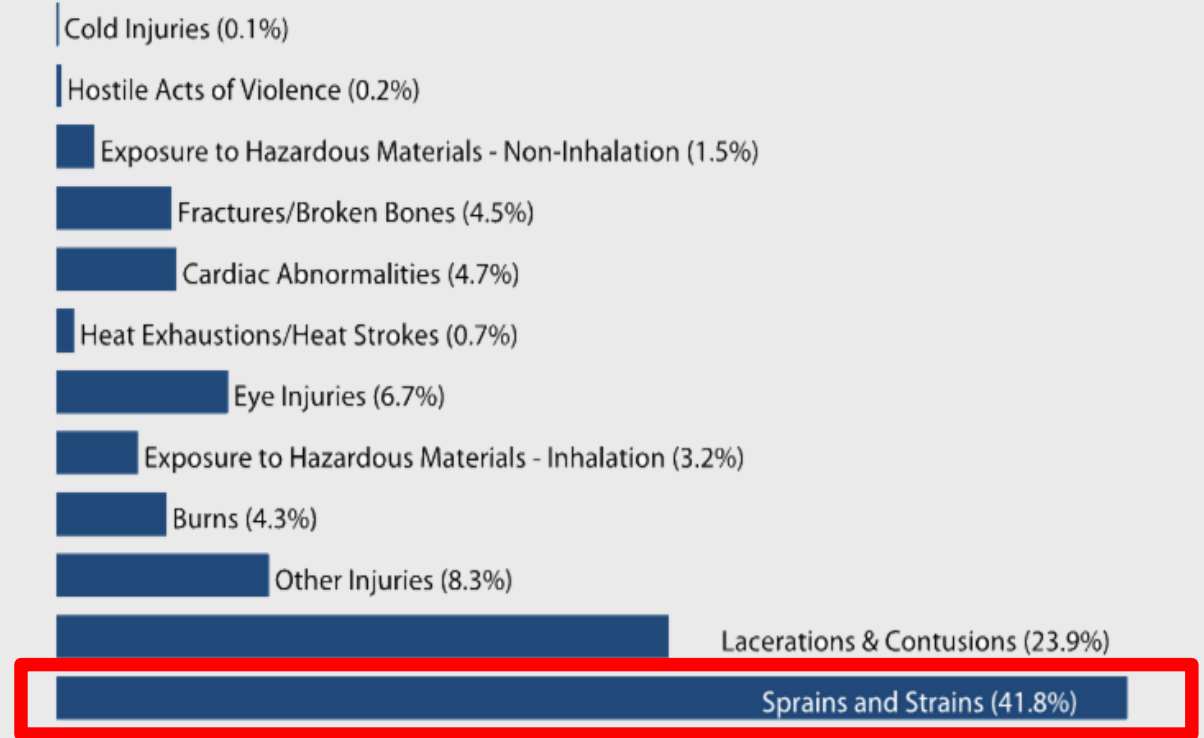
- Previous research has focused on:
  - Epidemiology of workplace injuries in firefighters<sup>1,2,3</sup>
  - Burns and inhalation injuries<sup>4,5</sup>
- Few studies have specifically examined musculoskeletal injuries
- Musculoskeletal issues are a major source of injury to firefighters<sup>1,2,3,6,7,8</sup>



# Background



Taylor et al. (2015)



International Association of Firefighters (2000)



# Purpose

- Describe the extent and nature of the research that informs our understanding of musculoskeletal injuries in firefighters



# Methods

## Step 1: Identifying the research question

1. Epidemiology of musculoskeletal injuries in firefighters
2. Primary or secondary prevention of musculoskeletal injuries in firefighters

## Step 2: Identify Relevant Studies

- Databases searched:

- PubMed, CINAHL, Embase, PsycINFO

- Limits: 'human' and 'English language'

- No limits on year of publication

- MeSH terms and keywords were used in varying combinations with firefighter to capture breadth of the literature



# Methods

## Step 3: Study Selection/Inclusion-Exclusion Criteria

Title/abstract screening and full text screening was performed independently by rotating pairs of two reviewers

- Disagreements were resolved by consensus, with consultation of a third party if required.

### Inclusion criteria

- Primarily about firefighters, and included one of:
- Epidemiology, MOI, primary or secondary prevention of MSK injuries in firefighters, related to job demands

### Exclusion criteria

- Chemical exposure, toxins, autoimmune disease, burns, cancer, smoke inhalation/exposure, mental health, non-occupational outcomes, or outcomes not related to physical health or disability
- Editorials, expert opinion, conference proceedings, annual reports, requests for comment, book chapters, or position statements





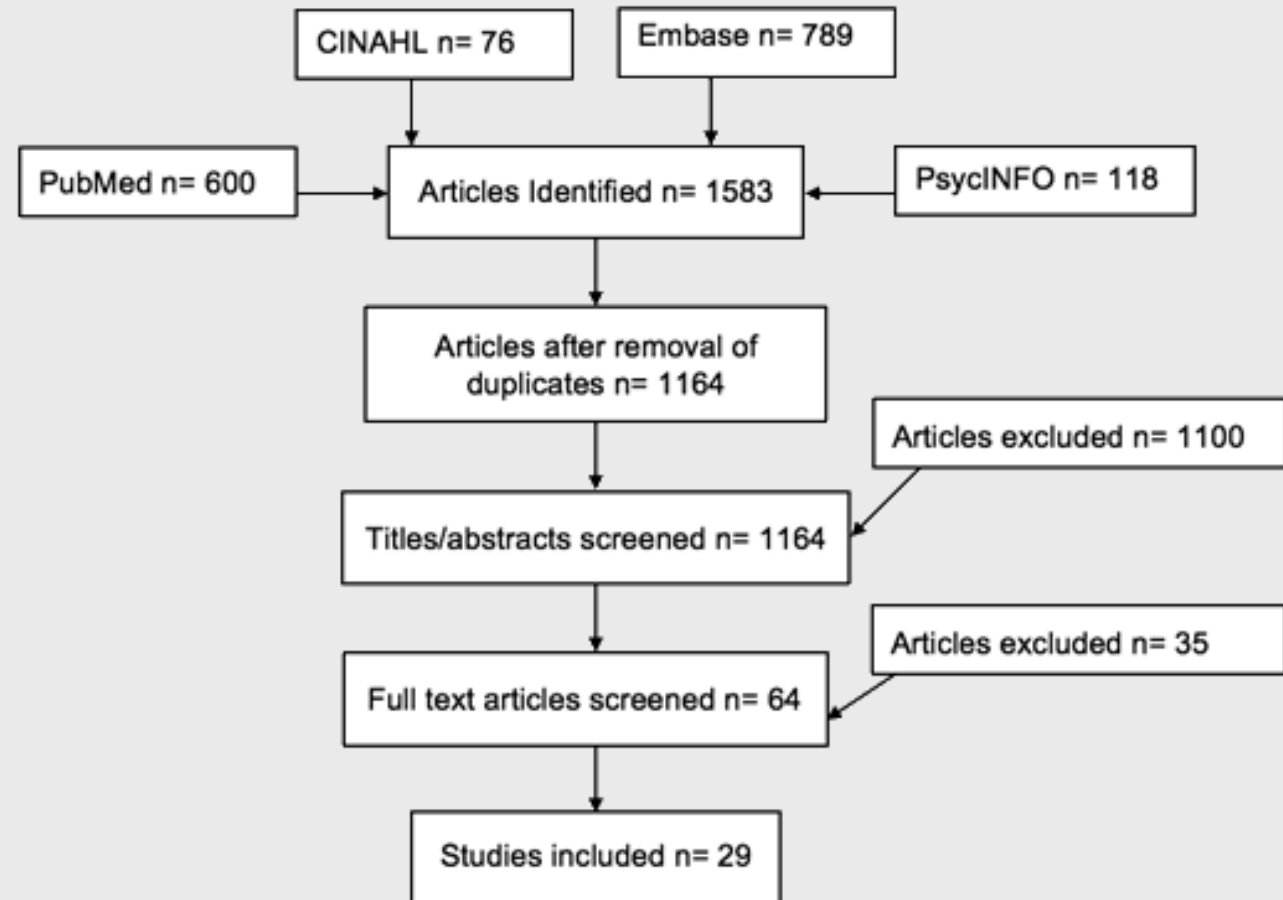
# Methods

- Stage 4: Charting the Data
  - Data extraction was performed independently by rotating pairs of two reviewers
  - ‘Iterative process’
- Stage 5: Collating, Summarizing, and Reporting the Results
  - Researchers independently reviewed results extracted from full text studies for themes
  - Final themes were resolved by consensus



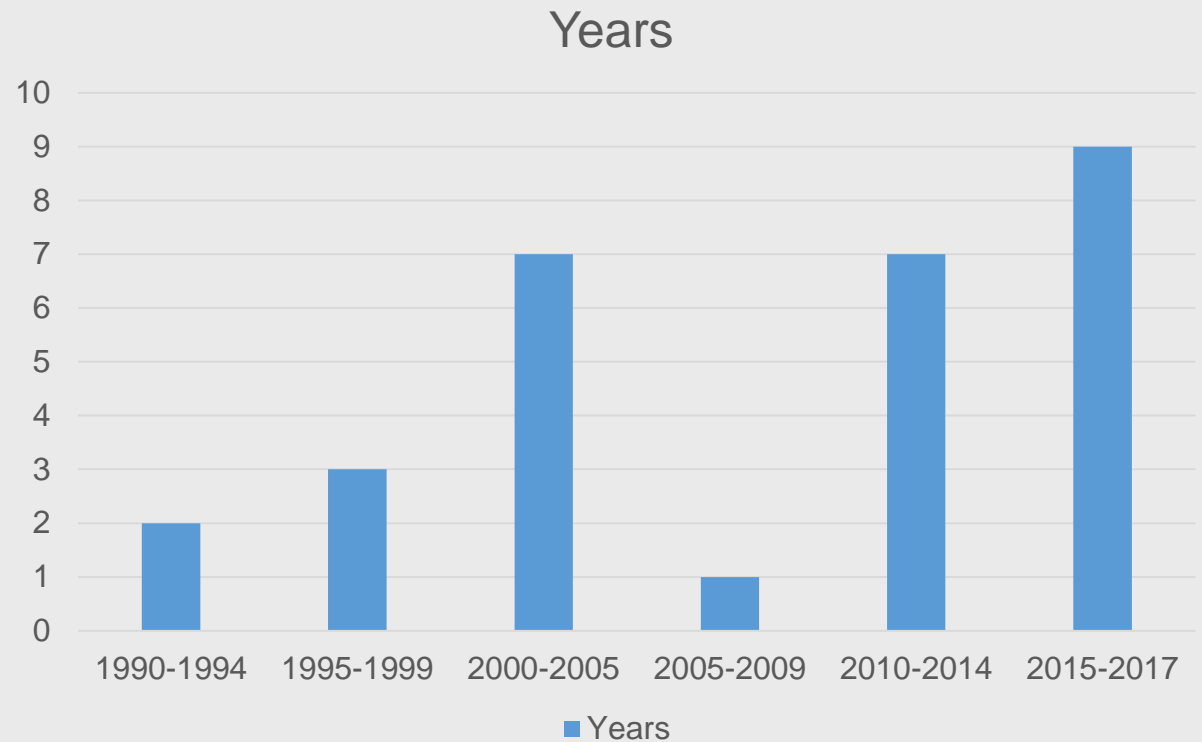
# Results

- Screened 1164 articles
- Included 29 studies



# Results – Study Year

- Studies were published between 1990 and 2016
  - Trend towards more papers being published after 2010
  - 6 papers published in 2016 alone



# Results – Study Types and Designs

- 26 studies investigated epidemiology of firefighter injuries
  - Utilized retrospective cohort (n=15), cross-sectional (n=8), and prospective cohort (n=3) study designs
- 2 studies conducted intervention studies
  - 1 used pre-test post-test with a control group design
  - 1 conducted a prospective non-randomized controlled trial
- 1 study conducted a focus group
  - Utilized a qualitative study design



# Results – Study Demographics

- Sex of the included firefighter samples was stated in 72% of papers (n=21)
  - 11 papers (38% of papers) consisted of both male and female firefighters
  - 10 papers consisted of male firefighters only
- Several papers chose to exclude females in their samples from analysis
  - Due to the small number of females
  - Authors stated that it “limited our ability to make gender-based inferences”<sup>9</sup>
- When females included, they were small percentage of sample
  - Average across studies was 6.8% (ranging from 2% to 19%)



# Results – MSK Injuries

- Only 2 epidemiology papers focused exclusively on MSK injuries
- 23 articles examined MSK injuries as a subset of other injuries, such as burns
  - MSK injuries were the most common injury in 65% (n=15) and the second most common injury in 8.7% (n=2)
  - MSK injuries made up 2% to 91.7% of all injuries, with a mean of 50%



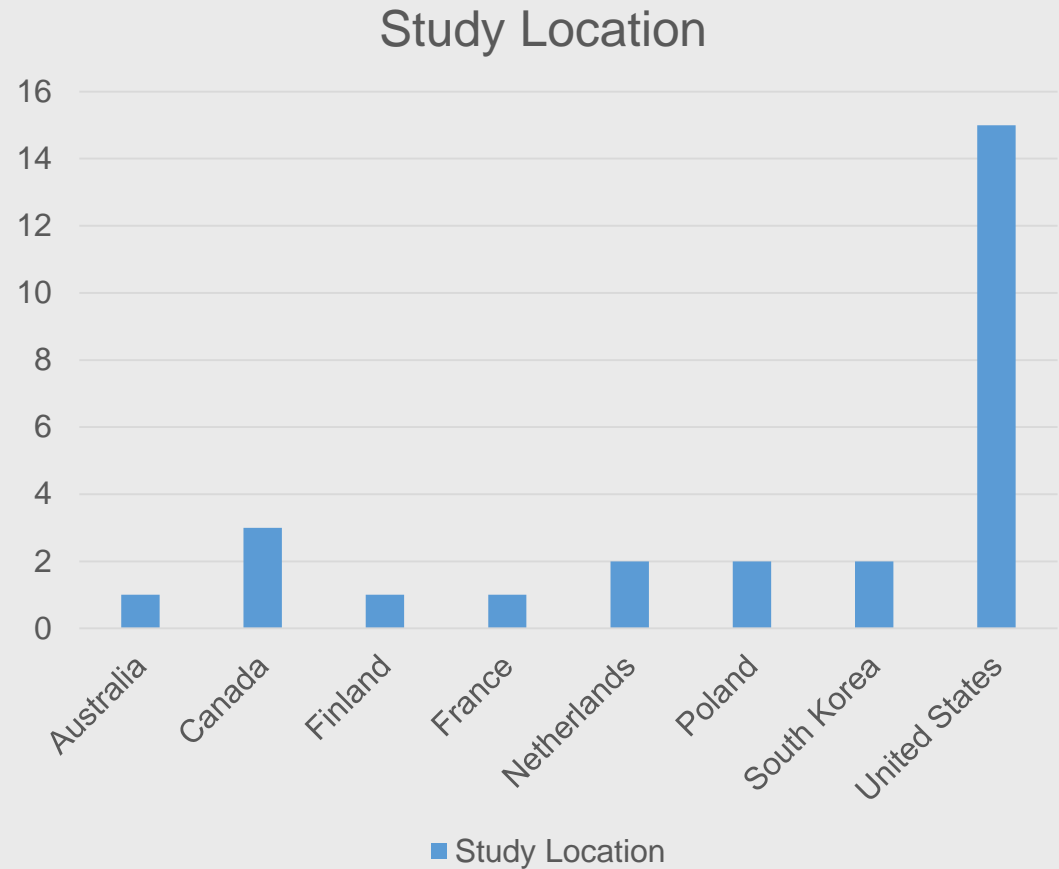
# Results – MSK Injuries

- Most commonly examined MSK injuries were sprains and strains
  - Included in 72% (n=21) of studies
- Next most common MSK injuries were fractures (n=15; 52%) and dislocations (n=10; 34%)
- Only 1 paper included other common MSK injuries, such as tendonitis and muscle tears



# Results – Location

- Majority of research is conducted within the United States (52%)
- Research was also conducted in Australia, Canada, Finland, France, the Netherlands, Poland, and South Korea





# Results – Injuries by Task/MOI

- In 9 epidemiology studies, injuries were quantified by the task or mechanism of injury (MOI)
- Most commonly reported MOI were “slips, trips, and falls” (STF) and “lifting or bending” (LFTB)
  - Both mechanisms were often reported as the main cause of sprains and strains, as well as fractures and dislocations
- 6 epidemiology studies reported injuries by job duty or activity
  - Numerous injuries occurred during physical training
  - 2 studies found that physical training was the cause of the same amount of MSK injuries or more as fire /rescue activities



# Discussion

- Most epidemiology studies use general categories of MSK injuries, such as “strain/sprain”
  - Future epidemiology studies should focus on specific MSK injuries, such as rotator cuff tears, low back pain, etc.
- Current research either excludes female firefighters, or females represent a small percentage of the overall sample size
  - Research investigating the prevalence and type of MSK injuries in female firefighters is needed



# Discussion

- Several studies highlighted a high prevalence of injuries during on-the-job fitness training
  - This highlights a need for further studies examining how and why these injuries are occurring during training
- Only two studies looked at primary prevention
  - There is a clear need for studies with a focus on primary and secondary prevention of MSK injuries in firefighters
- No studies looked at MSK injury interventions in firefighters
  - Randomized controlled trials should be conducted investigating interventions for MSK injuries in firefighters



# Conclusion

- The large majority of existing literature consists of epidemiological studies
- MSK injuries are often only a subset of ‘all injuries’
  - Most studies have not focused on specific MSK injuries
  - Only use broad categories of MSK injuries such as ‘sprains and strains’
- Female FF are often excluded



# Limitations

- Only English literature was searched
- Only published literature was searched
  - No search of grey literature
- Our search may have missed some studies
  - We ran variations of searches to check for missing studies
- Excluded papers which were not specific to FF, yet may have included FF as a small subset of larger samples



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