

Updated Evidence on The Frequency, Severity, and Economic Consequences of Firefighter Musculoskeletal Disorders

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Justice Policy Program

Firefighter Musculoskeletal Disorders

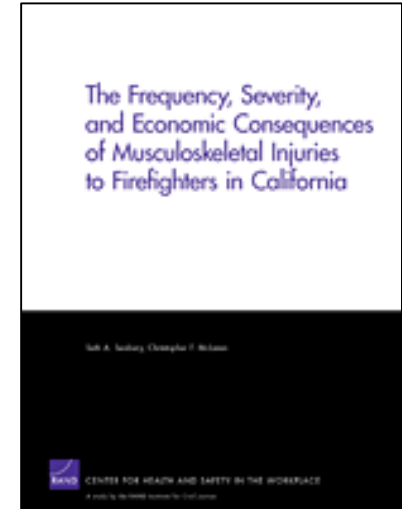
Important to Study for Many Reasons

- Dangerous work
- High physical demands
- Different injury compensation mechanisms
- Critical to resilience in face of California's "new abnormal" wildfire threat



RAND Previously Studied Firefighter Musculoskeletal Disorders in 2010

- MSDs are the most common type of nonfatal injury with days away from work
- RAND's previous study showed
 - Higher rates of MSDs among firefighters
 - Less severe economic consequences
 - Worsening outcomes with age at injury



We Reexamined Firefighter MSDs in Light of Changes in the Labor Market, WC Policy

- A changing economy
 - Great Recession
 - Aging workforce
- Workers' compensation reforms (SB 863)
- Greater awareness of PTSD and other psychiatric sequelae of acute injuries

Overview of Research Questions

- Frequency and case-mix
- Economic consequences
- Disability ratings
- Treatment caps
- Psychiatric comorbidities

We Use Data on WC Claims, Disability Ratings, Earnings, and Medical Treatment

- Extract data on injured workers from databases maintained by DWC and EDD
- Frequency, composition of MSD injuries
 - Study 2005-2018 injuries
- Earnings, benefits, PTSD, medical treatment
 - Study 2005-2015 injuries to capture follow-up

Use WCIS First Report of Injury to Identify Musculoskeletal Disorder Claims

- No consensus definition of MSD in literature
- We define MSD based on nature of injury and body part of injury
- Nature of Injury must be
 - Strain, Sprain, Cumulative Injury NOC, Carpal Tunnel Syndrome, Inflammation, Hernia, Dislocation, or Rupture
- **and** Body Part of Injury must be
 - Extremities, Neck, or Trunk (excl. fingers/toes/internal organs)
- Sensitivity analysis: use diagnosis codes on medical claims

We Use Occupation Titles to Identify Active Firefighters in WCIS Claims

- E.g: Firefighter; Fire Engineer; Fire Equipment Operator; Fire Lieutenant; Battalion Chief
- Include firefighters and first-line supervisors
- Include municipal and wildland firefighters
- Exclude: Volunteers; Inmates; Dispatchers; Mechanics; Arson Investigators; Fire Inspectors

Firefighter Job Demands, Labor Relations Differ Sharply from Most Other Jobs

- High physical, psychosocial job demands
- Public-sector employees
 - Low turnover/rigorous hiring practices
 - Heavily unionized
 - Retirement/disability pension coverage
- Public safety worker benefits (LC §4850)

Compare Firefighters to Police, Other Public Employees, and Similar Private-Sector Jobs

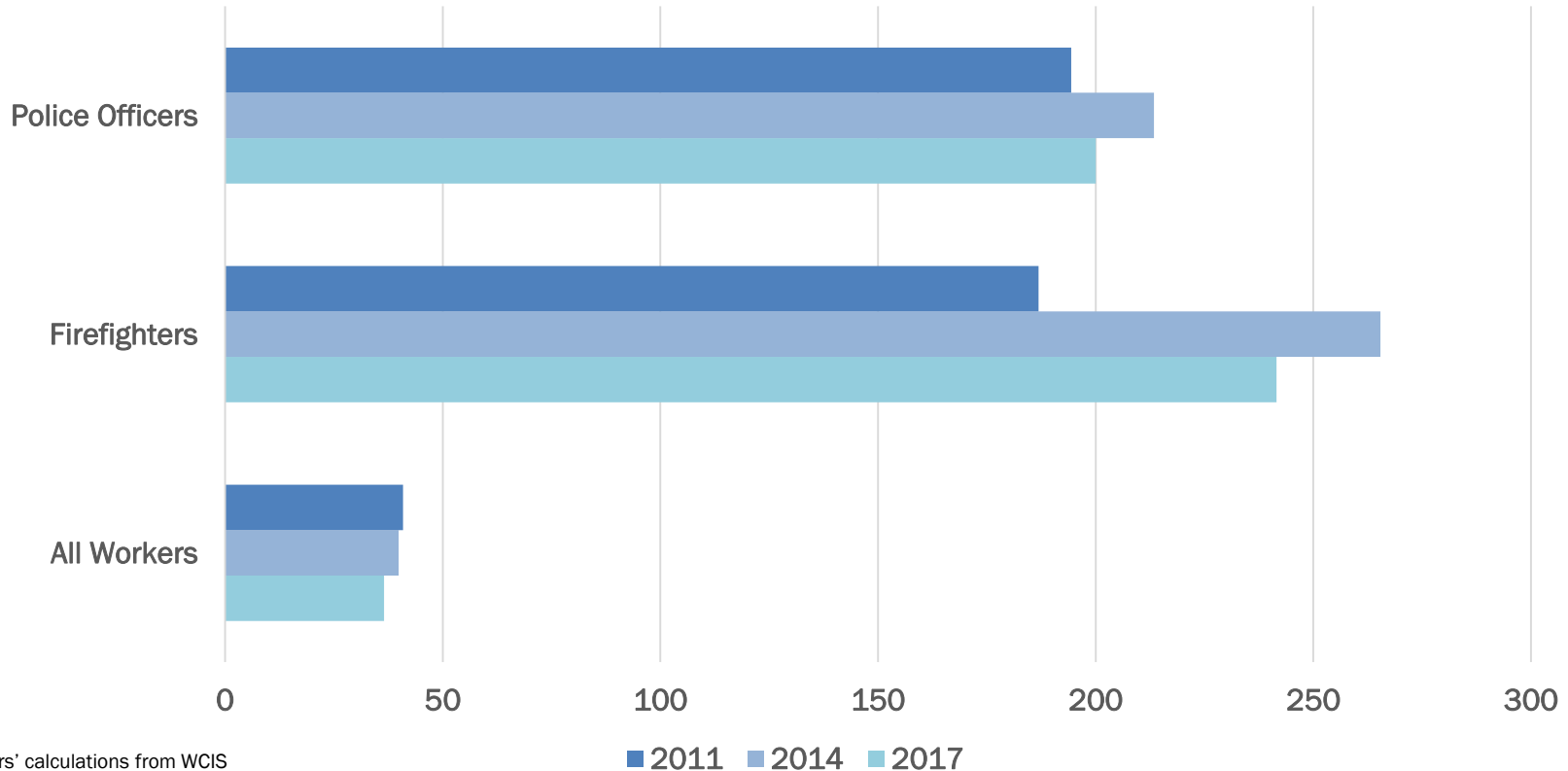
	Active Firefighters	Active Police	Other Public-Sector Workers	Private-Sector Comparison Group
High Job Demands	Y	Y		Y
Public-Sector Employees	Y	Y	Y	
Public Safety Workers	Y	Y		

Overview of Research Questions

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Firefighters Have Higher Frequency of Injuries

Number of Injuries Per 1,000 Workers

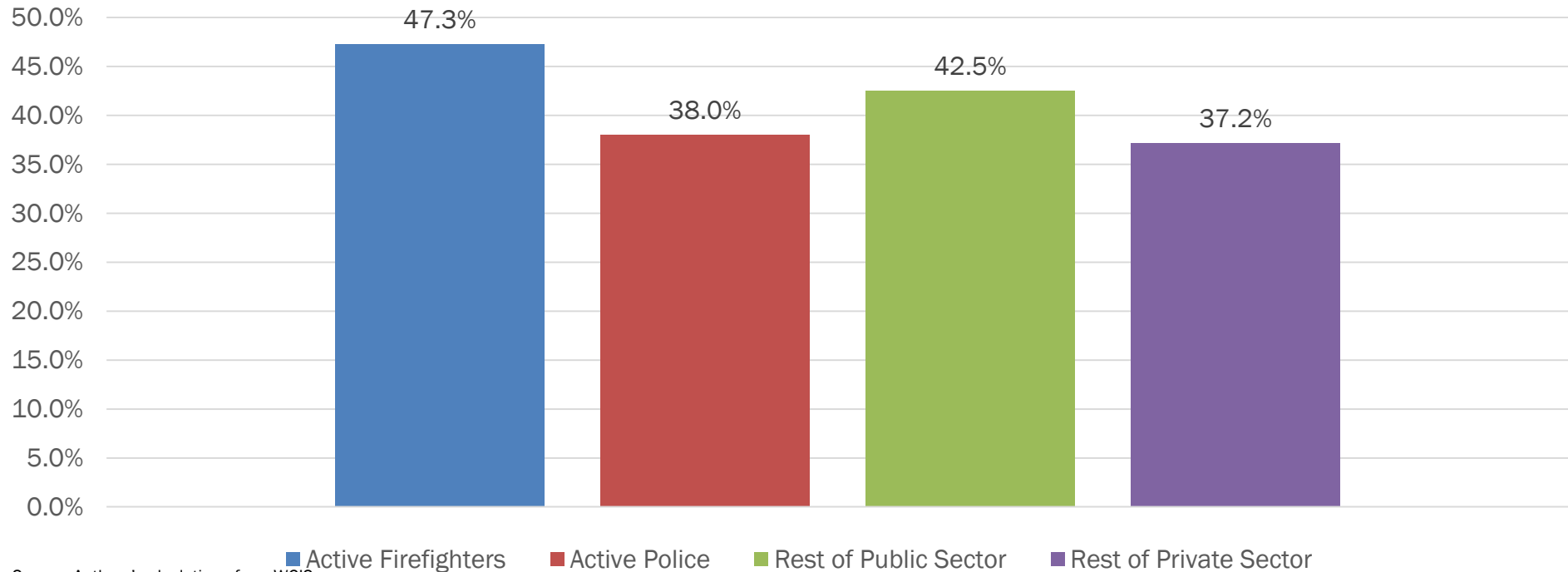


Source: Authors' calculations from WCIS
Employment figures come from BLS Occupational Employment
Statistics

Preliminary Results: Not for Distribution

Nearly Half of Firefighter Injuries are MSDs

% of Injuries That Are MSD by Occupation

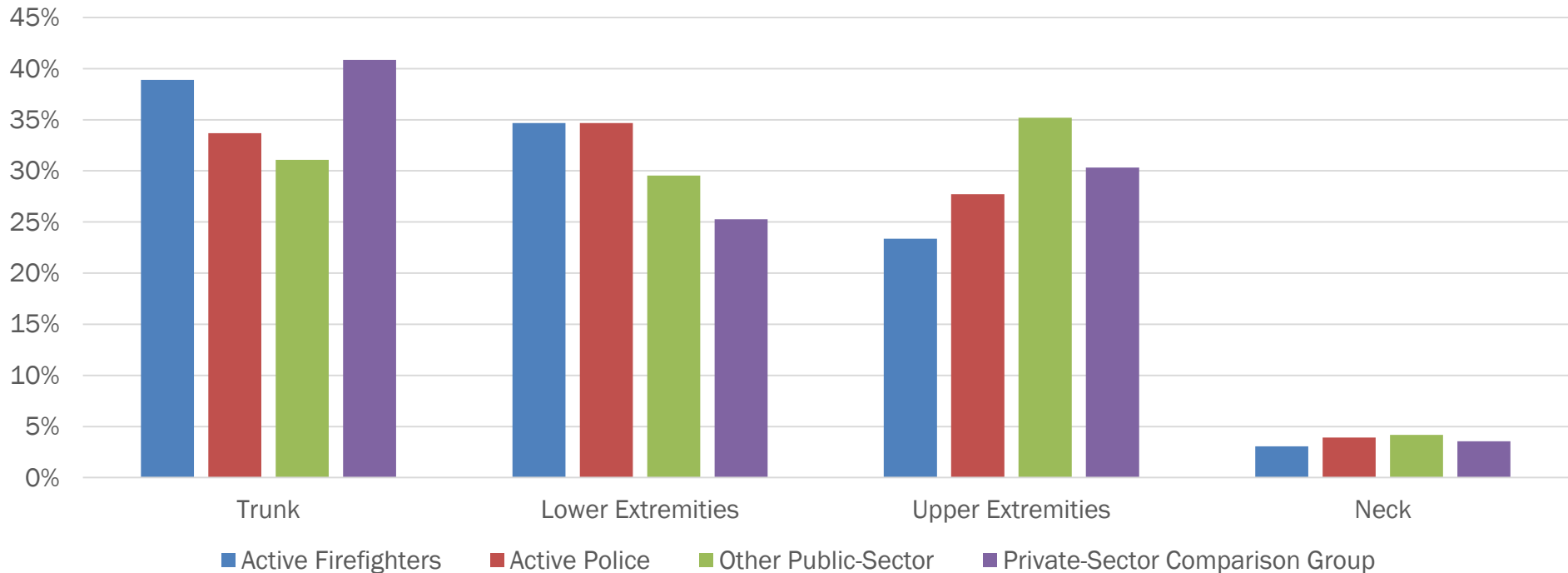


Source: Authors' calculations from WCIS

Preliminary Results: Not for Distribution

Firefighter MSDs are Concentrated in the Trunk and Lower Extremities

Body Part of Injury Among MSD, by Occupation

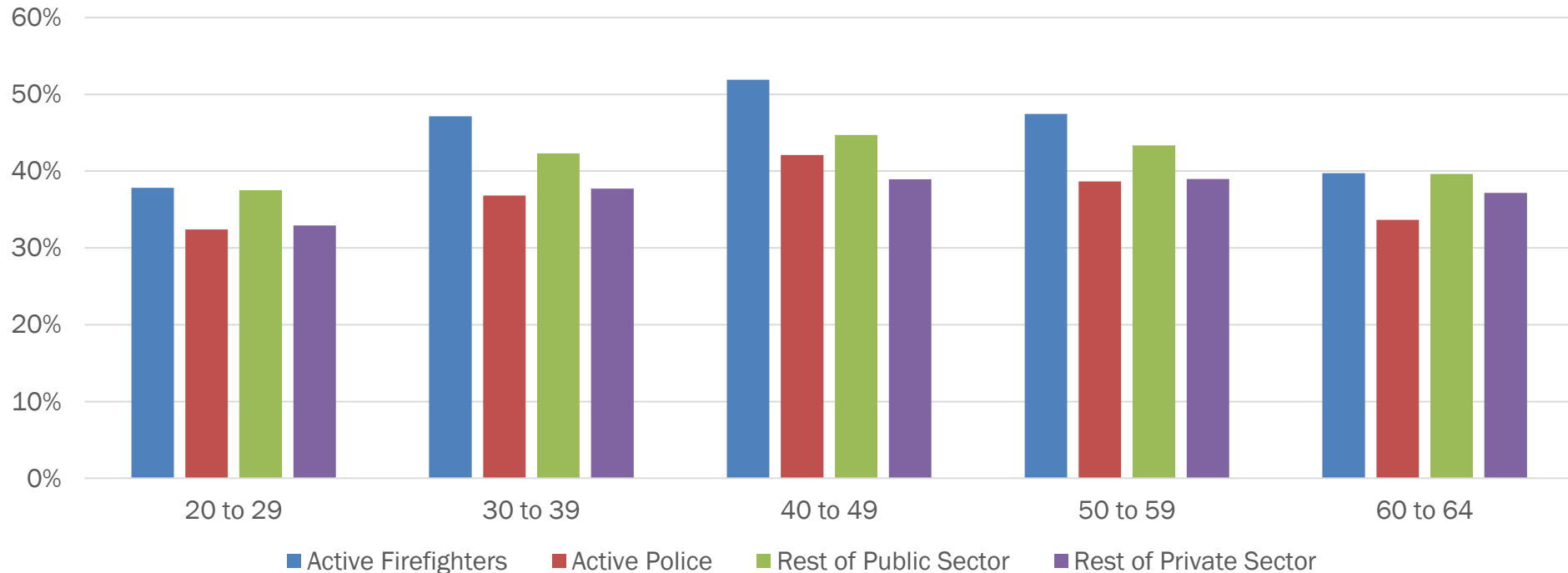


Source: Authors' calculations from WCIS

Preliminary Results: Not for Distribution

MSDs Are More Common for Firefighters Across the Age Distribution

% of Injuries That are MSD by Age at Injury and Occupation



Source: Authors' calculations from WCIS

Preliminary Results: Not for Distribution

Overview of Research Questions

- Frequency and case-mix
- **Economic consequences**
- Disability ratings
- Treatment caps
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We Focus on Earnings Loss to Measure Economic Consequences of Injury

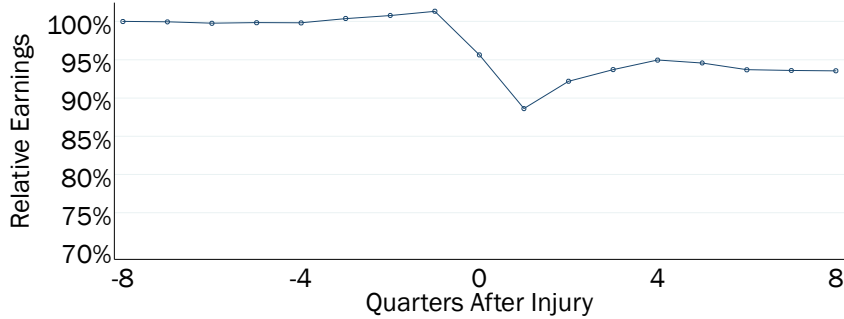
- Earnings loss is difference between
 - what worker actually earns after injury
 - what worker would have earned without injury
- Need control group to isolate impact of injury from other earnings dynamics
 - Layoff, retirement, non-work disability, etc.

Earnings Loss Estimation Methods

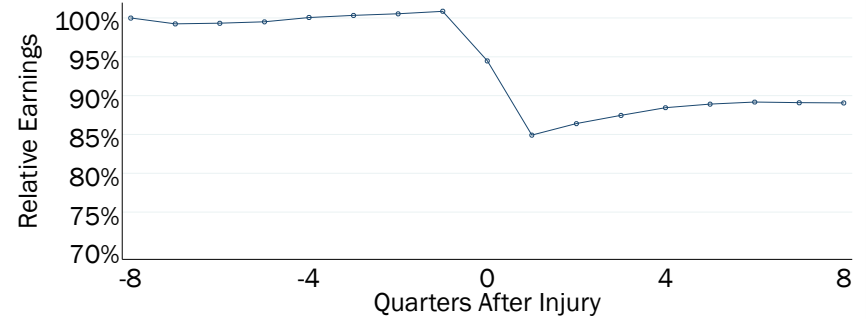
- Main estimates follow past RAND studies and use uninjured co-workers as control group
- Workers at same employer with same earnings and job tenure, but no injury claim
- Use medical-only cases to study age differences
- Additional analysis to address impact of §4850

Difference between Injured Control Earnings After Injury Provides Estimate of Loss

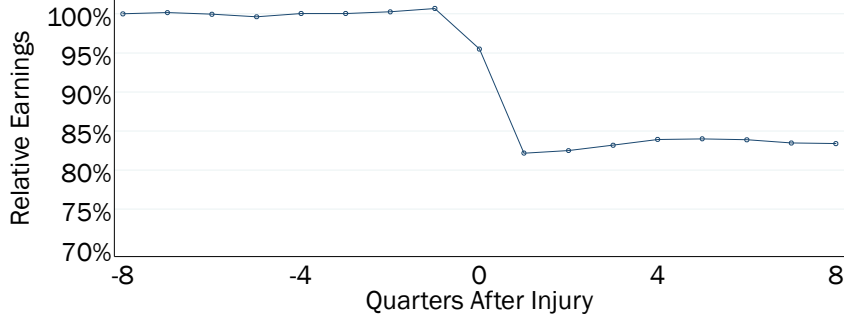
Active Firefighters



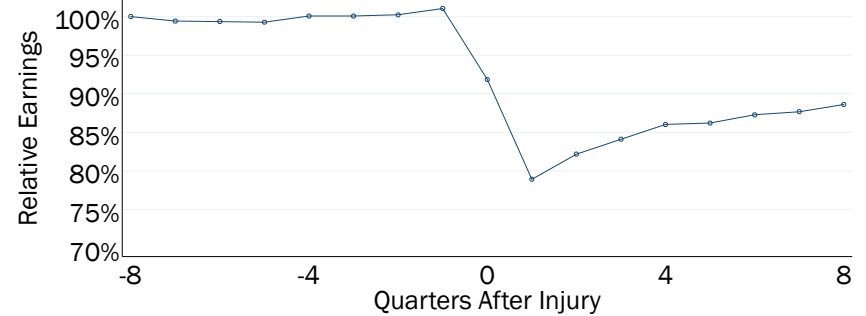
Active Police



Rest of Public Sector



Rest of Private Sector



Earnings and Employment by Occupation for 2005-2015 MSD Indemnity Claims

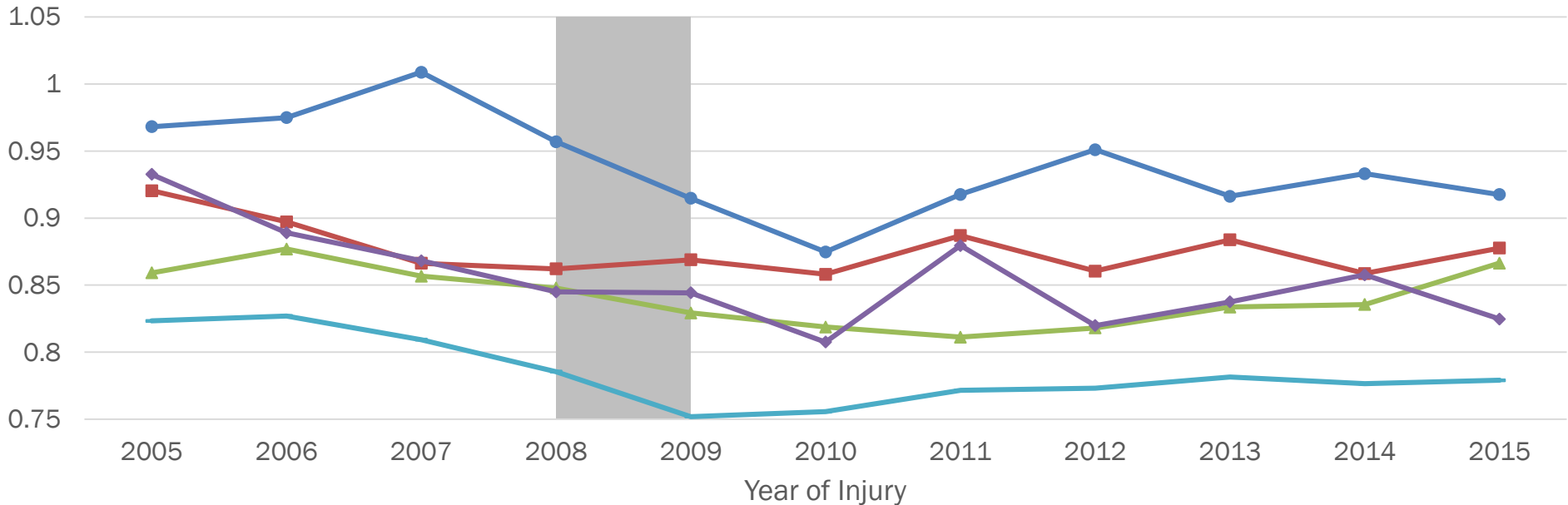
	Active Firefighters	Active Police	Other Public-Sector	Private-Sector Comparison
Earnings (\$)				
1 Year Pre-Injury	\$118,927	\$60,655	\$56,861	\$64,429
1 Year Post-Injury	\$108,970	\$51,600	\$47,333	\$51,672
2 Years Post-Injury	\$110,937	\$51,614	\$47,098	\$52,062
Relative Earnings				
1 Year Post-Injury	92%	85%	83%	81%
2 Years Post-Injury	95%	88%	85%	87%
Relative At-Injury Employment				
1 Year Post-Injury	97%	86%	90%	80%
2 Years Post-Injury	95%	82%	87%	75%
Sample Size	7,995	21,637	84,652	5,251

Source: authors' calculations, 2005-2015 MSD indemnity injuries in WCIS-EDD data

Preliminary Results: Not for Distribution

Firefighter Outcomes Declined Sharply During Great Recession and Recovered Only Partially

Relative Earnings Over Two Years After Indemnity MSD Injury, by Occupation



Earnings Declined for Firefighters, But Remained Above Other Occupations

	Active Firefighters	Active Police	Other Public-Sector	Private-Sector Comparison
All Years (2005-2015)	94.7%	87.7%	84.0%	85.9%
Pre-SB863 (2005-2012)	95.5%	87.9%	83.8%	86.6%
Post-SB863 (2013-2015)	92.2%	87.4%	84.6%	83.9%

Relative earnings over two years after indemnity MSD injury

Source: authors' calculations, 2005-2015 indemnity injuries in WCIS-EDD data

Preliminary Results: Not for Distribution

Overview of Research Questions

- Frequency and case-mix
- Economic consequences
- **Disability ratings**
- Treatment caps
- Psychiatric comorbidities

SB 863 Raised PD Benefits and Modified Ratings, but Restricted Add-on Impairments

- Maximum weekly PD benefit raised from \$230 to \$290 per week
- FEC multiplier set to maximum (1.4) for all impairments
- Secondary (add-on) impairments eliminated
 - Psychiatric; Sleep disorders; Sexual dysfunction

We Use 2005-2015 Injuries Rated at DWC's Disability Evaluation Unit (DEU)

Sample Size by Injury Date for DEU Rating Analysis
Ratings Performed within 33 Months After Injury

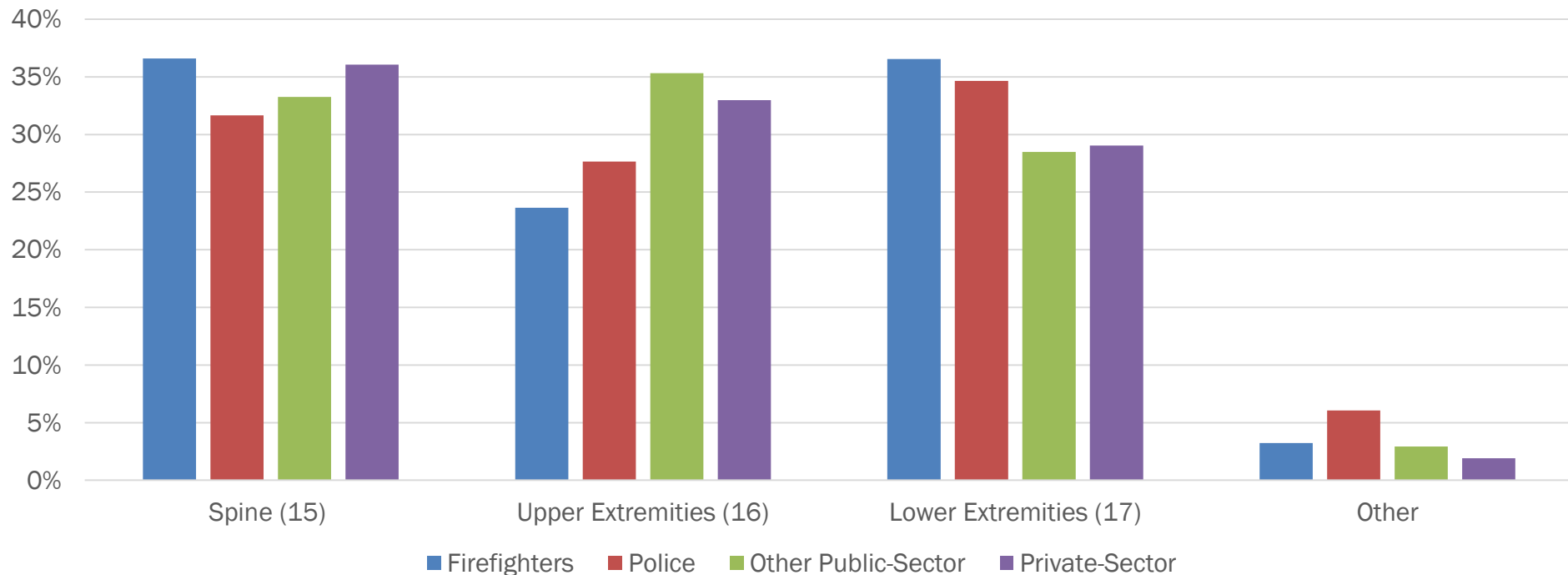
Injury Date	Firefighters	Police	Other Public Sector	Private Sector	Total
2005-2012	2,405	5,326	18,986	1,128	27,845
2013-2015	652	1,375	4,056	235	6,318
2005-2015	3,057	6,701	23,042	1,363	34,163

Firefighters Have Far Fewer Consult Ratings at DEU, Requiring Adjustment for Rating Type

	Firefighters	Police	Other Public-Sector	Private Sector
Consult Average	24.3	22.1	20.5	23.5
Summary Average	12.6	11.3	11.0	12.3
% Consult Ratings	24%	41%	35%	44%
Unweighted Average	15.4	15.8	14.4	17.3
Adjusted for Rating Type	15.4	13.9	13.3	14.9

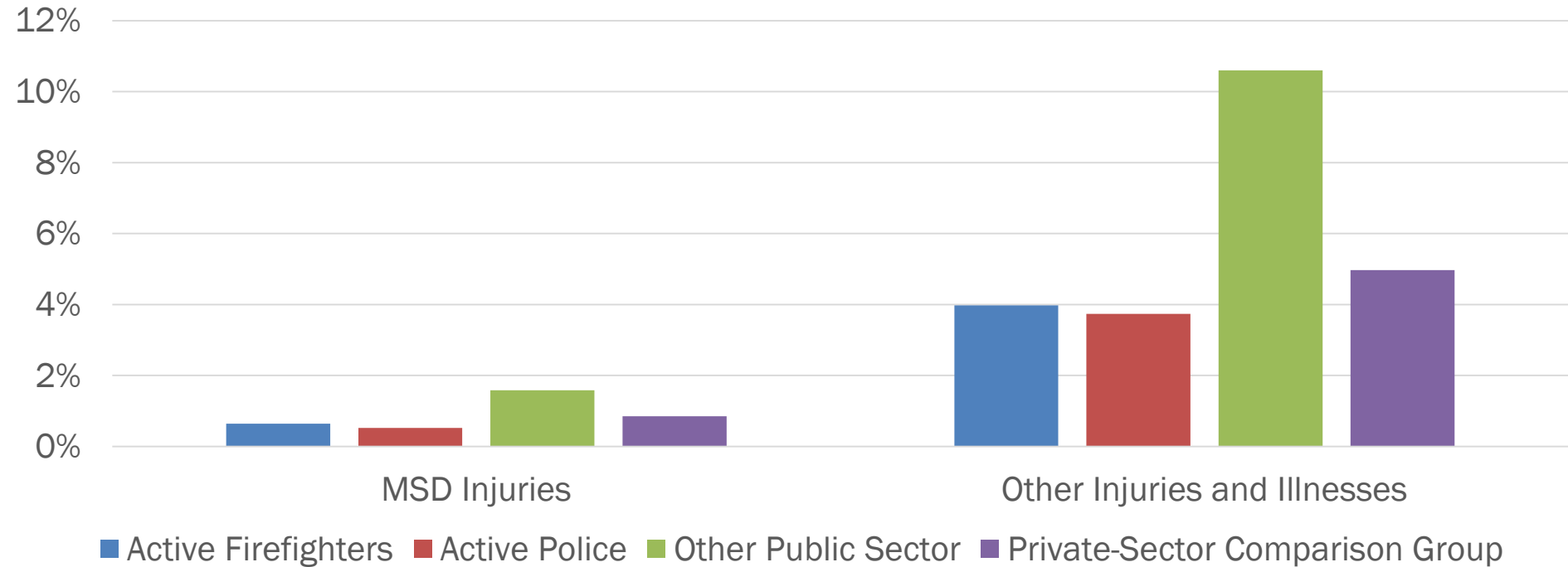
Firefighters More Likely to Have Spine or Lower Extremities as Highest-Rated Body Part

Body System of Highest-Rated Impairment in MSD Injuries



Psychiatric Impairments Infrequently Rated with Primary MSD Injuries in All Occupations

Share of DEU-Rated Cases with Any Rated Psychiatric Impairments

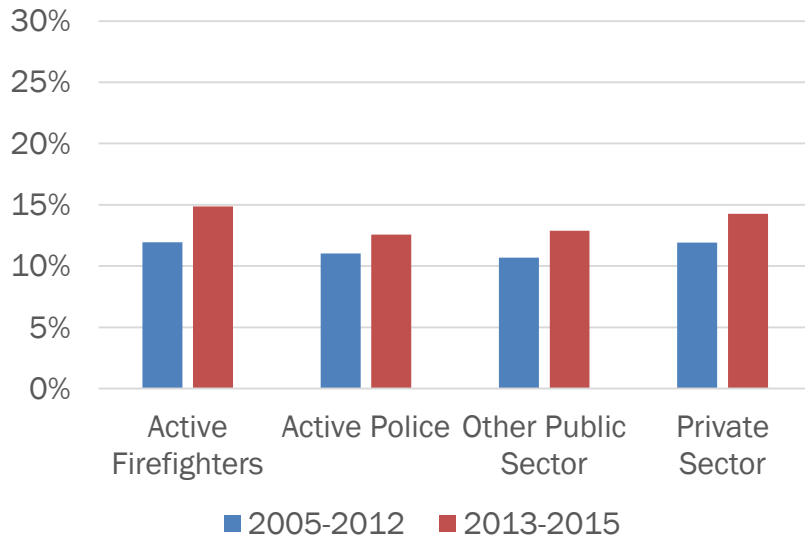


Source: Authors' calculations, DEU ratings with linked WCIS data, 2005-2015 injuries rated ≤ 1005 days after injury. June 28

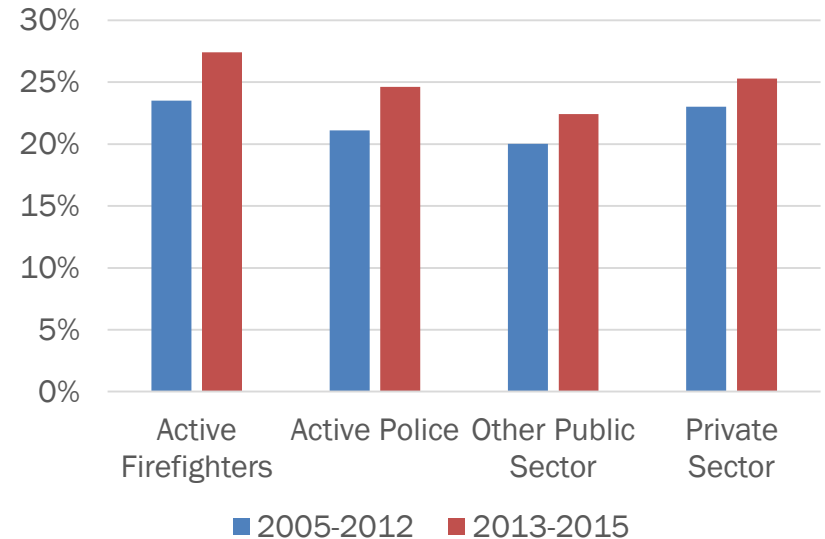
Preliminary Results. Not for Distribution

Firefighters, Other Occupations, Received Higher Ratings After SB 863

Average Final Rating by Injury Date, MSD Summary Ratings



Average Final Rating by Injury Date, MSD Consult Ratings

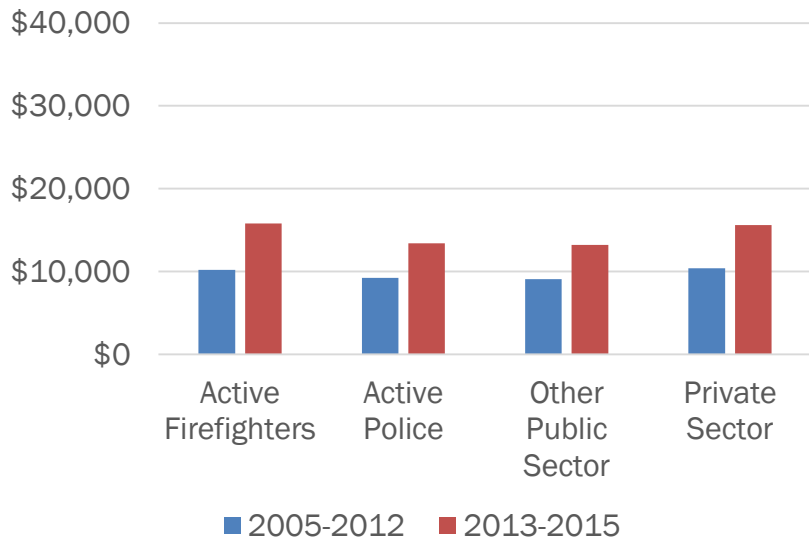


Source: Authors' calculations, DEU ratings with linked WCIS data, 2005-2015 MSD injuries rated <= 1005 days after injury. Figure reports final ratings after apportionment.

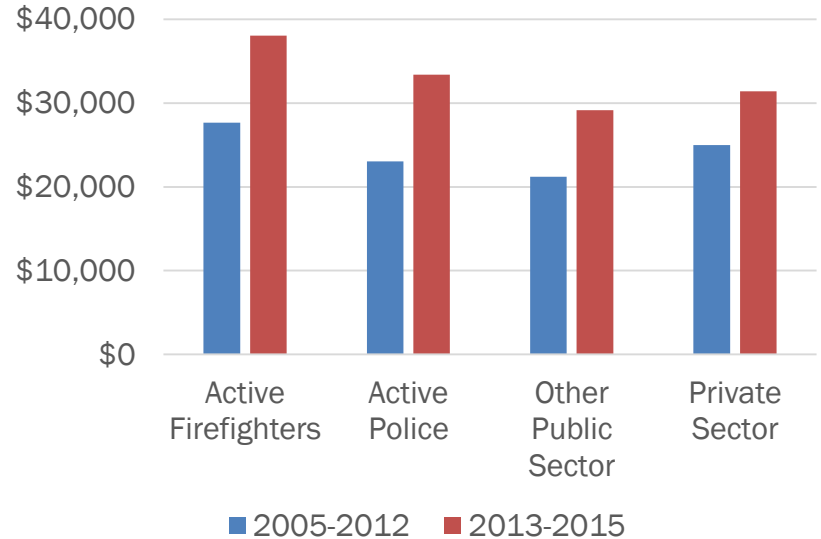
Preliminary Results: Not for Distribution

Statutory Benefits Increased After SB 863

Statutory Benefits by Injury Date, MSD Summary Ratings



Statutory Benefits by Injury Date, MSD Consult Ratings



Source: Authors' calculations, DEU ratings with linked WCIS data, 2005-2015 MSD injuries rated ≤ 1005 days after injury. Benefits calculated at statutory maximum wage using final rating after apportionment.

Overview of Research Questions

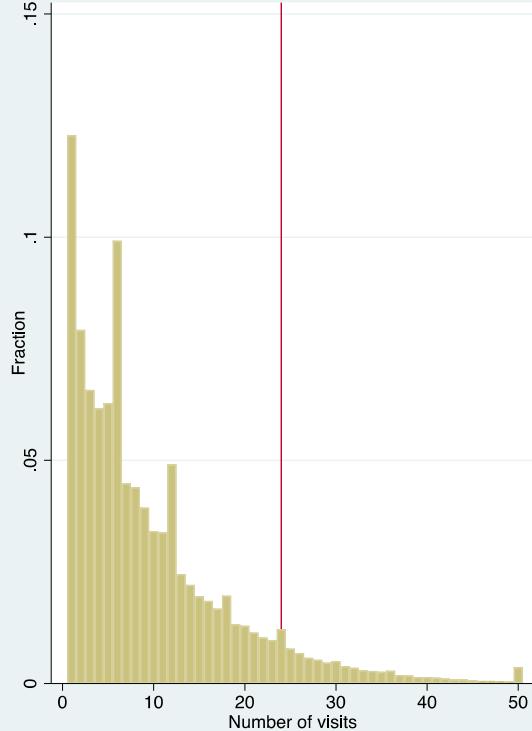
- Frequency and case-mix
- Economic consequences
- Disability ratings
- **Treatment caps**
- Psychiatric comorbidities

Are the SB 228 Visit Caps Affecting Treatment Patterns for MSD Cases?

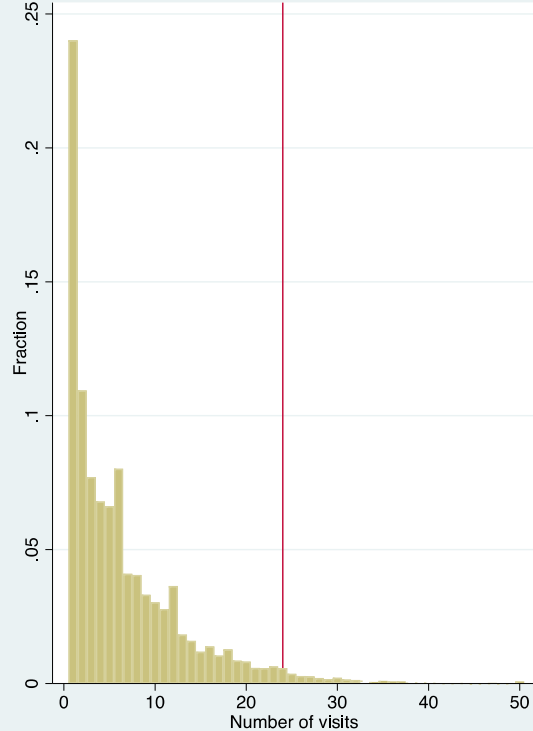
- LC §4604.5(d) imposes a cap of 24 visits for
 - Chiropractic
 - Physical Therapy
 - Occupational Therapy
- Authorization by employer required to exceed cap
- Early evidence showed sharp reductions in spending, average visits on capped services

Visit Counts Suggest that Cap Affects Relatively Few Workers

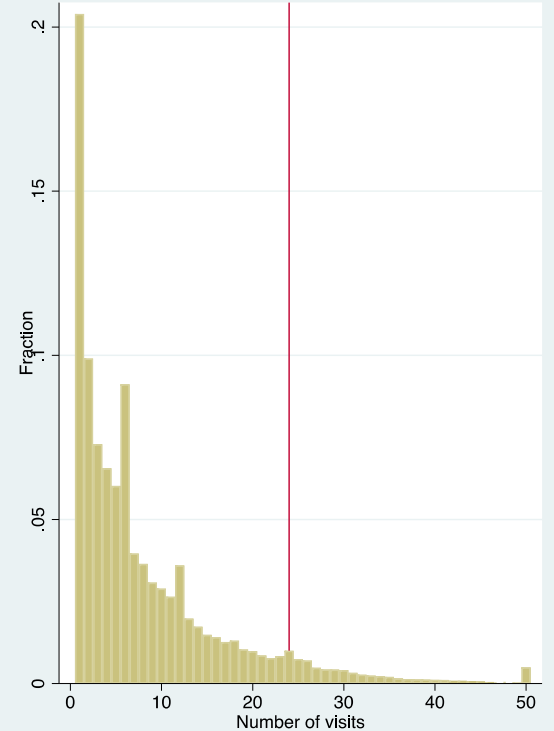
Total Physical Therapy visits in 12 months
MSD Cases with Indemnity Benefits and 1+ Visits



Total Occupational Therapy visits in 12 months
MSD Cases with Indemnity Benefits and 1+ Visits



Total Chiropractic visits in 12 months
MSD Cases with Indemnity Benefits and 1+ Visits



Preliminary Results: Not for Distribution

Overview of Research Questions

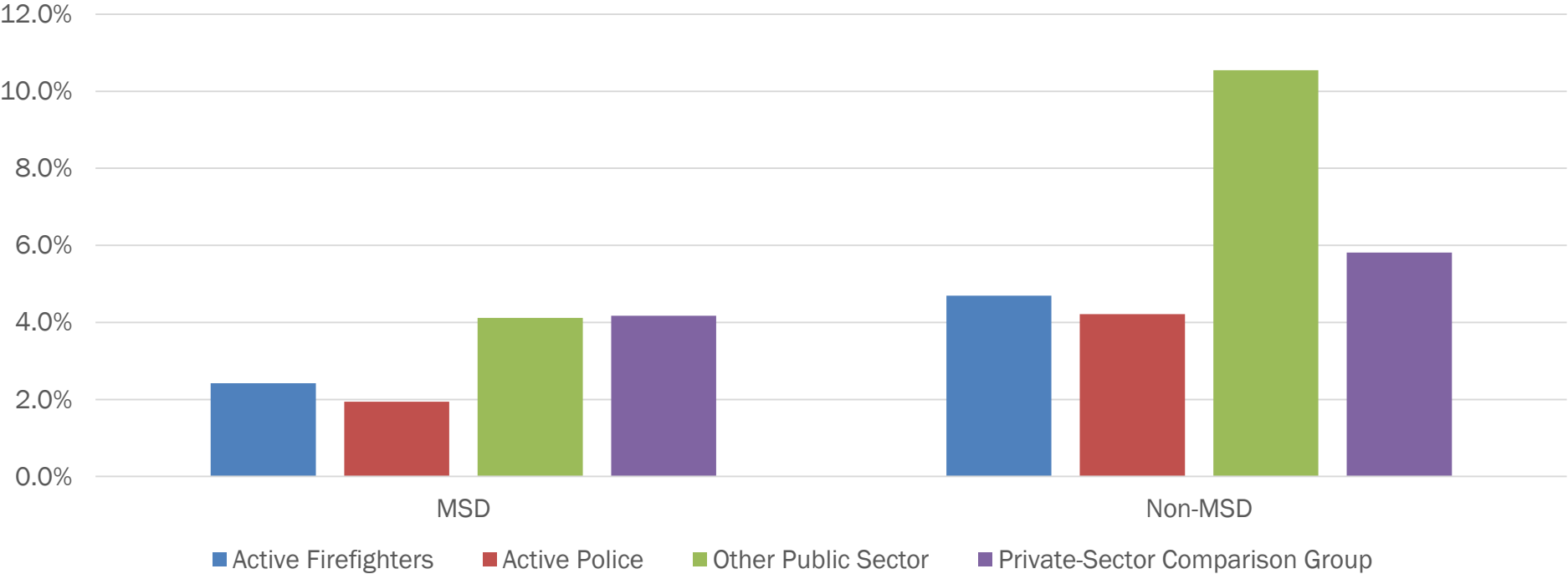
- Frequency and case-mix
- Economic consequences
- Disability ratings
- Treatment caps
- **Psychiatric comorbidities**

We Used Medical Claims to Estimate the Incidence of PTSD, Other Psychiatric Distress

- Psychiatric distress following MSD unlikely to be captured in WCIS First, Subsequent Reports of Injury
- Examine medical claims up to 2 years post-injury
- Any diagnosis codes for mental disorders?
 - PTSD, physical signs of PTSD, other mental disorders
- Any prescribed psychiatric medications?
 - Antidepressants or antipsychotics

Based on Medical Claims, Firefighters, Police Have Lower Psychiatric Condition Incidence

Psychiatric Condition Incidence by Occupation and MSD vs. Non-MSD



Conclusions

- Work-related musculoskeletal disorders remain more common among firefighters than for workers in similar occupations in the public, private sectors
- Economic outcomes worsened during Great Recession and have not fully recovered
- Yet economic consequences for firefighters remain less severe than observed in similar occupations
- SB 863 increased ratings and statutory benefits

Policy Implications

- Prevention efforts needed to reduce MSDs in firefighters
- Psychiatric claims, impairment ratings more common on non-MSD claims than on MSD claims
- Restriction of psychiatric add-ons had limited impact on firefighters with MSD; incidence was already very low
- Lower rates of psychiatric conditions consistent with reports of stigma among public-safety workers

Active Police Defined Using Similar Approach

- Use O*Net job titles, occupations reported in class 7720 (Police/Sheriffs–not volunteers)
- Refine further using class codes
- E.g: Police Officer; Security Officer; Police Sergeant; Deputy Sheriff; Police Detective
- Exclude: Correction Officers; Animal Control; Fish & Wildlife Officers

Other Public-Sector Workers Identified Using Class Codes

- Use class codes specifically indicating municipal, state, public agency employment
 - E.g., 9410, 9420, 8875, 8868, 7580, etc.
- E.g: Teacher; Correctional Officer; Custodian; Registered Nurse; Teacher Aide; Public Agency Employee; Bus Driver; Maintenance Worker
- Exclude workers classified as active fire/police

Compare to Private-Sector Workers with Job Demands Most Similar to Firefighting

- DOL O*Net survey measures job demands
- Workers across all US occupations asked to rate their job on how often different job demands or activities occur
- Compare responses to 55 questions for all occupations
- Choose 25 occupations with closest match to firefighting
- Ranking on physical demands only yields similar results

Selected Job Demands on which Firefighting Differs from Average US Occupation

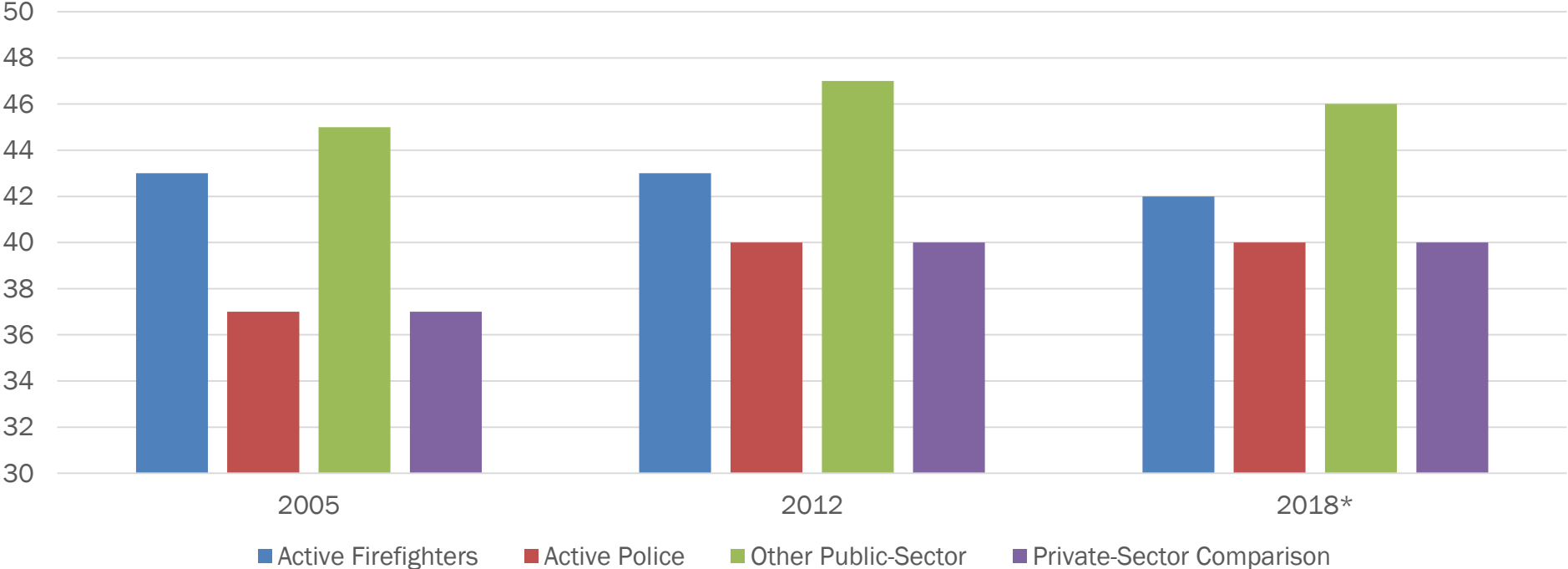
- Interpersonal relationships
 - Deal with physically aggressive people
 - Responsible for others' health and safety
- Physical work conditions Outdoors, Exposed to Weather
 - Exposed to disease or infections
 - Wear specialized protective or safety equipment
 - Outdoors, exposed to weather
- Structural job characteristics
 - How serious [are consequences of] a mistake that was not ... correctable?
 - How do decisions ... impact results of co-workers, clients or the company?
 - Level of competition

Private-Sector Comparison Group Uses Top 25 Occupation Matches Excluding Fire and Police

1. Municipal Fire Fighting and Prevention Supervisors
2. Fire Investigators
3. Forest Firefighters
4. Emergency Medical Technicians and Paramedics
5. Forest Fire Fighting and Prevention Supervisors
6. Control and Valve Installers and Repairers, Except Mechanical Door
7. Telecommunications Line Installers and Repairers
8. Transit and Railroad Police
9. Hydroelectric Plant Technicians
10. Electrical and Electronics Repairers, Powerhouse, Substation, and Relay
11. Pilots, Ship
12. Sheriffs and Deputy Sheriffs
13. Weatherization Installers and Technicians
14. Police Identification and Records Officers
15. Commercial Divers
16. First-Line Supervisors of Police and Detectives
17. Industrial Safety and Health Engineers
18. Elevator Installers and Repairers
19. Mates- Ship, Boat, and Barge
20. Ambulance Drivers and Attendants, Except Emergency Medical Technicians
21. Refrigeration Mechanics and Installers
22. Septic Tank Servicers and Sewer Pipe Cleaners
23. Millwrights
24. Commercial Pilots
25. Occupational Health and Safety Technicians

Age at MSD Injury Among Firefighters Has Held Steady As Other Occupations Have Aged

Median Age at Injury by Year of Injury and Occupation



Source: authors' calculations, 2005-2018 injuries in WCIS data; * through October

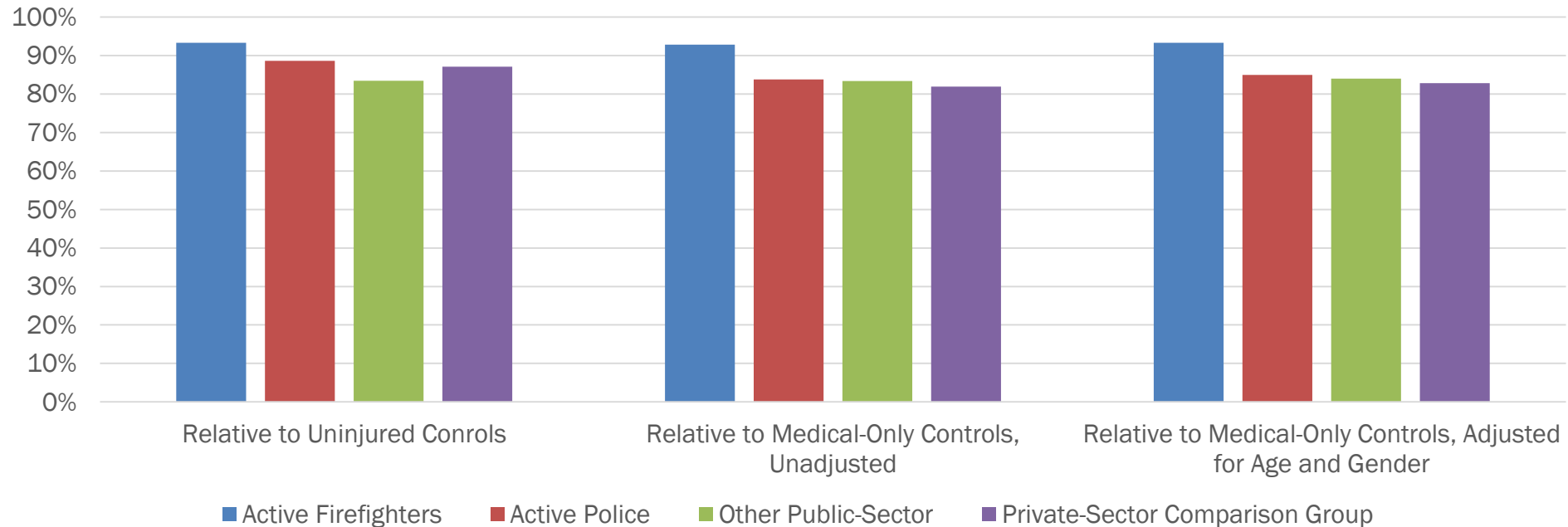
Preliminary Results: Not for Distribution

Do Demographic Differences for Firefighters Drive Results?

- Compare indemnity injuries to medical-only injuries instead of uninjured controls
- Adjust for age, gender, cause of injury
- Compare average earnings losses by occupation
- Compare earnings loss by age group

Earnings Loss Differences Across Occupations Not Driven by Demographics

Relative Earnings Over Two Years After Indemnity MSD Injury by Occupation, With vs. Without Adjustment for Demographics

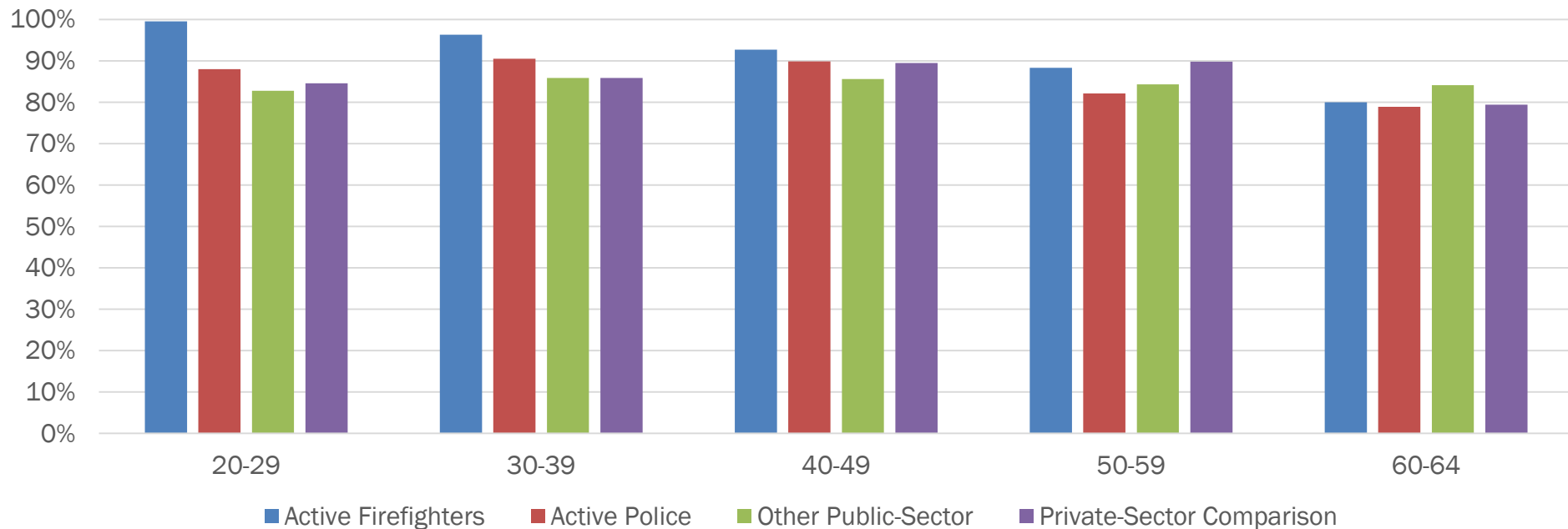


Source: authors' calculations, 2005-2015 injuries in WCIS-EDD data

Preliminary Results: Not for Distribution

Firefighter Earnings Losses Less Severe Than Comparison Groups Until Age 60

Adjusted Relative Earnings Over Two Years After Indemnity MSD Injury by Age and Occupation

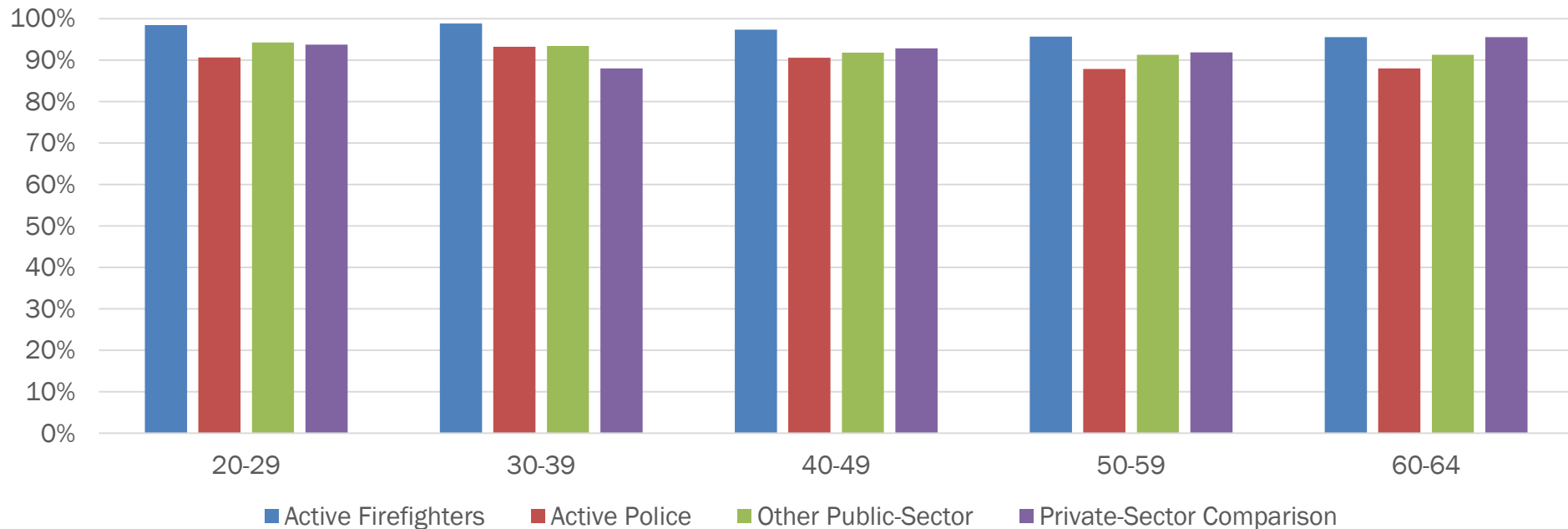


Source: authors' calculations, 2005-2015 injuries in WCIS-EDD data

Preliminary Results: Not for Distribution

Higher Return to Work Likely Contributes to Better Outcomes for Firefighters

Adjusted Return to Work at Same Employer Two Years After Indemnity
MSD Injury, by Age and Occupation



Source: authors' calculations, 2005-2015 injuries in WCIS-EDD data

Preliminary Results: Not for Distribution

Accounting for §4850 Time

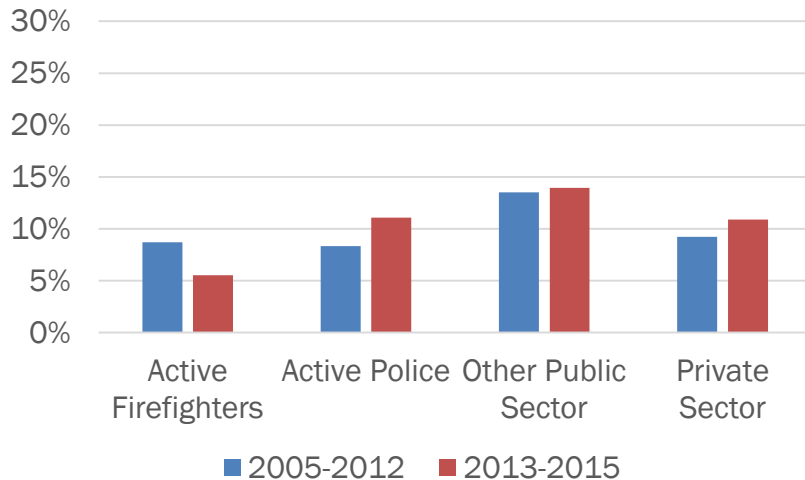
- LC §4850 provides public safety workers additional benefits after workplace injury
 - 1 year of leave at full salary, tax-exempt
 - In lieu of temporary disability payments
 - TTD benefits begin after 1 year
- Reported to WCIS as Employer Paid
- We count §4850 cases as indemnity injuries

§4850 Reporting Practices May Not Be Uniform Across All Jurisdictions

- Some may report to EDD as earnings
- Some may not report to WCIS
- To assess robustness, repeated analysis
 - For second-year earnings (after 4850 time limit)
 - Using lower-severity medical-only cases as controls
- Findings very similar to those reported above

Apportionment Has Increased on Consult Ratings, But Not Summary Ratings

Share of Cases with Any Apportionment Applied, MSD Summary Ratings



Share of Cases with Any Apportionment Applied, MSD Consult Ratings

