THURSDAY, JUNE 2ND

UPDATES FROM NIOSH

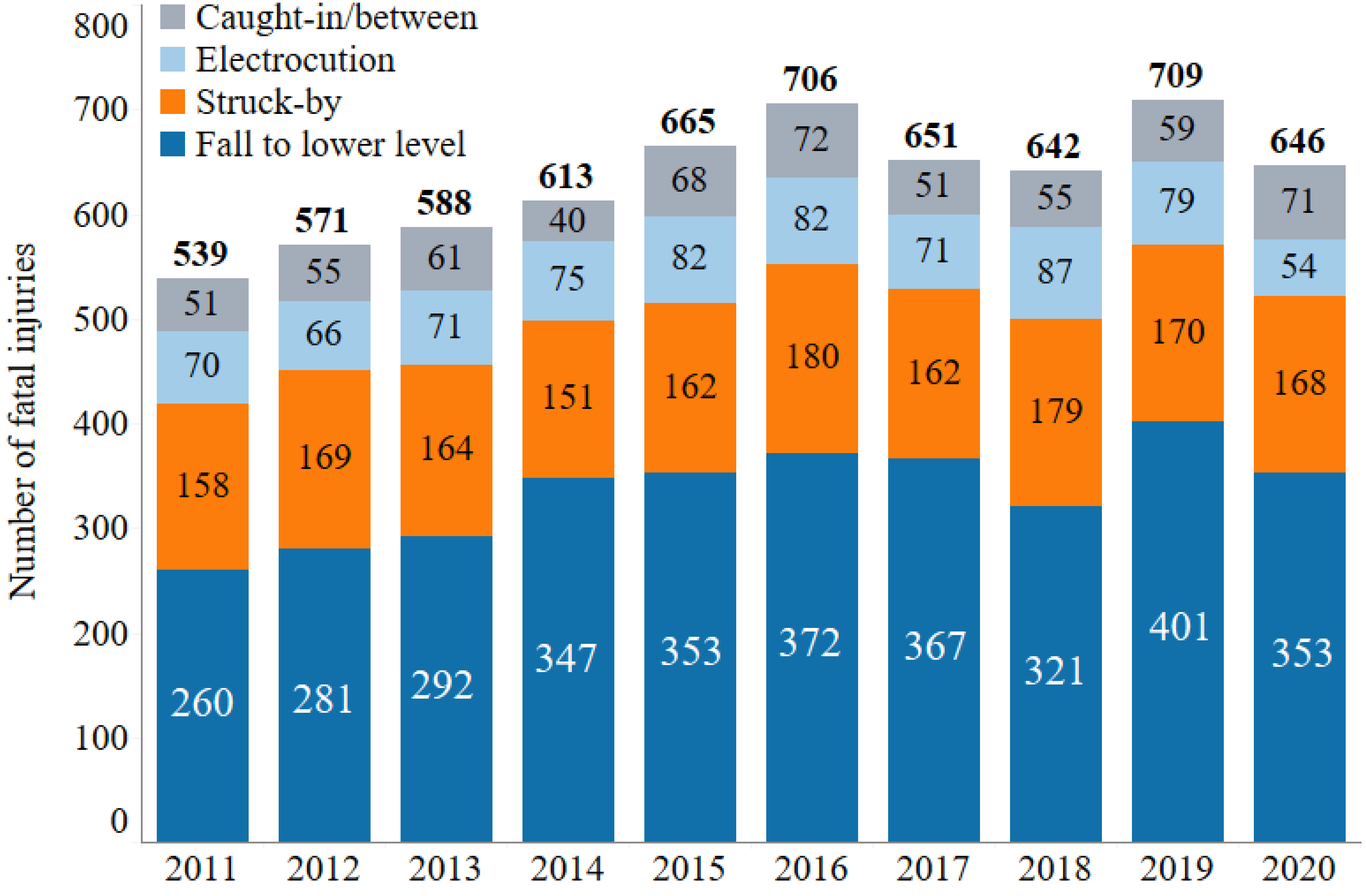
NIOSH Construction Program Update

Scott Earnest, PhD, PE, CSP
Director, NIOSH Office of Construction Safety and Health
Manager, NORA Construction Sector

NIOSH Office of Construction Safety & Health

June 2022

Number of fatal injuries caused by Construction Focus Four, 2011-2020



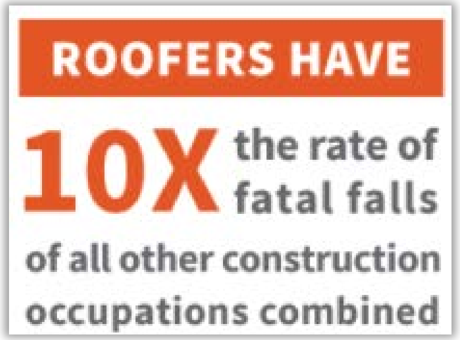
Source: U.S. Bureau of Labor Statistics. 2011-2020 Census of Fatal Occupational Injuries.

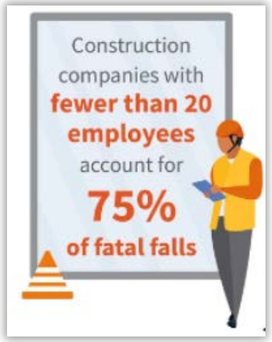
NORA Construction Involvement with 2 National Safety Stand Downs

STOP. TALK. ACT.

April 11-15

FALLS





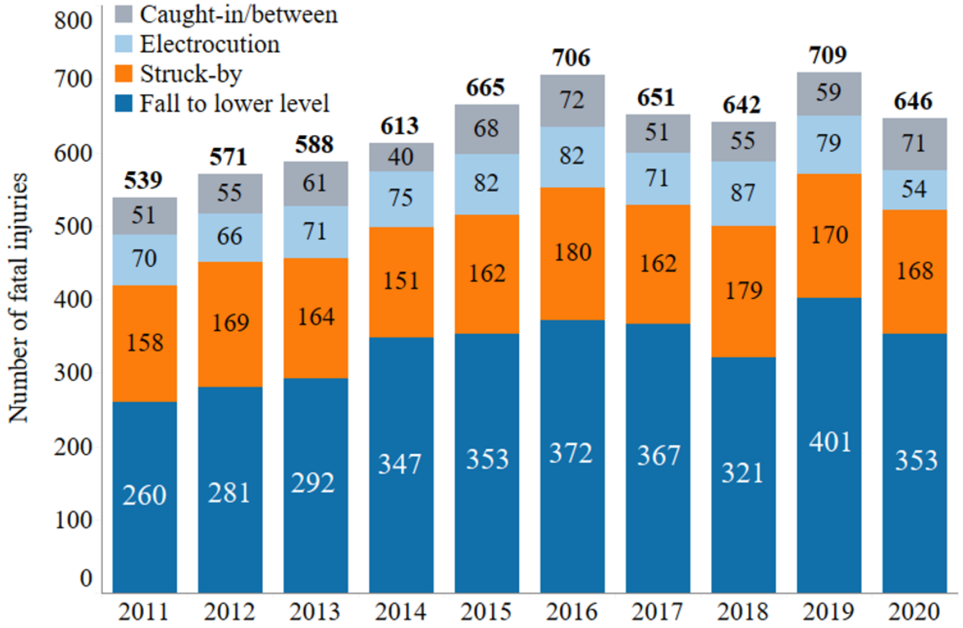
2022

- 10-Year Anniversary of National Campaign to Prevent Falls in Construction
- 9th National Stand-Down to Prevent Falls
- Focus on outreach to most at-risk
  - Small residential contractors, immigrant (Hispanic), roofer
  - [Other Languages | Stop Construction Falls]
  - En español (coming) NIOSH Construction YouTube Playlist

2021

- 5 NIOSH NORA Falls videos published in 2021
- [CDC Construction Safety & Health YouTube Playlist]
- [CPWR Fall Hazards & Prevention YouTube Playlist]

Number of fatal injuries caused by Construction Focus Four, 2011-2020



Source: U.S. Bureau of Labor Statistics. 2011-2020 Census of Fatal Occupational Injuries.

2011 2012 2013 2014 2015 2016 2017 2018 2019

Source: U.S. Bureau of Labor Statistics, Census of Fatal Occupational Injuries.

[http://stopconstructionfalls.com/]

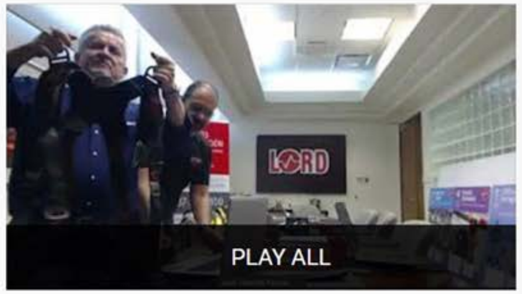
[https://www.osha.gov/stop-falls-stand-down]

FALLS

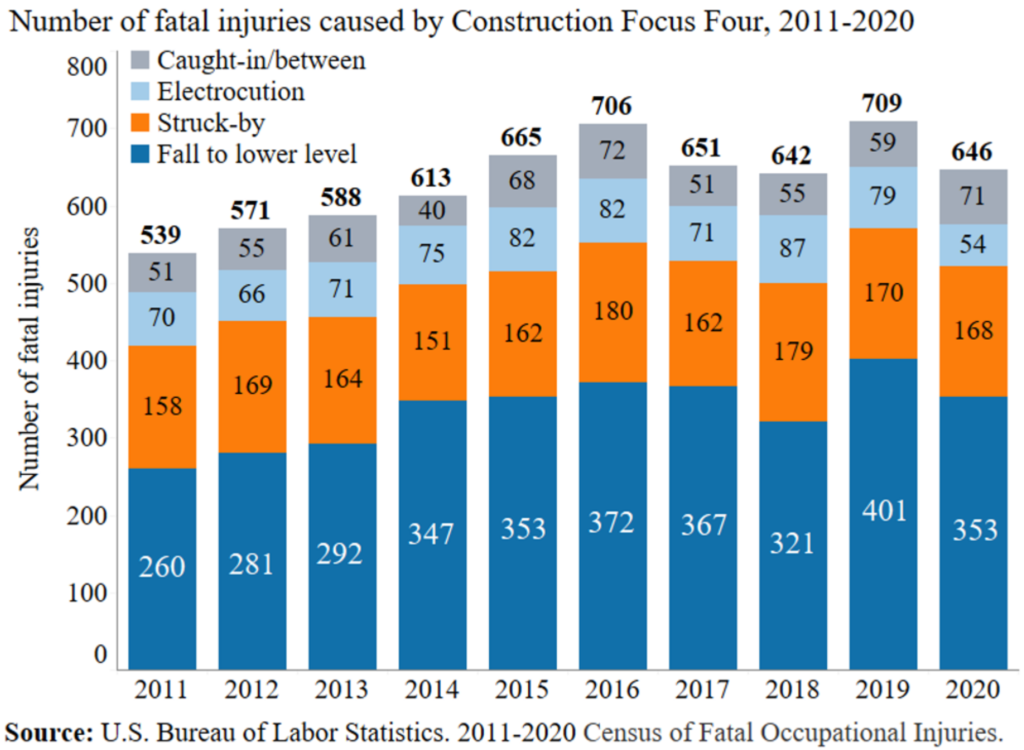
The urls:

- [CDC Construction Safety & Health (en español) – YouTube Playlist]
- **CPWR Spanish language fall prevention playlist:** https://youtube.com/playlist?list=PLuzTg2wYpXWXBW96Ak_Wi4EySZ-hDzKm9

"De eso vivo, la construcción – de lo que hacemos, para mí es muy valioso que no haya accidentes."



Prevención de caídas



Construction Safety & Health (en español)

http://stopconstructionfalls.com/

https://www.osha.gov/stop-falls-stand-down

Implementation

- Infographics, factsheets, flyers, posters, data bulletins
- Toolbox talks, hazard alert cards
- Spot the Hazard sheets
- Hard Hat Stickers
- Op ed release, press releases, media
- Mobile app
- How-to guide, planning tools
- Video Testimonials
- Social media resources
- Science blogs, Webinars, Podcasts

2014 Launched 1st National Stand-Down

https://stopconstructionfalls.com/

http://www.osha.gov/StopFallsStandDown

https://www.cdc.gov/niosh/construction/stopfallscampaign.html

FACE Fatality Assessment and Control Evaluation Program

APRIL 11-15 2022 | NATIONAL STAND-DOWN TO PREVENT STRUCK-BY INCIDENTS

- April 11, 2022 at 1 PM EDT – *Preventing Struck-by Incidents in Roadway Work Zones*
- 11 de abril de 2022 a las 3 PM EDT – *Prevención de Incidentes por Atropellos: Zonas de Trabajo, Equipos Pesados e Impacto de Objetos*
- April 13, 2022 at 2 PM EDT – *What's the risk? Best Practices to reduce the likelihood of struck-by injuries from heavy equipment and crane activities*
- April 14, 2022 at 2PM EDT – *Preventing Struck-by Incidents from Dropped Tools & Other Objects*

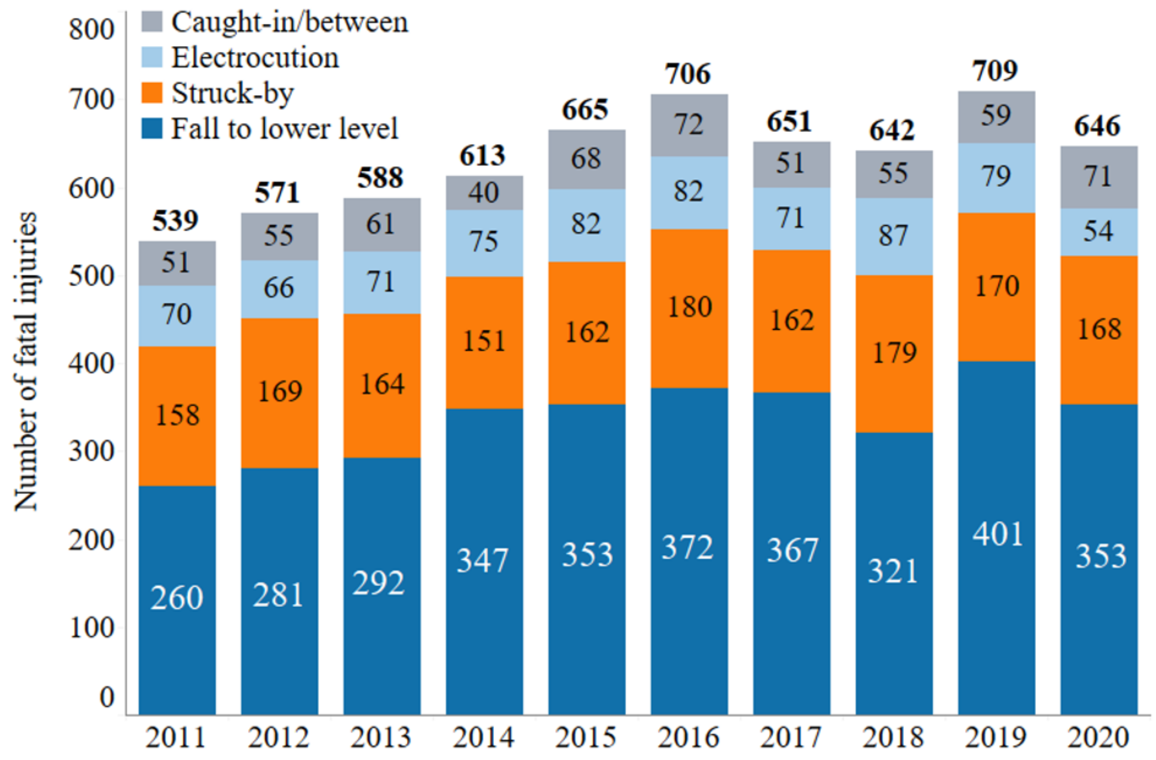
STOP. TALK. ACT.

https://www.cpwr.com/struck-by-hazards

STRUCK-BY

2022— 3rd National Stand-Down to Prevent Struck-by Injuries

Number of fatal injuries caused by Construction Focus Four, 2011-2020



Source: U.S. Bureau of Labor Statistics. 2011-2020 Census of Fatal Occupational Injuries.

https://www.cpwr.com/struck-by-hazards

Trench Safety: Before You Dig It, Plan It!

| January 2022 |

1 cubic yard of dirt weighs the same as a compact car!

137 deaths were caused by excavation and trench cave-ins from 2011 to 2018.

BEFORE YOU DIG IT, PLAN IT!

- Assign and train a competent person.
- Call 811 to identify and mark underground utility lines.
- Dig a minimum 5 ft away from utility lines.
- Evaluate the soil to determine its stability.
- Plan the job layout to identify safe locations for spoil piles and heavy equipment routes.
- Before the job starts, if the trench will be 5 ft or deeper, set up a protective system. If the trench will be 20 ft or deeper, provide engineering protections.
- Have a traffic control plan and lane closure permits.
- Develop a trench emergency action plan.

WHEN YOU DIG IT, USE CAUTION!

- Have the competent person inspect the trench, nearby areas, and protective systems each day before the start of work, when conditions change throughout the shift, and after every rainstorm.
- Maintain signs, barriers, and protection around the trench.
- Keep all vehicles and machinery a safe distance from the excavation.
- Ensure ladders and exits are never more than 25 ft away from any worker in the trench.
- Remove workers from the excavation upon any evidence that could cause a cave-in.
- Monitor other types of trench-related hazards that can occur, such as falls from the edge, rigging hazards, or toxic and combustible gases, or oxygen deficient conditions.
- Enforce procedures to ensure that work in an unprotected trench does not occur.

IF YOU WORK IN A TRENCH:

Check the trench for problems before entering and never enter an unprotected trench.
Make sure there is safe entry and exit before entering.
When there is evidence of problems, exit the trench and inform the competent person.
Never assume there will be a warning before a cave-in, or that you will have time to get out.

CDC NIOSH NORA CPWR THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

References
BLS [2020]. Injuries, illnesses, and fatalities. Fact Sheet | Fatal Occupational Injuries Involving Confined Spaces, July 2020. Washington, DC: U.S. Bureau of Labor Statistics. https://www.bls.gov/iif/oshwc/cfoi/confined-spaces-2011-18.htm
OSHA [2015]. Trenching safety and excavation safety. Washington, DC: U.S. Department of Labor. https://www.osha.gov/sites/default/files/publications/osha2226.pdf
NIOSH [2011]. Preventing worker deaths from trench cave-ins. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2011-208, https://www.cdc.gov/niosh/docs/wp-solutions/2011-208/default.html

Apprentice Ironworker Struck By Steel Wedge…

INCIDENT FACTS

REPORT #: 71-217-2022s

REPORT DATE: February 28, 2022

INCIDENT DATE: May 24, 2017

VICTIM: 25 years old

INDUSTRY: Structural steel and precast concrete contractors

OCCUPATION: Apprentice ironworker

SCENE: New construction of cold storage facility

EVENT TYPE: Struck by

Fatality Assessment and Control Evaluation Program

https://www.cdc.gov/niosh/face/pdfs/18MI105.pdf

Apprentice Ironworker Struck By Steel Wedge…

FACE Fatality Assessment and Control Evaluation Program

Investigators found:

- The employer had not provided workers with a means of securing wedges from falling or being dropped.
- The employer had not used red caution tape to keep workers out of the area below where the ironworkers were working.
- There was not a designated water station.
- The ironworkers did not expect anyone to be working below them because there were no other workers in the area.

Photo 2. Interior view of incident scene at the cold storage facility under construction.

Photo 3. Area where the apprentice ironworker went to retrieve a bottle of water when he was struck by the dropped steel wedge.

Apprentice Ironworker Struck By Steel Wedge…

Recommendations

Prepare tools and equipment

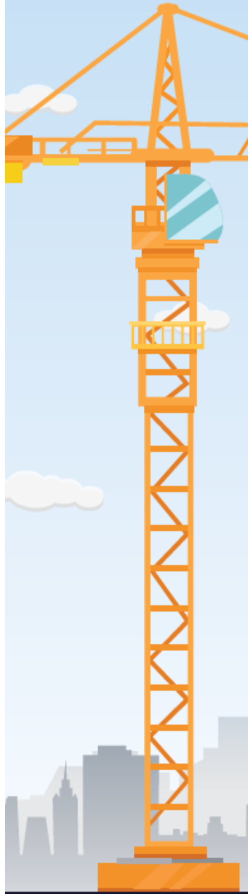
- Require that wedges and other tools used by workers at heights have lanyards, tethering devices, holsters, buckets and other devices to secure them.
- Add attachment points to wedges if they do not have them so they can be secured to a tether.
- Ensure that tethering systems are ANSI/ISEA 121-2018 Dropped Object Prevention Solutions compliant.
- Secure wedges and other tools, both when in use and not in use.

FACE Fatality Assessment and Control Evaluation Program

HOW HEAVY IS DEADLY?

Month 2022

An object may not be heavy...
but if it falls, it could be deadly.



The greater the drop height,
the greater the landing force.

Height	1 pound	2 pounds	5 pounds	10+ pounds
300 feet	Serious to Severe	Severe	Deadly	Deadly
200 feet	Serious to Severe	Severe	Severe to Deadly	Deadly
150 feet	Serious	Severe	Severe to Deadly	Deadly
100 feet	Serious	Severe	Severe	Deadly
50 feet	Serious	Serious to Severe	Severe	Severe to Deadly
20 feet	Serious	Serious	Severe	Severe to Deadly
10 feet	Serious	Serious	Serious to Severe	Severe
6 feet	Serious	Serious	Serious	Severe

FALLING OBJECTS CAN CAUSE

- Minor injuries like bruises and cuts
- More serious injuries like broken bones
- Severe injuries like paralysis
- Death, in extreme (or some) cases

WHAT CAN YOU DO?

- Tether your tools and equipment
- Keep your work area clear of materials, debris, and loose tools and equipment
- Learn about how to prevent falling or dropped objects from happening on your job site: *cpwr.com*

Note

DROPS Calculator and other similar tools are only guides—they are not an accurate prediction. Even a small object falling from height can be lethal. The wearing of standard PPE, e.g. hard hat, safety boots and eye protection, is assumed in the calculator. The calculator plots the mass of a dropped object against the distance it falls to determine its possible consequences.

Sources

DROPS [2021]. DROPS calculator EXCEL version. Loirston, Aberdeen: Dropped Objects Prevention Scheme Global Resource Centre, *https://www.dropsonline.org/resources-and-guidance/drops-calculator/*.

Solheid J [2020]. Prevent dropped objects with the three ts. Professional Safety 65(3):63, *https://www.proquest.com/scholarly-journals/prevent-dropped-objects-with-three-ts/docview/2371591423/se-2?accountid=26724*.

Suicides at Work in Construction, 2018-2020 (Wash State)

More construction workers have died by suicide at work in the last three years than workers in any other industry. The number of construction worker suicides at work increased each year.

INCIDENTS

In 2018	• A siding installer died by suicide [redacted] at a worksite.
In 2019	• A plumber died by suicide [redacted] at his place of employment. • A mason died by suicide by [redacted] at work.
In 2020	• A roofer died by suicide [redacted] at a worksite. • A construction company supervisor died by suicide [redacted] at a work site. • A truck driver employed by an electrical power and communication line construction company died by suicide [redacted] in the parking lot of his employer.

According to the Centers for Disease Control and Prevention (CDC), male construction workers die by suicide at a significantly higher rate (45.3 per 100,000 persons) compared with workers in all industries combined (27.4 per 100,000 persons).

Suicides at Work in Construction, 2018-2020 (Wash State)

FOR HELP

- Text **HELLO to 741741**. Connect with a crisis counselor, who is trained to listen and offer sound advice.
- Get free and confidential emotional support in suicidal crisis from the National Suicide Prevention Lifeline. 24 hours a day, 7 days a week.

OTHER RESOURCES

- A Construction Industry Blueprint: Suicide Prevention in the Workplace
  www.theactionalliance.org/sites/default/files/suicide_prevention_in_the_workplace_-_final.pdf
- Construction Industry Alliance for Suicide Prevention
  www.preventconstructionsuicide.com
- Associated General Contractors of Washington (AGCW) Suicide Prevention Resources
  www.agcwa.com/suicide-prevention-resources
- Suicide Prevention Resources, CPWR, the Center for Construction Research and Training
  www.cpwr.com/research/research-to-practice-r2p/r2p-library/other-resources-for-stakeholders/mental-health-addiction/suicide-prevention-resources
- Preventing Suicide, Centers for Disease Control and Prevention www.cdc.gov/violenceprevention/suicide/fastfact.html

REPORT #: 47-30-2021 **REPORT DATE:** April 6, 2021

FACE Fatality Assessment and Control Evaluation Program

Collaborating on Heat Illness Prevention Initiatives

Region V OSHA Heat Initiative Webinar Series

Act Now to Prevent Heat Illness at Work

Join us for a free three-part webinar series. Employees exposed to extreme heat and humid working conditions are at risk - both indoors and outdoors. These training sessions offer critical guidance on how to identify heat stress, how it affects the human body, and how to prevent it on the job.

Tuesday, May 10, 2022, 10-11 a.m. CT

- **Welcome and Opening Remarks** with Douglas L. Parker, assistant secretary of labor, USDOL OSHA. Discuss the importance of OSHA's Heat Illness Prevention Campaign
- **Basics of Occupational Exposure to Heat** with Douglas Trout, M.D. NIOSH Office of Construction Safety and Health. Learn to recognize the sources as well as signs and symptoms of heat-related illness and become familiar with elements of a workplace heat illness prevention program.

Tuesday, May 17, 2022, 10 -11 a.m. CT

- **OSHA National Emphasis Program: Outdoor and Indoor Heat-Related Hazards** with Gary Orr, Office of Health Enforcement, USDOL OSHA. Overview and how to comply with OSHA's new heat emphasis program designed to identify, eliminate, and reduce worker exposures to work-related heat illness in general industry, construction, maritime and agriculture.
- **Overview of enforcement of heat stress case(s)** with Bogdan Catalin, Ph.D. Industrial Hygienist, USDOL OSHA. Overview of enforcement heat stress cases highlighting the importance of being acclimatized and recognizing the signs and symptoms of heat stress and providing timely first-aid.

In **Episode 27**, the *S+H* editorial team discusses lightning safety for workers as the summer months approach. The team is also joined by NIOSH social scientist Gigi Petery, co-director of the agency's National Center for Productive Aging and Work, to discuss how aging workers can enjoy success on the job.

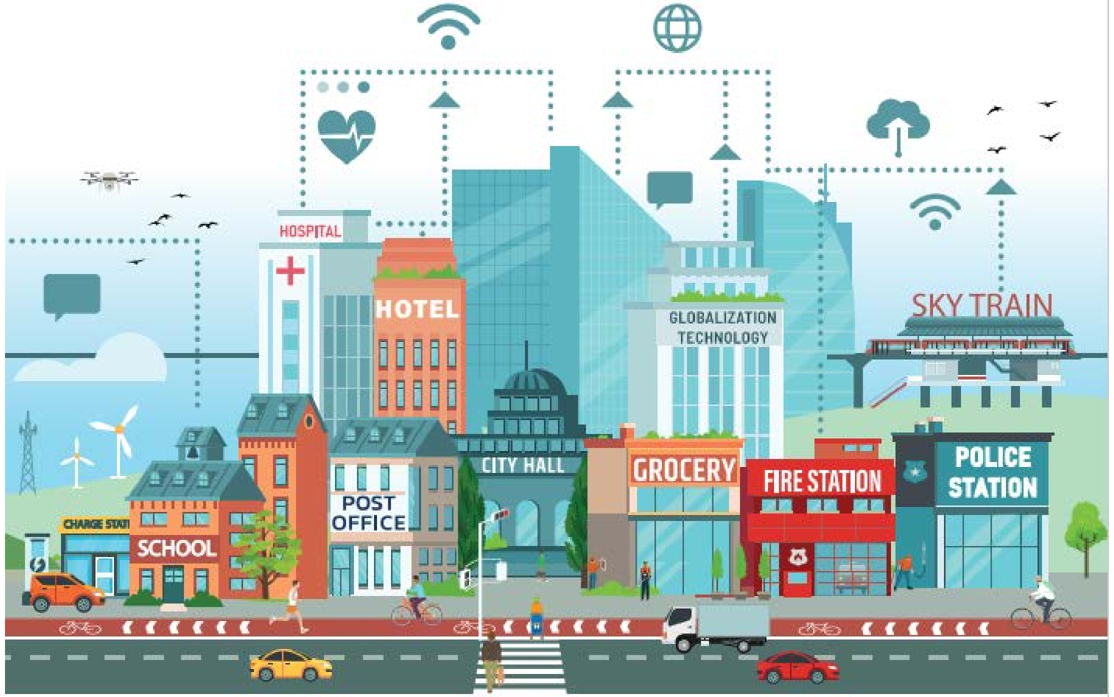
Listen to the podcast

FY 23 Funded CON-related Small NORA Research projects

FY23 Small Projects Selected for Funding

DLO	Project Officer(s)	IFR Title
DSR	Justin Haney	Investigation on Safety and Trust when Working Alongside Industrial Mobile Robots
DSR	Christopher Pan	Air-Bubble Cushioning Liners to Improve Construction Helmet Shock Performance
HELD	Scott Breloff	Evaluation of Stability, Slipping, & Intervention Methods for Roofing Workers
HELD	Erik Rader	Reexamination of the NIOSH Lifting Equation Calculator in a Research Mouse Model
HELD	Xueyan Sherry Xu Ren Dong	Technology Development and Evaluation for Controlling Hand-Arm Vibration Exposure
HELD	John Wu	Biomechanical Evaluation of Knee Savers for Reducing Joint Load During Squatting
RHD	Aleksandr Stefaniak	Recycled Plastic Mechanical Properties as Exposure Predictors for 3-D Printing

The NIOSH Future of Work Initiative Research Agenda



CDC NIOSH
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

Goal 1: Improve worker safety, health, and well-being outcomes through healthier organizational design policies, programs, and practices. 5
Background 5
Objectives 8

Goal 2: Determine and address worker issues related to automation, technological job displacement, and occupational polarization. 9
Background 9
Objectives 10

Goal 3: Identify and address the safety, health, and well-being risks for workers in different work arrangements. 11
Background 11
Objectives 13

Goal 4: Minimize worker risks and maximize benefits associated with artificial intelligence application. 14
Background 14
Objectives 15

Goal 5: Mitigate worker safety and health challenges and leverage opportunities associated with robotics. 15
Background 15
Objectives 16

Goal 6: Evaluate the impact of innovative and emerging technologies on worker well-being 17
Background 17
Objectives 19

Goal 7: Identify, examine, and reduce the inequitable distribution of work-related risks and benefits due to demographic characteristics. 19
Background 19
Objectives 21

Goal 8: Reduce adverse worker safety, health, and well-being effects resulting from economic insecurity 22
Background 22
Objectives 23

Goal 9: Assess continued education, training, and skill-building needs and approaches to improve OSH outcomes 24
Background 24
Objectives 26

NIOSH Science Blog

NOISH Science Blogs on Construction

- Welder’s Anthrax (Apr 2022)
- Falls Campaign 2022: Making Research Work (Apr 2022)
- Preventing Struck-by Fatalities Related to Excavator Quick Couplers, Buckets, and Attachments (Mar 2022)
- Partnering to Design Safe and Healthy Workplaces for the Construction Workforce (Feb 2022)
- Exoskeletons: Potential for Preventing Work-related Musculoskeletal Injuries and Disorders in Construction Workplaces (Feb 2022)

PREVENTION THROUGH DESIGN (PtD)

Series of workshops funded by NIOSH in collaboration with Arizona State University

- 3rd Workshop May 25-26 ‘22
- Goals
  - To drive the implementation of PtD at large industry organizations
  - To advance knowledge in PtD
  - To promote the instruction of PtD in construction management and construction engineering programs at US universities

[Prevention through Design | (asu.edu)]

Arizona State University

NOIRS

National Occupational Injury Research Symposium

DAY 1: TUESDAY, MAY 10, 2022

12:00 – 1:00 pm OPENING PLENARY SESSION

Preventing Workplace Injuries in a Changing World

Opening

Dawn N. Castillo, MPH
Director, Division of Safety Research
National Institute for Occupational Safety and Health

Plenary Speakers

John M. Howard, MD
Director
National Institute for Occupational Safety and Health

Lorraine M. Martin, MS
President and CEO
National Safety Council

Ron Gantt, M Eng, CSP
Director and Principal Consultant
Reflect Consulting Group

D3 Understanding and Visualizing Recent Construction Safety and Health Trends
Moderator: Richard Rinehart

12:00 D3.1 Visualizing and Disseminating Data on Fatal and Severe Injuries in the U.S. Construction Industry
William Harris

12:15 D3.2 Mental Health Among Construction Workers in the United States
Samantha Brown

12:30 D3.3 Prescription Opioid Use and Stigmatized Attitudes Among Apprentice Construction Workers
Ann Marie Dale

A3 Research to Practice in the Construction Industry
Moderator: Scott Earnest

1:00 A3.1 Stand-Downs to Raise Awareness and Prevent Fatalities in Construction
Elizabeth Garza

1:15 A3.2 Identifying Common Root Causes of Work-Related Falls from Heights Through Self-Reported Data from Individuals Who Experienced, Witnessed, or Investigated Fatal and Nonfatal Falls
Jessica Bunting

1:30 A3.3 Behavioral Economics in the Construction Industry: Use of Choice Architecture Techniques to Accelerate Acceptance and Adoption of Health and Safety Research Findings and Solutions
Sue Ann Sarpy

National Occupational Injury Research Symposium | NIOSH | CDC

New NIOSH Products

COVID-19 guidance

Check out our NIOSH COVID-19 Science Blogs.
Learn more by visiting our NIOSH National Construction Center COVID-19 Resources.

Suicides in Construction

Learn more by visiting our NIOSH National Construction Center Suicide Prevention Resources.

Opioids in Construction

Learn more by visiting our NIOSH National Construction Center Preventing Opioids Deaths Resources. Watch our new videos series: Opioids in the Construction Industry.

1. The Evolution of a Crisis
2. Impacting Lives
3. Pathways to Recovery

Spotlights

- NEW 2022 Kickoff Webinar
- May 2-6, '22 Falls Stand-Down
  - 2022 Falls Blog
- Infrastructure Resources: Keeping Construction Workers Safe 3/22
- Respiratory Protection Toolbox Talk 2/22
- Exoskeletons: Potential for Preventing WMSDs 2/22
- Partnering to Design Safe and Healthy Workplaces 2/22
- Using CPWR's Small Study Program 10/21

National Campaign to Prevent Falls

Falls are the #1 cause of construction fatalities. Join the National Campaign to Prevent Falls. Click here to learn more. Infographics

Trench Safety: Before You Dig It, Plan It!

Trench Safety - full factsheet
English JPG Spanish JPG
English PDF

NIOSH Science Blogs: Construction

Follow NIOSH Construction on Twitter

Questions?

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513-841-4539 GEarnest@cdc.gov

CDR Elizabeth Garza, MPH, CPH
202-245-0668 EGarza@cdc.gov

Doug Trout, MD DTrout@cdc.gov
513-515-5053

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

https://www.cdc.gov/niosh/construction/

THURSDAY, JUNE 2ND

INDUSTRY TRENDS FROM CPWR'S DATA CENTER

CPWR

THE CENTER FOR CONSTRUCTION
RESEARCH AND TRAINING

Industry Trends from CPWR's Data Center

June 2nd, 2022

2022 Research to Practice (r2p) Seminar and Partnership Workshop

Amber Trueblood, Director

Sam Brown, Research Analyst

William Harris, Research Assistant

Presentation Outline

I. CPWR Data Center Background
   I. Data Center Introduction
   II. CPWR Data Center Product Overview
      I. Data Bulletins
      II. Data Dashboards
      III. Interactive Chart Book
II. Industry Trends
   I. Employment Trends
   II. Injury and Health Trends
III. Wrap-Up/Questions

All Products:

- FREE
- Posted at cpwr.com
- Include Excel files with the underlying data
- Chart files

CPWR
THE CENTER FOR CONSTRUCTION
RESEARCH AND TRAINING

CPWR Data Center Background

Who are we?

- CPWR's Data Center
  - Launched in the mid-1990s
  - Leading source of timely and reliable statistics on construction safety and health
  - Falls within CPWR's research prong
- Current Team
  - Amber Trueblood (Director)
  - Sam Brown (Research Analyst)
  - William Harris (Research Assistant)
  - Sue Dong (Consultant)
  - Raina Brooks (Consultant)

CPWR
THE CENTER FOR CONSTRUCTION
RESEARCH AND TRAINING

Data Bulletins

- Published six times a year (every two months)
- Focused on one key topic area or an emerging area
- Based on national surveillance data
- Topics Covered in Past Year:
    - Fatal and nonfatal injuries
    - Employment trends and projections
    - Mental Health
    - Construction Safety Management
    - OSHA Inspections and Citations for Fall Protection
    - COVID-19 impacts
    - Struck-by injuries

CPWR THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

Data Bulletin

WWW.CPWR.COM

JUNE 2021

Construction Employment, Businesses, and COVID-19 Vaccinations During the Pandemic

Samantha Brown, MPH, Raina D. Brooks, MPH, William Harris, MS, Xiuwen Sue Dong, DrPH*

OVERVIEW

This Data Bulletin provides updated information on construction employment, business, and vaccination rates and attitudes since March 2020. Employment and work losses due to COVID-19 were estimated from monthly data of the Current Population Survey, a data collection of the U.S. Bureau of Labor Statistics. The effects of COVID-19 on construction businesses were assessed using the U.S. Census Bureau's weekly Small Business Pulse Survey. Employment and business trends were compared between construction and all industries, and among construction subgroups. Percentages of worker vaccination and hesitancy were calculated using data from the COVID Symptom Survey, a voluntary online survey of active Facebook users to track COVID-19 across the United States, conducted by the Delphi Group at Carnegie Mellon University through collaboration with Facebook. Patterns of vaccination and hesitancy were analyzed and compared among major occupational categories. Time periods covered by this report varied by source according to data availability.

I GOT MY COVID-19 VACCINE!

THE COVID-19 VACCINE:

As essential as you are.

THIS ISSUE

This issue focuses on COVID-19's impact on the construction industry through spring 2021, including trends in employment, small business conditions, and vaccination rates and attitudes.

KEY FINDINGS

Compared to March 2020, employment in April 2021 was 3% lower in all industries but 2% higher in construction. *Chart 1*

Hispanic employment fell more than non-Hispanic employment in construction, but rebounded and was 4% higher in April 2021 than in March 2020. *Chart 2*

The large negative effect of COVID-19 declined by over 40% in construction and all nonfarm businesses from April 2020 to May 2021. *Chart 8*

By the end of May 2021, workers in construction and extraction occupations had the lowest COVID-19 vaccination rate (51%) and the highest hesitancy rate (42%) among all workers included in the survey. *Chart 10*

Among hesitant construction and extraction workers, top barriers included distrust of vaccines (56%) or the government (55%). *Chart 11*

NEXT DATA BULLETIN

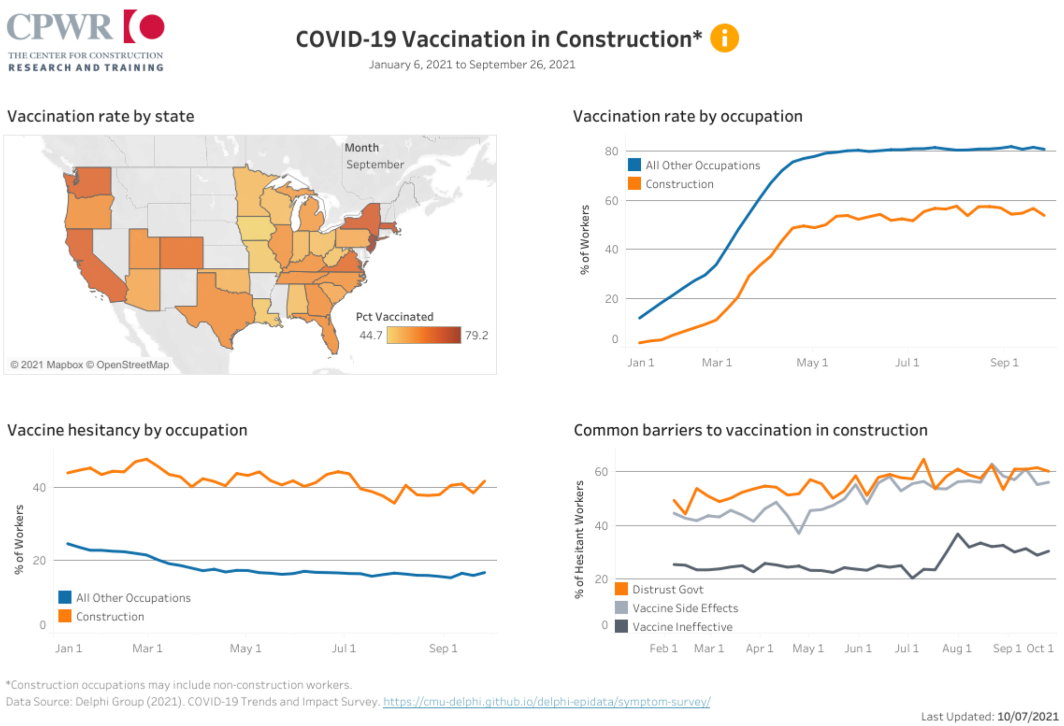
OSHA inspections of construction falls

* Correspondence to: Xiuwen Sue Dong, SDong@cpwr.com.
Numbers in text and charts were calculated by the CPWR Data Center.

CPWR THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

https://www.cpwr.com/research/data-center/data-reports/

Data Dashboards



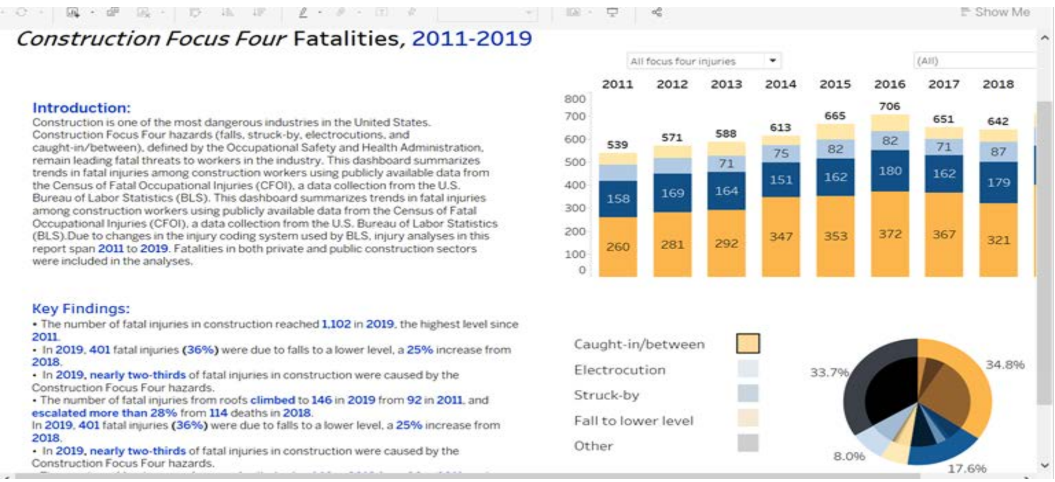
- Provide detailed information beyond the data bulletins with interactive charts and downloadable data files
- Updated as new data is available
- Can be a dashboard or storyboard format
  - Dashboard=One Sheet
  - Storyboard=Multiple Sheets
- Published as:
  - Corresponding to a Data Bulletin
  - Stand alone dashboards
- 18 Dashboards Currently Available

https://www.cpwr.com/research/data-center/data-dashboards/

THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

Interactive Chart Book

- History
  - First Published 1997
  - Published Every 5-years
  - E-Book Published 2018
  - Interactive Construction Chart Book Next Version
    - Allows for data to be updated on a more regular basis
    - Provides dynamic text that users can tailor to their needs/interests



CPWR
THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

Construction Payroll Establishments and Employees

State
(All)

Subsector
(All)

Year
2011 2019

Introduction:

Construction is a large, dynamic, and complex industry sector dominated by small establishments or those with fewer than 10 employees. From 2011-2019, about 82% of payroll establishments had fewer than 10 employees. While, large establishments with more than 500 employees accounted for 0.1% of payroll establishments, but 6% the paid construction employees.

This dashboard examines payroll establishments and employees in the construction industry from 2011 to 2019 by state, establishment size,and subsector. Key findings are summarized on the left hand side next to each respective chart.

The key finding section is dynamic and will update as you change the filters selected at the top of the dashboard. **Blue bold text** indicates text or a number that will update with your selected filters. All charts and tables update with selected filters.

The dashboard will be updated annually when new data are available, with the next update scheduled for Fall 2022. If you have questions or comments, please email datacenter@cpwr.com.

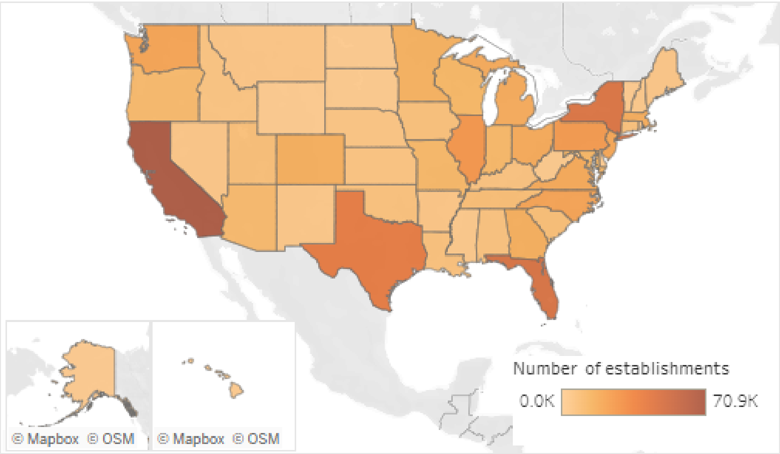
Key Findings:

On average annually from 2011 to 2019, there were 692,472 establishments and 5,880,709 employees in the United States in All Construction (NAICS 23).

The top five states based on establishment size on average annually from 2011 to 2019 in All Construction (NAICS 23) included:

California
Florida
New York
Texas
Illinois

Construction establishments map
All Construction (NAICS 23)



Looking for

Volunteers to provide feedback

- Round 1: Overall Layout/Usability
- Round 2: Content Expertise

Contact Amber Trueblood, atrueblood@cpwr.com if you are interested.

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Industry Trends

General Employment Trends

Annual Employment Trends | Employment and COVID-19

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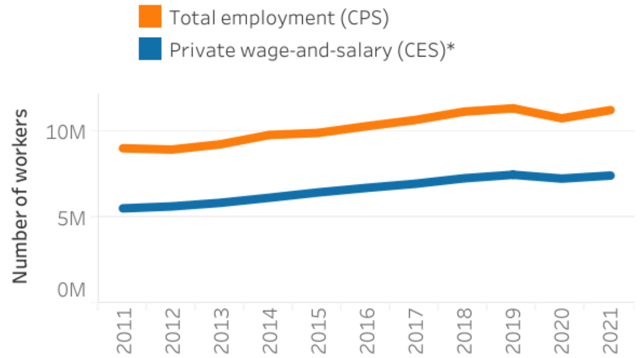
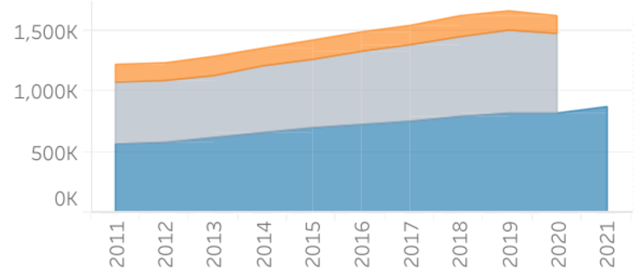
Construction Employment Trends

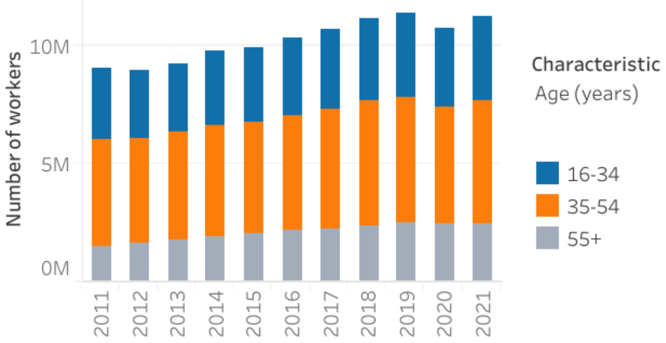
Overall employment by year



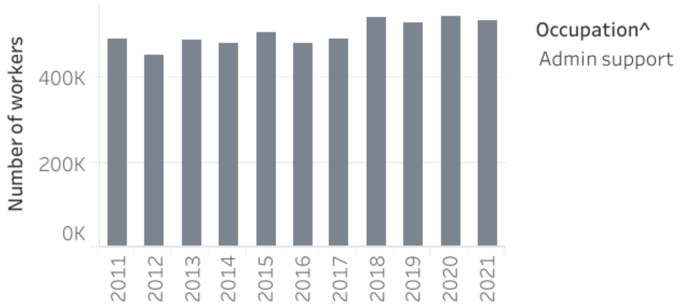
Private payroll employment by year* and detailed subsector for Construction of Buildings (NAICS 236)



Employment by year and age



Employment by year among admin support workers



*Estimates for 2021 are preliminary. Data unavailable are not shown.

^Only the top 10 Specialty Trade detailed subsectors (top right chart) and top 25 occupations (bottom right chart) are displayed.

Data Sources: (1) U.S. Bureau of Labor Statistics, Current Employment Statistics (CES), 2011-2021. (2) U.S. Census Bureau, Current Population Survey (CPS), 2011-2021, downloaded through IPUMS: Sarah Flood, Miriam King, Renae Rodgers, Steven Ruggles, J. Robert Warren and Michael Westberry. Integrated Public Use Microdata Series, 2011-2021 Current Population Survey: Version 9.0 [dataset]. Minneapolis, MN: IPUMS, 2021. https://doi.org/10.18128/D030.V9.0 Calculations by the CPWR Data Center.

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Construction Employment Trends Dashboard

https://www.cpwr.com/research/data-center/data-dashboards/construction-employment-trends/

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Annual Employment Trends | Employment and COVID-19

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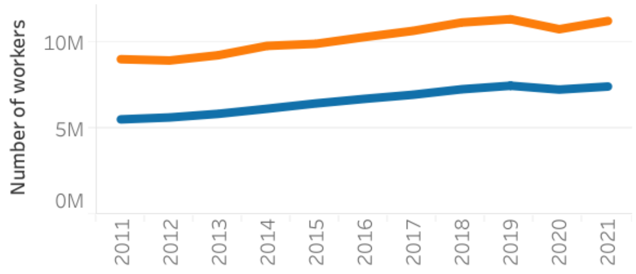
Construction Employment Trends

Overall employment by year

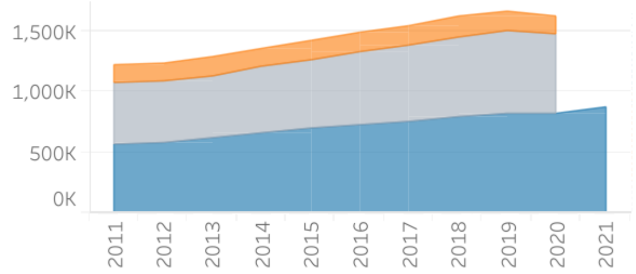
Total employment (CPS)
Private wage-and-salary (CES)*



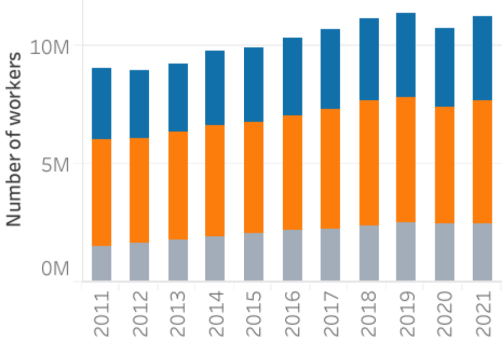
Private payroll employment by year* and detailed subsector for Construction of Buildings (NAICS 236)

Major Subsector ^
Construction of Buildings (NAICS 236)

Industrial building
Commercial building
Residential building



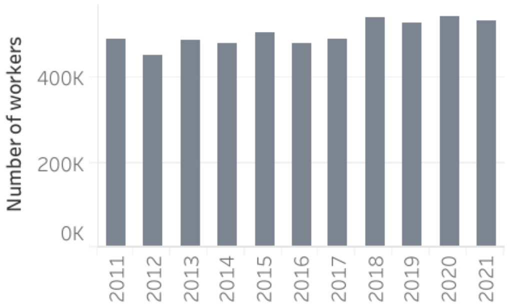
Employment by year and age



Characteristic
Age (years)

16-34
35-54
55+

Employment by year among admin support workers



Occupation^
Admin support

*Estimates for 2021 are preliminary. Data unavailable are not shown.

^Only the top 10 Specialty Trade detailed subsectors (top right chart) and top 25 occupations (bottom right chart) are displayed.

Data Sources: (1) U.S. Bureau of Labor Statistics, Current Employment Statistics (CES), 2011-2021. (2) U.S. Census Bureau, Current Population Survey (CPS), 2011-2021, downloaded through IPUMS: Sarah Flood, Miriam King, Renae Rodgers, Steven Ruggles, J. Robert Warren and Michael Westberry. Integrated Public Use Microdata Series, 2011-2021 Current Population Survey: Version 9.0 [dataset]. Minneapolis, MN: IPUMS, 2021. https://doi.org/10.18128/D030.V9.0 Calculations by the CPWR Data Center.

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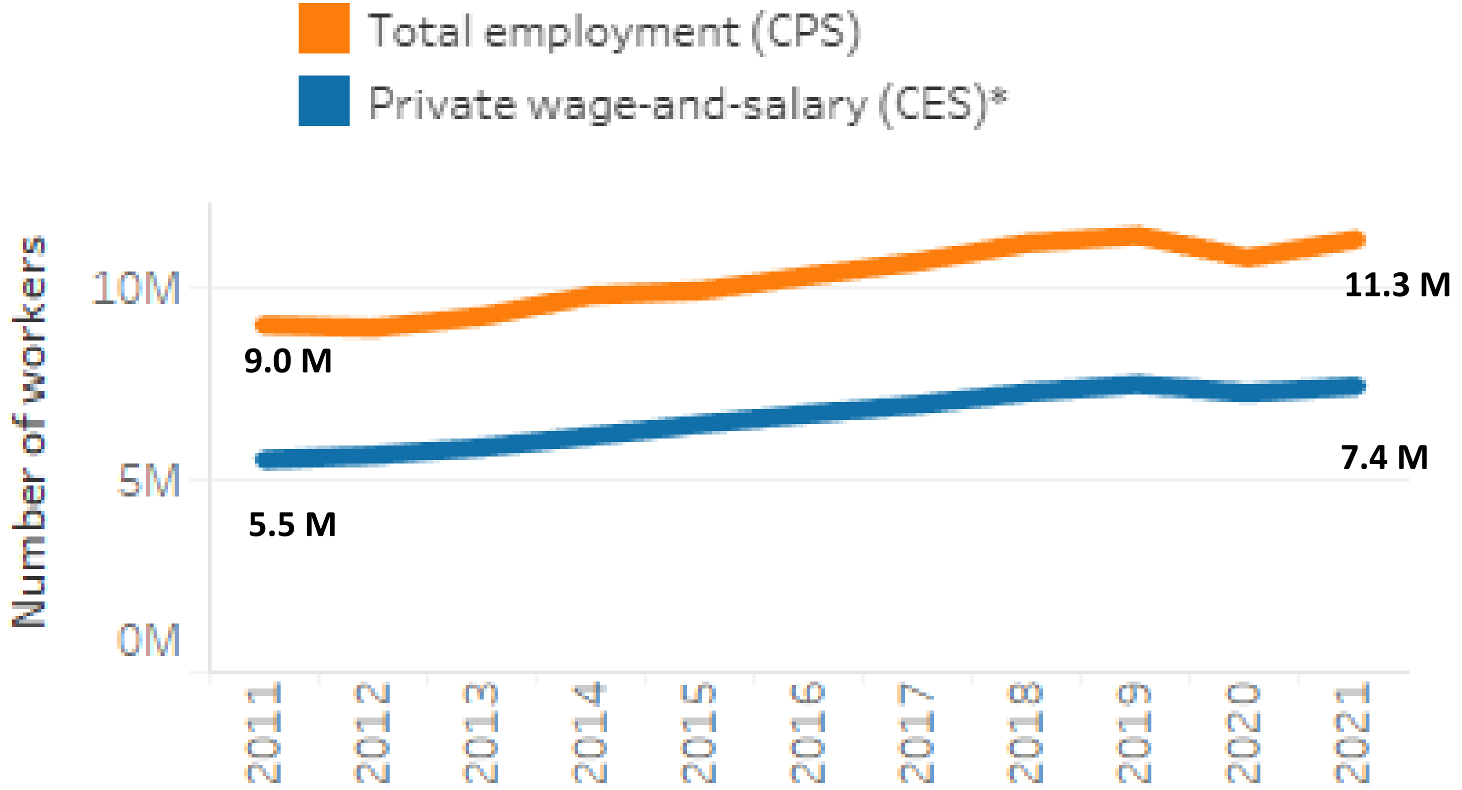
Overall employment by year



*November and December 2021 estimates are preliminary for payroll employment.
Data Sources: (1) U.S. Bureau of Labor Statistics, Current Employment Statistics (CES), 2011-2021. (2) U.S. Census Bureau, Current Population Survey (CPS), 2011-2021, downloaded through IPUMS: Sarah Flood, Miriam King, Renae Rodgers, Steven Ruggles, J. Robert Warren and Michael Westberry. Integrated Public Use Microdata Series, 2011-2021 Current Population Survey: Version 9.0 [dataset]. Minneapolis, MN: IPUMS, 2021. https://doi.org/10.18128/D030.V9.0 Calculations by the CPWR Data Center.

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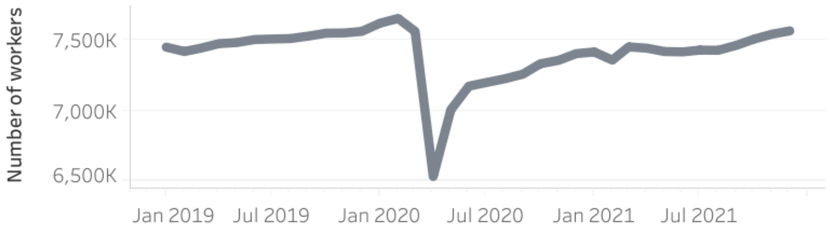
Annual Employment Trends | Employment and COVID-19

Construction Employment Trends

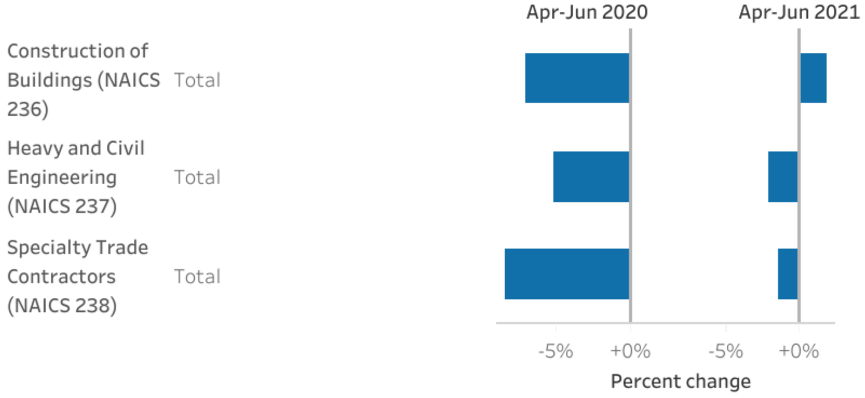
Employment by Subsector (Private Payroll)

Major Subsector
All

Employment by month for All Construction (NAICS 23)*



Employment change since Apr-Jun 2019^

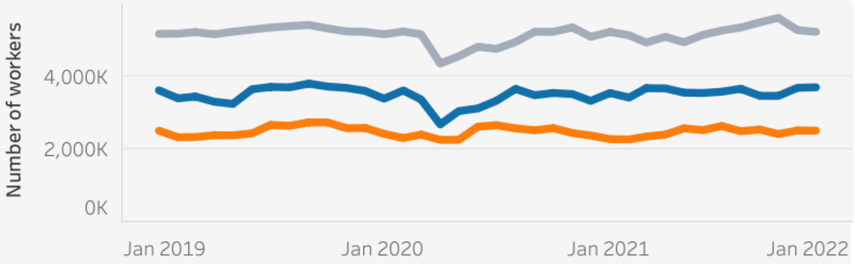


Employment by Worker Characteristics

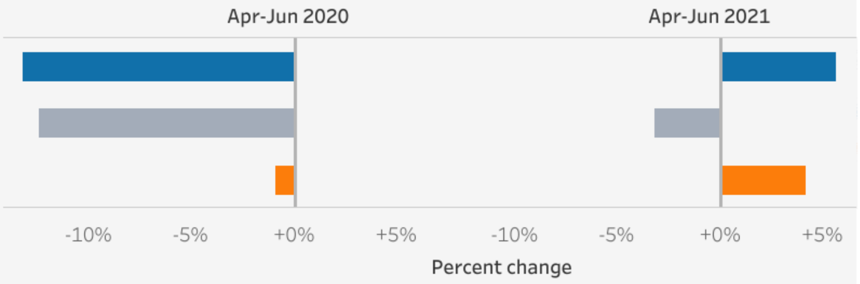
Characteristic
Age (years)

16-34
35-54
55+

Employment by age (years), 2019-2021



Employment change since Apr-Jun 2019, by age (years)



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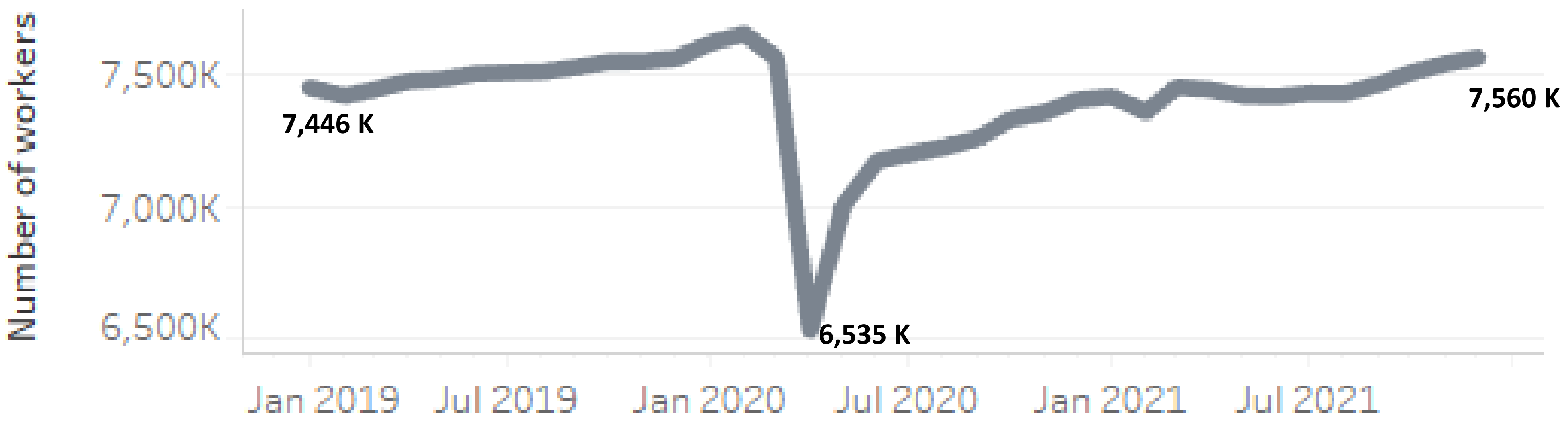
Employment by month for All Construction (NAICS 23)*



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Data Bulletin

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MARCH 2022

Employment Trends and Projections in Construction

William Harris, MS, Samantha Brown, MPH, Amber Brooke Trueblood, DrPH[1]

THIS ISSUE

This issue examines 1) employment trends from 2011 to 2021, including the impact of COVID-19, and 2) employment projections through 2030.

OVERVIEW

This Data Bulletin provides information on employment in construction, including trends over the past decade, the impact of COVID-19, and future projections. Current and future construction workforce trends provide stakeholders with information to identify resources needed to train the evolving workforce, as well as safety and health interventions. All national employment estimates and projections were obtained from the U.S. Bureau of Labor Statistics (BLS). Total employment, employment by demographic and worker characteristics, and unemployment from 2011 to 2021 were estimated using BLS's Current Population Survey (CPS),[2] which is published monthly. Employment for private *nonfarm wage-and-salary* workers and for construction subsectors from 2011 to 2021 was obtained from BLS's Current Employment Statistics (CES) program, which collects monthly data from payroll establishments. National occupational employment projections from 2020 to 2030 accounting for the economic impact of the COVID-19 pandemic were collected from the BLS Employment Projections program. State-level employment projections were obtained through Projections Central, a product of the Projections Managing Partnership, which the U.S. Department of Labor funds.

KEY FINDINGS

From 2011 to 2019, employment grew 12.6% in all industries and 26.7% in construction. *Chart 1*

From 2011 to 2021, there were increases in the construction workforce among those who were 55 years or older (16.9% to 21.9%), Hispanic (24.3% to 32.6%), and/or female (9.2% to 11.0%). *Chart 3*

Between April-June 2019 and April-June 2021, private wage-and-salary employment fell 2.1% in Heavy and Civil Engineering Construction (NAICS 237) but rose 1.9% in Construction of Buildings (NAICS 236). *Chart 7*

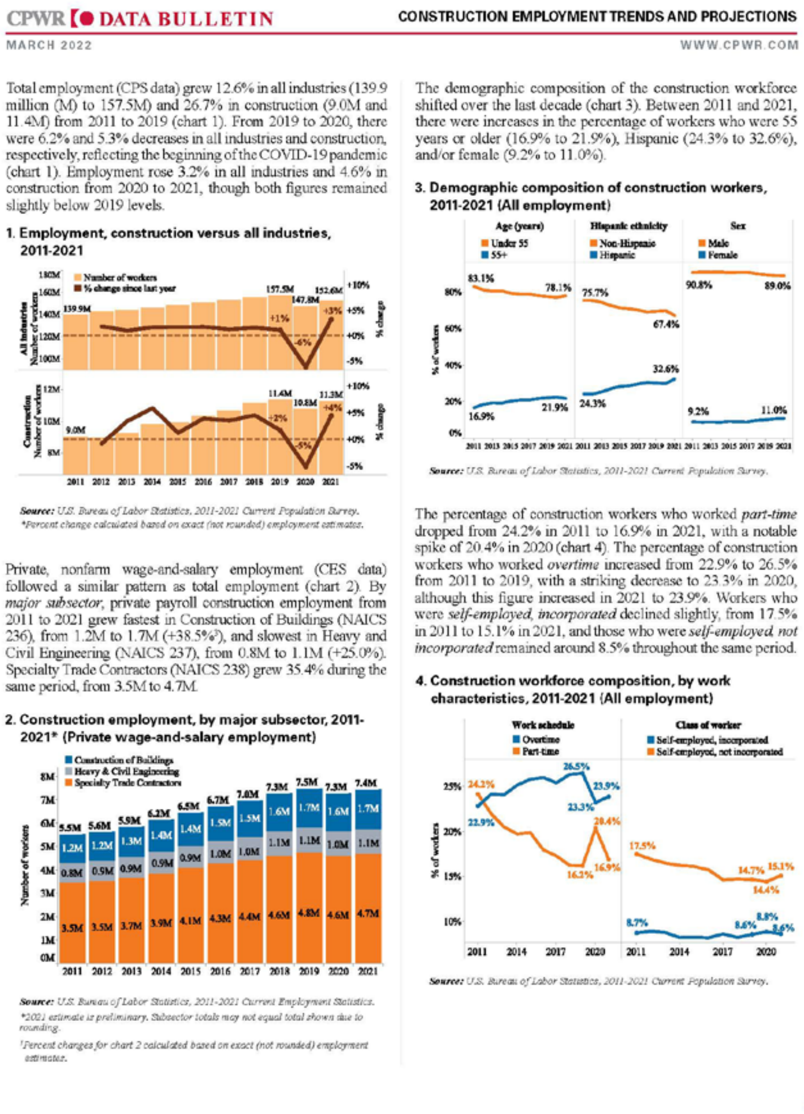
Construction employment is projected to grow 4.4% in total from 2020 to 2030, with the Construction of Buildings (NAICS 236) subsector increasing the fastest (+4.9%). *Chart 8*

The construction laborer occupation is expected to have the largest number of openings by 2030 (n=1.4 million). *Chart 11*

NEXT DATA BULLETIN

Fatal and Nonfatal Injury Trends in the Construction Industry

[1]Correspondence to: datacenter@cpwr.com.
[2]The CPS is conducted by the U.S. Census Bureau for BLS.
Numbers in text and charts were calculated by the CPWR Data Center.



Total employment (CPS data) grew 12.6% in all industries (139.9 million (M) to 157.5M) and 26.7% in construction (9.0M and 11.4M) from 2011 to 2019 (chart 1). From 2019 to 2020, there were 6.2% and 5.3% decreases in all industries and construction, respectively, reflecting the beginning of the COVID-19 pandemic (chart 1). Employment rose 3.2% in all industries and 4.6% in construction from 2020 to 2021, though both figures remained slightly below 2019 levels.

1. Employment, construction versus all industries, 2011-2021

Source: U.S. Bureau of Labor Statistics, 2011-2021 Current Population Survey.
*Percent change calculated based on exact (not rounded) employment estimates.

Private, nonfarm wage-and-salary employment (CES data) followed a similar pattern as total employment (chart 2). By *major subsector*, private payroll construction employment from 2011 to 2021 grew fastest in Construction of Buildings (NAICS 236), from 1.2M to 1.7M (+38.5%[†]), and slowest in Heavy and Civil Engineering (NAICS 237), from 0.8M to 1.1M (+25.0%). Specialty Trade Contractors (NAICS 238) grew 35.4% during the same period, from 3.5M to 4.7M.

2. Construction employment, by major subsector, 2011-2021* (Private wage-and-salary employment)

Source: U.S. Bureau of Labor Statistics, 2011-2021 Current Employment Statistics.
*2021 estimate is preliminary. Subsector totals may not equal total shown due to rounding.
[†]Percent changes for chart 2 calculated based on exact (not rounded) employment estimates.

The demographic composition of the construction workforce shifted over the last decade (chart 3). Between 2011 and 2021, there were increases in the percentage of workers who were 55 years or older (16.9% to 21.9%), Hispanic (24.3% to 32.6%), and/or female (9.2% to 11.0%).

3. Demographic composition of construction workers, 2011-2021 (All employment)

Source: U.S. Bureau of Labor Statistics, 2011-2021 Current Population Survey.

The percentage of construction workers who worked *part-time* dropped from 24.2% in 2011 to 16.9% in 2021, with a notable spike of 20.4% in 2020 (chart 4). The percentage of construction workers who worked *overtime* increased from 22.9% to 26.5% from 2011 to 2019, with a striking decrease to 23.3% in 2020, although this figure increased in 2021 to 23.9%. Workers who were *self-employed, incorporated* declined slightly, from 17.5% in 2011 to 15.1% in 2021, and those who were *self-employed, not incorporated* remained around 8.5% throughout the same period.

4. Construction workforce composition, by work characteristics, 2011-2021 (All employment)

Source: U.S. Bureau of Labor Statistics, 2011-2021 Current Population Survey.

Data Bulletin

https://www.cpwr.com/wp-content/uploads/DataBulletin-March2022.pdf

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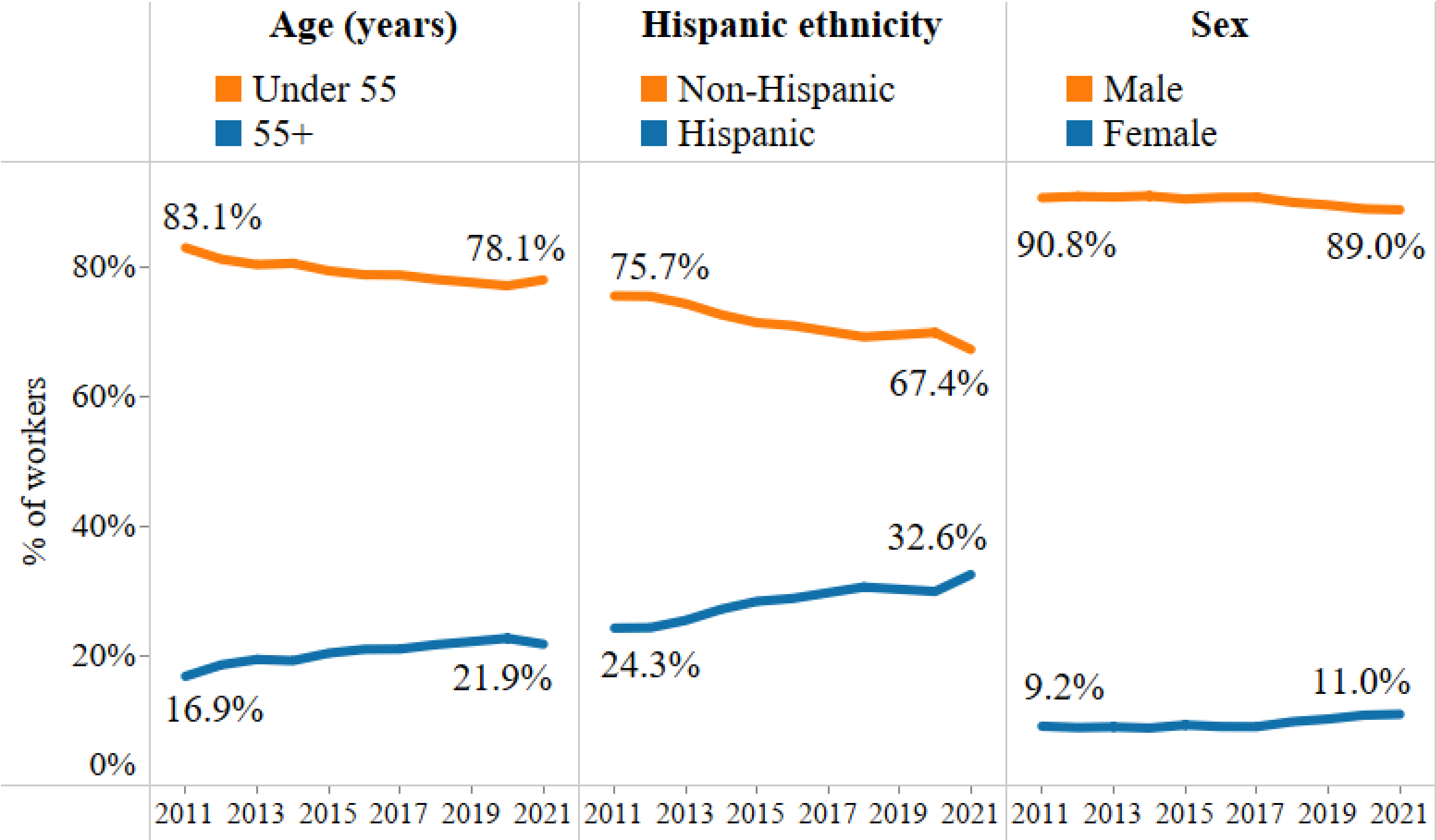
3. Demographic composition of construction workers, 2011-2021 (All employment)



Source: U.S. Bureau of Labor Statistics, 2011-2021 Current Population Survey. Calculations by the CPWR Data Center.

From 2011-2021, there were increases in the construction workforce who were female, Hispanic, and 55 years or older.

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Industry Trends

Hispanic Construction Workers

Employment Trends | Demographics | Foreign-born Hispanics

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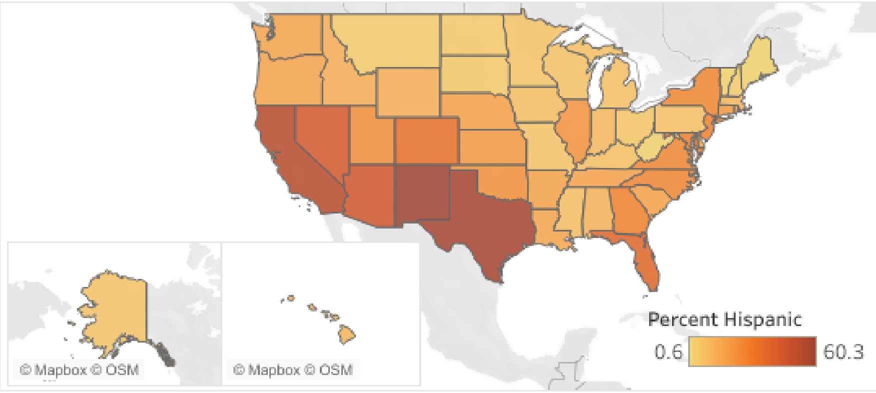
Hispanic Construction Workers, 2011-2019

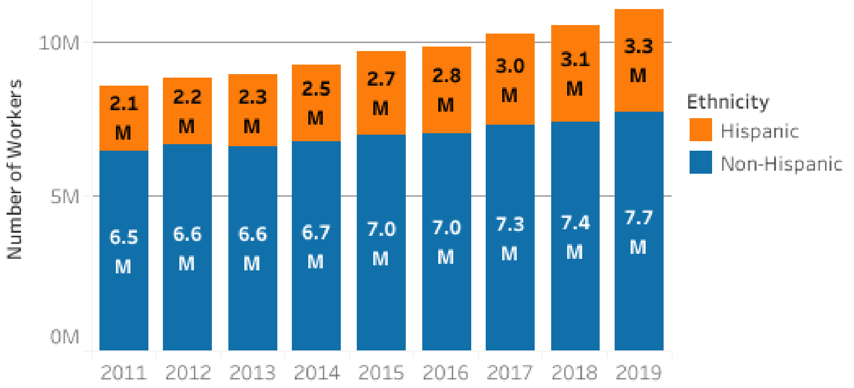
Year: All

State: All

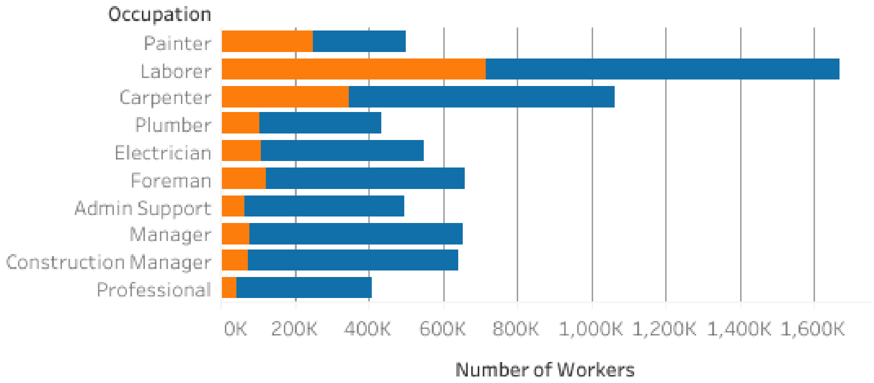
Hispanic employment by state



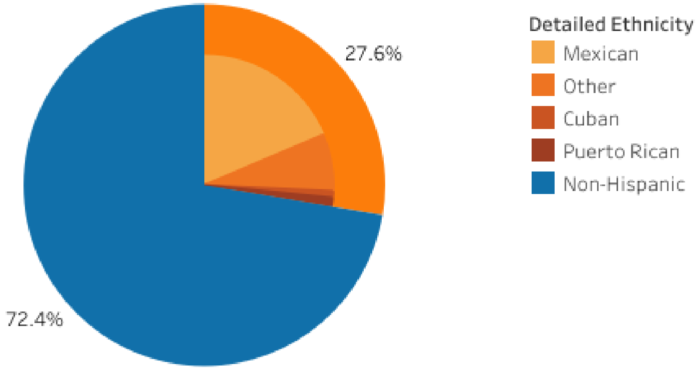
Employment by ethnicity and year



Occupations with the highest proportion of Hispanic workers



Employment by detailed ethnicity



Hispanic Employment Dashboard

https://www.cpwr.com/research/data-center/data-dashboards/hispanic-employment-dashboard/

Data Source: U.S. Census Bureau, American Community Survey (ACS), 2011-2019. Calculations by the CPWR Data Center. Datasets were downloaded through IPUMS: Steven Ruggles, Sarah Flood, Sophia Foster, Ronald Goeken, Jose Pacas, Megan Schouweiler and Matthew Sobek. IPUMS USA: Version 11.0 [dataset]. Minneapolis, MN: IPUMS, 2021. https://doi.org/10.18128/D010.V11.0

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Employment Trends | Demographics | Foreign-born Hispanics

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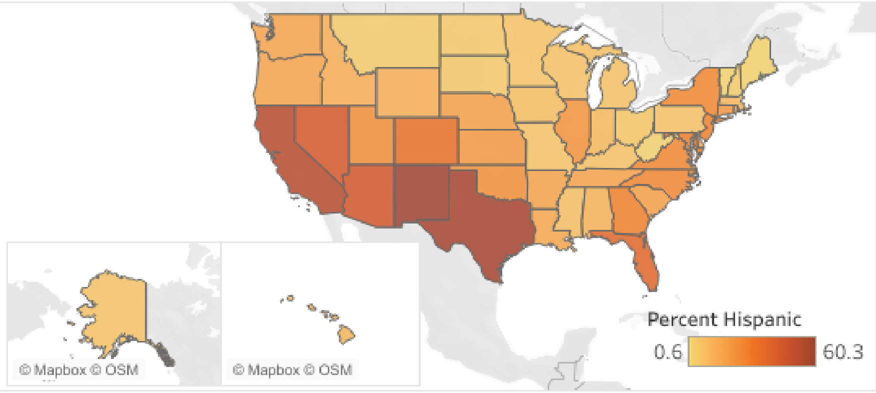
Hispanic Construction Workers, 2011-2019

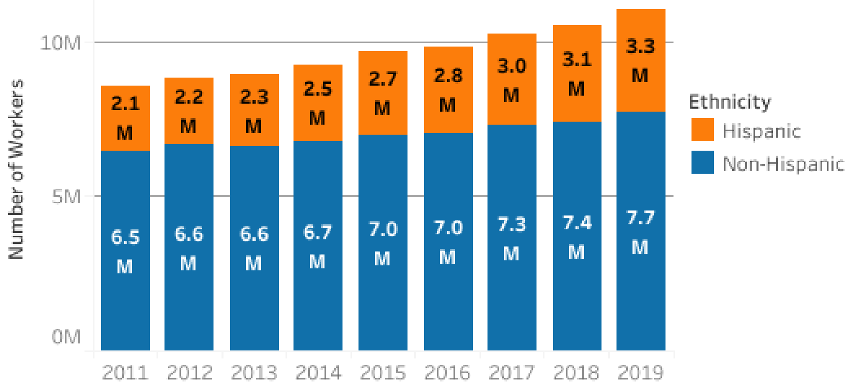
Year
All

State
All

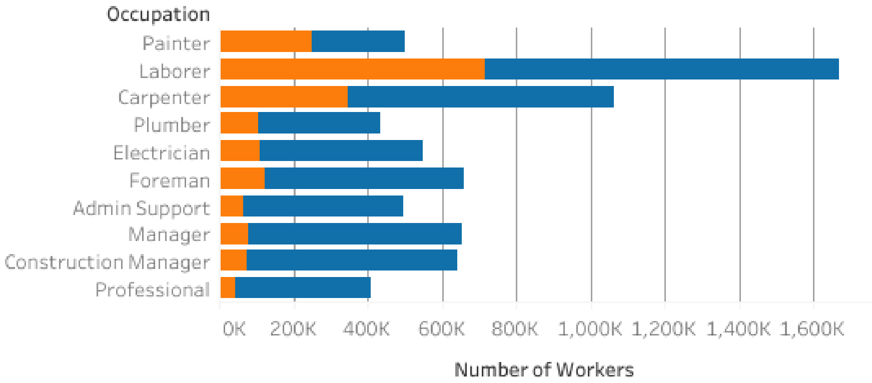
Hispanic employment by state



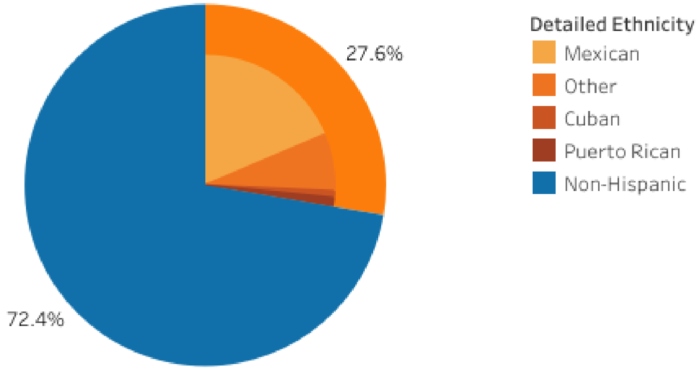
Employment by ethnicity and year



Occupations with the highest proportion of Hispanic workers



Employment by detailed ethnicity



Data Source: U.S. Census Bureau, American Community Survey (ACS), 2011-2019. Calculations by the CPWR Data Center. Datasets were downloaded through IPUMS: Steven Ruggles, Sarah Flood, Sophia Foster, Ronald Goeken, Jose Pacas, Megan Schouweiler and Matthew Sobek. IPUMS USA: Version 11.0 [dataset]. Minneapolis, MN: IPUMS, 2021. https://doi.org/10.18128/D010.V11.0

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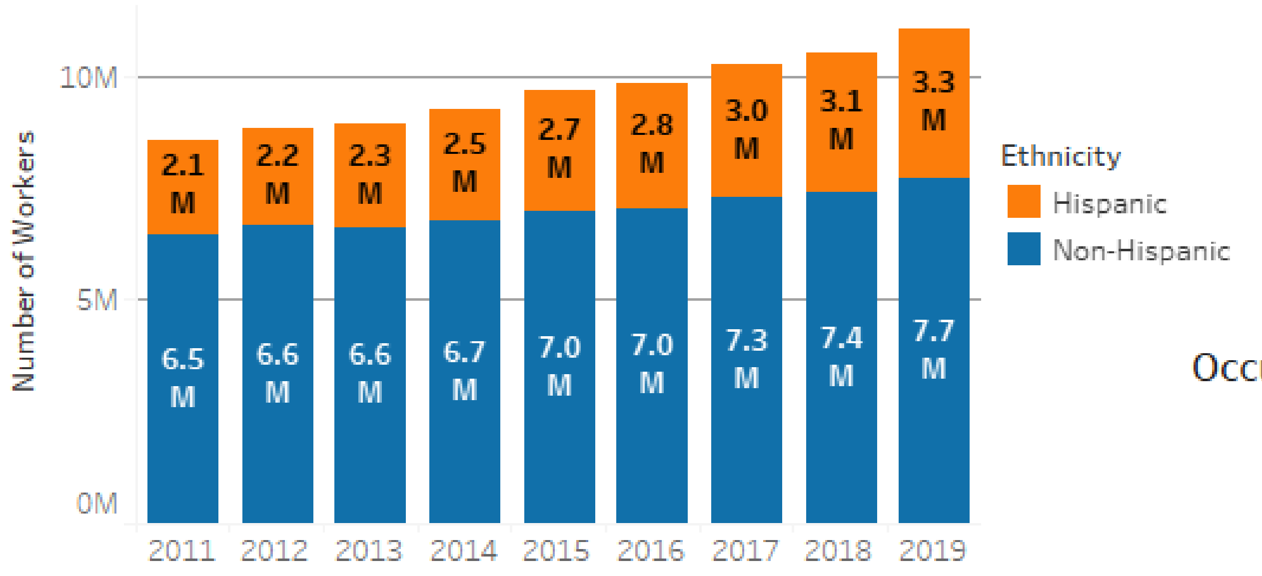
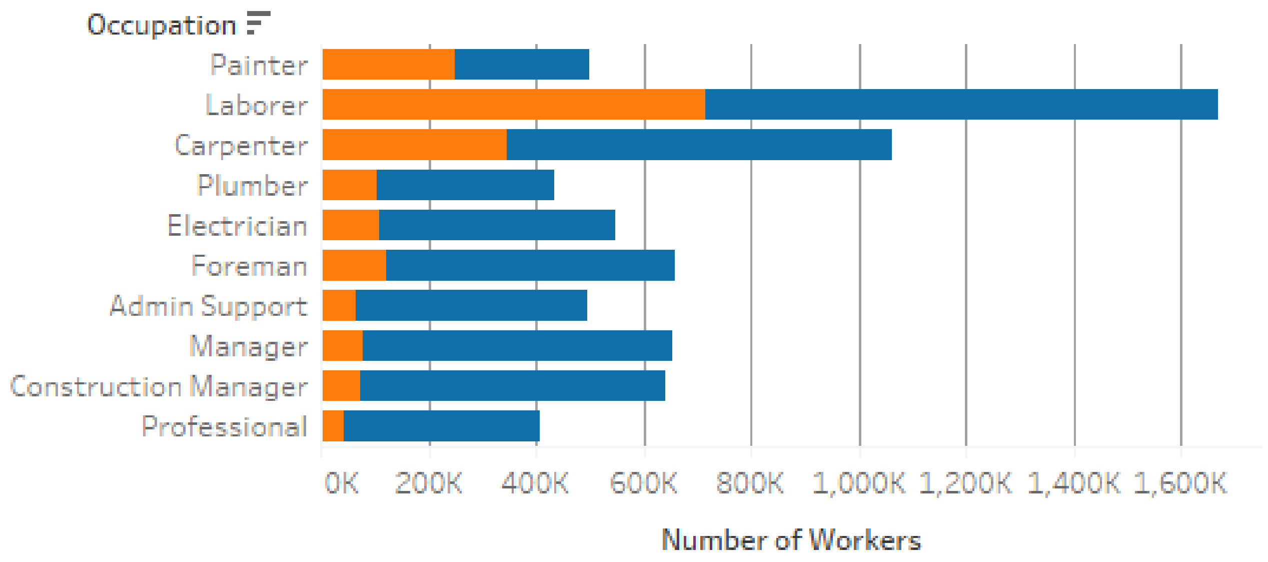
Employment by ethnicity and year



- **Top 3 Occupations**
  - **Painter=49.9%**
  - **Laborers=42.8%**
  - **Carpenter=32.8%**

Occupations with the highest proportion of Hispanic workers



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Employment Trends | Demographics | Foreign-born Hispanics

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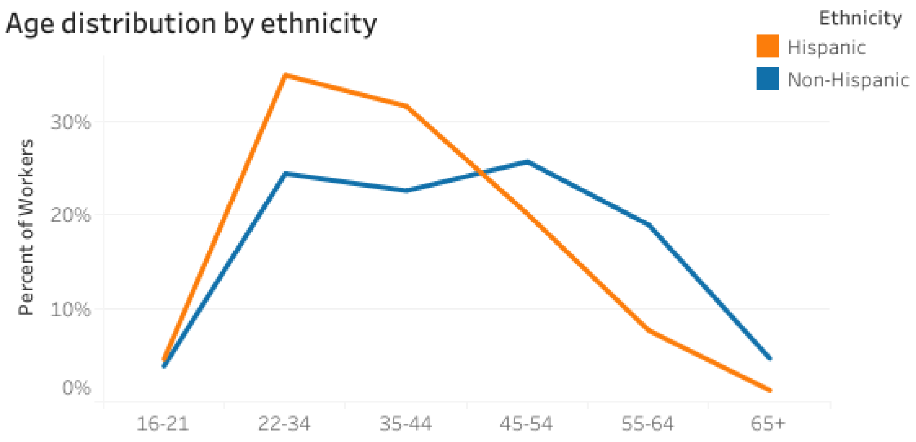
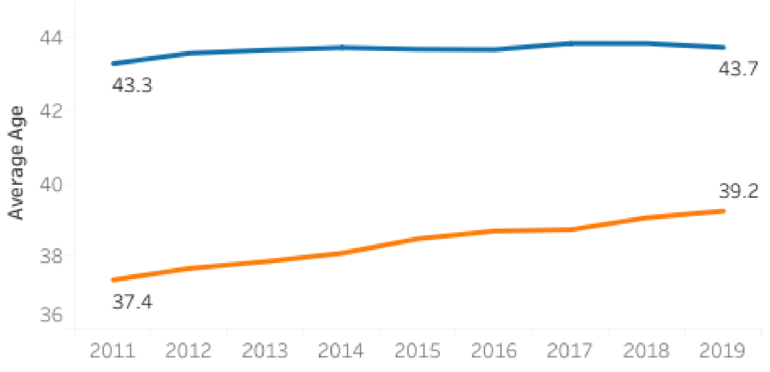
Hispanic Construction Workers, 2011-2019

Year
All

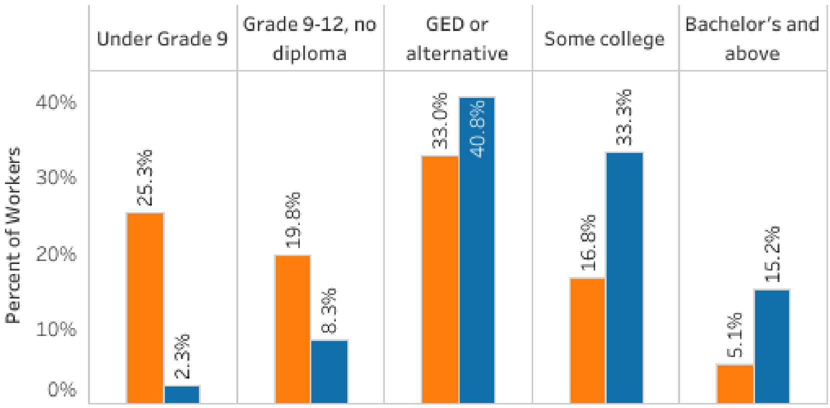
Age distribution by ethnicity



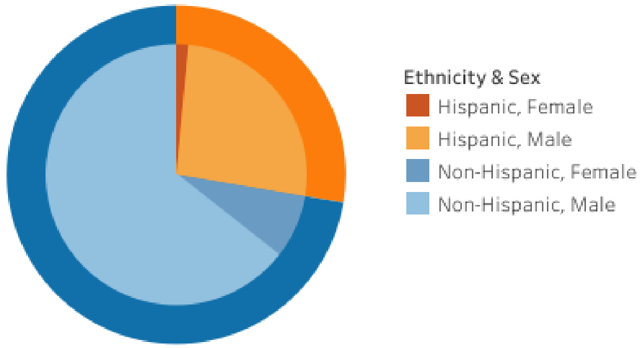
Average age of workers by ethnicity



Distribution of educational attainment by ethnicity



Gender of workers by ethnicity



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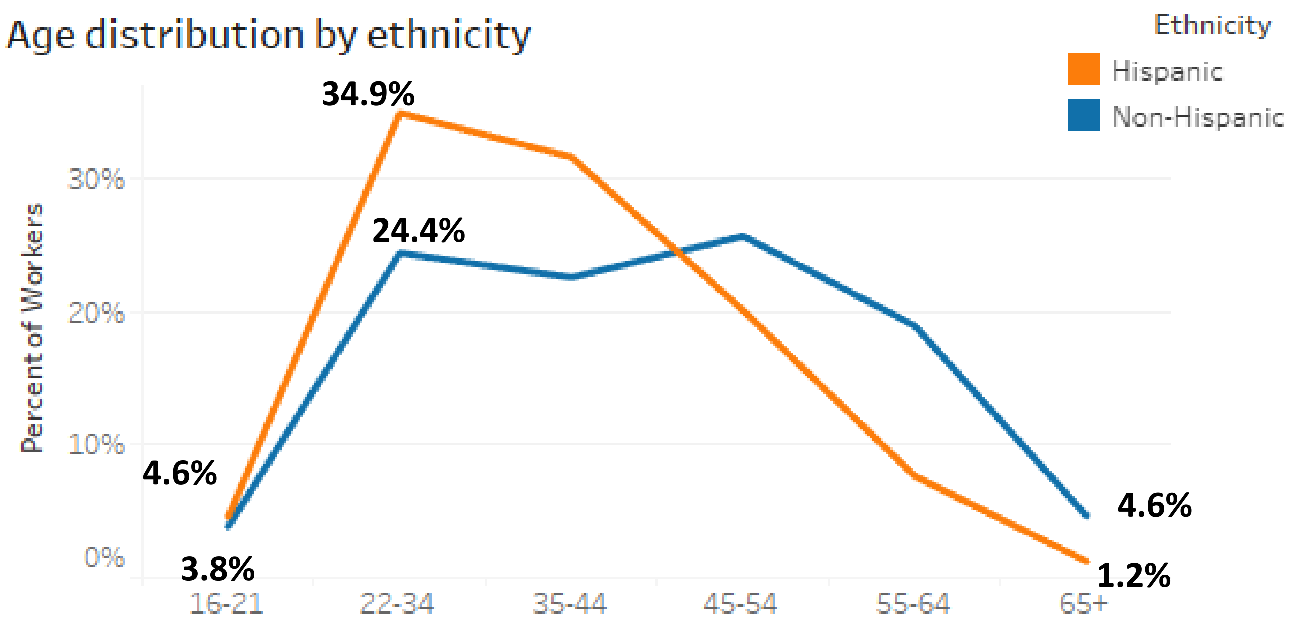

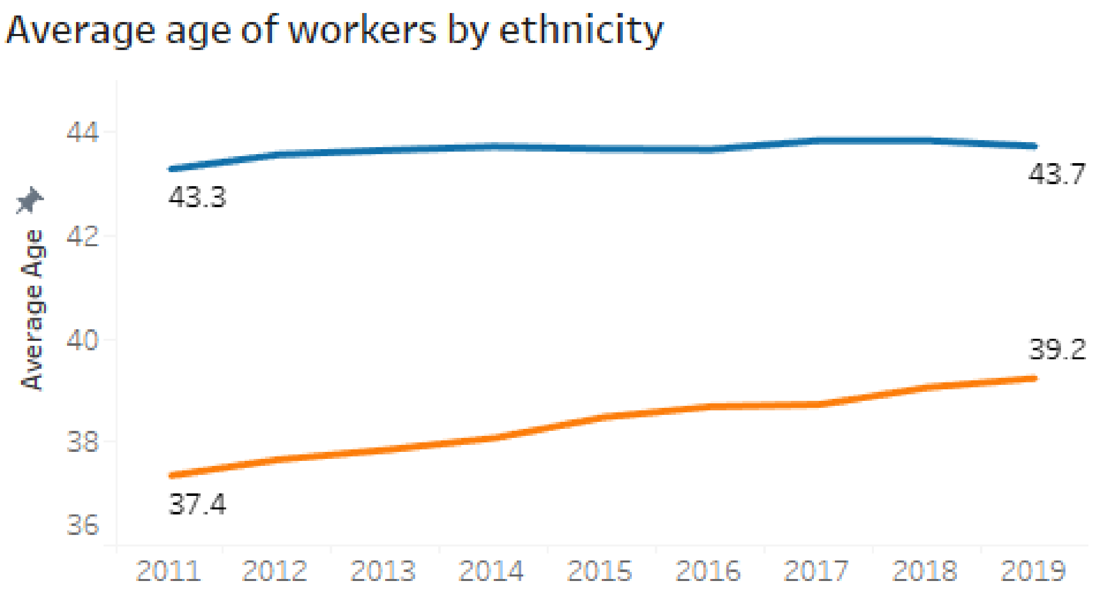

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Employment Trends | Demographics | Foreign-born Hispanics

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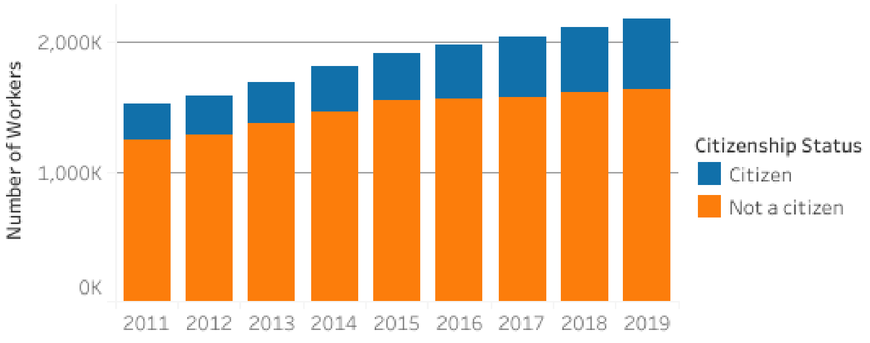
Hispanic Construction Workers, 2011-2019

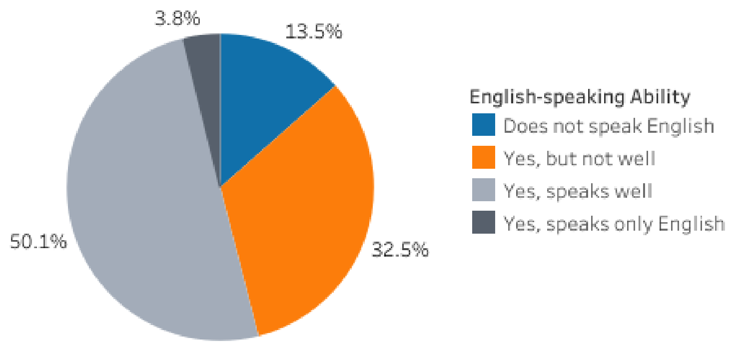
Year
All

Foreign-born Hispanic workers by citizenship status and year*

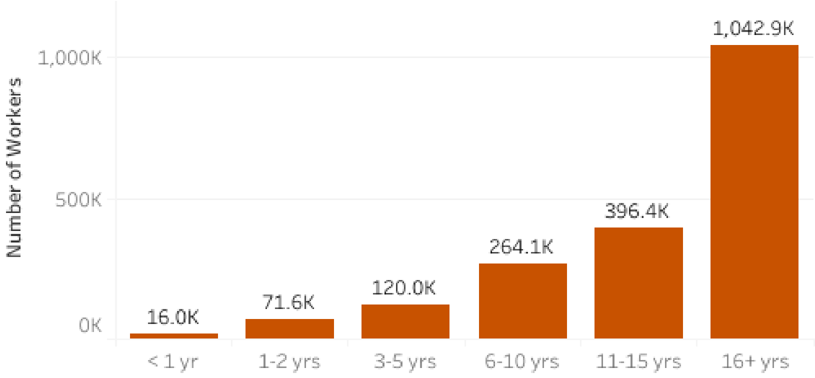


*Foreign-born workers for whom citizenship status is unknown are excluded

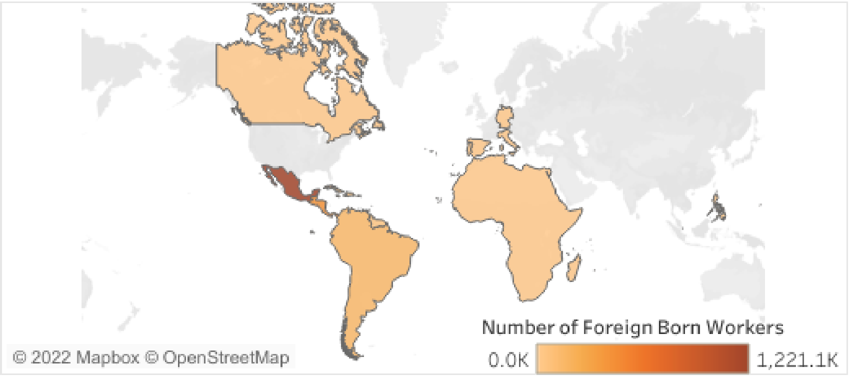
English-speaking ability among Foreign-born Hispanics



Foreign-born Hispanic workers by years lived in the U.S.



Birthplaces among Foreign-born Hispanic workers



Data Source: U.S. Census Bureau, American Community Survey (ACS), 2011-2019. Calculations by the CPWR Data Center. Datasets were downloaded through IPUMS: Steven Ruggles, Sarah Flood, Sophia Foster, Ronald Goeken, Jose Pacas, Megan Schouweiler and Matthew Sobek. IPUMS USA: Version 11.0 [dataset]. Minneapolis, MN: IPUMS, 2021. https://doi.org/10.18128/D010.V11.0

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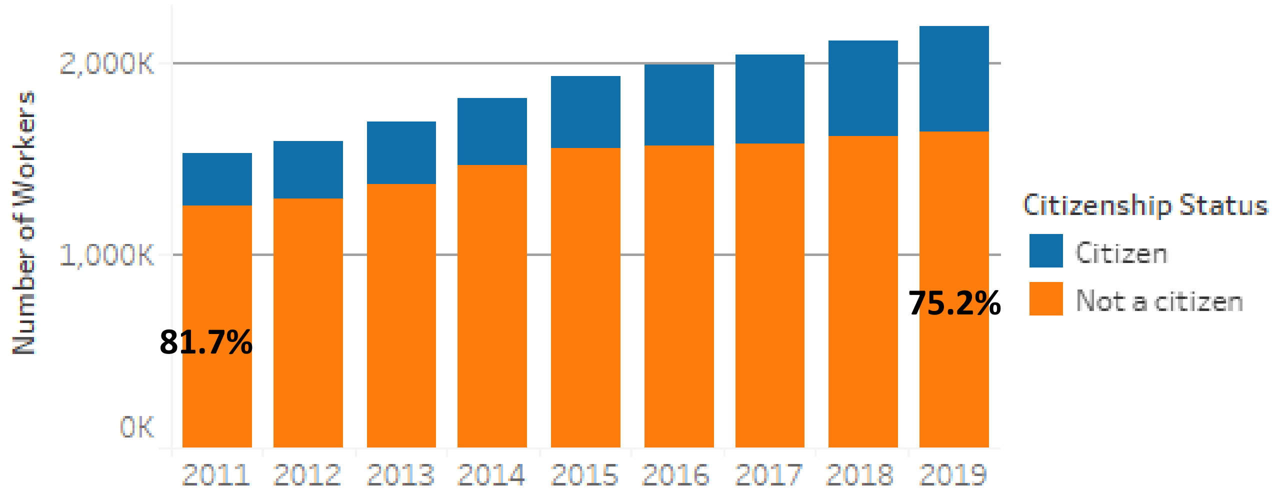
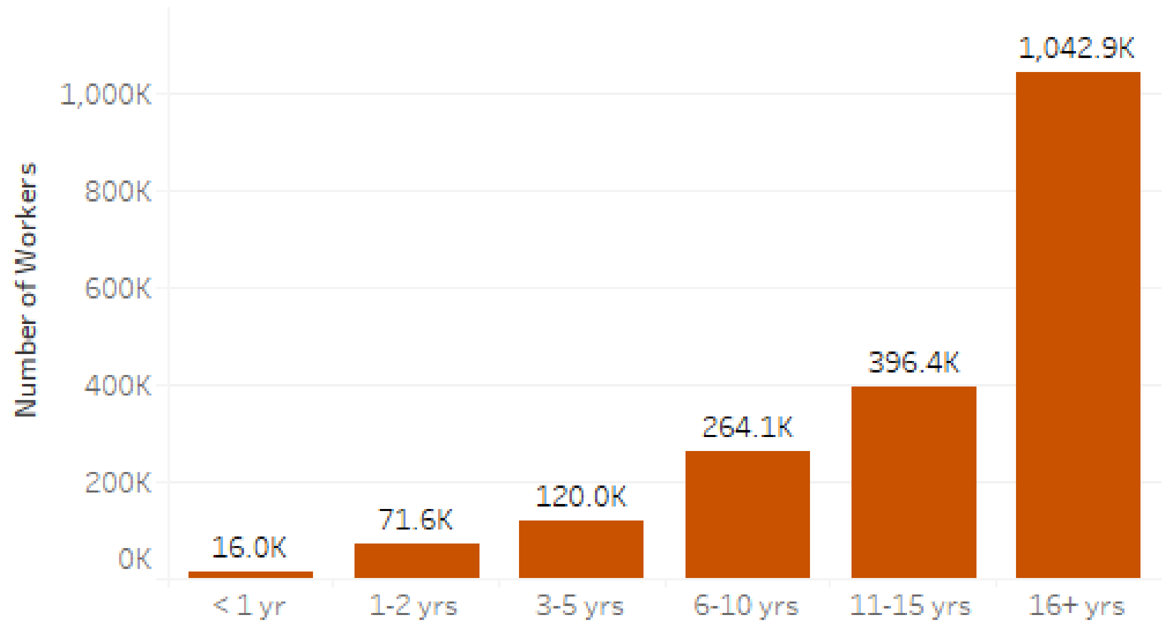
Foreign-born Hispanic workers by citizenship status and year*



*Foreign-born workers for whom citizenship status is unknown are excluded

Foreign-born Hispanic workers by years lived in the U.S.



Data Source: U.S. Census Bureau, American Community Survey (ACS), 2011-2019. Calculations by the CPWR Data Center. Datasets were downloaded through IPUMS: Steven Ruggles, Sarah Flood, Sophia Foster, Ronald Goeken, Jose Pacas, Megan Schouweiler and Matthew Sobek. IPUMS USA: Version 11.0 [dataset]. Minneapolis, MN: IPUMS, 2021. https://doi.org/10.18128/D010.V11.0

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Industry Trends

Women in Construction

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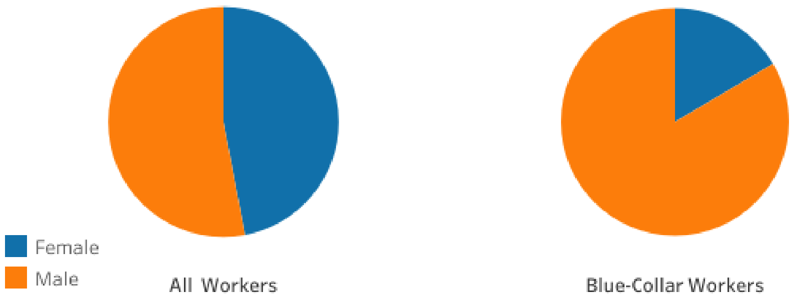
Women in Construction

Year
2021

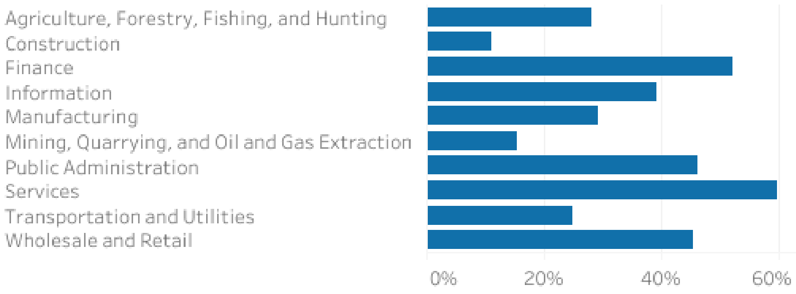
Total women workers all industries:

71.8 Million

Number of workers in all industries by sex



Women as a percentage of workers by industry

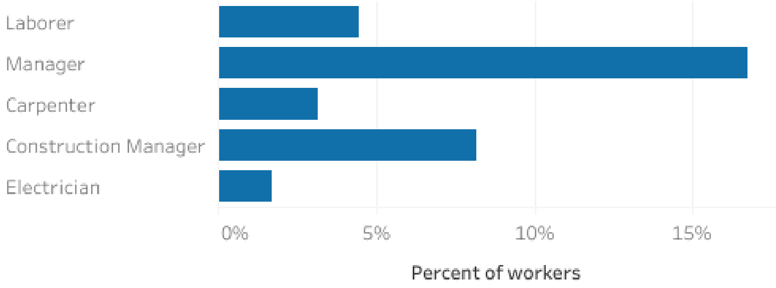


Total women workers construction:

1.2 Million

Number of construction workers by sex

Women as a percentage of workers in the top 5 occupations*



*Exlcudes other occupations.

Data Source:U.S. Bureau of Labor Statistics, 2011-2021 Current Population Survey, downloaded through IPUMS: Sarah Flood, Miriam King, Renae Rodgers, Steven Ruggles, J. Robert Warren and Michael Westberry. Integrated Public Use Microdata Series, Current Population Survey: Version 9.0 [dataset]. Minneapolis, MN: IPUMS,2021. https://doi.org/10.18128/D030.V9.0 . Calculations by the CPWR Data Center.

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Women in Construction

https://www.cpwr.com/research/data-center/data-dashboards/women-in-construction/

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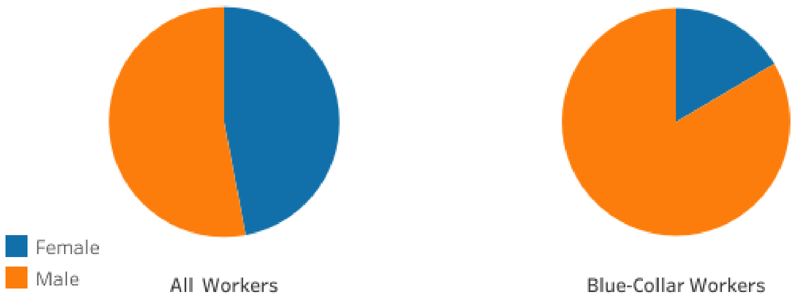
Women in Construction

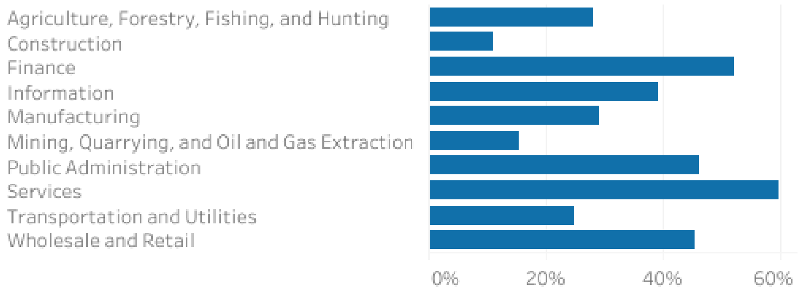
Year
2021

Total women workers all industries:
71.8 Million

Number of workers in all industries by sex

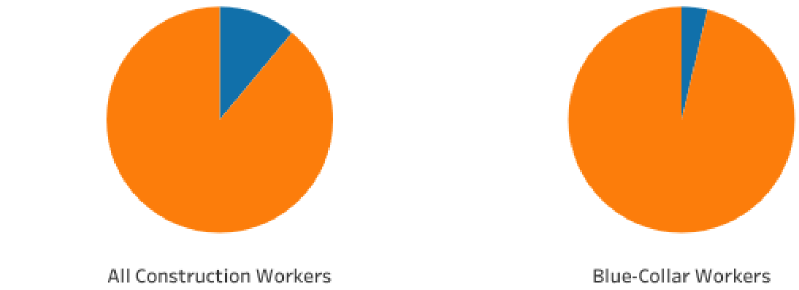


Women as a percentage of workers by industry

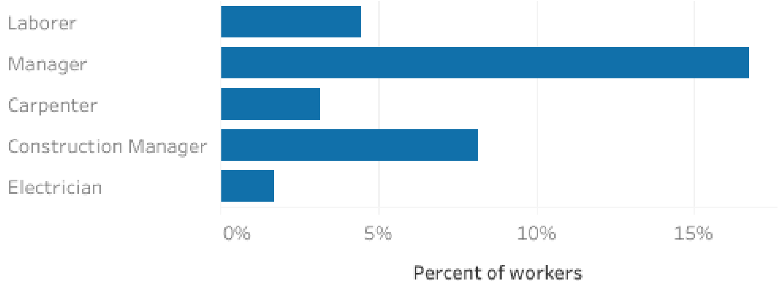


Total women workers construction:
1.2 Million

Number of construction workers by sex



Women as a percentage of workers in the top 5 occupations*



*Exlcudes other occupations.

Data Source:U.S. Bureau of Labor Statistics, 2011-2021 Current Population Survey, downloaded through IPUMS: Sarah Flood, Miriam King, Renae Rodgers, Steven Ruggles, J. Robert Warren and Michael Westberry. Integrated Public Use Microdata Series, Current Population Survey: Version 9.0 [dataset]. Minneapolis, MN: IPUMS,2021. https://doi.org/10.18128/D030.V9.0 . Calculations by the CPWR Data Center.

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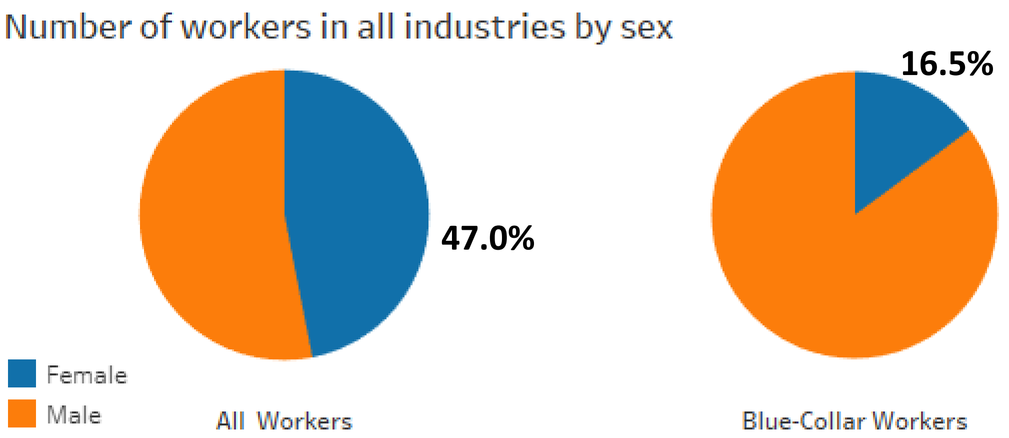
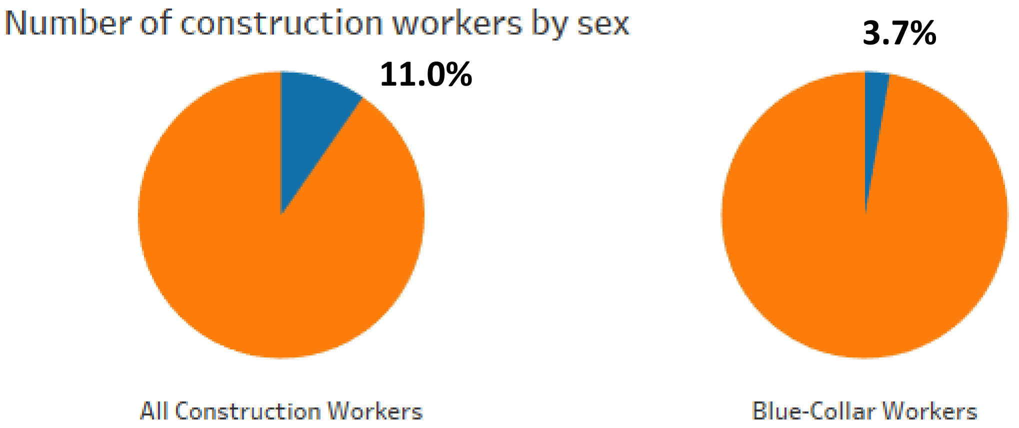




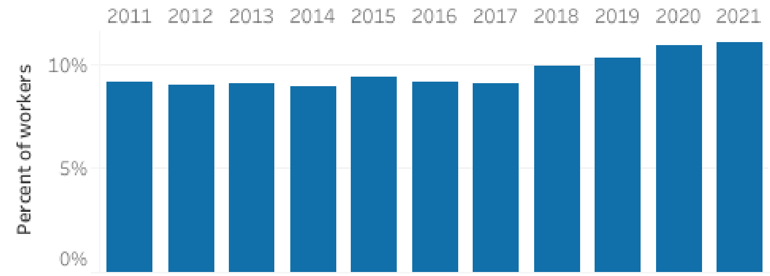
Data Source: U.S. Bureau of Labor Statistics, 2011-2021 Current Population Survey, downloaded through IPUMS: Sarah Flood, Miriam King, Renae Rodgers, Steven Ruggles, J. Robert Warren and Michael Westberry. Integrated Public Use Microdata Series, Current Population Survey: Version 9.0 [dataset]. Minneapolis, MN: IPUMS,2021. *https://doi.org/10.18128/D030.V9.0*. Calculations by the CPWR Data Center.

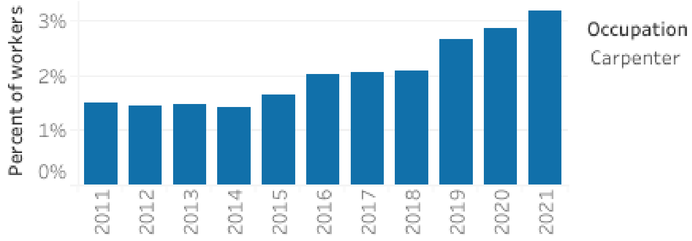
Women in Construction and All Industries | Characteristics of Women in Construction

Women in Construction

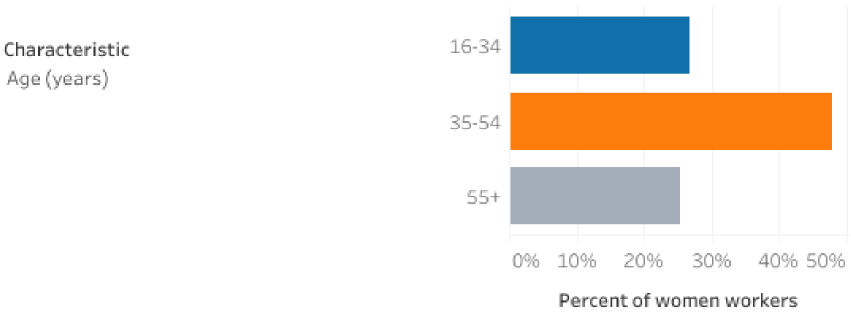
Year: All

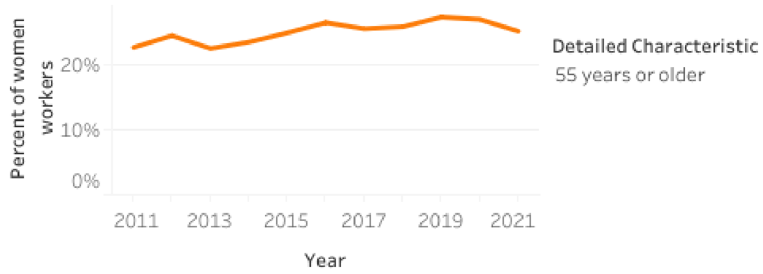
Occupation Type: All Construction





Characteristics of Women Construction Workers





*Occupations were excluded if a) they had low frequencies (N<30) for all years and b) those with N=0 for any year. Occupations with low frequencies (N<30) for one or more years are indicated in the tooltips and should be interpreted with caution.

Data Source:U.S. Bureau of Labor Statistics, 2011-2021 Current Population Survey, downloaded through IPUMS: Sarah Flood, Miriam King, Renae Rodgers, Steven Ruggles, J. Robert Warren and Michael Westberry. Integrated Public Use Microdata Series, Current Population Survey: Version 9.0 [dataset]. Minneapolis, MN: IPUMS,2021. https://doi.org/10.18128/D030.V9.0 . Calculations by the CPWR Data Center.

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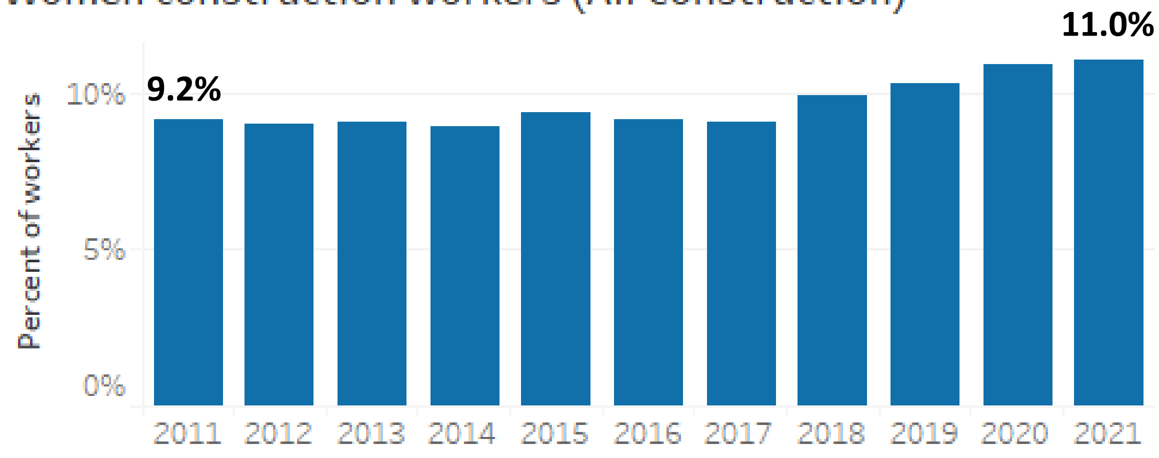
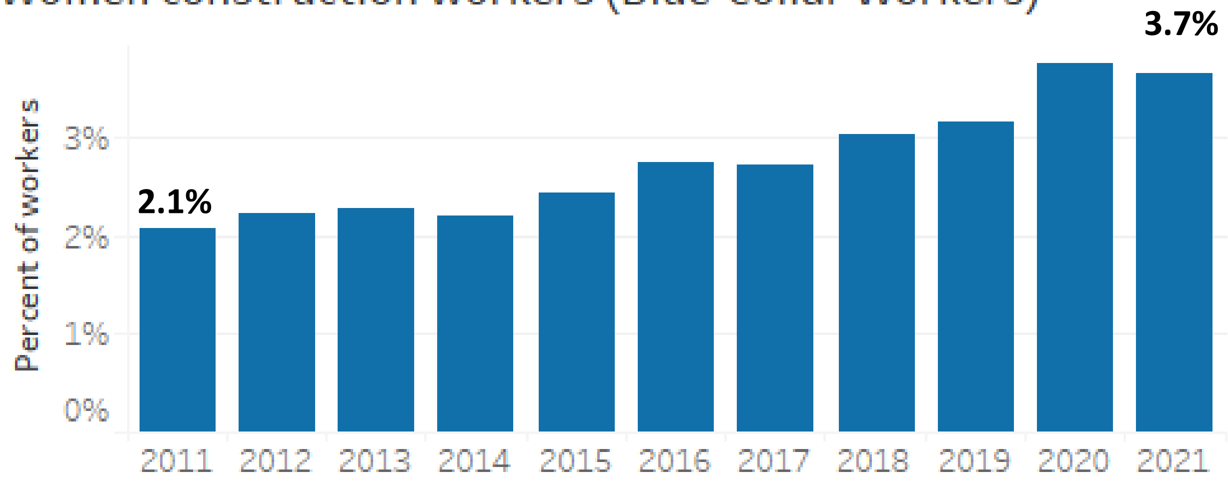
Women construction workers (All Construction)



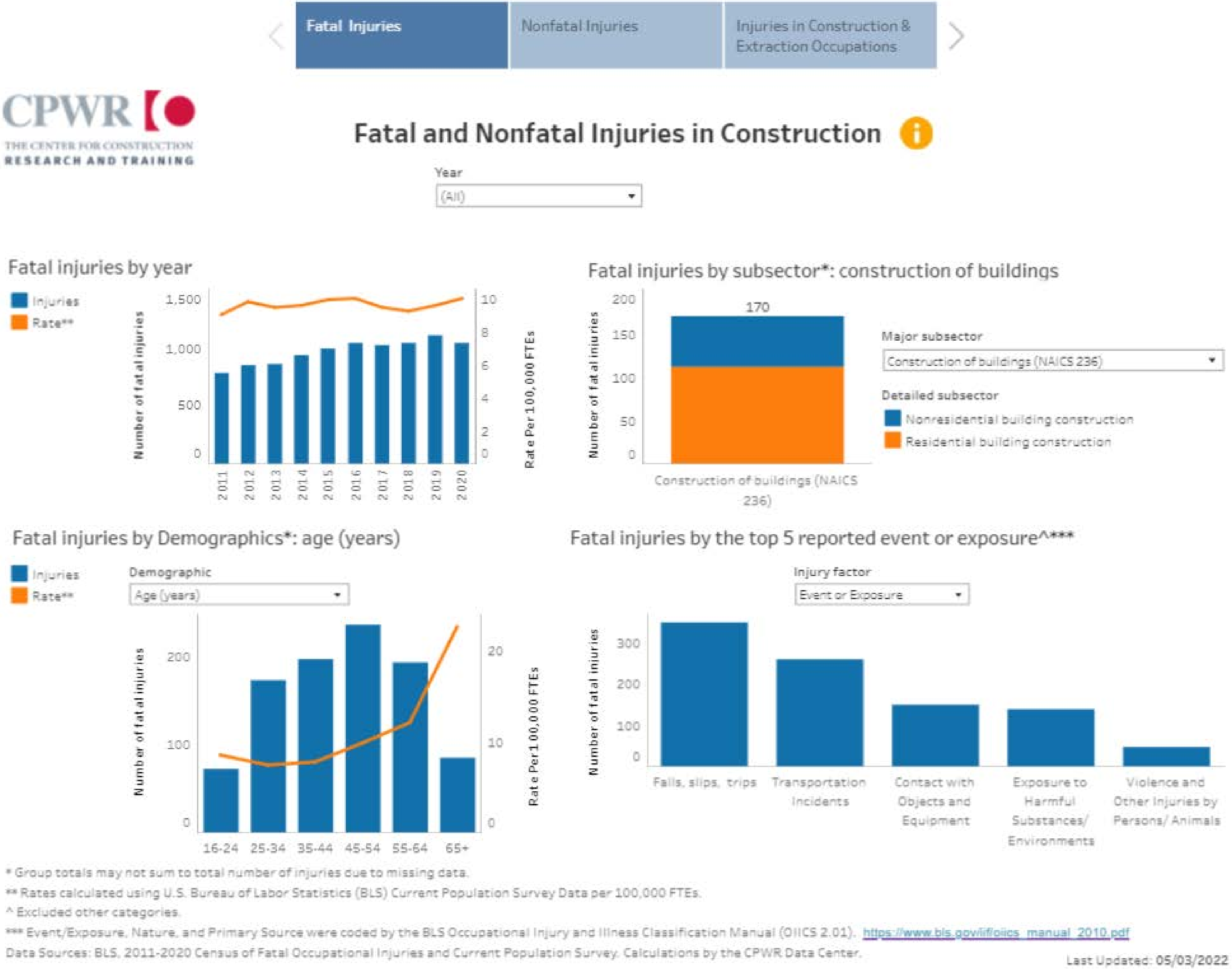
Women construction workers (Blue-Collar Workers)



Data Source: U.S. Bureau of Labor Statistics, 2011-2021 Current Population Survey, downloaded through IPUMS: Sarah Flood, Miriam King, Renae Rodgers, Steven Ruggles, J. Robert Warren and Michael Westberry. Integrated Public Use Microdata Series, Current Population Survey: Version 9.0 [dataset]. Minneapolis, MN: IPUMS,2021. *https://doi.org/10.18128/D030.V9.0*. Calculations by the CPWR Data Center.

Industry Trends

Fatal and nonfatal injury trends in construction



Fatal and nonfatal injuries story dashboard

https://www.cpwr.com/research/data-center/data-dashboards/fatal-and-nonfatal-injuries-in-construction/

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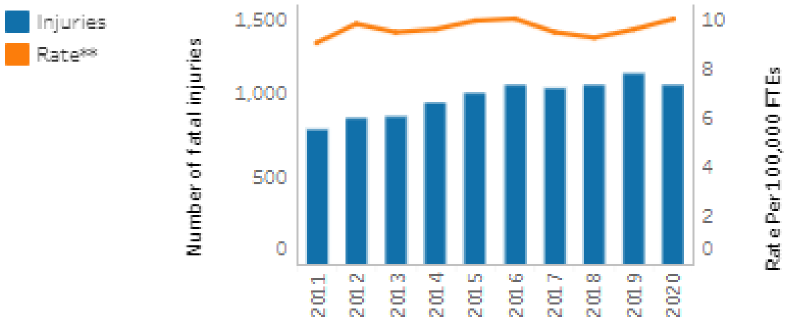
Fatal Injuries | Nonfatal Injuries | Injuries in Construction & Extraction Occupations

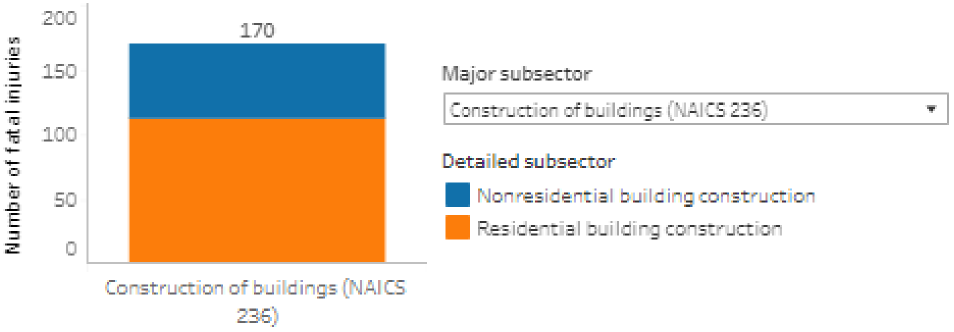
Fatal and Nonfatal Injuries in Construction

Year
(All)

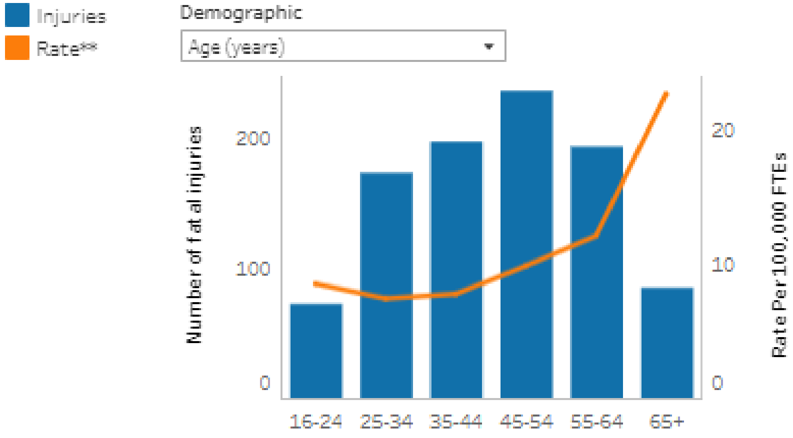
Fatal injuries by year



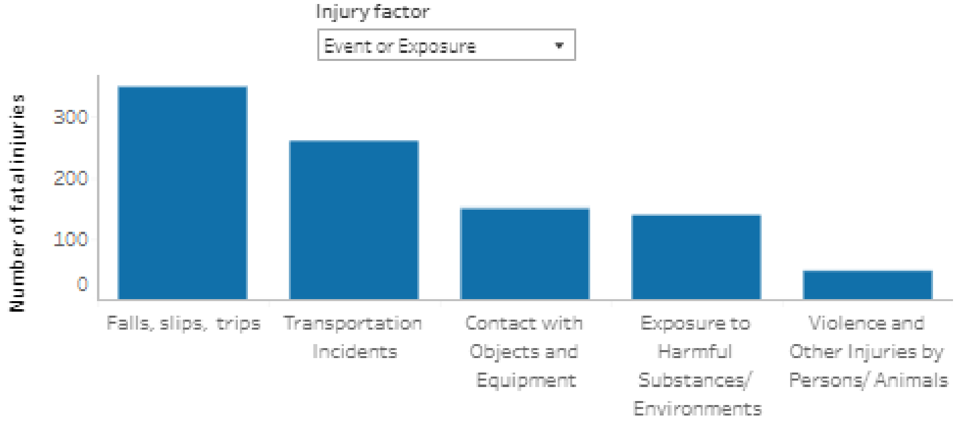
Fatal injuries by subsector*: construction of buildings



Fatal injuries by Demographics*: age (years)



Fatal injuries by the top 5 reported event or exposure^***



* Group totals may not sum to total number of injuries due to missing data.
** Rates calculated using U.S. Bureau of Labor Statistics (BLS) Current Population Survey Data per 100,000 FTEs.
^ Excluded other categories.
*** Event/Exposure, Nature, and Primary Source were coded by the BLS Occupational Injury and Illness Classification Manual (OIICS 2.01). https://www.bls.gov/iif/oiics_manual_2010.pdf
Data Sources: BLS, 2011-2020 Census of Fatal Occupational Injuries and Current Population Survey. Calculations by the CPWR Data Center.

Last Updated: 05/03/2022

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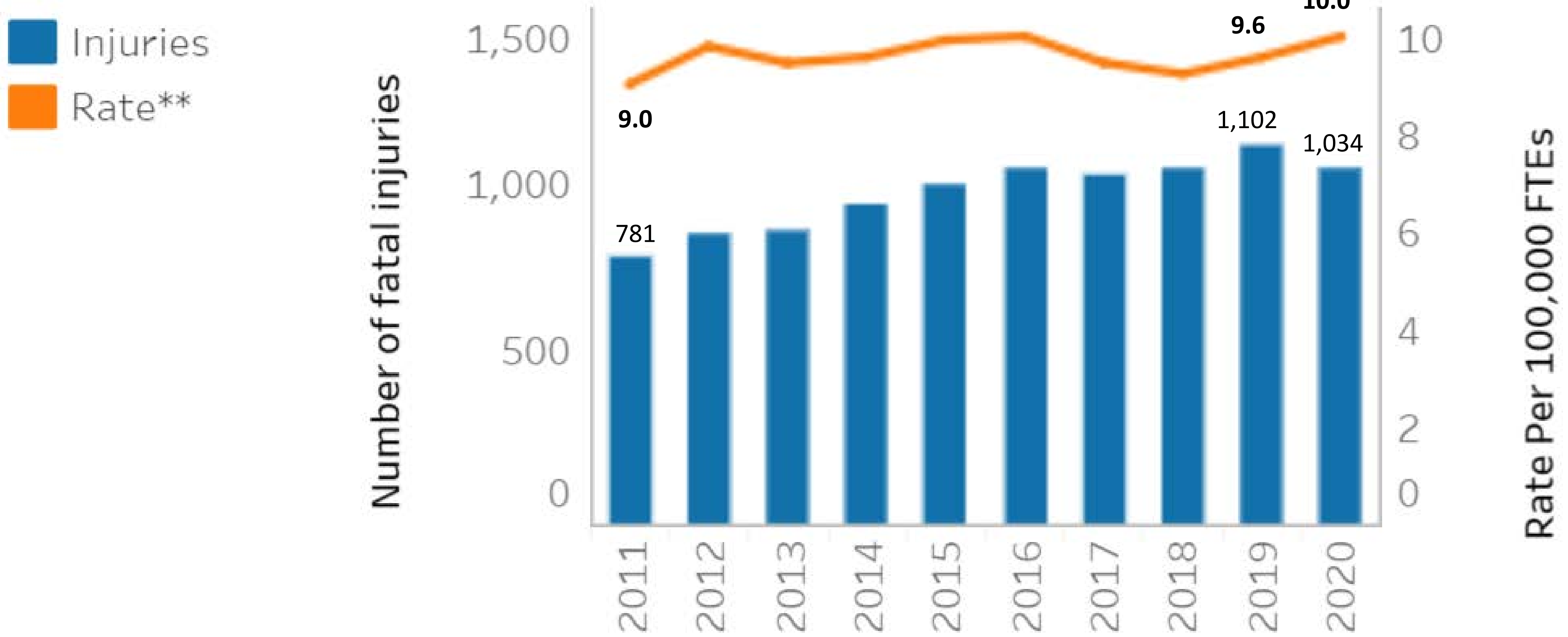
Fatal injuries by year



** Rates calculated using U.S. Bureau of Labor Statistics (BLS) Current Population Survey Data per 100,000 FTEs.

Data Sources: BLS, 2011-2020 Census of Fatal Occupational Injuries and Current Population Survey. Calculations by the CPWR Data Center.

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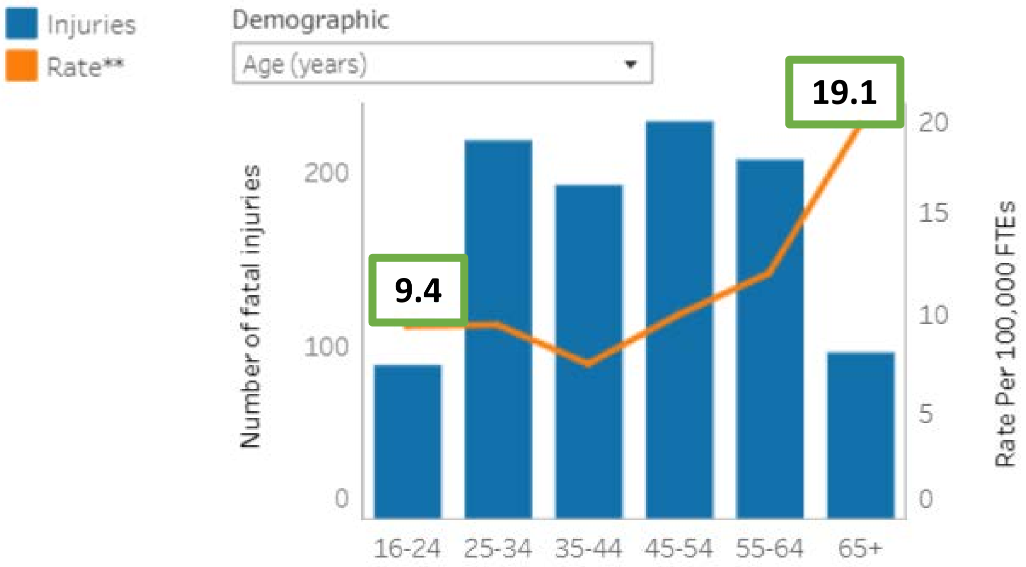
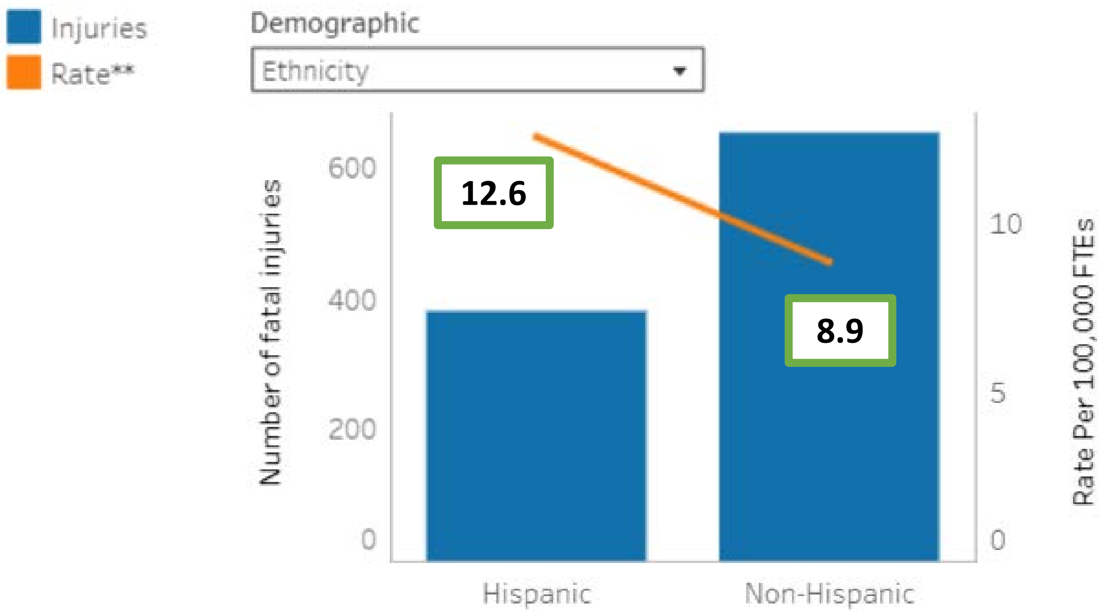
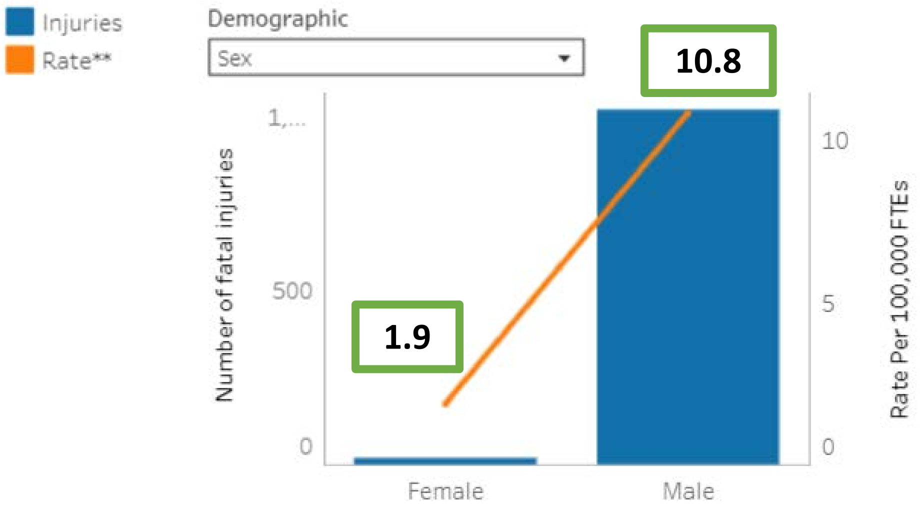
Fatal injuries by Demographics*: age (years)



Fatal injuries by Demographics*: ethnicity



Fatal injuries by Demographics*: sex



Year

2020

* Group totals may not sum to total number of injuries due to missing data.

** Rates calculated using U.S. Bureau of Labor Statistics (BLS) Current Population Survey Data per 100,000 FTEs.

Data Sources: BLS, 2011-2020 Census of Fatal Occupational Injuries and Current Population Survey. Calculations by the CPWR Data Center.

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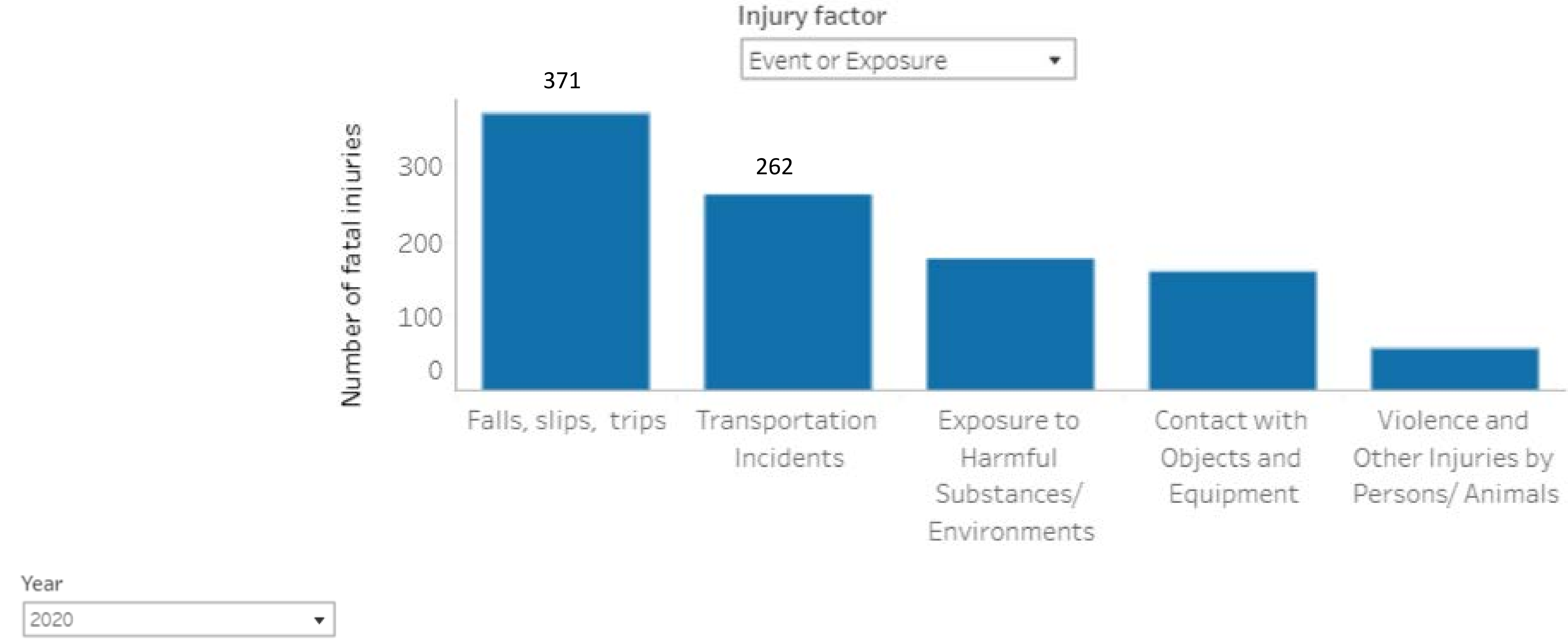
Fatal injuries by the top 5 reported event or exposure^***



^ Excluded other categories.

*** Event/Exposure, Nature, and Primary Source were coded by the BLS Occupational Injury and Illness Classification Manual (OIICS 2.01).

Data Sources: BLS, 2011-2020 Census of Fatal Occupational Injuries and Current Population Survey. Calculations by the CPWR Data Center.

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Fatal Injuries | Nonfatal Injuries | Injuries in Construction & Extraction Occupations

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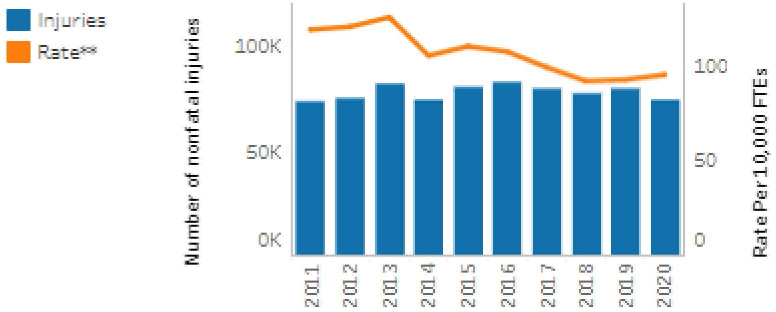
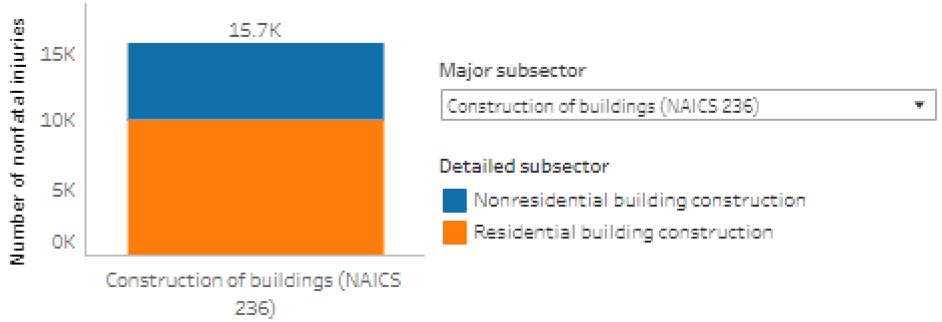
Fatal and Nonfatal Injuries in Construction

Year
(All)

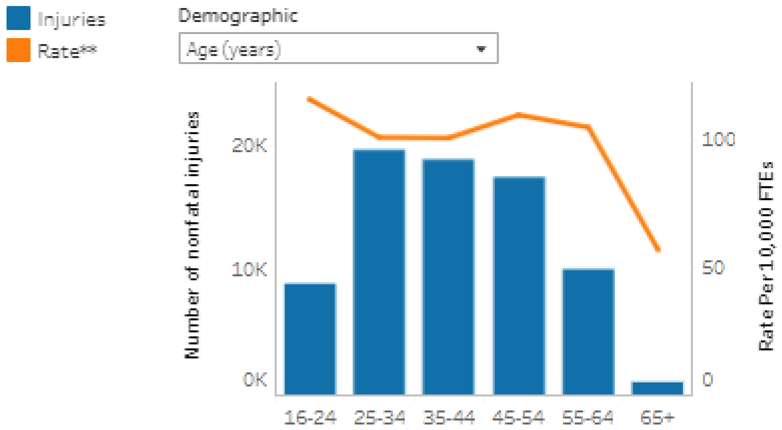
Nonfatal injuries by year



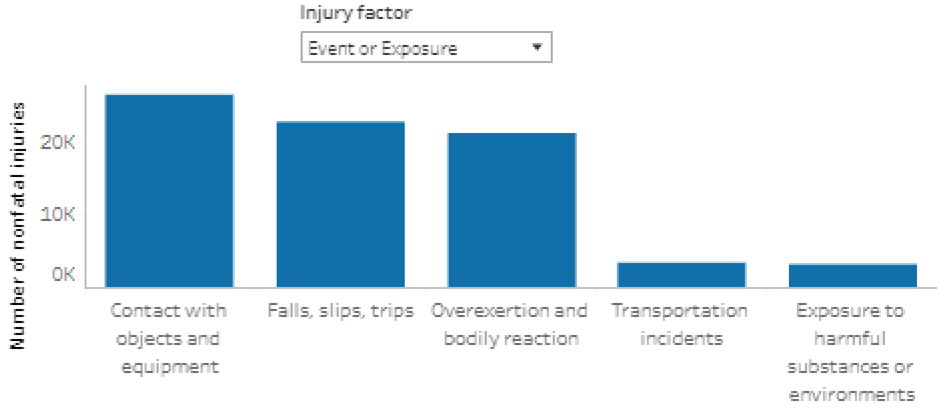
Nonfatal injuries by subsector*: construction of buildings



Nonfatal injuries by demographics*: age (years)



Nonfatal injuries by the top 5 reported event or exposure^***



* Group totals may not sum to total number of injuries due to missing data.
** Rates calculated using Current Population Survey Data per 10,000 FTEs. CPWR nonfatal rates will not align with BLS published nonfatal rates as they use employer logs.
^ Excluded other categories.
*** Event/Exposure, Nature, and Primary Source were coded by the BLS Occupational Injury and Illness Classification Manual (OIICS 2.01). https://www.bls.gov/iif/oiics_manual_2010.pdf
Data Sources: BLS, 2011-2020 Census of Fatal Occupational Injuries and Current Population Survey. Calculations by the CPWR Data Center.

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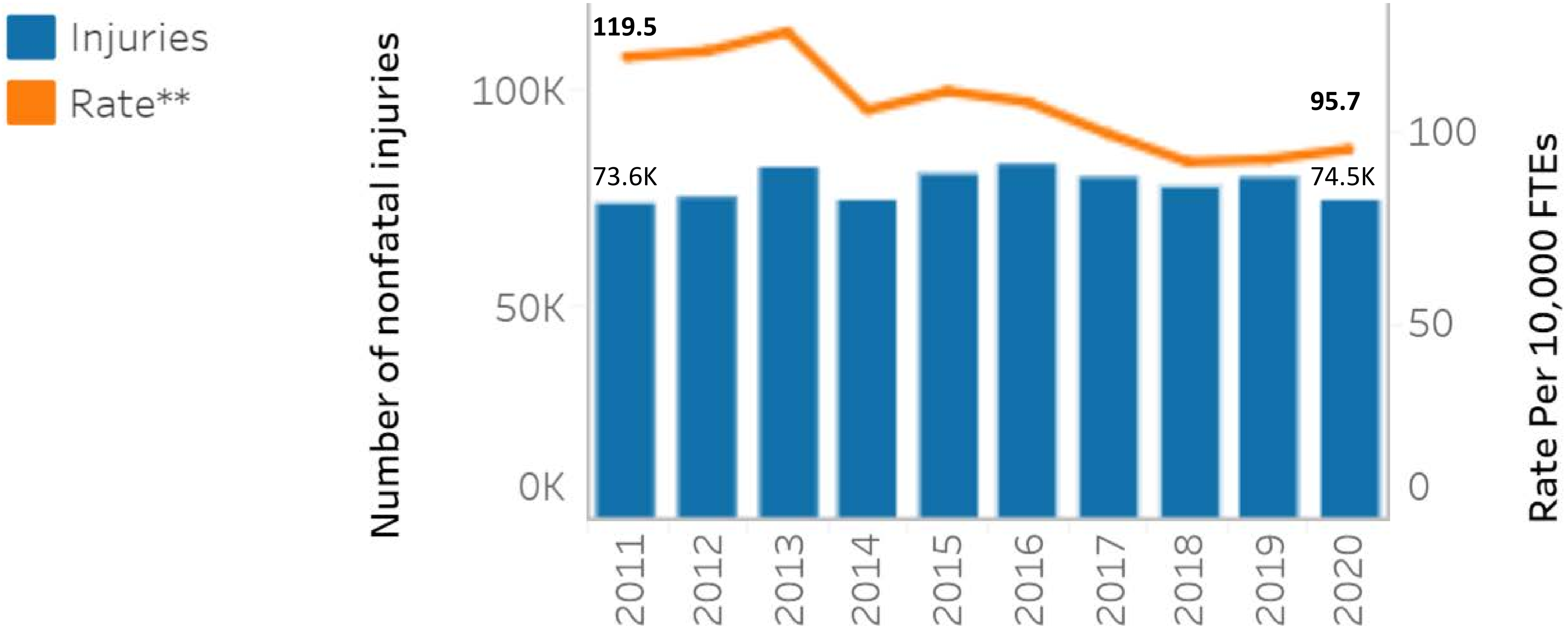
Nonfatal injuries by year



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Data Sources: BLS, 2011-2020 Census of Fatal Occupational Injuries and Current Population Survey. Calculations by the CPWR Data Center.

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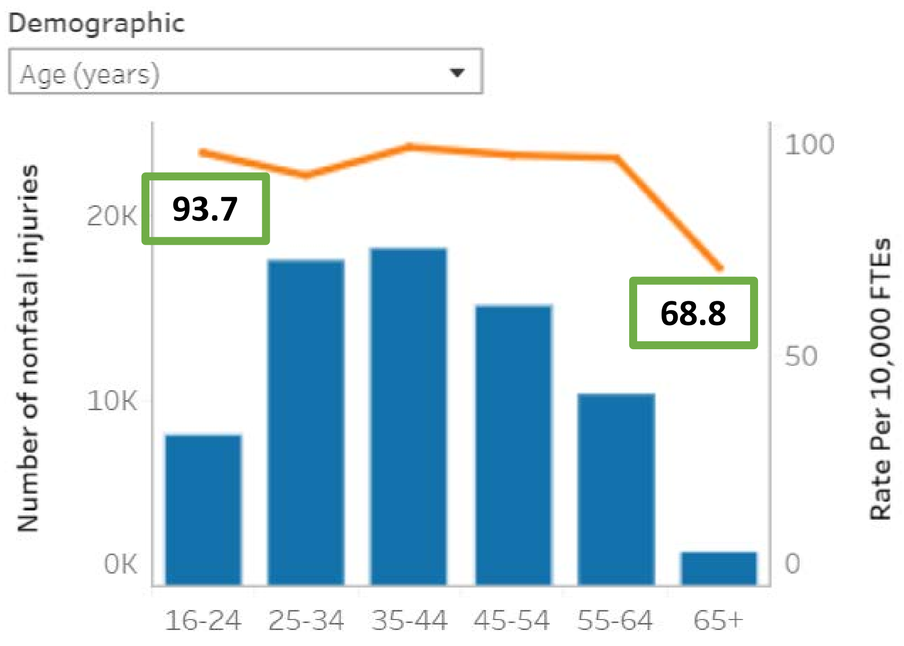
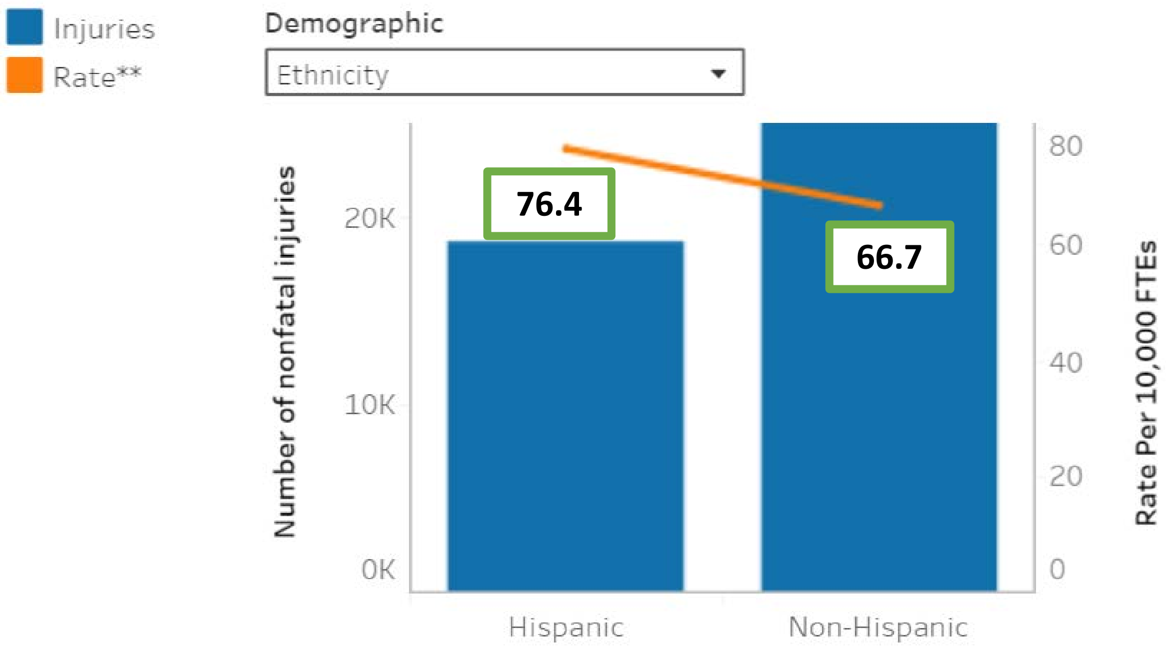
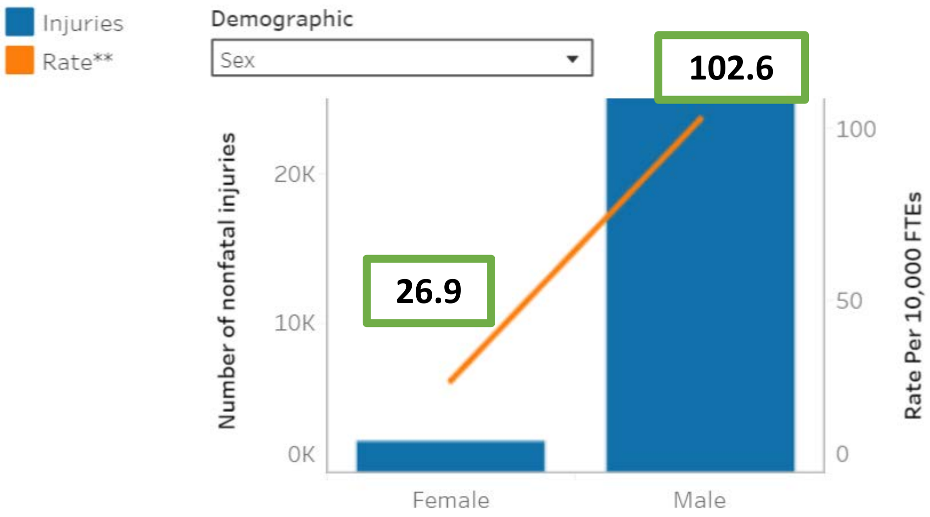
Nonfatal injuries by demographics*: age (years)



Nonfatal injuries by demographics*: ethnicity



Nonfatal injuries by demographics*: sex



Year

2020

* Group totals may not sum to total number of injuries due to missing data.

Data Sources: BLS, 2011-2020 Census of Fatal Occupational Injuries and Current Population Survey. Calculations by the CPWR Data Center.

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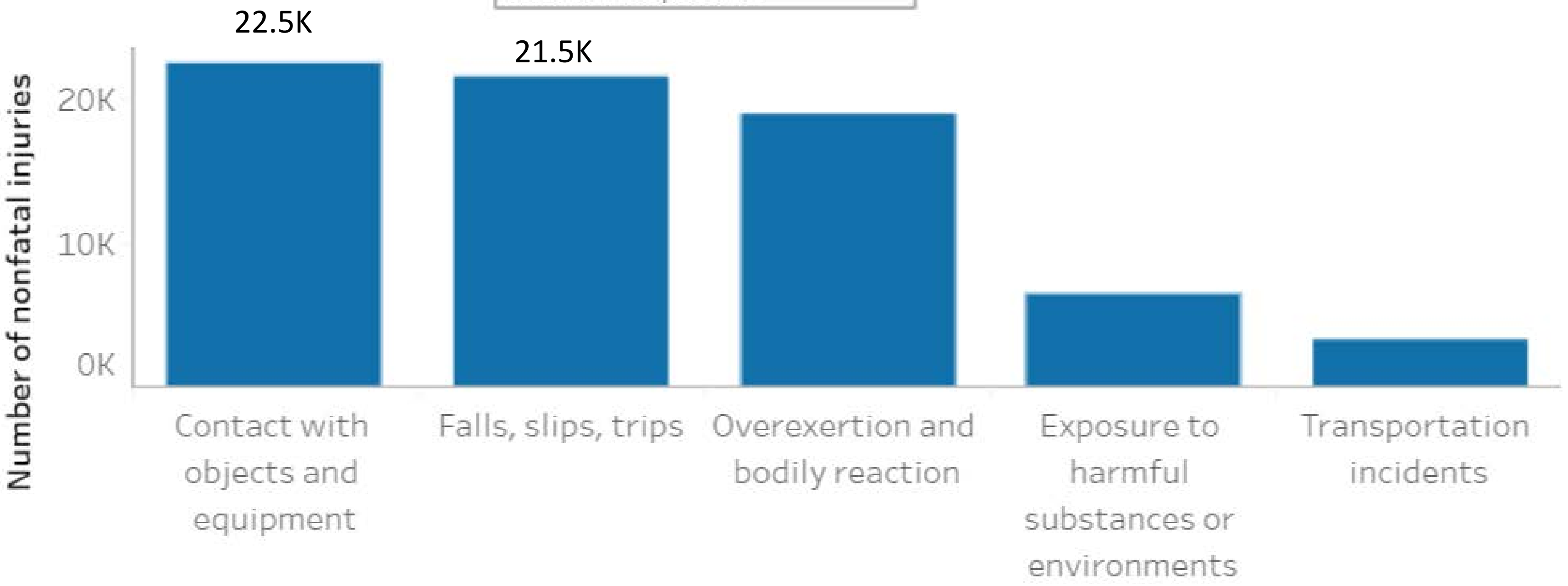
Nonfatal injuries by the top 5 reported event or exposure^***

Injury factor

Event or Exposure



Year

2020

^ Excluded other categories.

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Data Sources: BLS, 2011-2020 Census of Fatal Occupational Injuries and Current Population Survey. Calculations by the CPWR Data Center.

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Data Bulletin

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MAY 2022

Fatal and Nonfatal Injuries in the Construction Industry

Amber Brooke Trueblood, DrPH, Samantha Brown, MPH, William Harris, MS[1]

OVERVIEW

Construction is one of the most hazardous industries in the United States. Construction workers are significantly overrepresented in injuries, comprising 7.3% of the workforce but 21.7% of fatal injuries in 2020. Timely and accurate data on injuries is vital to guide safety and health interventions in the industry. This Data Bulletin provides updated information on fatal and nonfatal injuries in construction, including by subsector, occupation, demographic group, primary source, and event/exposure. Numbers for fatal injuries for all employment were obtained from the U.S. Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI), a complete count of reported fatal injuries and their circumstances. Estimates of nonfatal injuries were based on employer logs obtained from the BLS Survey of Occupational Injuries and Illnesses (SOII) for private, *wage-and-salary* construction workers. Nonfatal injuries include injuries or illnesses that resulted in *days away from work (DAFW)*. It is important to note that SOII data has been found to underreport nonfatal injuries and specifically to underreport nonfatal injuries among Hispanic construction workers. Employment figures used for rate calculations were estimated using the BLS Current Population Survey (CPS)[2], a monthly population survey. CPWR calculated fatal injury rates per 100,000 *full-time equivalent workers (FTEs)*, whereas nonfatal rates were calculated per 10,000 FTEs. Chart 4 provides BLS calculated rates. Finally, data for private nonfarm wage-and-salary employment in construction subsectors was obtained from the BLS Current Employment Statistics (CES) program, as subsector level data is not available in CPS. Categories with missing data are noted in chart footnotes.

[1]Correspondence to: datacenter@cpwr.com.
[2]The CPS is conducted by the U.S. Census Bureau for BLS.
Unless otherwise noted, numbers in text and charts were calculated by the CPWR Data Center.

THIS ISSUE

This issue examines fatal and nonfatal injuries from 2011 to 2020, including by subsector, occupation, demographic group, primary source, and event/exposure.

KEY FINDINGS

From 2011 to 2020, there were an annual average of 963 fatal injuries among all construction workers and 78,000 nonfatal injuries among private wage-and-salary construction workers.
Charts 1, 7

Fatal injury rates (per 100,000 FTEs) increased from 2011 to 2020 among those who were under 55 (8.1 to 9.0), Hispanic (9.6 to 12.6), and male (9.7 to 10.8).
Chart 3

Of all construction and extraction occupations examined, roofers had the highest fatal injury rate in 2020, with 47 fatalities per 100,000 FTEs.
Chart 4

From 2018 to 2020, helpers had the highest nonfatal injury rate (501.8 per 10,000 FTEs).
Chart 10

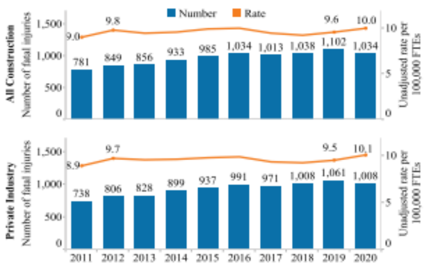
Falls, slips, and trips were among the leading events/exposures, resulting in 376 fatal and 22,900 nonfatal injuries on average annually from 2018 to 2020.
Charts 6, 12

NEXT DATA BULLETIN

Impact of COVID-19 on the Construction Industry: 2 years in review

From 2011 to 2020, 9,625 construction workers in the U.S. lost their lives due to an occupational injury, an annual average of 963 fatal injuries and a fatal injury rate of 9.6 per 100,000 FTEs (chart 1). During this period, the rate of fatal injuries increased 11.1%, from 9.0 to 10.0. During the first year of the COVID-19 pandemic (2019 to 2020), there was a 6.2% decrease in fatalities (1,102 to 1,034) but a 4.2% increase in the fatal injury rate (9.6 to 10.0). These figures are consistent with other findings that the pandemic had a minimal impact on the number of fatal injuries, but the decrease in construction employment during 2020 resulted in a higher fatal injury rate. Private industry followed a similar pattern as all construction, with a majority (average of 96.1%) of injuries occurring in the private industry.

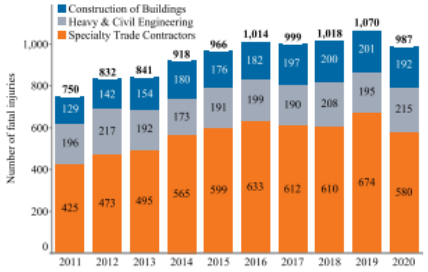
1. Number and rate of fatal injuries in construction, 2011-2020



Source: U.S. Bureau of Labor Statistics, 2011-2020 Census of Fatal Occupational Injuries and 2011-2020 Current Population Survey.

When divided according to *major subsector*, an average of 60.3% of fatal injuries in construction from 2011 to 2020 occurred in Specialty Trade Contractors (NAICS 238; chart 2). During this period, Construction of Buildings (NAICS 236) had the largest increase in fatal injuries (+48.8%; 129 to 192), followed by Specialty Trade Contractors (NAICS 238; +36.5%; 425 to 580). Heavy and Civil Engineering (NAICS 237) had the smallest increase (+9.7%) among the subsectors, from 196 to 215.

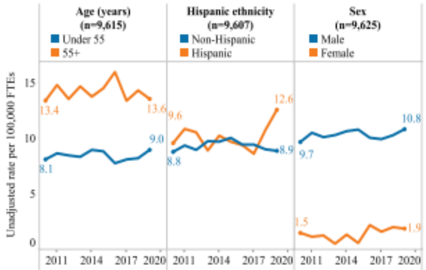
2. Fatal injuries, by major subsector, 2011-2020*



Source: U.S. Bureau of Labor Statistics, 2011-2020 Census of Fatal Occupational Injuries.
**Cases missing subsector data were excluded.*

The fatal injury rate (per 100,000 FTEs) increased in all demographic groups examined between 2011 and 2020 (chart 3). The largest increases in rates were for workers who were under 55 years old (8.1 to 9.0), Hispanic (9.6 to 12.6), or male (9.7 to 10.8). In 2020, the fatal injury rate in workers 55 or older was 51.1% higher than that of those younger than 55 (13.6 versus 9.0). The rate was 41.6% higher among Hispanic workers than among non-Hispanics in 2020 (12.6 versus 8.9). Interestingly, the fatal injury rate for Hispanic workers increased 46.5% from 2018 to 2020 (8.6 to 12.6), while the rate decreased 6.3% for non-Hispanic workers (9.5 to 8.9). Males had a 468.4% higher fatal injury rate than females in 2020 (10.8 versus 1.9).

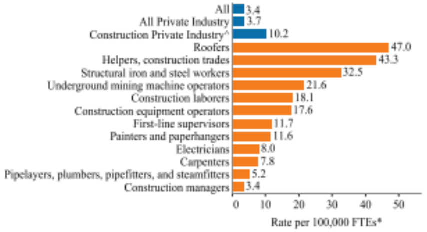
3. Rate of fatal injuries in construction by demographics, 2011-2020*



Source: U.S. Bureau of Labor Statistics, 2011-2020 Census of Fatal Occupational Injuries and 2011-2020 Current Population Survey.
**Cases missing age or ethnicity data were excluded.*

Fatal injury rates provided by BLS for select construction and extraction *occupations* in all industries in 2020 were examined (chart 4). The top three rates (per 100,000 FTEs) for the selected occupations were roofers (47.0), helpers (43.3), and structural iron and steel workers (32.5).

4. Rate of fatal injuries in construction and extraction occupations, 2020*



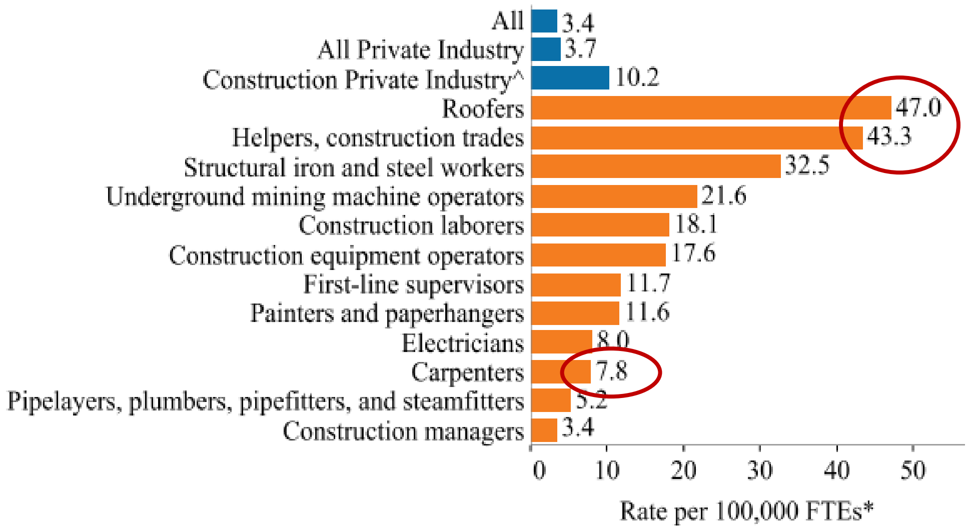
Source: U.S. Bureau of Labor Statistics, Total hours worked and rate of fatal occupational injuries by selected worker characteristics, occupations, and industries, civilian workers, 2020. https://www.bls.gov/iif/oshwc/cfoi/cfoi_rates_2020hb.xlsx. Accessed April 2022.
**BLS calculates the rate per 100,000 FTEs as Number of Fatal Injuries/Total Hours Worked X 200,000,000.*
^Due to differences in rate calculations and data this rate varies slightly from Chart 1.

Data Bulletin

https://www.cpwr.com/wp-content/uploads/DataBulletin-May2022.pdf

Fatal and nonfatal injury rates tended to be higher in roofers, helpers, and carpenters.

Rate of fatal injuries in construction and extraction occupations, 2020*

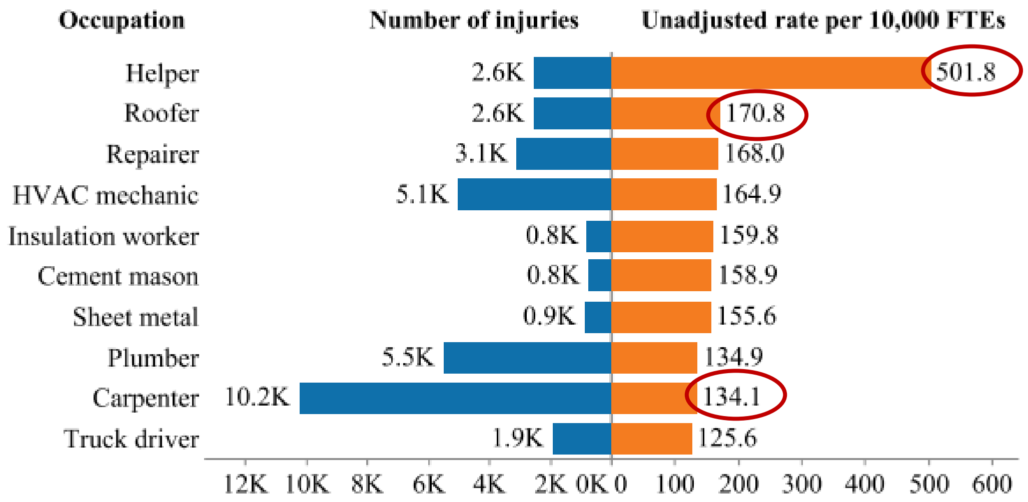


Source: *U.S. Bureau of Labor Statistics, Total hours worked and rate of fatal occupational injuries by selected worker characteristics, occupations, and industries, civilian workers, 2020. https://www.bls.gov/iif/oshwc/cfoi/cfoi_rates_2020hb.xlsx. Accessed April 2022.*

**BLS calculates the rate per 100,000 FTEs as Number of Fatal Injuries/Total Hours Worked X 200,000,000.*

^Due to differences in rate calculations and data this rate varies slightly from Chart 1.

Number and rate of nonfatal injuries in the 10 construction occupations* with the highest injury rate^, average of 2018-2020 (Private wage-and-salary workers)



Source: *U.S. Bureau of Labor Statistics, 2018-2020 Survey of Occupational Injuries and Illnesses and 2018-2020 Current Population Survey.*

**Occupations with N of less than 30 in any year in the CPS data were excluded.*

^CPWR rates may not align with published BLS SOII rates as they use employer logs which vary from CPS data.

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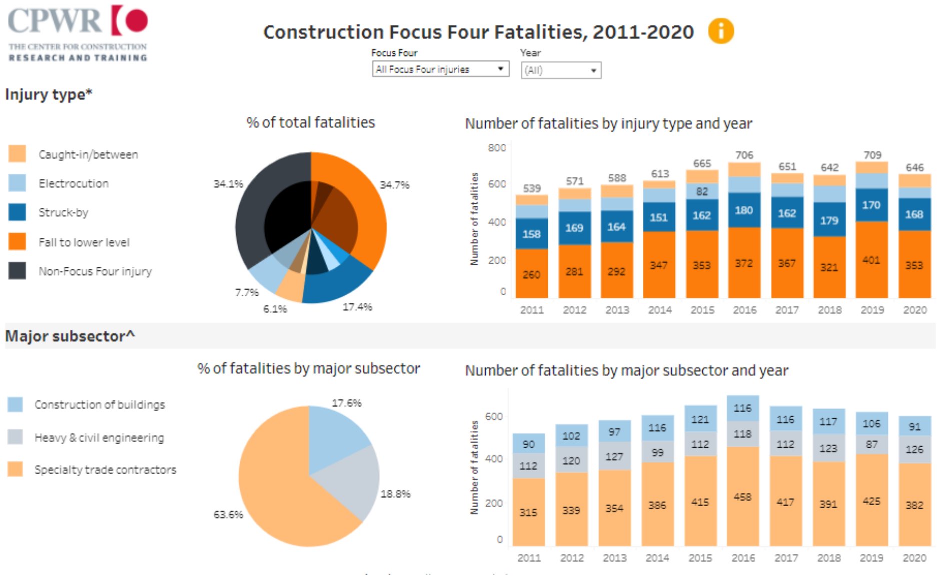
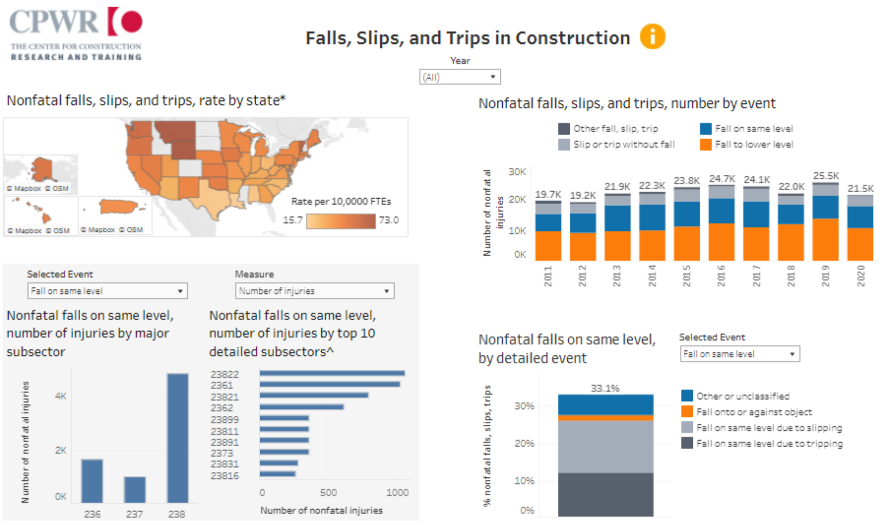
Other Fatal and Nonfatal Injury Data Dashboards

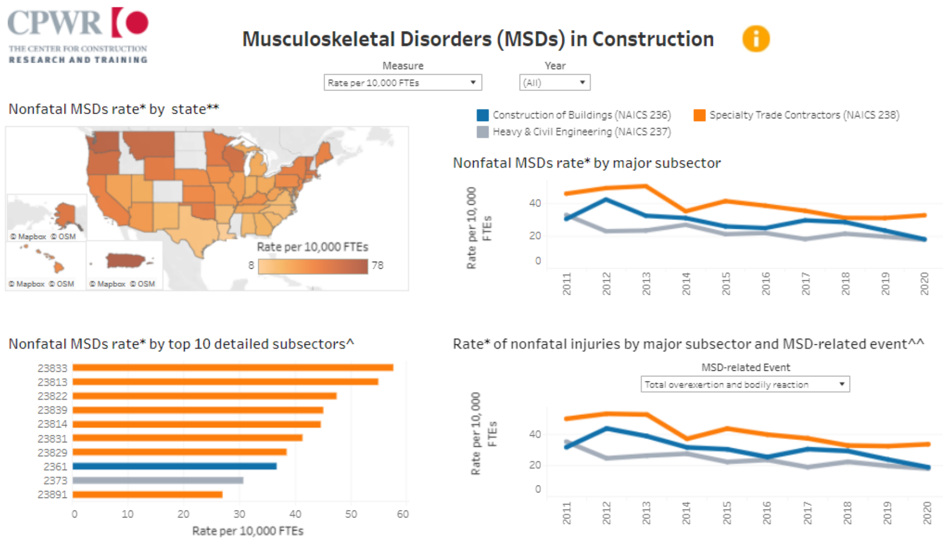
https://www.cpwr.com/research/data-center/data-dashboards/



Construction Focus Four Fatalities



Falls, Slips, and Trips in Construction



Musculoskeletal Disorders (MSDs) in Construction

Industry Trends

Construction Worker Mental Health

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Data Bulletin

WWW.CPWR.COM
JANUARY 2022

Construction Worker Mental Health During the COVID-19 Pandemic

Samantha Brown, MPH, Amber Brooke Trueblood, DrPH, William Harris, MS, Xiuwen Sue Dong, DrPH[1]

OVERVIEW

Anxiety and depression symptoms significantly worsened nationwide during the COVID-19 pandemic. Construction workers already suffer from an increasing and alarmingly high suicide rate, making it particularly important to understand mental health in the industry during the pandemic. To support that goal, this Data Bulletin examines self-reported symptoms of *anxiety* and *depression* in the population using the National Health Interview Survey (NHIS) from 2011 to 2018 and in 2020,[2] focusing on patterns and changes during the pandemic. Anxiety and depression were measured for *construction workers* by A) feelings of anxiety or depression at least once a month; and B) feelings of anxiety or depression at least once a week, or associated medication use. (see the Definitions section at the end of the report for detailed criteria). Differences in the frequency or level of anxiety/depression between 2019 and 2020 were measured in a subsample of construction workers who were interviewed in both years. Anxiety/depression was compared across[3] worker demographics, socioeconomic status, and health indicators (i.e., health status, alcohol use, opioid use, and health insurance coverage). Due to the survey methodology changes in 2020 and fewer respondents during the pandemic, the sample size of some subgroups is relatively small.[4]

[1]Correspondence to: datacenter@cpwr.com.
[2]No industry and occupation information in the 2019 survey due to the questionnaire redesign.
[3]Statistical significance is not discussed in the text but is provided in the associated charts.
[4]Frequencies of anxiety/depression are small (n < 30) for some subgroups in certain charts (see chart footnotes). Readers are advised to use related results with caution.
Numbers in text and charts were calculated by the CPWR Data Center.

THIS ISSUE

This issue examines anxiety and depression symptoms or medication use among construction workers before and during the COVID-19 pandemic, comparing differences by demographics, socioeconomic status, and health indicators.

KEY FINDINGS

Construction workers feeling anxious at least once per month rose 20% between 2011 and 2018.
Chart 1

In 2020, the prevalence of anxiety/depression (based on feelings or medication) in workers was 15%, and was particularly high in those who were age 18-34 (18%), female (24%), living below the poverty line (18%), or working part-time (19%).
Charts 4-6

In 2020, symptoms or medication use for anxiety/depression were almost three times higher in workers who used prescription opioids in the past year compared to those who did not (39% versus 14%).
Chart 7

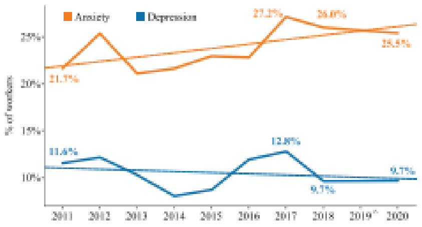
Among workers who were surveyed in both 2019 and 2020, 43% had increases in the frequency or level of anxious/depressed feelings between years, with increases more common in those who were age 18-54 (46%), female (50%), or had a family income below the poverty line (61%).
Charts 8-10

NEXT DATA BULLETIN

Employment Trends and Projections in Construction

In 2018, one quarter (26.0%) of construction workers felt anxious at least once per month, an increase of 19.8% since 2011 (chart 1). In contrast, 9.7% of construction workers felt depressed at least once per month in 2018, a decrease of 16.4% since 2011. The prevalence of anxious and depressed feelings in 2020 were similar to 2018. However, estimates before and after 2018 may not be directly comparable due to survey redesign.

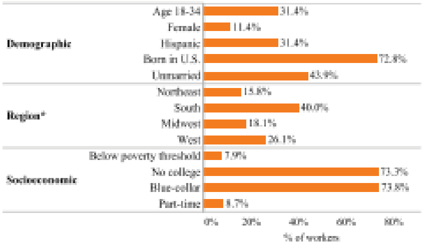
1. Prevalence of feelings of anxiety or depression at least once a month* among construction workers, 2011-2018, 2020



Source: National Health Interview Survey, 2010-2018, 2020.
**Chart includes anxious or depressed feelings at any level (a little, a lot, or somewhere in between) (see Definition A).*
^Data unavailable for 2019. Chart displays average of 2018 and 2020 as 2019.

In 2020, 1,258 NHIS respondents reported that they worked in construction as their main job in the last week or last year, representing about 13 million U.S. construction workers (chart 2). Of these workers, 31.4% were age 18-34 years, 11.4% were female, 31.4% were Hispanic, and 43.9% were unmarried. Additionally, 7.9% of construction workers lived below the *poverty threshold*, nearly three-fourths (73.8%) held a blue-collar occupation, and 8.7% worked part-time.

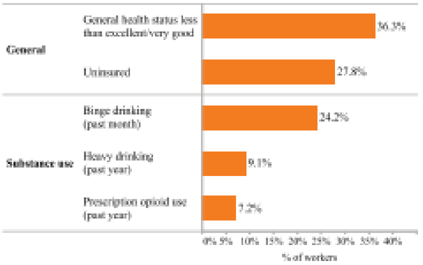
2. Demographic and socioeconomic characteristics of construction workers, 2020 (Estimated total = 12.98 million)



Source: National Health Interview Survey, 2020.
**Region reported separately from other demographic variables because it has four levels (Northeast, South, Midwest, West).*

Over one in three (36.3%) construction workers considered themselves not in very good or excellent health (i.e., perceived their general health status as good, fair, or poor; chart 3). More than a quarter (27.8%) of workers were *uninsured*. Overall 24.2% reported *binge drinking* in the past month, 9.1% reported *heavy drinking* over the past year, and 7.2% used *prescription opioids* in the past year.

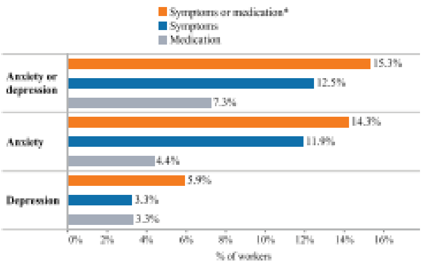
3. Health indicators among construction workers, 2020 (Estimated total = 12.98 million)



Source: National Health Interview Survey, 2020.

In 2020, the percentage of construction workers with anxiety and depression—based on symptoms or medication use—was 14.3% and 5.9%, respectively (chart 4). The prevalence of anxiety or depression based on symptoms or medication use (hereafter referred to as "anxiety/depression") was 15.3%.

4. Prevalence of anxiety and depression among construction workers, 2020



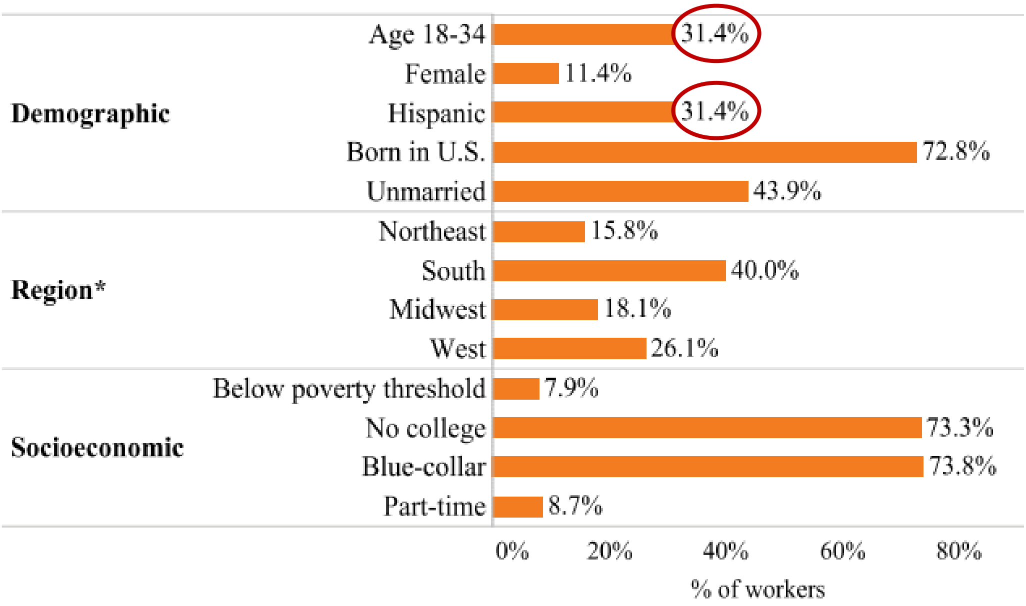
Source: National Health Interview Survey, 2020.
**Anxious/depressed feelings at least once a week with a level of "a lot" or "somewhere between a little and a lot" and/or reported medication for anxiety/depression (see Definition B).*

Data Bulletin

https://www.cpwr.com/wp-content/uploads/DataBulletin-January2022.pdf

In 2020, 15.3% of construction workers had anxiety and/or depression.

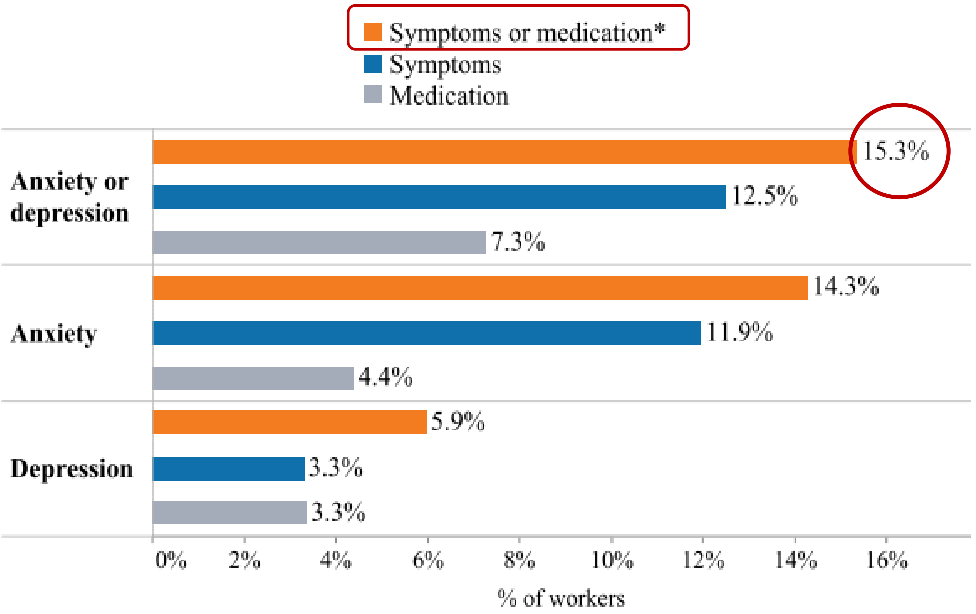
Demographic and socioeconomic characteristics of construction workers, 2020 (Estimated total = 12.98 million)



Source: *National Health Interview Survey, 2020.*

**Region reported separately from other demographic variables because it has four levels (Northeast, South, Midwest, West).*

Prevalence of anxiety and depression among construction workers, 2020



Source: *National Health Interview Survey, 2020.*

**Anxious/depressed feelings at least once a week with a level of "a lot" or "somewhere between a little and a lot" and/or reported medication for anxiety/ depression (see Definition B).*

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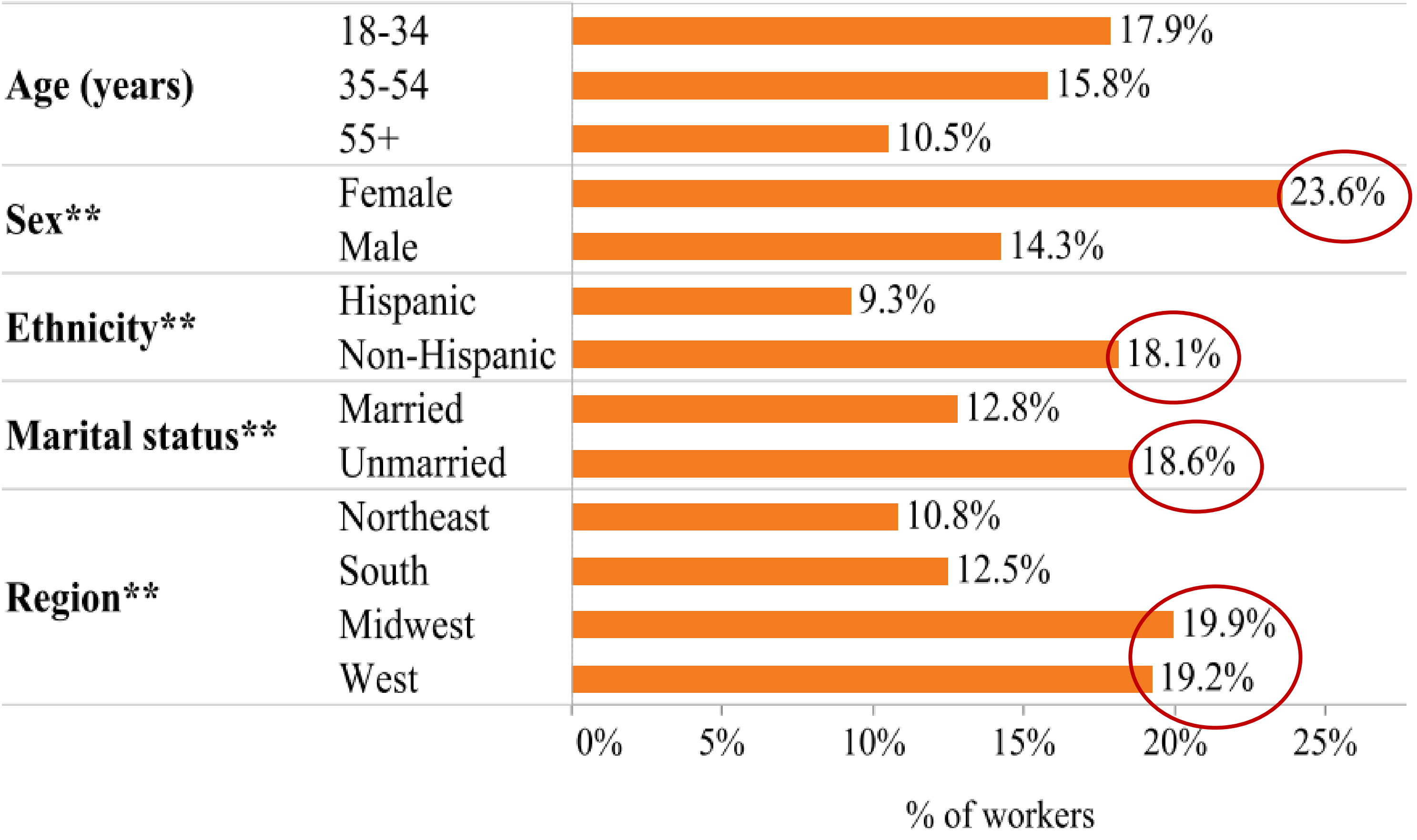
Anxiety/depression^ prevalence among construction workers, by demographics, 2020*



Source: *National Health Interview Survey, 2020.*

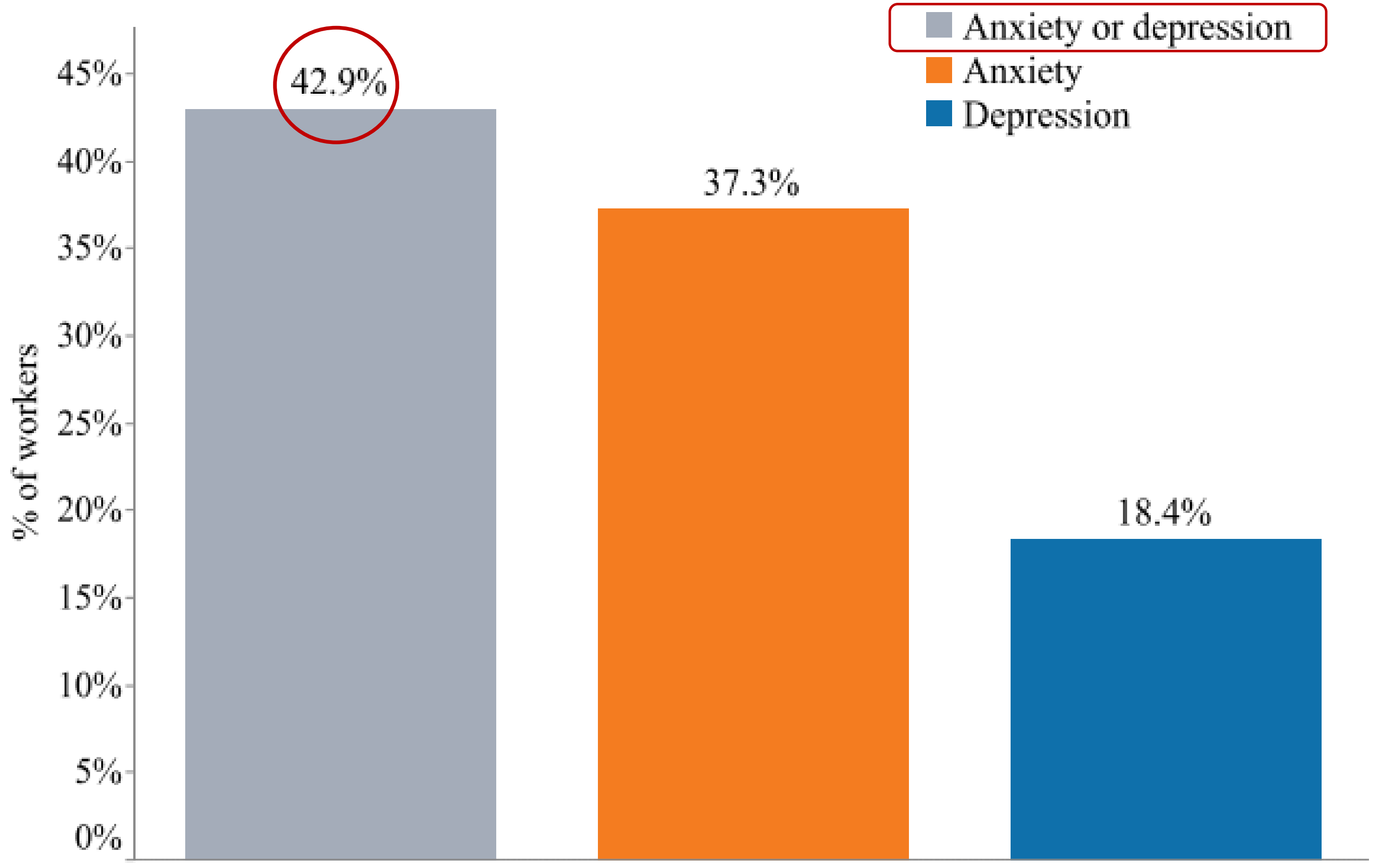
^Anxiety/depression based on symptoms or medication (see Definition B).

**N<30 for Northeast.*

***Significant differences between categories (Chi-square p-value <0.05).*

In 2020, anxiety/ depression was more common in workers who were: female, non-Hispanic, unmarried, or lived in the West (p<0.05).

Percentage of construction workers feeling more anxious/depressed in 2020 than in 2019*



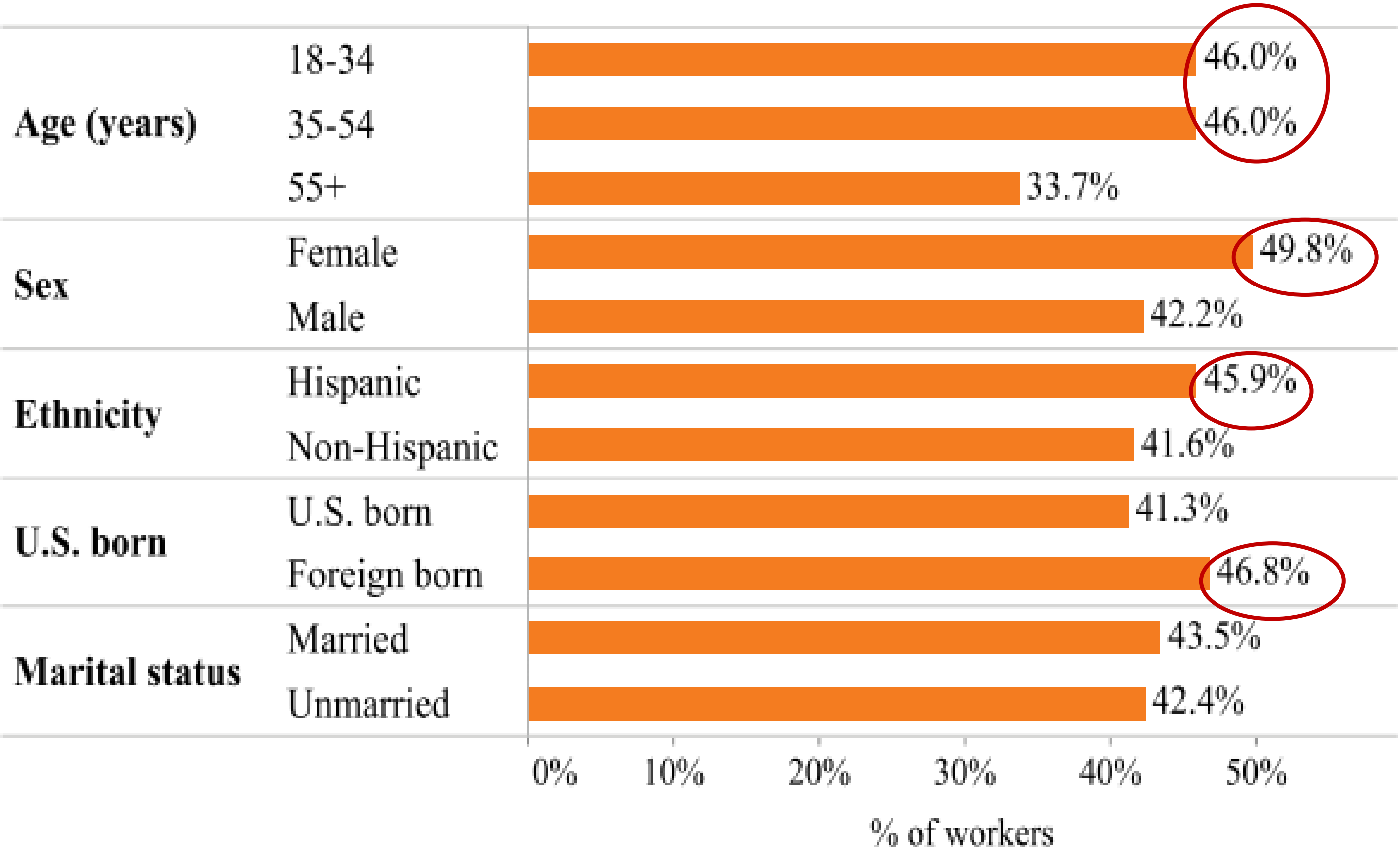
Source: *National Health Interview Survey, 2019-2020.*

**Chart includes sub-sample of construction workers who were interviewed in both 2019 and 2020.*

42.9% of construction workers* felt more anxious/ depressed in 2020 than in 2019.

*longitudinal Subsample N = 408 workers

Percentage of construction workers feeling more anxious/depressed in 2020 than in 2019^, by demographics*



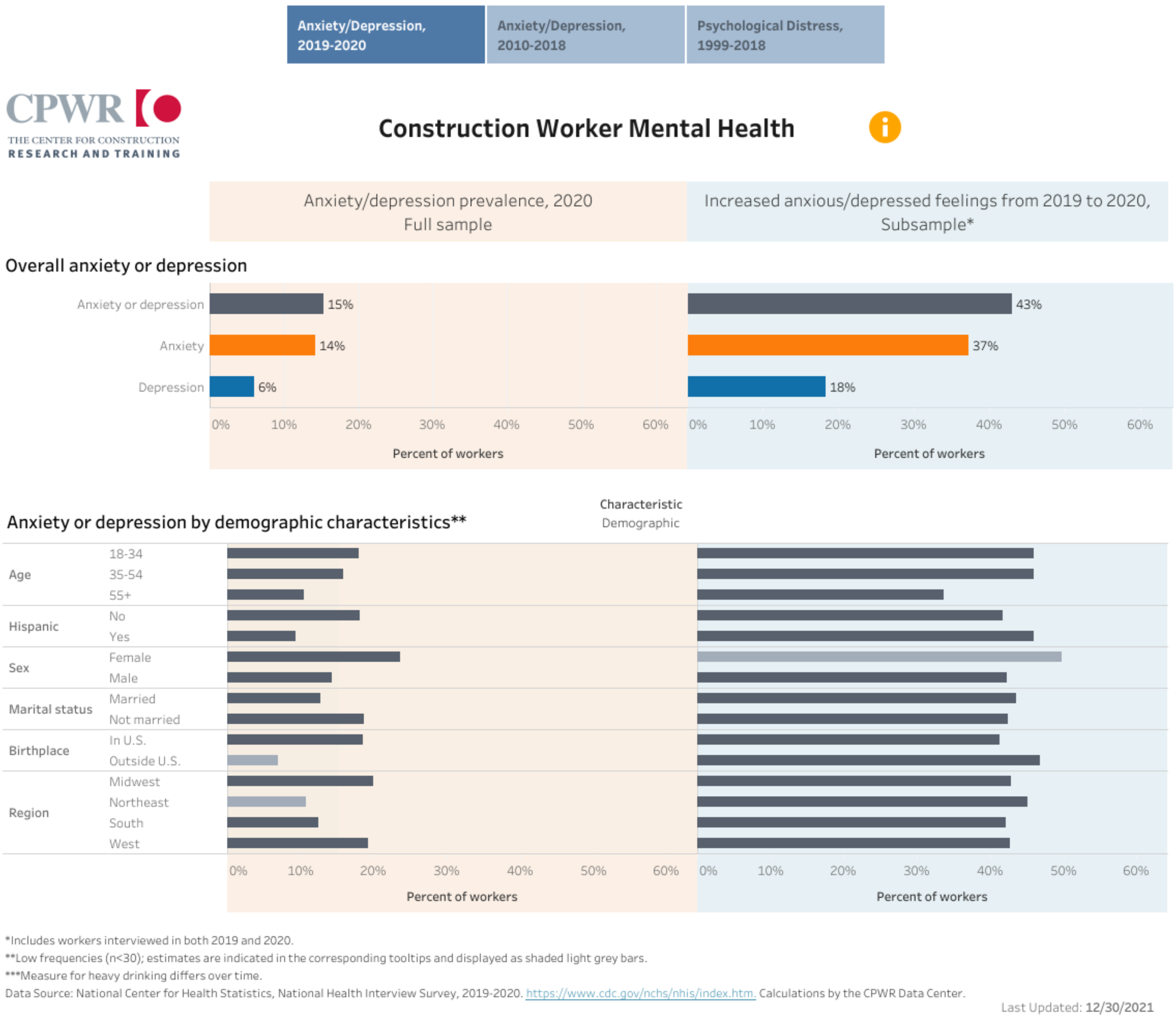
Source: *National Health Interview Survey, 2019-2020.*

^Chart includes sub-sample of construction workers who were interviewed in both 2019 and 2020.

**N<30 for Female.*

***No significant differences between any categories (Chi-square p-value > 0.05).*

Workers who were younger, female, Hispanic, or foreign-born felt more anxious/ depressed in 2020 than in 2019.



Mental Health Dashboard

https://www.cpwr.com/research/data-center/data-dashboards/construction-worker-mental-health/

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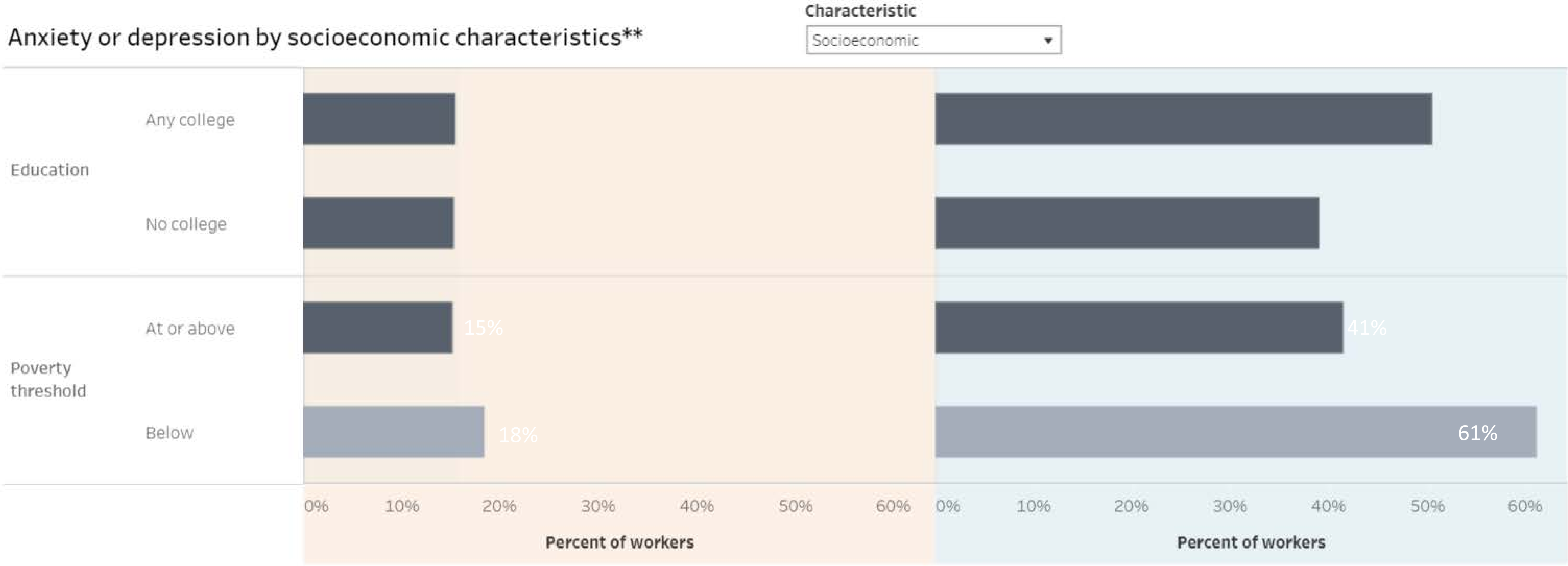
Anxiety/depression prevalence, 2020
Full sample

Increased anxious/depressed feelings from 2019 to 2020,
Subsample*

Anxiety or depression by socioeconomic characteristics**



*Includes workers interviewed in both 2019 and 2020.
**Low frequencies (n<30); estimates are indicated in the corresponding tooltips and displayed as shaded light grey bars.
***Measure for heavy drinking differs over time.
Data Source: National Center for Health Statistics, National Health Interview Survey, 2019-2020. https://www.cdc.gov/nchs/nhis/index.htm. Calculations by the CPWR Data Center.

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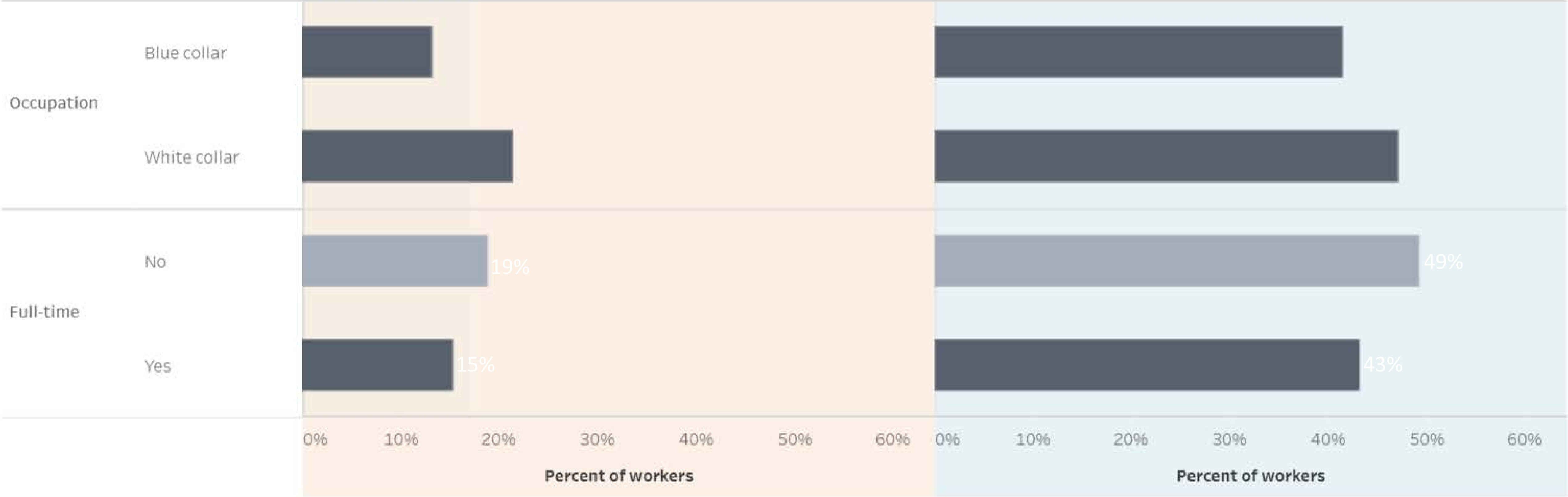
Anxiety/depression prevalence, 2020 Full sample	Increased anxious/depressed feelings from 2019 to 2020, Subsample*

Anxiety or depression by work characteristics**

Characteristic

Work



*Includes workers interviewed in both 2019 and 2020.

**Low frequencies (n<30); estimates are indicated in the corresponding tooltips and displayed as shaded light grey bars.

***Measure for heavy drinking differs over time.

Data Source: National Center for Health Statistics, National Health Interview Survey, 2019-2020. https://www.cdc.gov/nchs/nhis/index.htm. Calculations by the CPWR Data Center.

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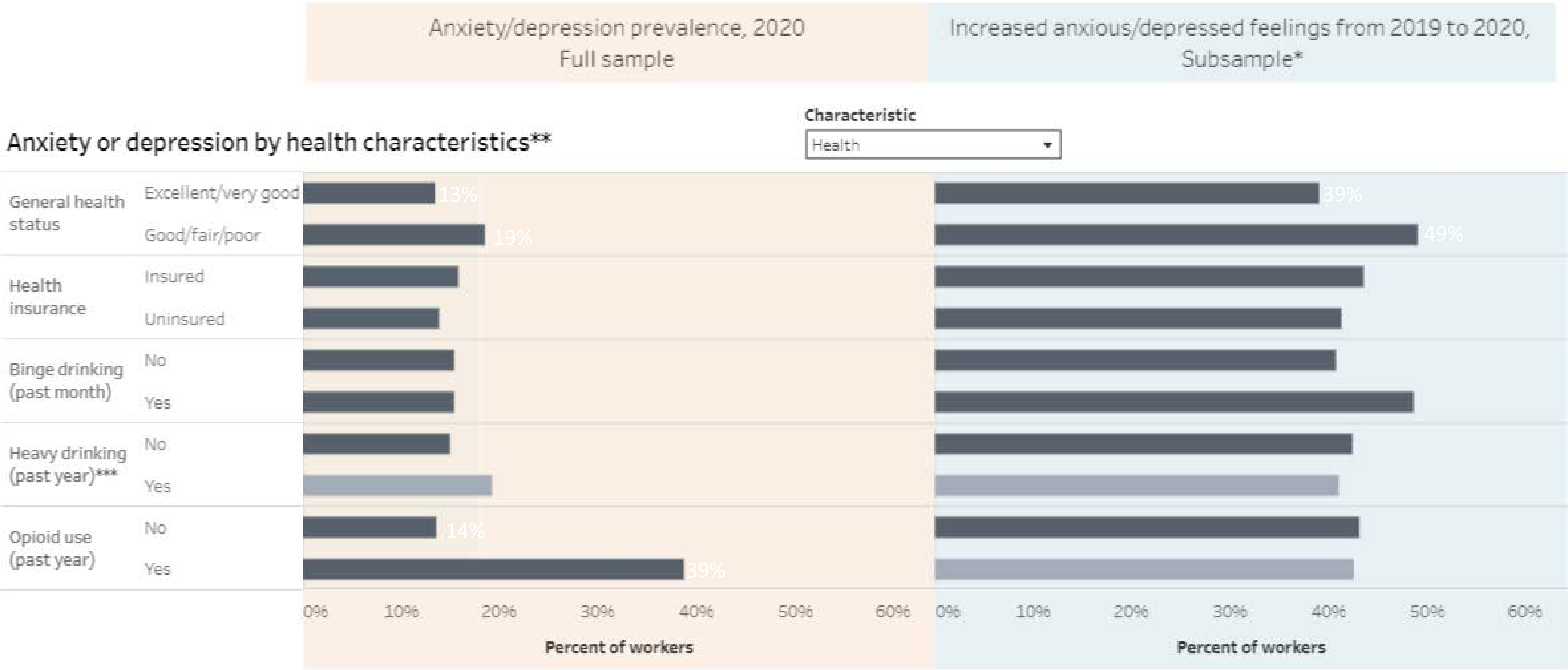

*Includes workers interviewed in both 2019 and 2020.

**Low frequencies (n<30); estimates are indicated in the corresponding tooltips and displayed as shaded light grey bars.

***Measure for heavy drinking differs over time.

Data Source: National Center for Health Statistics, National Health Interview Survey, 2019-2020. https://www.cdc.gov/nchs/nhis/index.htm. Calculations by the CPWR Data Center.

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Anxiety/Depression, 2019-2020 | **Anxiety/Depression, 2010-2018** | Psychological Distress, 1999-2018

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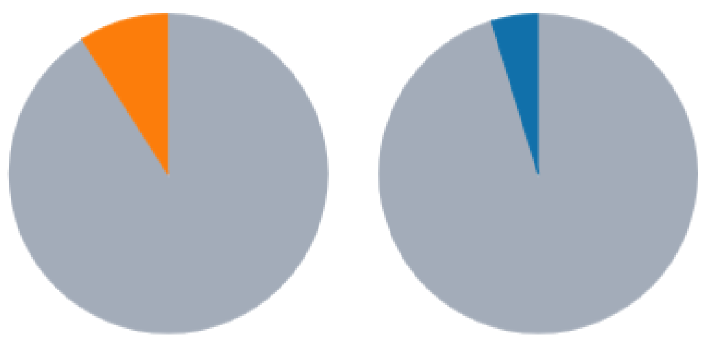
Construction Worker Mental Health

Anxiety   Depression

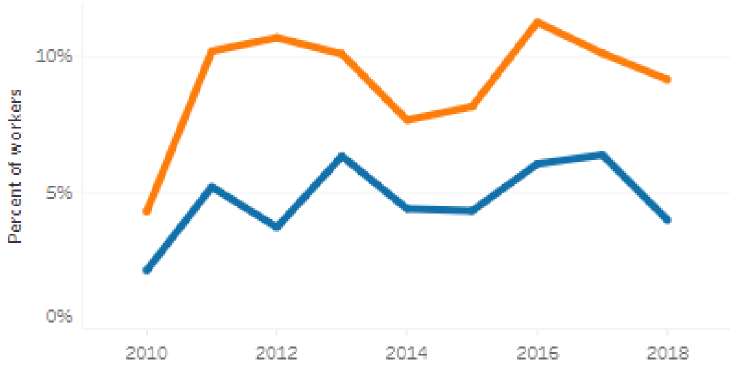
Anxiety and depression, overall

Year Range: 2010 – 2018

Prevalence, average of years



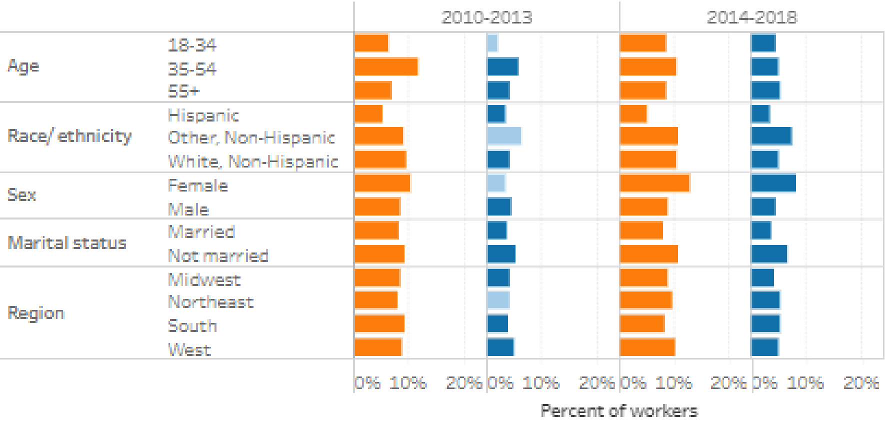
Prevalence by year



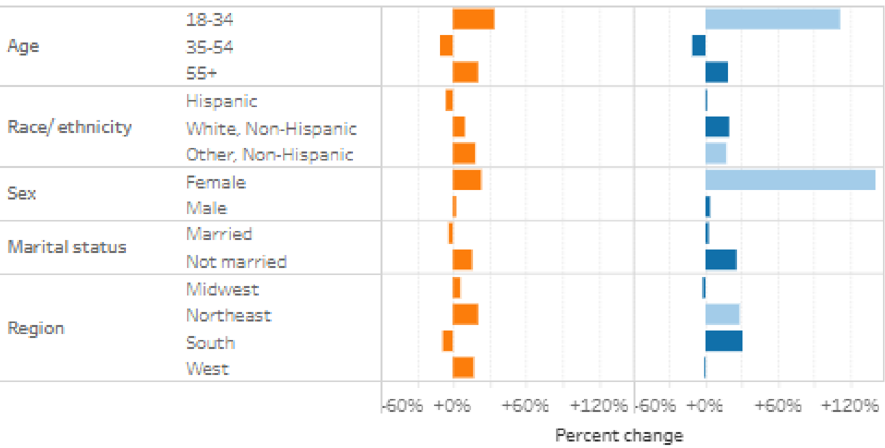
Anxiety and depression by characteristics*

Characteristic: Demographic

Prevalence by demographic characteristics*



Changes by demographic characteristics, 2014-2018 versus 2010-2013



*Low frequencies (n<30); estimates are indicated in the corresponding tooltips and displayed as shaded light blue bars.

Data Source: Lynn A. Blewett, Julia A. Rivera Drew, Risa Griffin and Kari C.W. Williams. IPUMS Health Surveys: Medical Expenditure Panel Survey, Version 1.1 [dataset]. Minneapolis, MN: IPUMS, 2019. https://doi.org/10.18128/D071.V1.1. Calculations by the CPWR Data Center.

Last Updated: 12/30/2021

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Anxiety/Depression, 2019-2020 | Anxiety/Depression, 2010-2018 | **Psychological Distress, 1999-2018**

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Construction Worker Mental Health

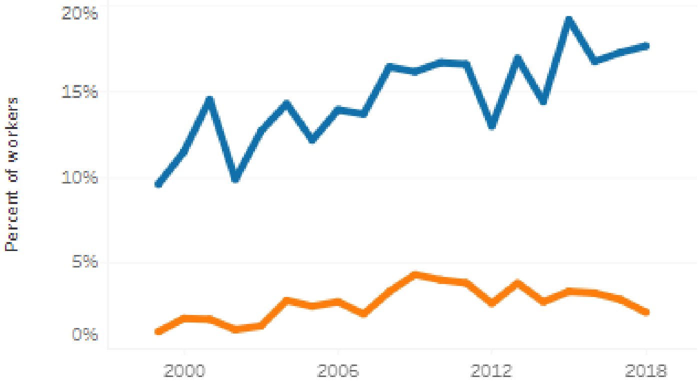
Moderate psychological distress   Serious psychological distress

Psychological distress, overall

Year Range: 1999 – 2018

Prevalence, average of years**

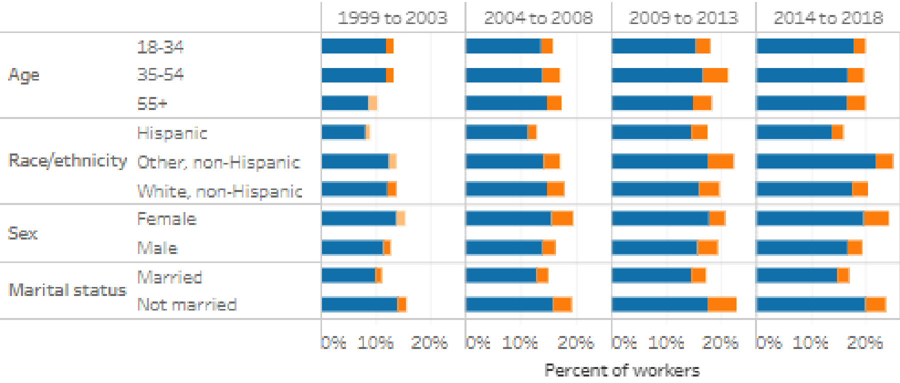
Prevalence by year**



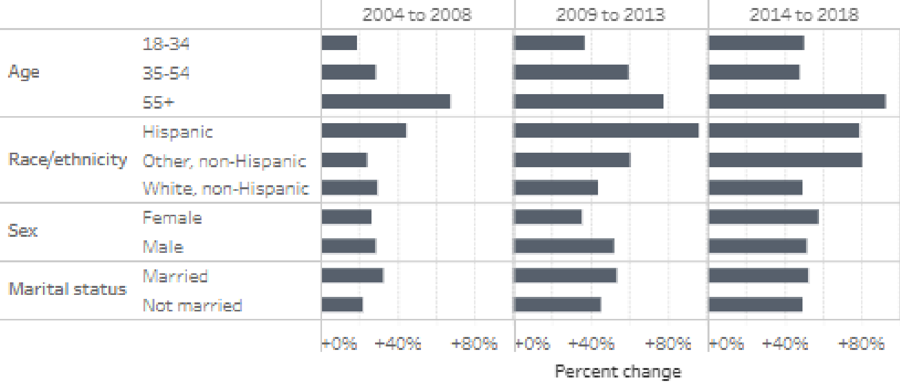
Psychological distress by characteristics

Characteristic: Demographic   Time period: (All)

Prevalence by demographic characteristics**



Change in moderate-to-serious psychological distress since 1999-2003* by demographic characteristics

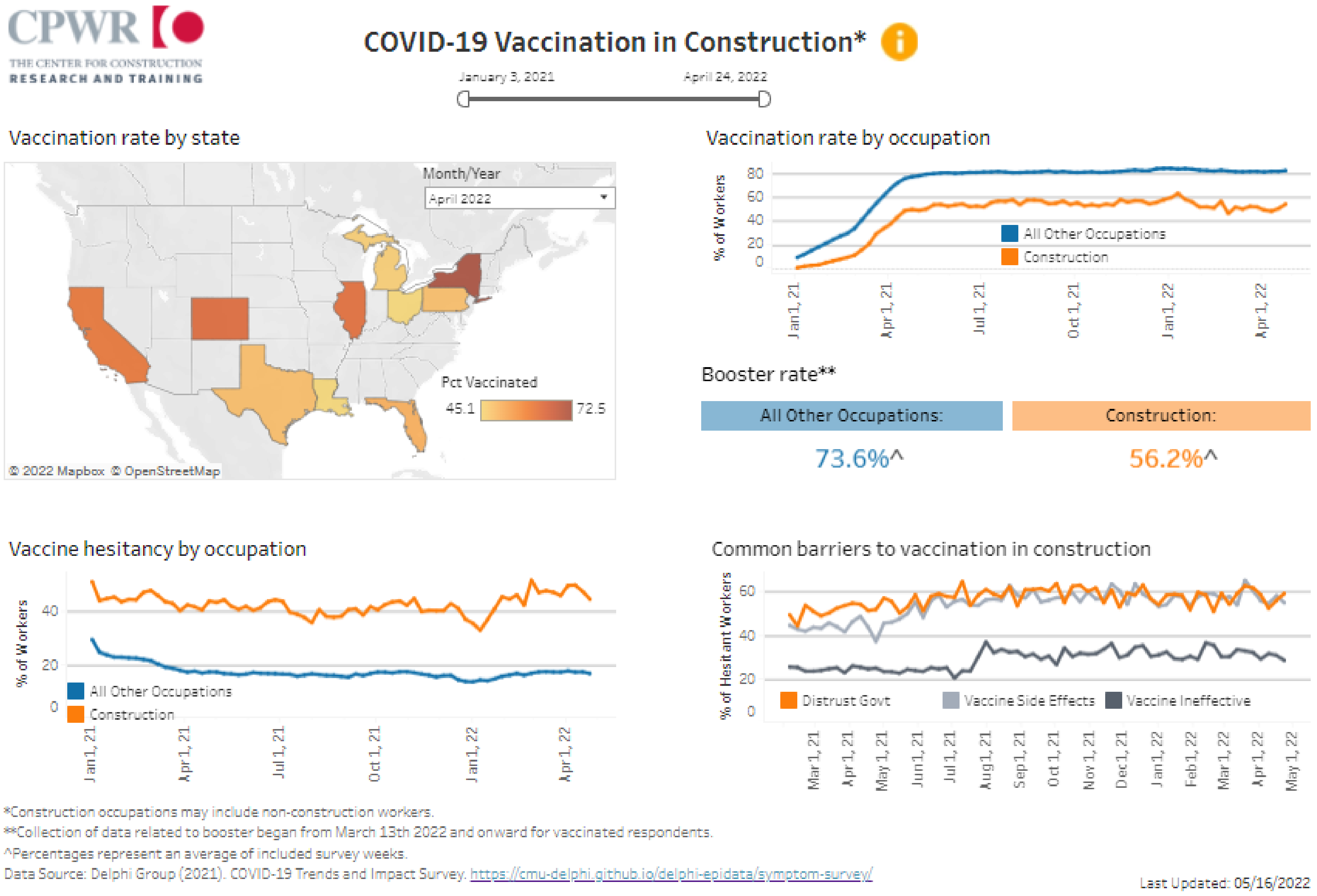


*The period 1999-2003 was used as baseline for comparison. The unemployed were excluded from 1999-2003 surveys, while included in 2004-2019 surveys.
**Low frequencies (n<30); estimates are indicated in the corresponding tooltips and displayed as shaded light orange stacked bars.
Data Source: Lynn A. Blewett, Julia A. Rivera Drew, Risa Griffin and Kari C.W. Williams. IPUMS Health Surveys: Medical Expenditure Panel Survey, Version 1.1 [dataset]. Minneapolis, MN: IPUMS, 2019. https://doi.org/10.18128/D071.V1.1. Calculations by the CPWR Data Center.

Last Updated: 12/30/2021

Industry Trends

COVID-19 and Construction Worker Health



COVID-19 Vaccination in Construction

https://www.cpwr.com/research/data-center/data-dashboards/covid-19-vaccination-dashboard/

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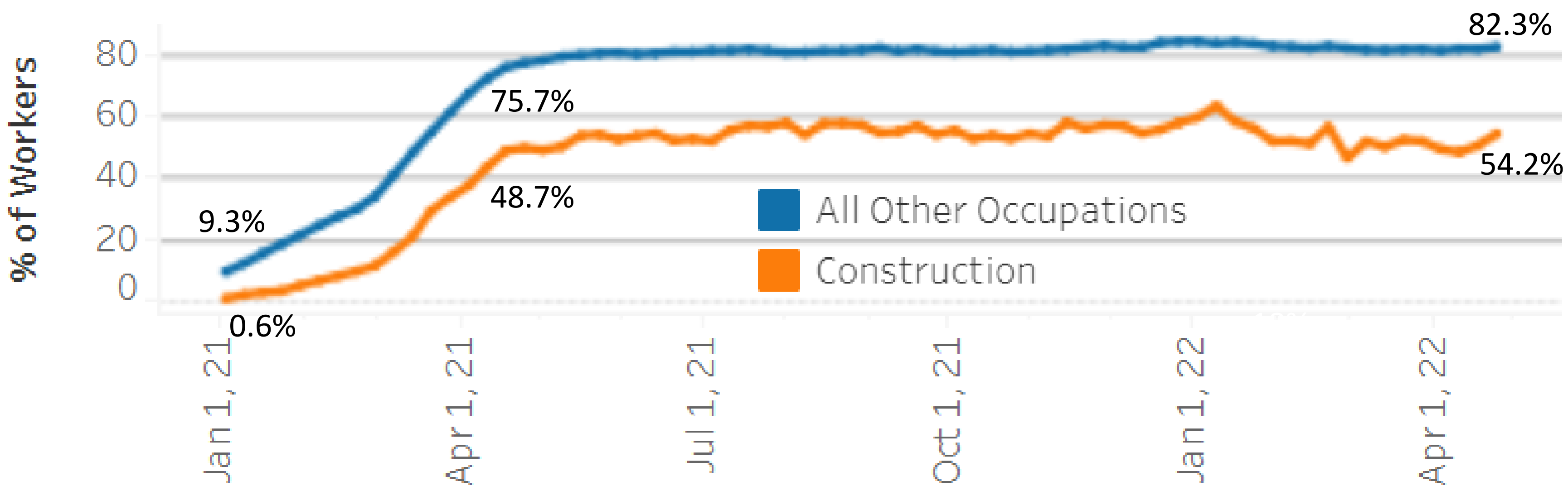
January 3, 2021 April 24, 2022

Vaccination rate by occupation



Booster rate**

All Other Occupations:	Construction:
73.6%^	56.2%^

*Construction occupations may include non-construction workers.

**Collection of data related to booster began from March 13th 2022 and onward for vaccinated respondents.

^Percentages represent an average of included survey weeks.

Data Source: Delphi Group (2021). COVID-19 Trends and Impact Survey. https://cmu-delphi.github.io/delphi-epidata/symptom-survey/

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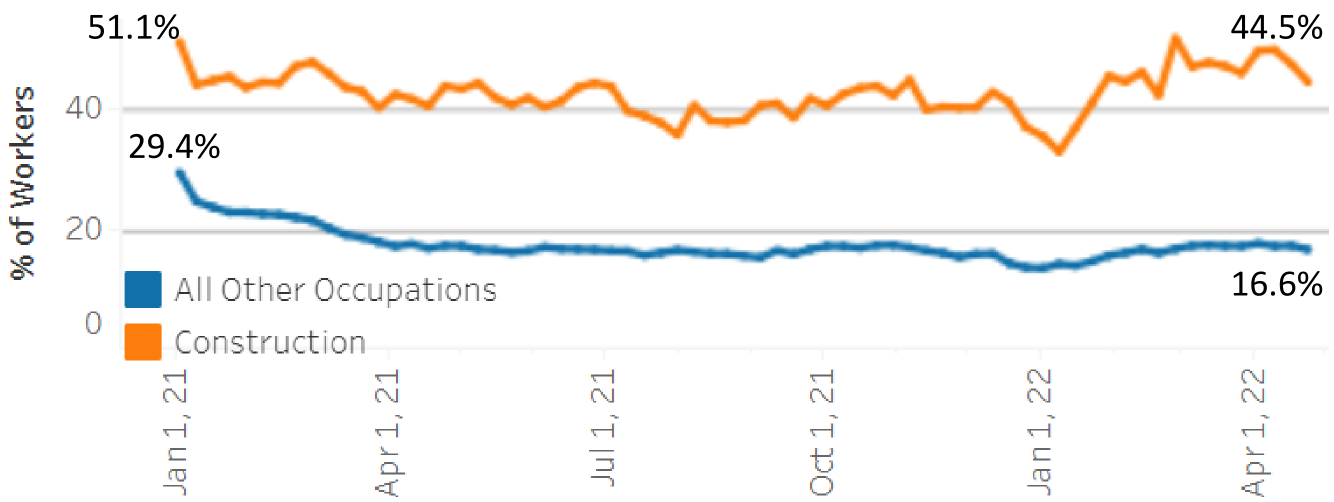
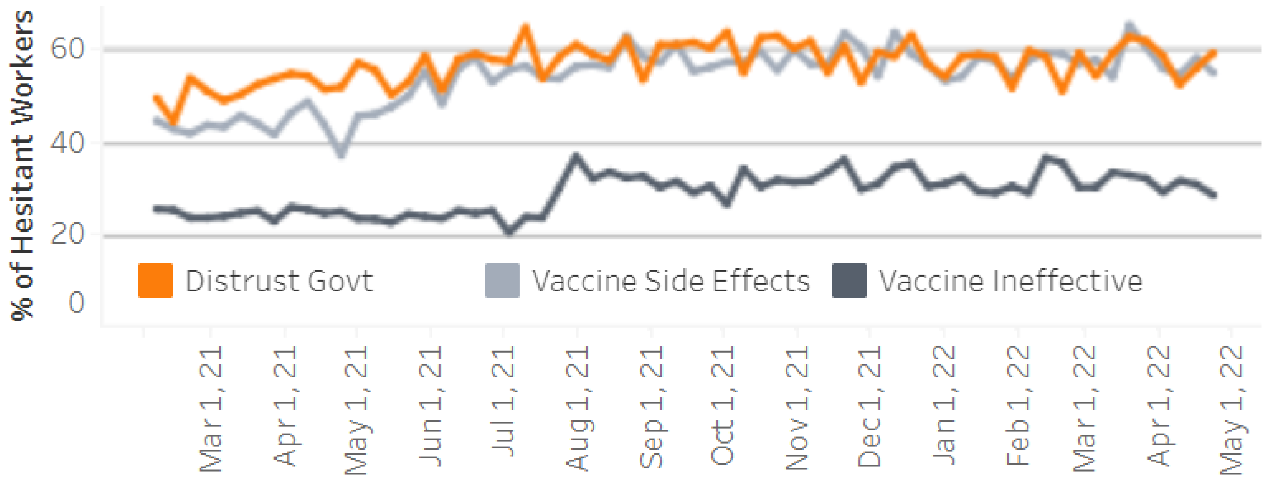
January 3, 2021 April 24, 2022

Vaccine hesitancy by occupation



Common barriers to vaccination in construction



*Construction occupations may include non-construction workers.

Data Source: Delphi Group (2021). COVID-19 Trends and Impact Survey. https://cmu-delphi.github.io/delphi-epidata/symptom-survey/

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Upcoming Products July and September 2022

- July 2022:
  - Data Bulletin: Impact of COVID-19 on the Construction Industry: 2-year review
  - Dashboard: Income and Benefits among Construction Workers
  - Dashboard: O*NET Database and Occupational Exposures in Construction
- September 2022
  - Data Bulletin and Dashboard: Transportation Injuries in the Construction Industry

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8. CPWR-The Center for Construction Research and Training. [2022]. Women in Construction [dashboard]

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THURSDAY, JUNE 2ND

EVALUATING
SAFETY AND HEALTH
INTERVENTIONS

Best Built Plans Manual Material Handling Tool for Construction

Ann Marie Dale

Brad Evanoff

Marco Barrera

r2p CPWR: Jess Bunting and Grace Barlet

Washington University in St. Louis School of Medicine

BEST BUILT PLANS
BUILD SAFETY INTO EVERY JOB

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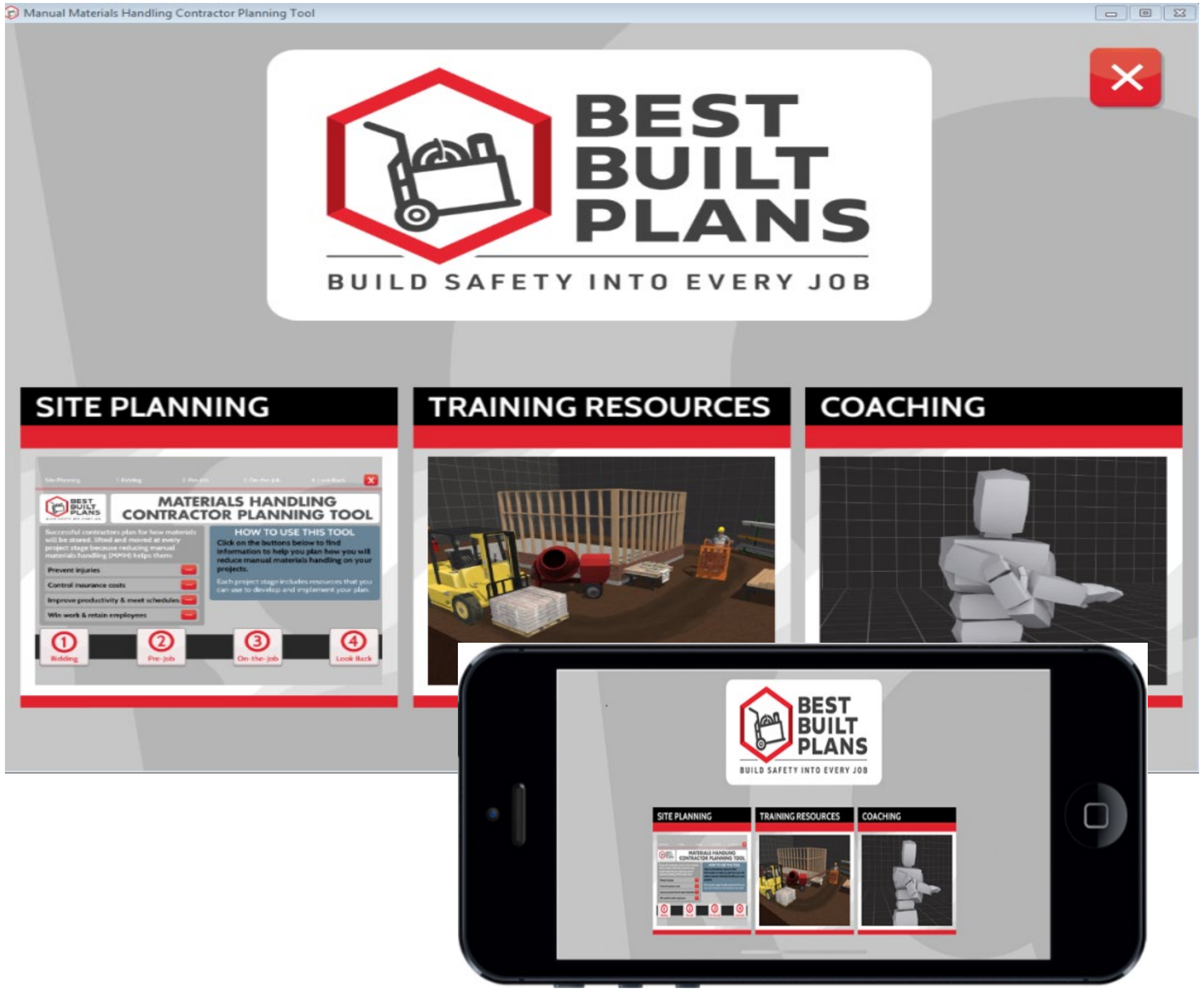
THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

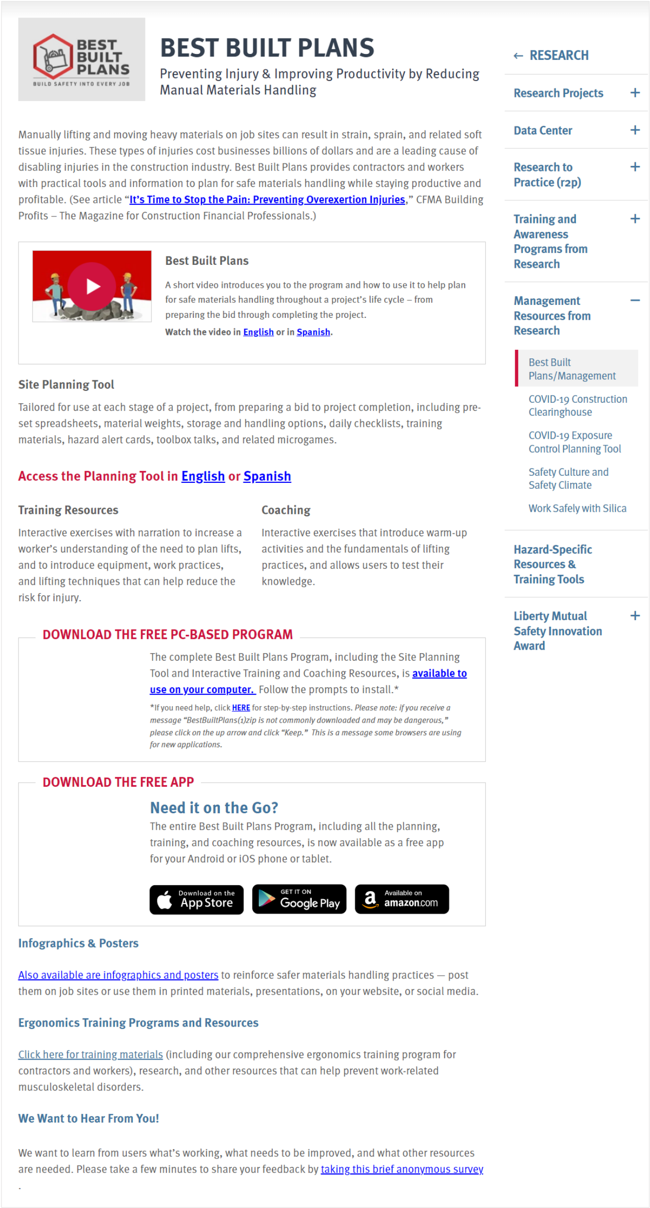
History of Best Built Plans

- Best Built Plans (BBP), manual material handling program (MMH) developed using a Social Marketing process
- Ergonomics Community of Practice (ECOP)
  - Academics
  - Contractors
  - Insurance
  - CPWR, union organizations
- BBP program objectives:
  - Plan for Manual material handling on construction projects
  - Weight limit policy
  - Storage equipment (Lift equipment)

Best Built Plans (BBP)

www.bestbuiltplans.org





BEST BUILT PLANS

Preventing Injury & Improving Productivity by Reducing Manual Materials Handling

← RESEARCH

Research Projects +

Data Center +

Research to Practice (r2p) +

Training and Awareness Programs from Research +

Management Resources from Research −

- Best Built Plans/Management
- COVID-19 Construction Clearinghouse
- COVID-19 Exposure Control Planning Tool
- Safety Culture and Safety Climate
- Work Safely with Silica

Hazard-Specific Resources & Training Tools

Liberty Mutual Safety Innovation Award +

Manually lifting and moving heavy materials on job sites can result in strain, sprain, and related soft tissue injuries. These types of injuries cost businesses billions of dollars and are a leading cause of disabling injuries in the construction industry. Best Built Plans provides contractors and workers with practical tools and information to plan for safe materials handling while staying productive and profitable. (See article "It's Time to Stop the Pain: Preventing Overexertion Injuries," CFMA Building Profits – The Magazine for Construction Financial Professionals.)

Best Built Plans

A short video introduces you to the program and how to use it to help plan for safe materials handling throughout a project's life cycle – from preparing the bid through completing the project.

Watch the video in English or in Spanish.

Site Planning Tool

Tailored for use at each stage of a project, from preparing a bid to project completion, including pre-set spreadsheets, material weights, storage and handling options, daily checklists, training materials, hazard alert cards, toolbox talks, and related microgames.

Access the Planning Tool in English or Spanish

Training Resources

Interactive exercises with narration to increase a worker's understanding of the need to plan lifts, and to introduce equipment, work practices, and lifting techniques that can help reduce the risk for injury.

Coaching

Interactive exercises that introduce warm-up activities and the fundamentals of lifting practices, and allows users to test their knowledge.

DOWNLOAD THE FREE PC-BASED PROGRAM

The complete Best Built Plans Program, including the Site Planning Tool and Interactive Training and Coaching Resources, is available to use on your computer. Follow the prompts to install.*

*If you need help, click HERE for step-by-step instructions. *Please note: if you receive a message "BestBuiltPlans(1)zip is not commonly downloaded and may be dangerous," please click on the up arrow and click "Keep." This is a message some browsers are using for new applications.*

DOWNLOAD THE FREE APP

Need it on the Go?

The entire Best Built Plans Program, including all the planning, training, and coaching resources, is now available as a free app for your Android or iOS phone or tablet.

Download on the App Store | GET IT ON Google Play | Available on amazon.com

Infographics & Posters

Also available are infographics and posters to reinforce safer materials handling practices — post them on job sites or use them in printed materials, presentations, on your website, or social media.

Ergonomics Training Programs and Resources

Click here for training materials (including our comprehensive ergonomics training program for contractors and workers), research, and other resources that can help prevent work-related musculoskeletal disorders.

We Want to Hear From You!

We want to learn from users what's working, what needs to be improved, and what other resources are needed. Please take a few minutes to share your feedback by taking this brief anonymous survey
.

Research Project

Purpose: To evaluate the efficacy and implementation process of the BBP program

- Enroll 45 contractors: all sizes, emphasis on small and medium size.

- Efficacy study: Measure MMH exposures, pre/post intervention
    - Worker surveys
    - Worksite observations (inputs for NLE- NIOSH Lift Equation)

- Implementation process: Measure pre/post intervention
  - Record changes to MMH program in the contractors safety program
    - Document feedback and which tools were used in the BBP program

The Ups and Downs of Pandemic Year 2: Recruitment Strategies and Success

Intermediary recruiting methods:

- Posted in CPWR newsletter
- Email Blast (2 contractor organizations, 1 general contractor)
- Presented at contractor project manager's meeting
- Presented at local union, contractor organization and apprentice meeting
- 1:1 communication-7 General Contractor, 1 insurer, and 2 unions

Past contacts

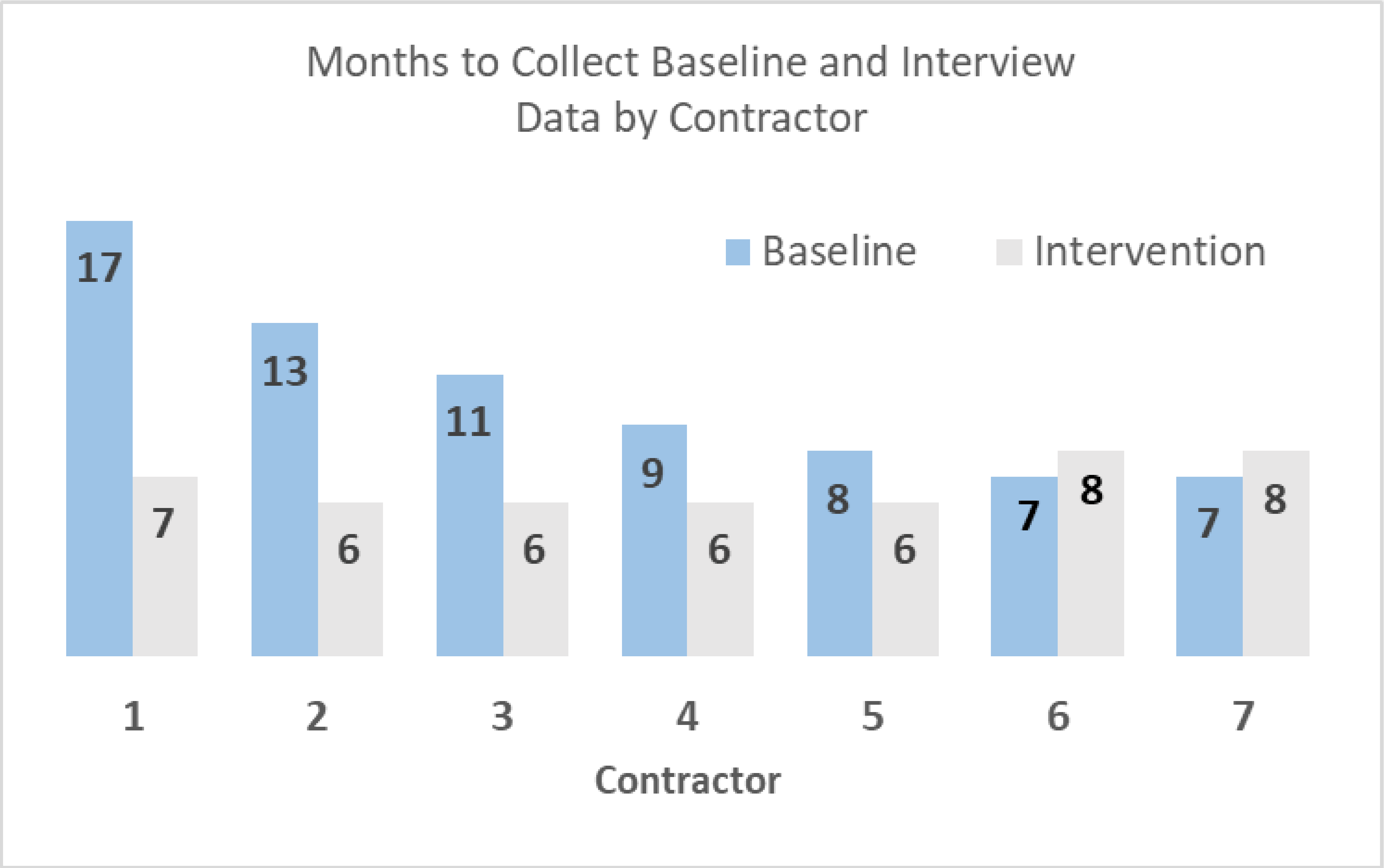
RESULTS

- 1:1 GC- 2 contractors
- Email blasts- 2 contractors
- Past contacts- 3 contractors

The Ups and Downs of Pandemic Year 2: Change in enrollment over time

	Contractors
• June 2021	10
• Pandemic Year 2	
• NEW recruits	7
• Contractors dropped	6

- Reasons for drop
  - Unstable or inadequate work
  - Overburdened with managing projects and COVID
  - Lack of staff and project time constraints
- **Current contractors** **11 [9 large, 1 medium, 1 small]**



Months to Collect Baseline and Interview Data by Contractor
Baseline
Intervention
17
7
13
6
11
6
9
6
8
6
7
8
7
8
1
2
3
4
5
6
7
Contractor

Current status and results

- Recruitment remains challenging, low enrollment in the project
- Time to complete data collection (baseline and intervention) is reducing
- Indirect effects of COVID: the economy, supply chain, manpower impede data collection

- No early results for the efficacy study
- Early results of implementation process: 6 contractors

What The Contractors liked:

Examples of Weights of Common Building Materials

Examples of Weights of Common Building Materials

(Please note -- The list is in alphabetic order by material category. These examples were identified through a search of the Internet and the CPWR Solutions database (www.cpwrconstructionsolutions.org) as of October 2021. CPWR does not endorse any specific material, equipment or product.)

Updated: October 2021

Category of Material	Construction Material	Size or Coverage	Units	Weight per unit (lbs)	Total Weight (lbs)	Source	Link	Other Resources/ Comments
Abrasive blasting	Crushed glass blast media	1 bag	1	50	50	MSC Industrial Supply	http://www.mscdirect.com\product\details\52405891	
Abrasive blasting	Glass bead blast media	1 bucket	1	25	25	Northern Tool + Equipment	http://www.northerntool.com/shop/tools/product_200136774_200136774	lower weight option
Abrasive blasting	Glass bead blast media	1 bucket	1	50	50	Harbor Freight	https://www.harborfreight.com/50-lb-glass-bead-80-grit-abrasive-media-61874.html	

Link to the Ergonomics Training Program (Appendix C)

1c. One-Person "Power Lift"

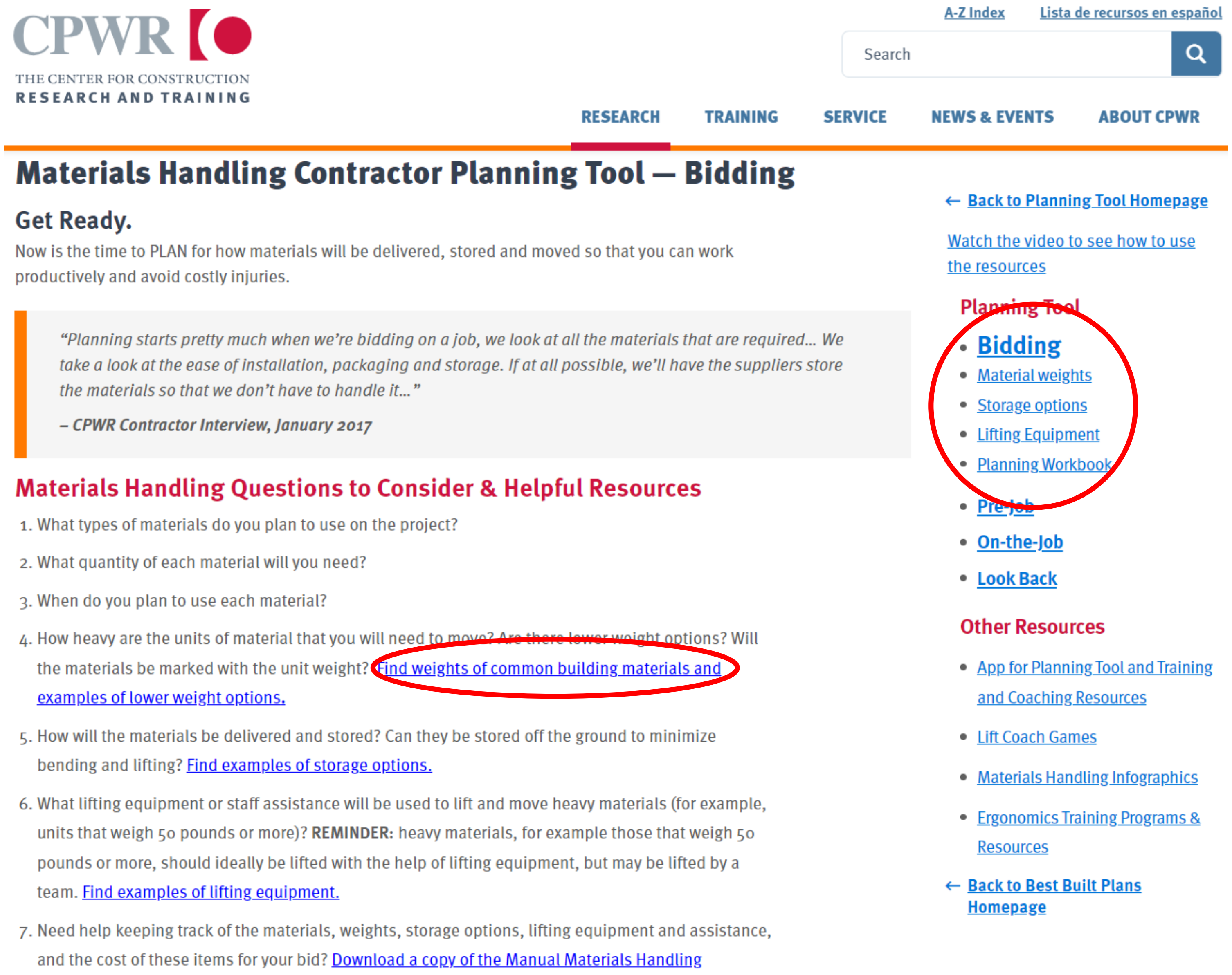
Steps

1. Approach object from front, one foot *angled* on each side of object
2. Move close to object
3. Bend knees and hips
4. "Lock" back, lift with back straight (NO TWISTING)
5. Use slow, smooth movements

1c. One Person Lifting Box: "Power lift"

Photos courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

Challenges: Hard to Navigate Website



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A-Z Index Lista de recursos en español

Search

RESEARCH TRAINING SERVICE NEWS & EVENTS ABOUT CPWR

Materials Handling Contractor Planning Tool — Bidding

Get Ready.

Now is the time to PLAN for how materials will be delivered, stored and moved so that you can work productively and avoid costly injuries.

> *"Planning starts pretty much when we're bidding on a job, we look at all the materials that are required… We take a look at the ease of installation, packaging and storage. If at all possible, we'll have the suppliers store the materials so that we don't have to handle it…"*
>
> ***– CPWR Contractor Interview, January 2017***

Materials Handling Questions to Consider & Helpful Resources

1. What types of materials do you plan to use on the project?
2. What quantity of each material will you need?
3. When do you plan to use each material?
4. How heavy are the units of material that you will need to move? Are there lower weight options? Will the materials be marked with the unit weight? Find weights of common building materials and examples of lower weight options.
5. How will the materials be delivered and stored? Can they be stored off the ground to minimize bending and lifting? Find examples of storage options.
6. What lifting equipment or staff assistance will be used to lift and move heavy materials (for example, units that weigh 50 pounds or more)? **REMINDER:** heavy materials, for example those that weigh 50 pounds or more, should ideally be lifted with the help of lifting equipment, but may be lifted by a team. Find examples of lifting equipment.
7. Need help keeping track of the materials, weights, storage options, lifting equipment and assistance, and the cost of these items for your bid? Download a copy of the Manual Materials Handling

← Back to Planning Tool Homepage

Watch the video to see how to use the resources

Planning Tool

- **Bidding**
- Material weights
- Storage options
- Lifting Equipment
- Planning Workbook
- **Pre-Job**
- **On-the-Job**
- **Look Back**

Other Resources

- App for Planning Tool and Training and Coaching Resources
- Lift Coach Games
- Materials Handling Infographics
- Ergonomics Training Programs & Resources

← Back to Best Built Plans Homepage

BBP Tools used for Site Planning

Planning Questions on the Website

Materials Handling Questions to Consider & Helpful Resources

1. What types of materials do you plan to use on the project?
2. What quantity of each material will you need?
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4. How heavy are the units of material that you will need to move? Are there lower weight options? Will the materials be marked with the unit weight? Find weights of common building materials and examples of lower weight options.
5. How will the materials be delivered and stored? Can they be stored off the ground to minimize bending and lifting? Find examples of storage options.

Planning Questions in the MMH Workbook

Lifting & Moving Equipment	Quantity	Where will it be used	Who will be responsible for manual materials handling (storage, movement, worker training, oversight on jobsite?	When & where will training take place and what materials will be needed (e.g., toolbox talks, etc.)

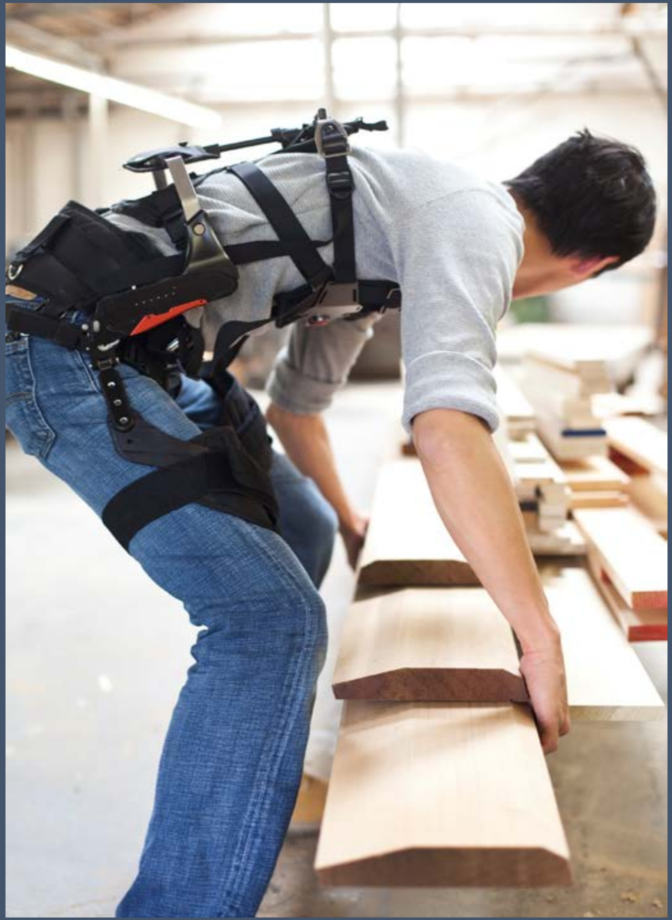
ECOP Reconvened March 2022

- Large group of stakeholders:
  - Insurance-4
  - Equipment manufacturer-2
  - Union-3
  - Contractor organizations-1
  - Contractors-3
  - Academic-3
  - Research team (Wash U and CPWR)
- Had 2 meetings and planned to address the initial issues
  - Usability of the website
  - Contractor planning tools

Thank you!

Ann Marie Dale PhD, OTR/L
e-mail: amdale@wustl.edu

- Website: http://healthyworkcenter.wustl.edu



Evaluation of Exoskeletons for Construction

Carisa Harris, PhD

David Rempel, MD

Alan Barr, MS

Amber Young

Maury Nussbaum, PhD

Sunwook Kim, PhD

Aanuoluwapo Ojelade

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VIRGINIA TECH

Disclosures

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- The UC Ergonomics Research & Graduate Training Program is supported by:

"The findings and conclusions in this presentation are those of the author(s) and do not necessarily represent the official position of the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention.

Burden of WMSD

Construction workers continue to:

- Experience high rates of work- related musculoskeletal disorders (WMSDs) - 11%
- Have higher injury rates than other industry sectors

The back and the shoulder were the most impacted body regions:

- Back injuries account for 43% of all cases, with a median of 8 lost work-days
- Shoulder injuries account for 16% of all cases, with a median of 25 lost work-days

Objectives

Aim 1 Obtain input from construction industry stakeholders

Aim 2 Determine the efficacy

Aim 3 Assess the perceived safety, effectiveness, and acceptability

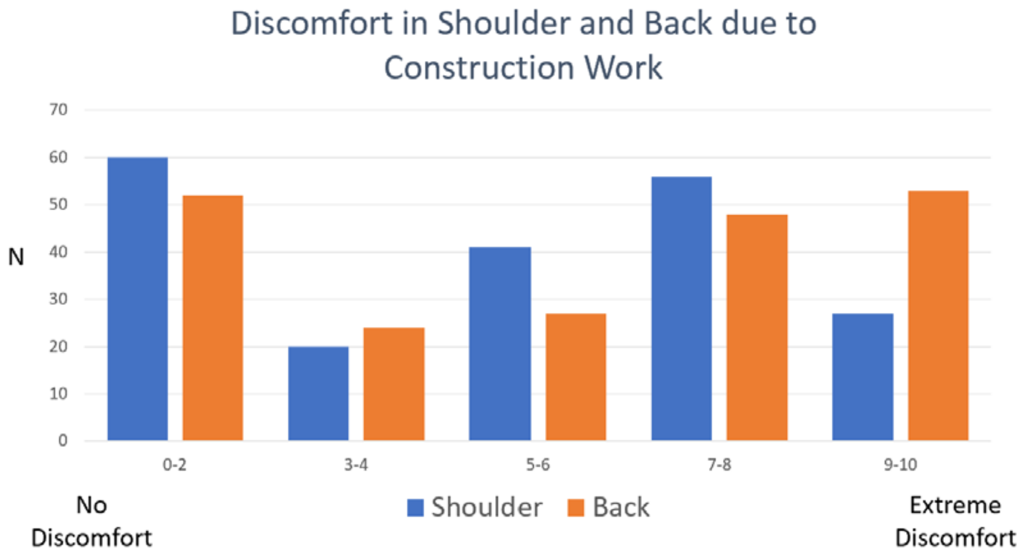
Aim 4 Disseminate study findings nationwide

Aim 1: Input from Stakeholders

- 361 Respondents
  - 63% Caucasian
  - 24% Hispanic
  - 77% Male
  - 47 years median age

- Work Experience
  - 66% had >15 years of work experience in companies of various size

- Exoskeleton Knowledge
  - 36% have heard of workers using an exoskeleton
  - 35% had never heard of it



Exoskeleton Receptivity Scales

BENEFITS (Range: 3-15)

- Make job easier
- Reduce fatigue
- More productive

BARRIERS (Range: 4-12)

- Sharing
- Storage
- Cleanliness
- Fit/Adjust

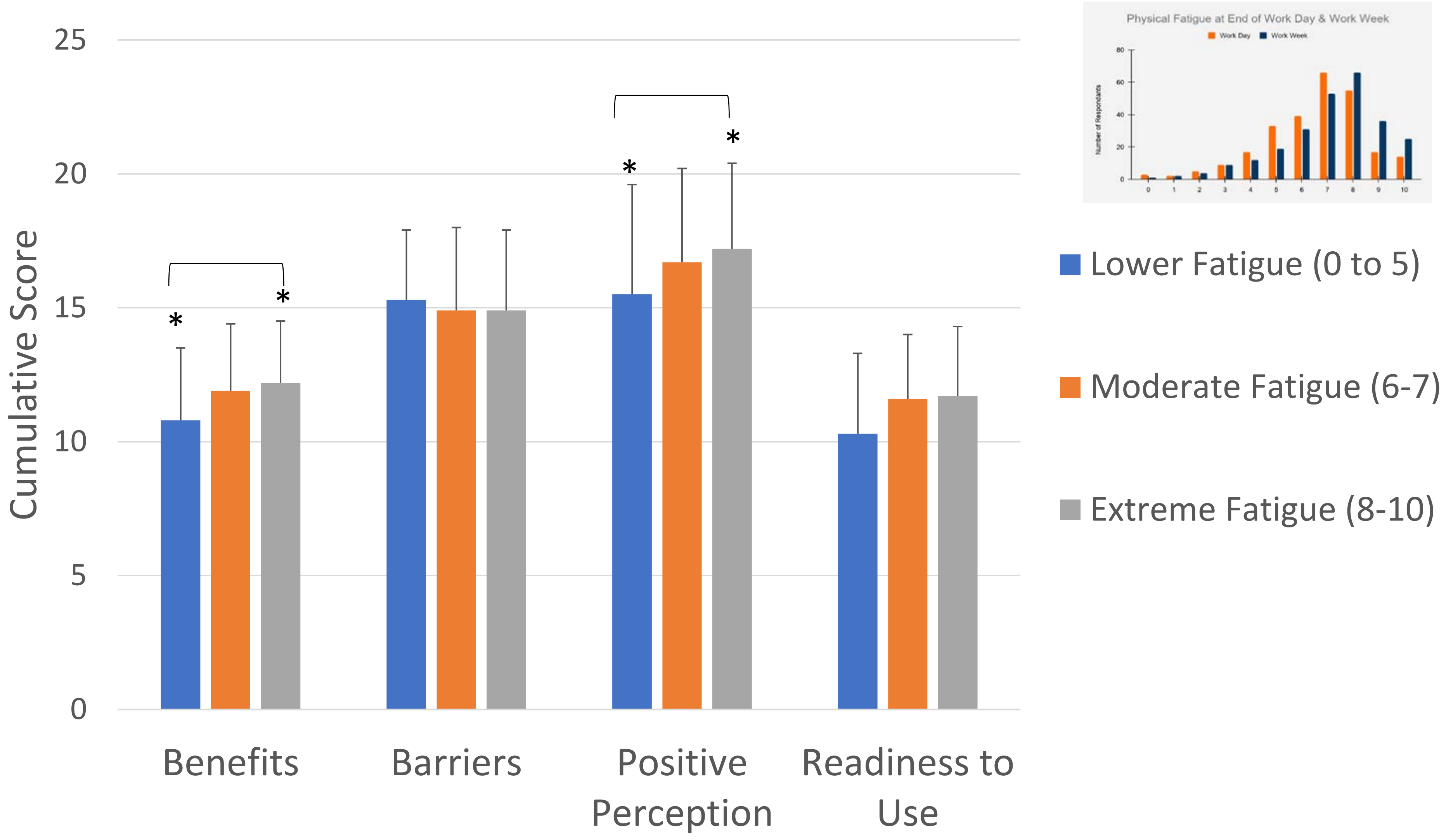
25)

- They are old / injured /weak
- How cool
- Why don't I have one?

READINESS TO USE (Range: 3-15)

- Use voluntarily
- Wear it all day
- Usefulness

Exoskeleton Receptivity by Fatigue



Other Major Insights from Survey

- Sharing & fitting the exoskeleton was a barrier
  - 97% agreed they would share an exoskeleton
  - 80% agreed that sharing would make it difficult to refit and/or use

- Common safety concerns included:
  - Slips, trips & falls
  - Struck by/caught in/between
  - Scaffold/Trench Work

A tool to predict proper anthropometric fit and support level settings would improve the usability by:

- Allowing fit ASEs without an expert present
- Allowing for easy sharing/re-fit
  - Allowing for task specific support level adjustment

Fit Prediction

Optimize the fit and support level settings of a passive ASE based on a subject’s height, weight, and sex to facilitate use across construction workers.

Estimating the Anthropometric Fit Setting

Prediction Equations

- Inputs: Height, weight, and sex
- Outputs: settings for fit and support

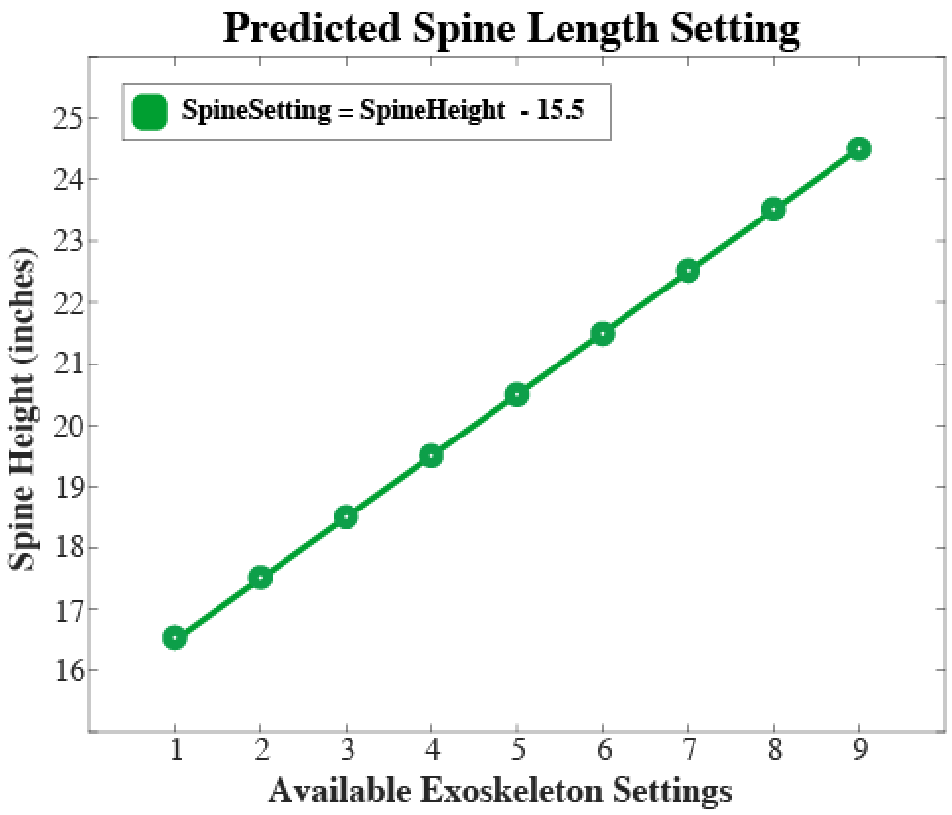
Exoskeleton Adjusted

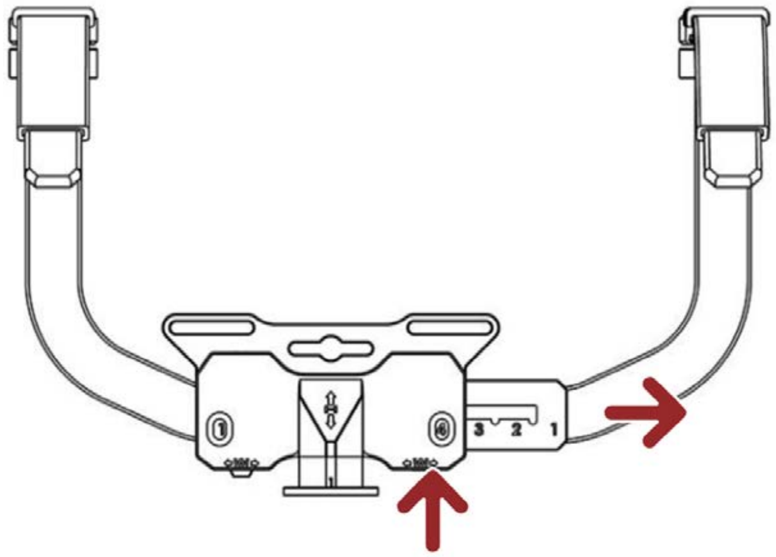
Settings for fit and support were adjusted on the ASE by an expert

Predictions Validated

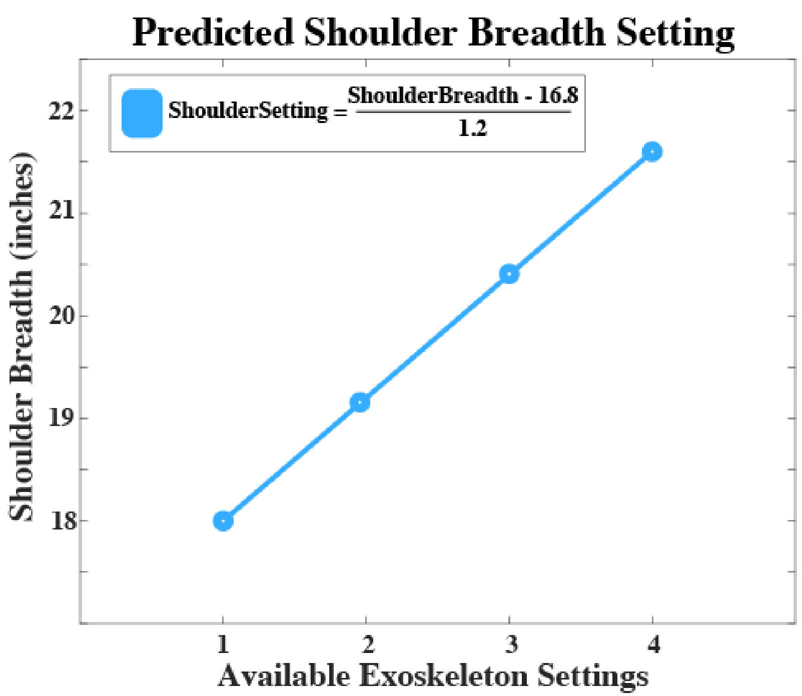
Each ASE was put on the subject by an expert, and predicted settings were validated

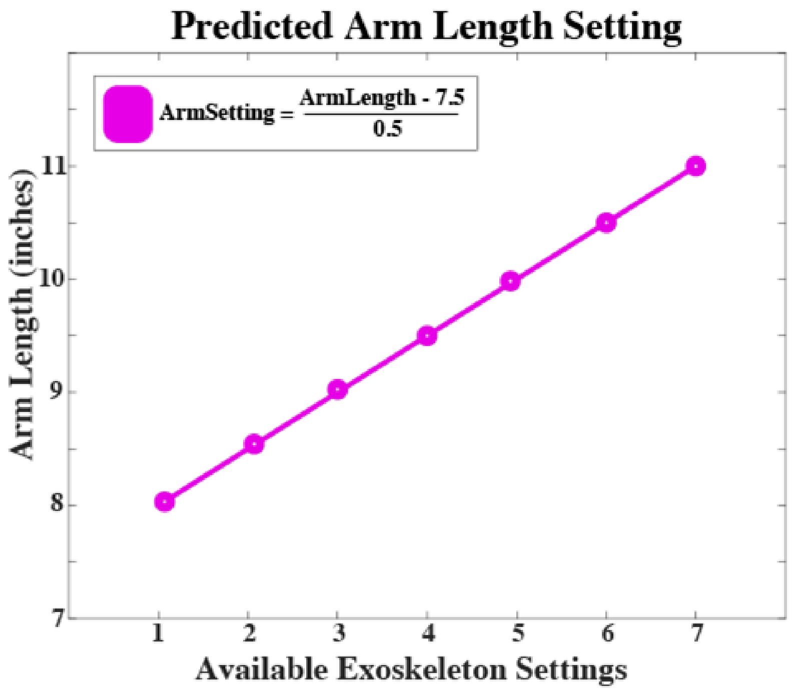
Estimating the Anthropometric Fit Setting



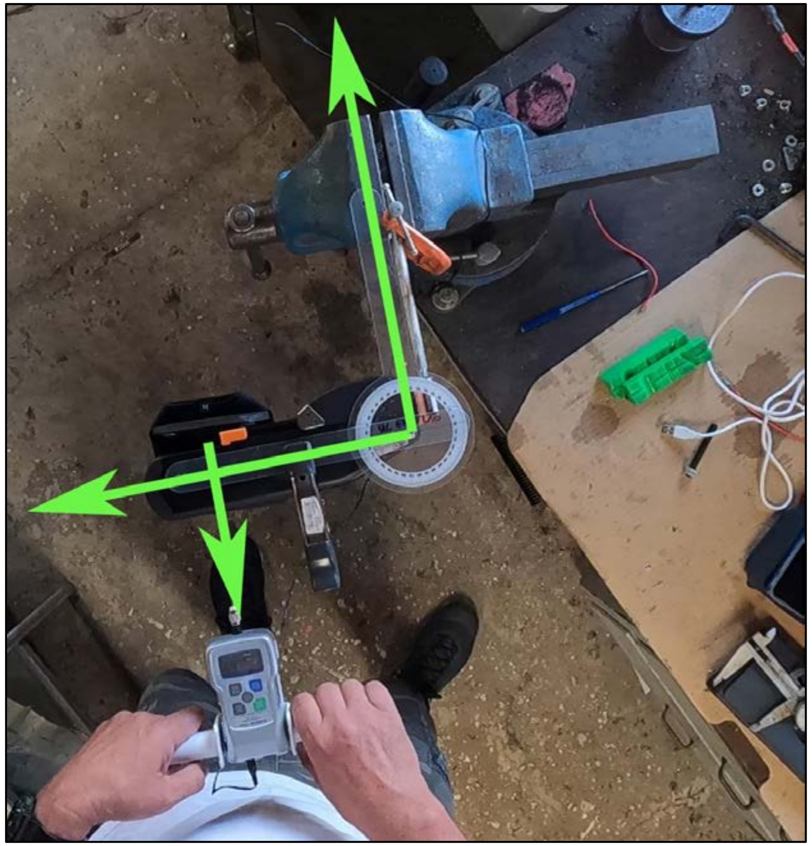


Estimating the Anthropometric Fit Setting





Estimating the Support Level



- Calculated from the ShoulderX arm unit using a force gauge and long-arm protractor, with ASE shoulder joint at 90º
- Reaction force was calculated for all available support level settings and arm cuff lengths

Exoskeleton-specific Proper Setting Definitions for Anthropometric Fit

- **SHOULDER BREADTH**
  - Small gap between the shoulder and the arm units
- **ARM LENGTH**
  - Arm cuff edge is aligned with the end of elbow when arm is bent
- **SPINE LENGTH**
  - No contact between the upper shoulder frame and the top of the user's shoulder for entire range of motion
  - Hip pads are over the hip bones
  - Spine is vertical

Percent of Good Predictions for All Settings

Prediction Results for All Settings				
Setting	**Good**	**Poor**	**Total**	**% Good**
Shoulder Breadth	13	2	15	87%
Spine Length	12	3	15	80%
Arm Length	8	7	15	**53%**
Total Anthropometric Fits	33	12	45	73%
Support Level	14	1	15	**93%**

- Arm length had the lowest number of good predictions (53%)
- Support level had the highest number of ‘good’ predictions (93%)

Differences by Sex

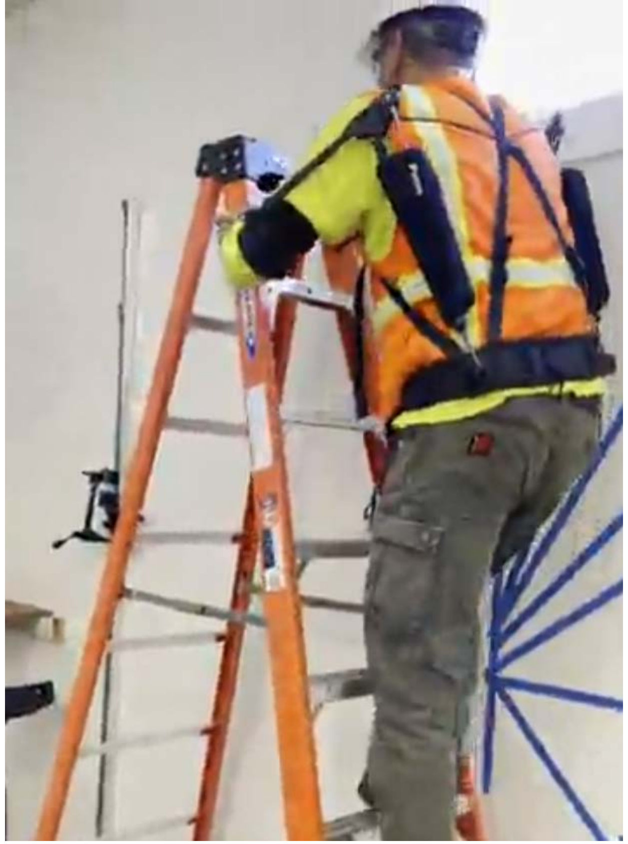
All Settings			
Setting		**Female**	**Male**
	Shoulder Breadth	60%	**100%**
	Spine Length	60%	90%
	Arm Length	**40%**	**60%**
Total Anthropometric Fits		**53%**	**83%**
Support Level		80%	**100%**

- Females had 30% fewer ‘good’ prediction settings
- Arm length settings had fewest ‘good’ predictions for both sexes

Aim 2:
Determine the efficacy of commercially-available ASEs and BSEs (2021-2022)

Vary support level, and task characteristics to determine the effects on:

- Safety
- Functional performance
- Physical Demands
- Work Performance
- Usability



ASE Safety Test

Determine impact of EXO use on maneuverability, balance, gait, shoveling, & climbing

- EXO (Diverse types)
- Fall harness/tool belt
- Support level fixed

Dependent Variables

- **Time to Completion**
- **Number of “Errors”**
  - snags, bumps, contact
- **Body kinematics (IMU)**
  - Major joint kinematics
- **User perception**
  - Perceived Exertion
  - Comfort/Discomfort
  - Safety & Usability

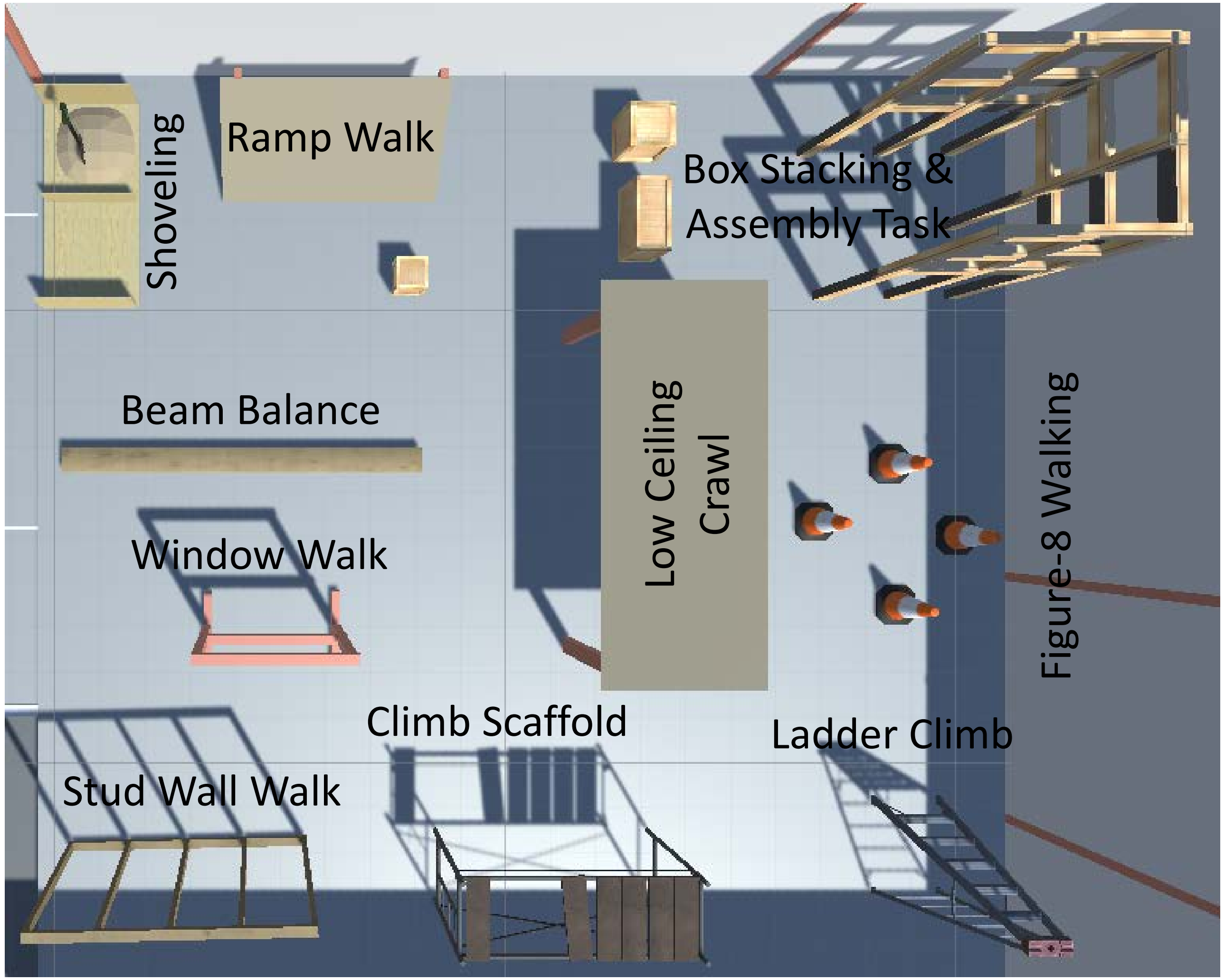
Support Level Testing

Determine the level of support preferred for location and type of task.

- Location of Work (OH/ Wall)
- Type of Work (Static /Dynamic)
- Support Level (none, low, medium, high)

Compare fit, comfort and preference across EXO design characteristics when performing tasks.

BSE Safety Test



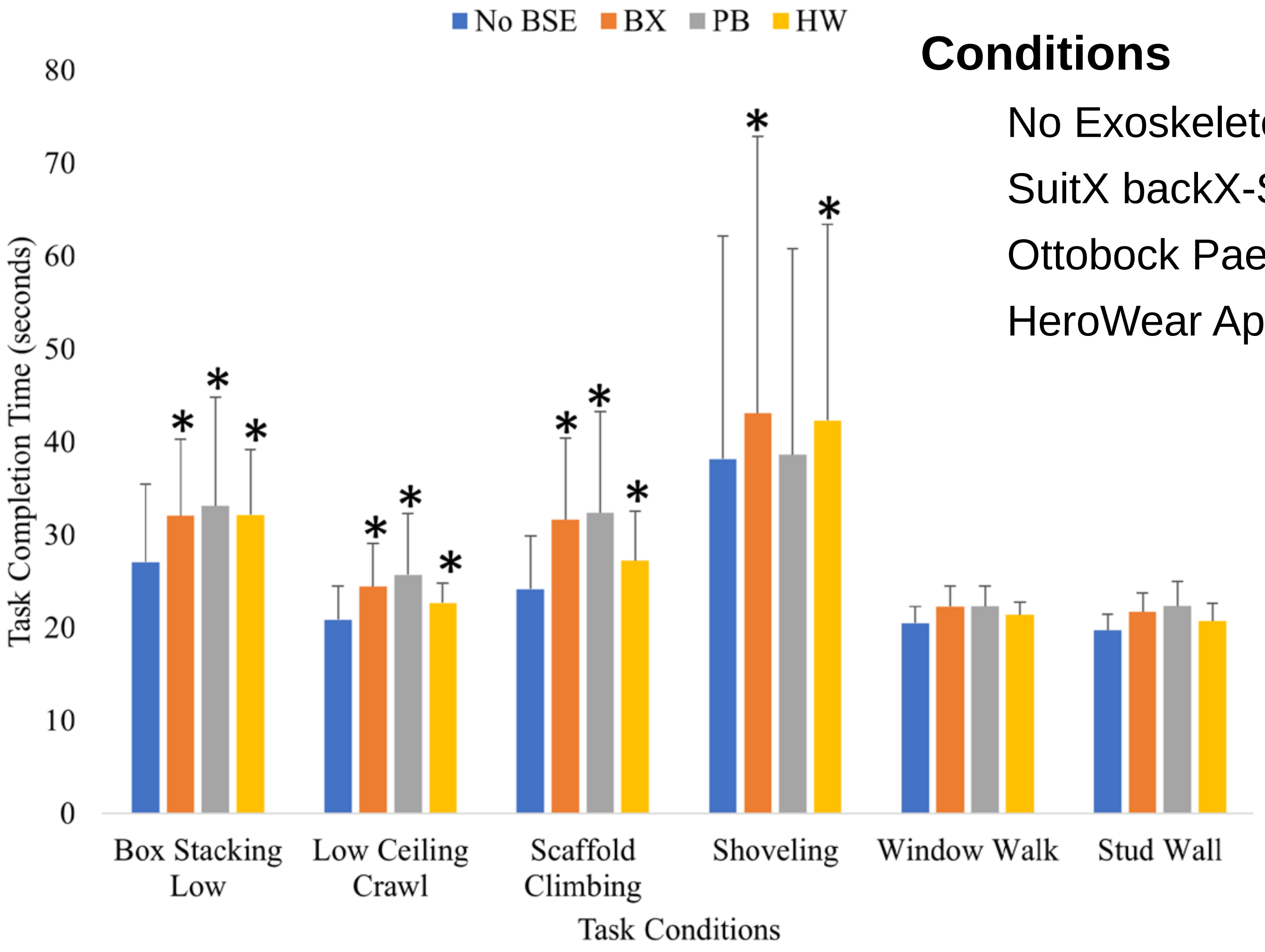
- **Other Tasks**
  - Donning & Doffing
  - 3-point kneeling
  - Squatting
  - Stair climbing
- **Conditions**
  - No Exoskeleton
  - SuitX backX-S (BX)
  - Ottobock Paexo Back (PB)
  - HeroWear Apex (HW)

Dependent Measures

- **Time to Completion**
- **User perceptions**
  - Physical exertion
  - Discomfort
  - Movement restrictions
  - Task Interference
  - Balance
  - Safety

Preliminary results from 20 novices (10 F, 10 M)

Task completion time increased using some exoskeletons for some tasks

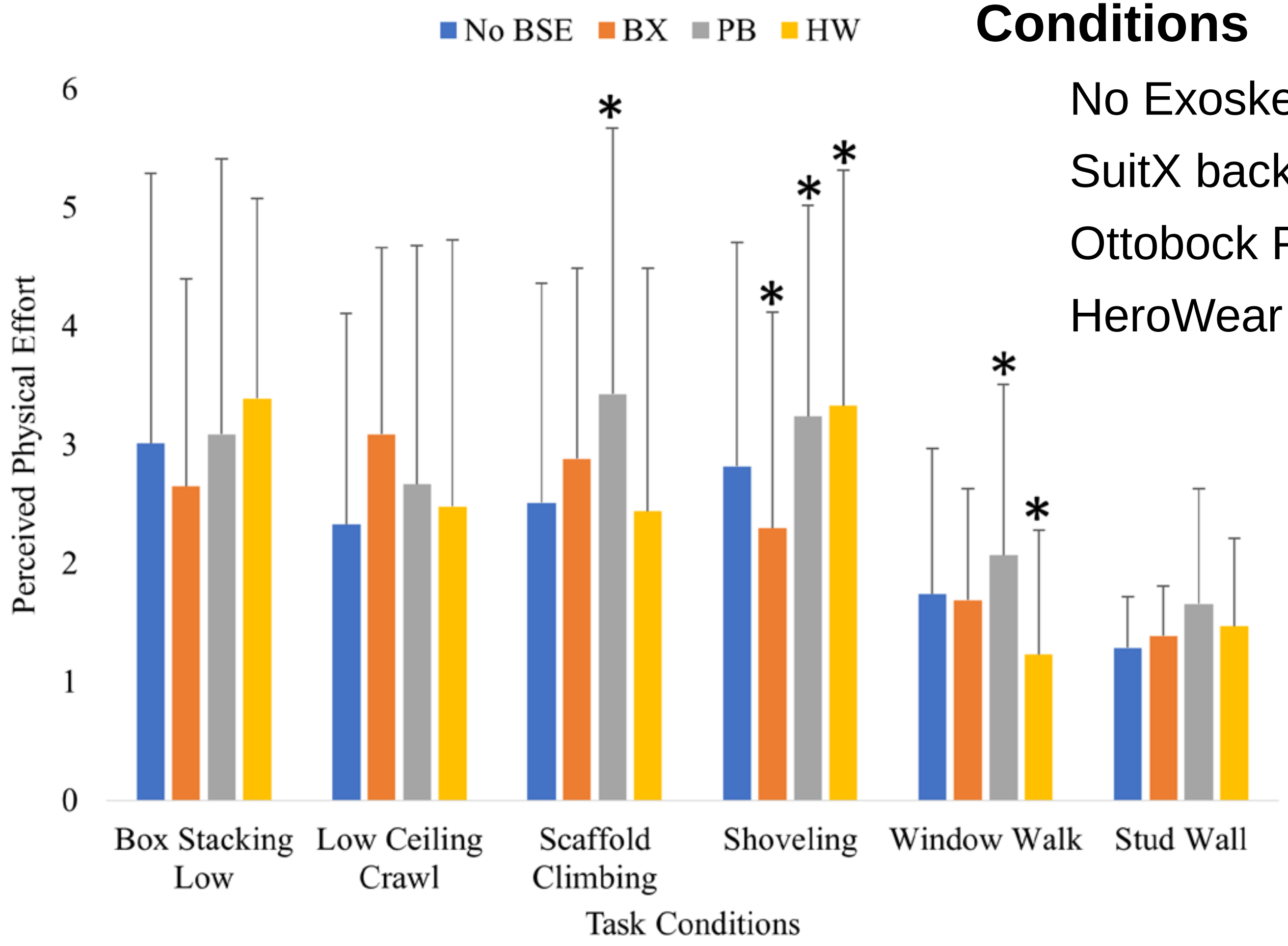


Conditions

- No Exoskeleton
- SuitX backX-S (BX)
- Ottobock Paexo Back (PB)
- HeroWear Apex (HW)

* significant difference from the No BSE condition.

Perceived physical effort increased *or* decreased using some exoskeletons



Conditions

No Exoskeleton

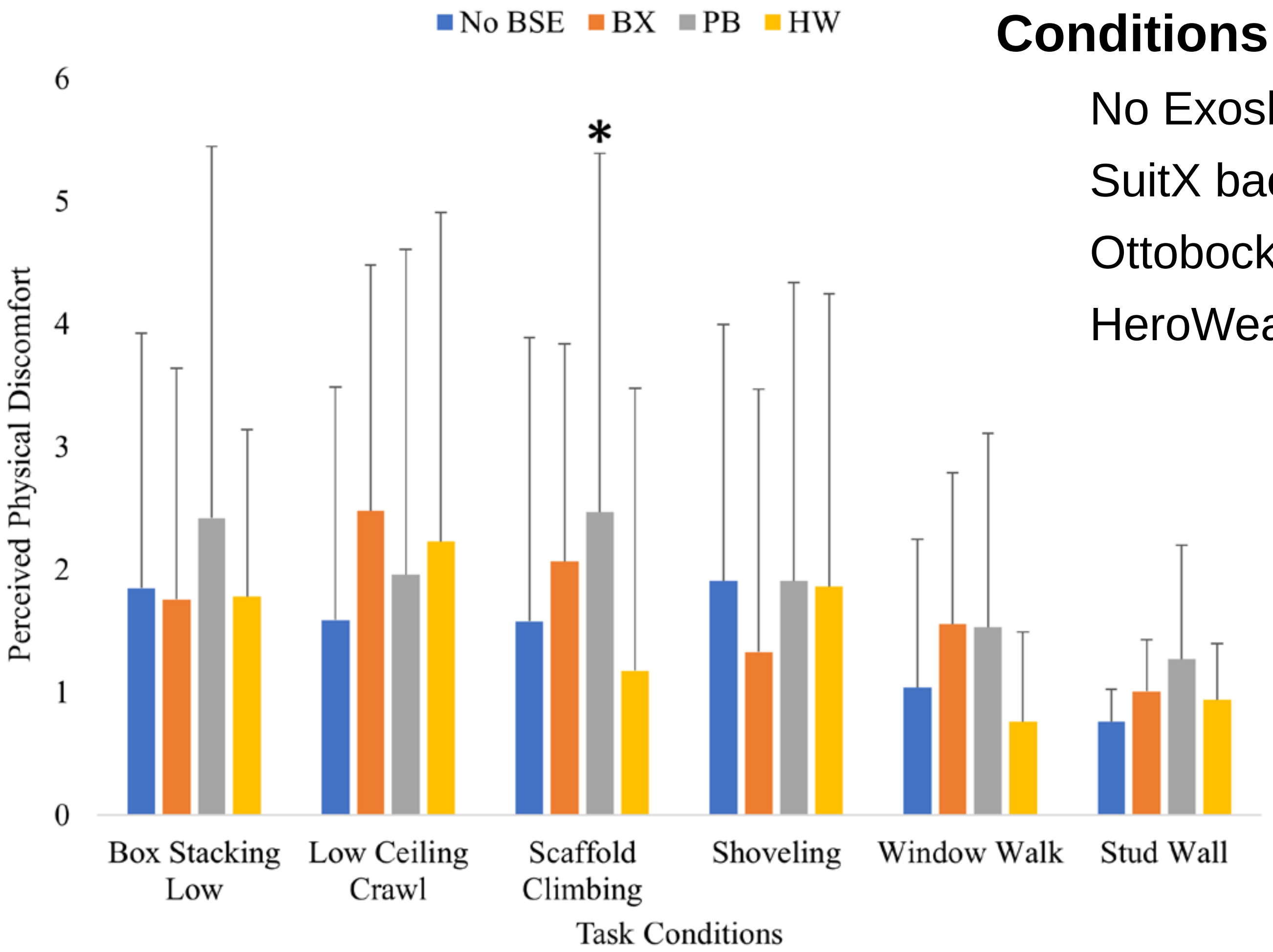
SuitX backX-S (BX)

Ottobock Paexo Back (PB)

HeroWear Apex (HW)

* significant difference from the No BSE condition.

Limited effects of Exoskeleton use on **perceived discomfort**



Conditions

No Exoskeleton

SuitX backX-S (BX)

Ottobock Paexo Back (PB)

HeroWear Apex (HW)

* significant difference from the No BSE condition.

Next Steps: Task-specific Simulations

Concrete Grinding

Drywall Installation

Roofing

Tiling

THANK YOU!

We would like to acknowledge NIOSH & CPWR, The Center for Construction Research and Training, for their support of this project (U60-OH009762-11).

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https://www.facebook.com/UCErgoResearch/posts/3766397566725967

Evaluation and Improvement of OSHA 10-Hour Construction Safety Training

2022 Research to Practice (r2p) Seminar and Partnership Workshop
June 2-3, 2022

Mark Fullen - West Virginia University – Safety & Health Extension
Kimberly Rauscher - Boise State University - Department of Community and Environmental Health
Brandon Takacs - West Virginia University – Safety & Health Extension
Eric Lundstrom, West Virginia University - School of Public Health, Department of Epidemiology
Wayne Lundstrom - West Virginia University – Safety & Health Extension
Douglas Myers - Boise State University - Department of Community and Environmental Health

EXTENSION

Study Objectives

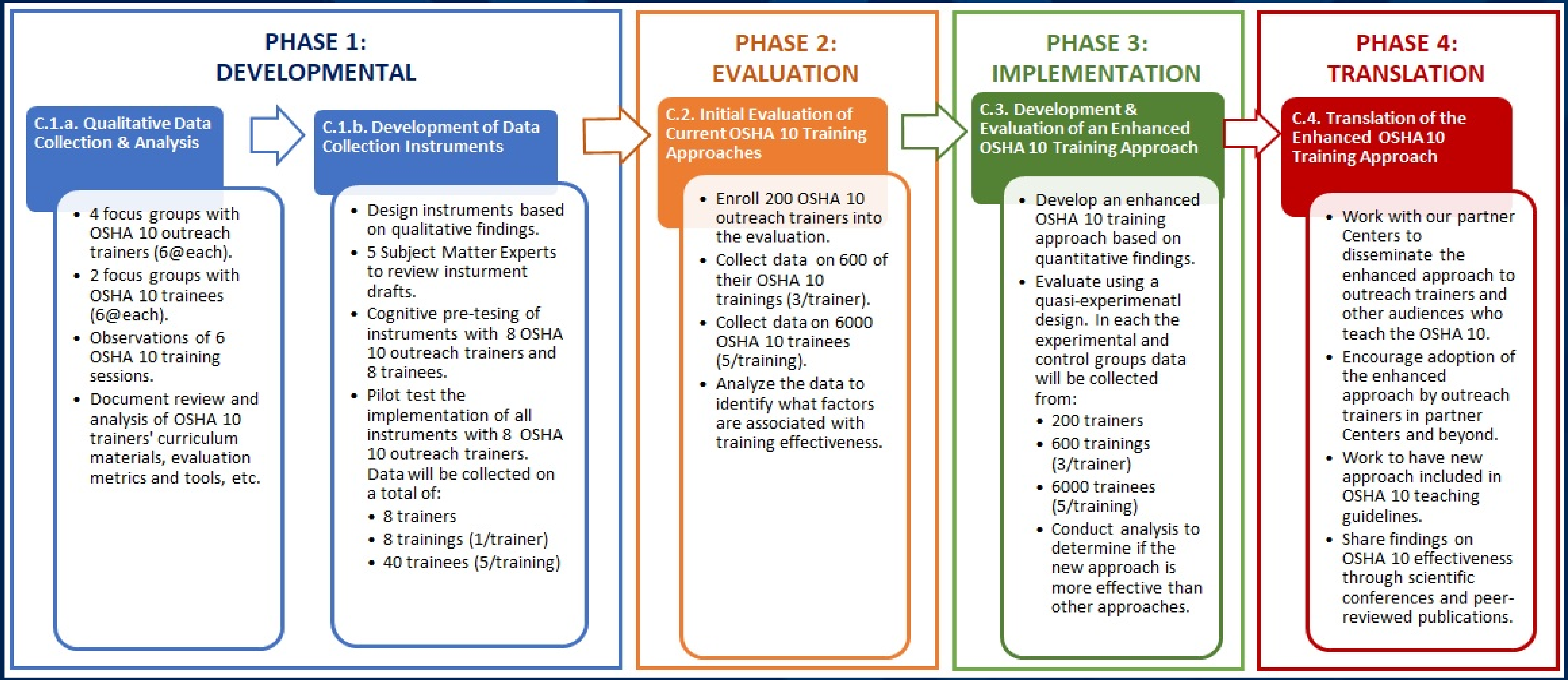
1. To understand the current approaches used by Outreach Trainers when teaching the OSHA 10
2. Evaluate the quality of these approaches and identify areas in need of improvement
3. Develop an enhanced OSHA 10 training approach that addresses current areas of weakness
4. Translate the new approach into practice among Outreach Trainers.

EXTENSION

Methods

- 5-year, mixed-methods study in four phases
- Interviews, surveys of trainers, training evaluations, and student knowledge assessments
- 200 affiliated OSHA 10 authorized outreach trainers
- 6000 of their OSHA 10 trainees.

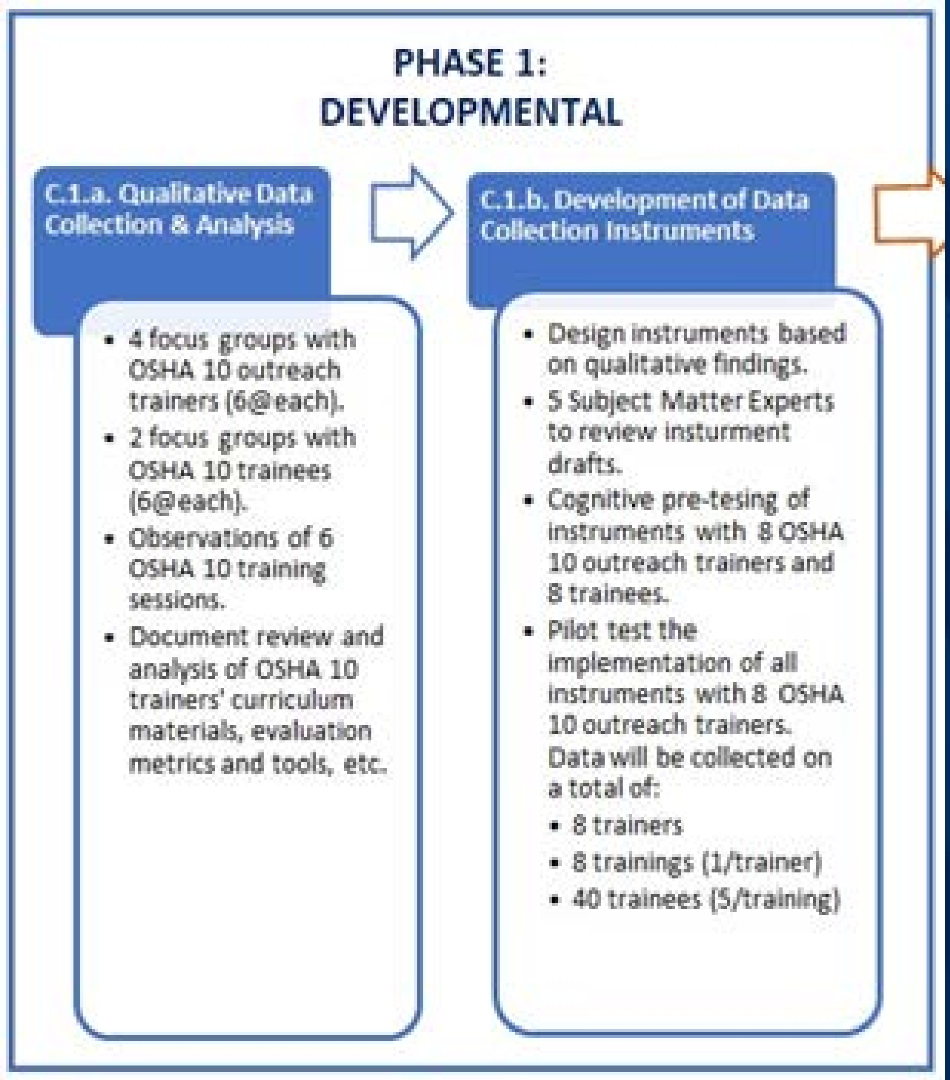
EXTENSION



Study Phases

EXTENSION

Current Activities: PHASE 1 Developmental into Phase 2 Evaluation



COVID-19 Adjustments to Research Approach

- Focus groups with Outreach Trainers & students => **phone interviews**
- Face-to-face training observations => **cancelled, increasing interviews instead**.

EXTENSION

Major Findings from Interviews

- Participation/Engagement
  - Trainers believe they are engaged, conduct student-led trainings, and resist using only lectures. However, students did not experience engaged, student-led activities as the norm.
  - Mainly PowerPoint, videos, and handouts. Students preferred more participatory trainings but still felt trainers were effective in teaching the course, they felt the material learned would keep them safe and planned to use what they learned

Major Findings from Interviews

- Material's
    - Trainers do not develop their own material. They mostly use material developed by OSHA - and others, but they do not come with trainer guides or lesson plans, etc.
- Assessment/Evaluation
    - Trainers do not conduct student evaluations or learning assessments.

Major Findings from Interviews

- Content Expertise
  - Trainers are often consultants, that come into an organization with limited knowledge of specific hazards and worksite conditions
- Context
  - Trainings are often held in hotel or office conference rooms with little to no opportunity to engage in hands-on training.
  - Trainings have a mixture of trainees from different trades and companies - makes it difficult to tailor the training

Dissemination

"Construction Trainer and Trainee Perspectives on the Quality and Effectiveness of the OSHA 10 Construction Course" presented at the National Occupational Injury Research Symposium (NOIRS) 2022, May 10 – 12, 2022.

EXTENSION

Next Steps

From this qualitative analysis and adult education literature we have developed:

- Trainer Questionnaire pre training instruments complete
- Training Evaluation Tool (trainee) complete
- Trainee Knowledge Assessment post training complete
- Will soon pilot these instruments
- Collect this data across 6 OTIECs with 200 OSHA 10 Construction Trainers and 6,000 trainees.

Thank you!

Questions?

THURSDAY, JUNE 2ND

THE IMPACT OF
THE INFRASTRUCTURE
INVESTMENT AND JOBS ACT
ON CONSTRUCTION

Supporting Infrastructure Worker Safety and Health

Chris Trahan Cain, CIH
Jessica Bunting, MPH

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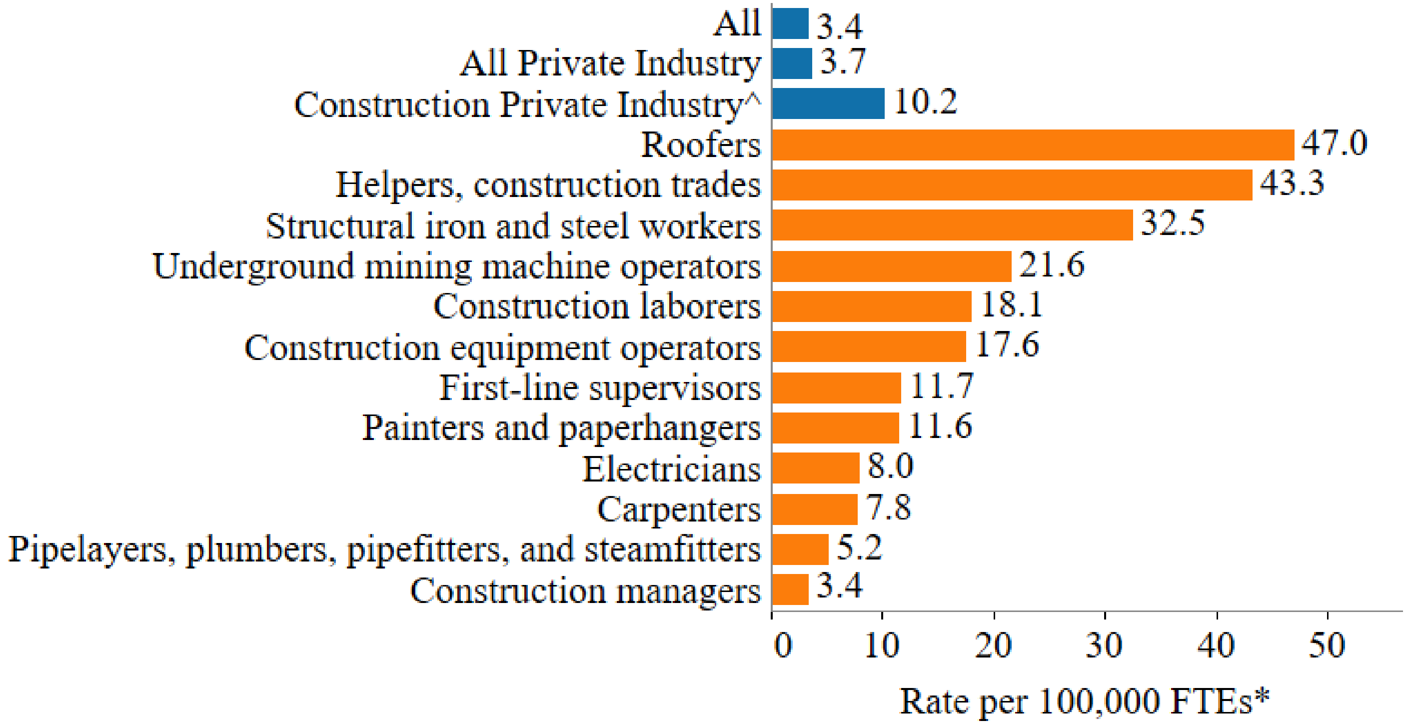
RESEARCH AND TRAINING

Why Focus on Infrastructure Safety & Health Outreach?

- From 2011 to 2020, fatal injury rates increased most significantly for Hispanic workers
- Helpers, iron and steel workers, and other occupations with high fatality rates will be impacted by the IIJA

4. Rate of fatal injuries in construction and extraction occupations, 2020*



Sources: U.S. Bureau of Labor Statistics, Total hours worked and rate of fatal occupational injuries by selected worker characteristics, occupations, and industries, civilian workers, 2020. https://www.bls.gov/iif/oshwc/cfoi/cfoi_rates_2020hb.xlsx .Accessed April 2022.
*BLS calculates the rate per 100,000 full-time equivalent workers as Number of Fatal Injuries/Total Hours Worked X 200,000,000.
^Due to differences in rate calculations and underlying data this rate varies slightly from Chart 1.

Why Focus on Infrastructure Safety & Health Outreach?

- Transportation incidents were a top event/exposure for both fatal and nonfatal injuries in 2020

5. Number of fatal injuries in construction by the most common primary sources, average of 2018-2020*

Other Source | Top Source Category

Primary Source Category	Top Source Category^	Number of fatal injuries
Structures and surfaces (e.g., confined spaces, scaffolds, roofs)	Other structural elements (e.g., roofs, skylights, elevator shafts)	298 (Top=153)
Vehicles (e.g., highway vehicles, bucket trucks, forklift, tractors)	Highway vehicles, motorized (e.g., automobiles, trucks, vans)	275 (Top=236)
Machinery (e.g., construction/HVAC/metal machinery, cranes)	Construction, logging, and mining machinery (e.g., loaders, excavators)	106 (Top=58)
Tools,instruments, and equipment (e.g., handtools, ladders, protective equipment)	Ladders (e.g., fixed and moveable ladders)	103 (Top=92)
Chemicals and chemical products	Data Unavailable	83
		0 100 200 300 400 500 600

Source: U.S. Bureau of Labor Statistics, 2018-2020 Census of Fatal Occupational Injuries. Calculations by the CPWR Data Center.
*Cases missing primary source data were excluded.
^Defined as the most common category within the primary source category.

Why Focus on Infrastructure Safety & Health Outreach?

- The IIJA offers a unique opportunity for government, labor, management, and safety and health researchers to work together to ensure workers receive safety and health training, OSHA standards are complied with, and research findings and best practices are followed.
- CPWR is well positioned to work with these groups.

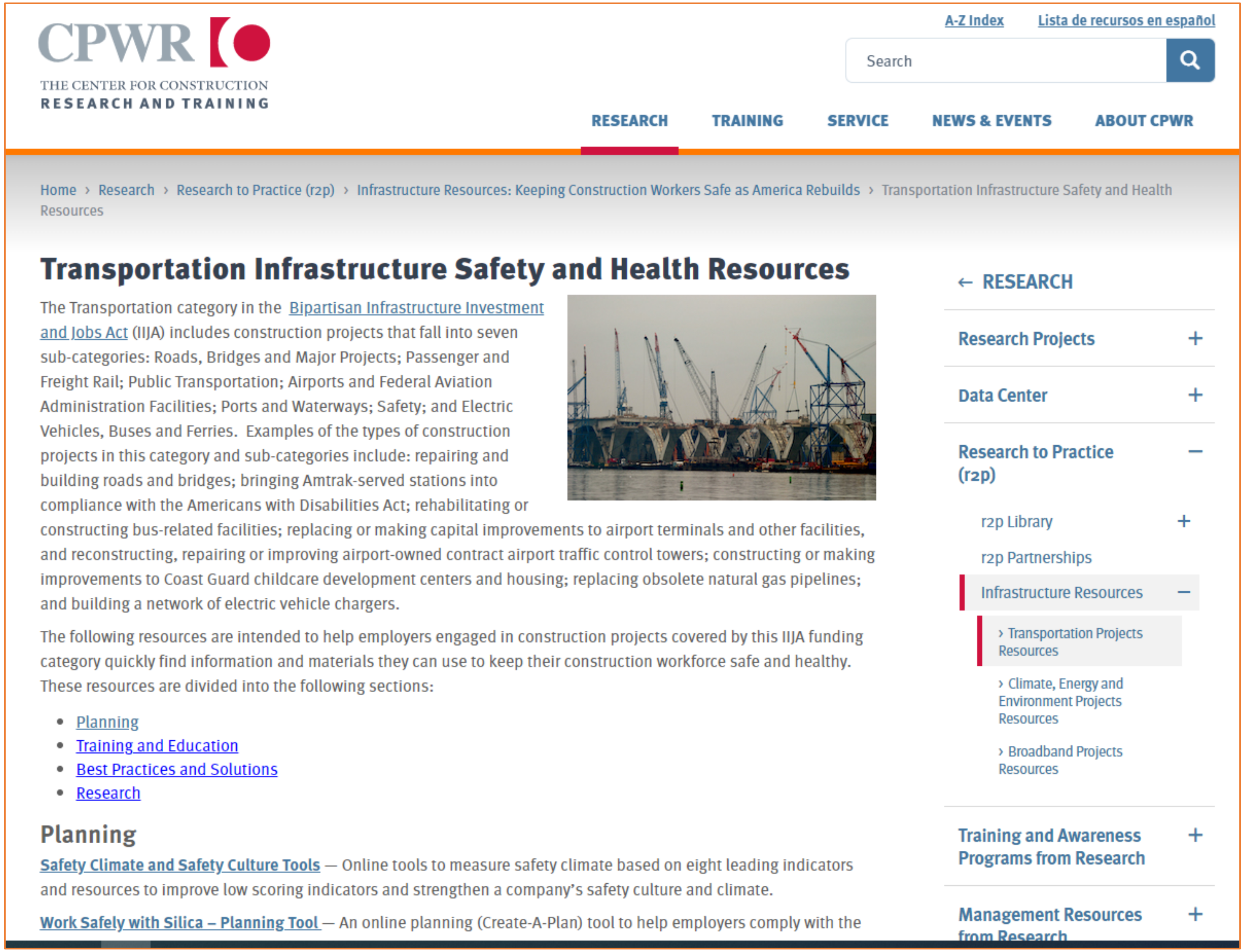
CPWR's Infrastructure Efforts

- Infrastructure-focused section of CPWR's website
- New promotional resources + r2p/Communications Outreach
- CPWR's Data Center monitoring and reporting

Infrastructure Webpages

- **Three categories based on infrastructure funding:**
  - Transportation
  - Climate, Energy, and the Environment
  - Broadband
- **Four sections in each category:**
  - Planning
  - Training and Education
  - Best Practices and Solutions
  - Research

https://cpwr.com/infrastructure



CPWR
THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

A-Z Index   Lista de recursos en español

Search

RESEARCH   TRAINING   SERVICE   NEWS & EVENTS   ABOUT CPWR

Home › Research › Research to Practice (r2p) › Infrastructure Resources: Keeping Construction Workers Safe as America Rebuilds › Transportation Infrastructure Safety and Health Resources

Transportation Infrastructure Safety and Health Resources

The Transportation category in the Bipartisan Infrastructure Investment and Jobs Act (IIJA) includes construction projects that fall into seven sub-categories: Roads, Bridges and Major Projects; Passenger and Freight Rail; Public Transportation; Airports and Federal Aviation Administration Facilities; Ports and Waterways; Safety; and Electric Vehicles, Buses and Ferries. Examples of the types of construction projects in this category and sub-categories include: repairing and building roads and bridges; bringing Amtrak-served stations into compliance with the Americans with Disabilities Act; rehabilitating or constructing bus-related facilities; replacing or making capital improvements to airport terminals and other facilities, and reconstructing, repairing or improving airport-owned contract airport traffic control towers; constructing or making improvements to Coast Guard childcare development centers and housing; replacing obsolete natural gas pipelines; and building a network of electric vehicle chargers.

The following resources are intended to help employers engaged in construction projects covered by this IIJA funding category quickly find information and materials they can use to keep their construction workforce safe and healthy. These resources are divided into the following sections:

- Planning
- Training and Education
- Best Practices and Solutions
- Research

Planning

Safety Climate and Safety Culture Tools — Online tools to measure safety climate based on eight leading indicators and resources to improve low scoring indicators and strengthen a company's safety culture and climate.

Work Safely with Silica – Planning Tool — An online planning (Create-A-Plan) tool to help employers comply with the

← RESEARCH
Research Projects +
Data Center +
Research to Practice (r2p) −
r2p Library +
r2p Partnerships
Infrastructure Resources −
› Transportation Projects Resources
› Climate, Energy and Environment Projects Resources
› Broadband Projects Resources
Training and Awareness Programs from Research +
Management Resources from Research +

Planning & Management Tools

- **Safety Culture & Climate**
  - Safety Climate-Safety Management Information System (SC-SMIS)
- **Work Safely with Silica** + **Create-A-Plan** tool.
- **Best Built Plans Program**
- **Fall Prevention Planning**
- **COVID-19** planning tool and COVID-19 Construction Clearinghouse.
- **Return on Investment Calculator**

Training & Education Programs

- NIEHS-funded + OSHA training programs (affiliates only)
- Foundations for Safety Leadership (FSL)
- Best Built Plans: Comprehensive Ergonomics Training Program for Workers and Contractors
- Head Protection: Preventing Head Injuries
- Construction Noise and Hearing Loss Prevention Training Program
- Opioids Awareness Training Program
- Safety Voice for Ergonomics (SAVE)
- Radiofrequency (RF) Radiation Awareness Program for the Construction Industry
- Nano—trade specific

Best Practices & Solutions

- **[Construction Solutions Database]**
- **[Hazard-Specific Tools & Resources]**
  - Hazard Alert Cards
  - IMPACT cards
  - Infographics
  - Physicians Alerts Cards
  - Toolbox Talks
  - Dealer/Manufacturer Fact Sheets
  - Videos
  - Webinars
  - Podcasts
  - Websites (e.g., ChooseHandSafety.org; StopConstructionFalls.com)

Research

- Current Research
- Completed Research
- CPWR Key Findings
- CPWR Reports
- Small Studies Reports
- CPWR Data Center

New Research: Small Study Program

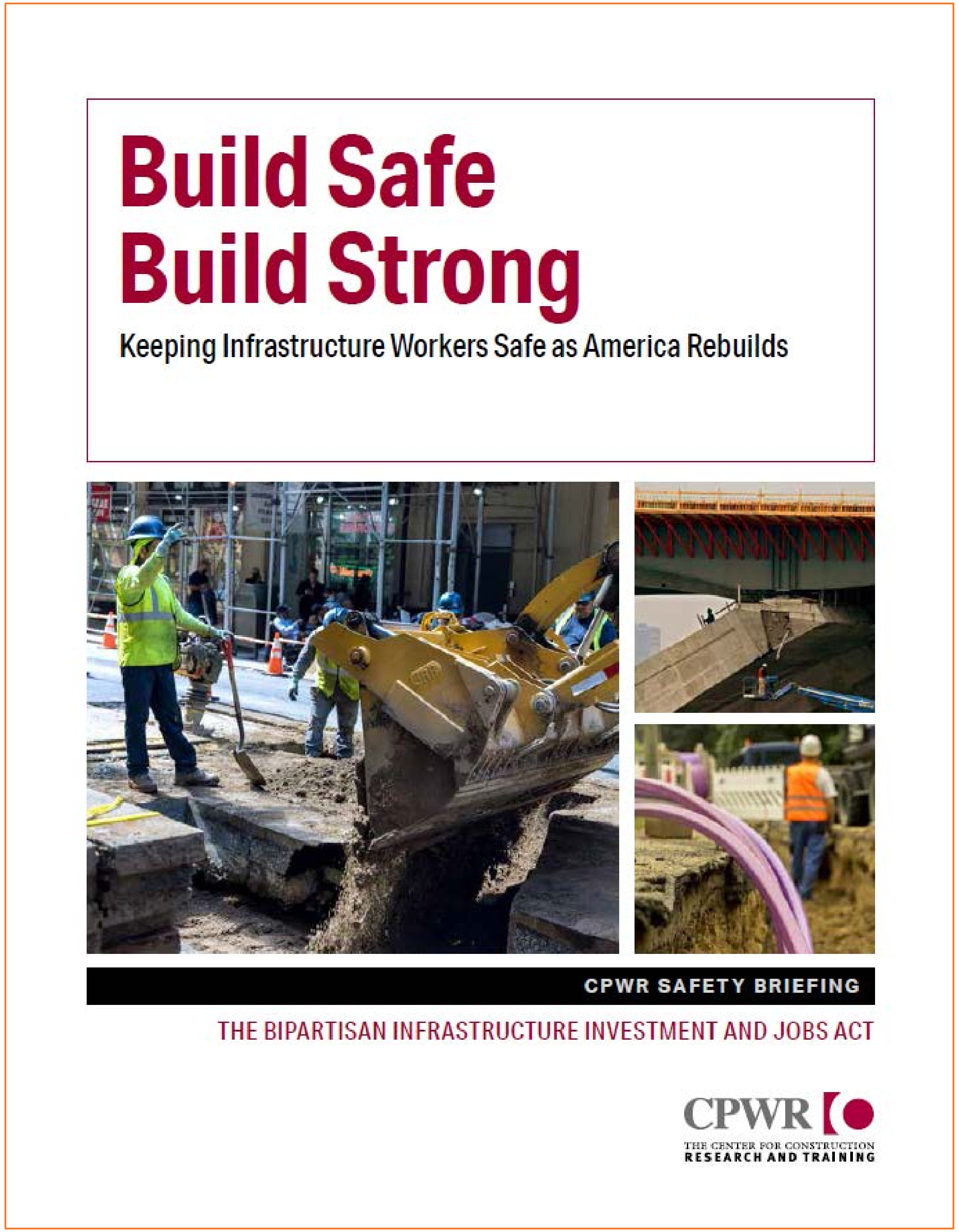
- Up to 1 year
- Up to $30,000
- Now accepting applications
- We encourage innovative research proposals focused on:
  - Reaching high-risk populations: small employers, vulnerable workers, residential and light commercial construction firms
  - Developing applicable, practical interventions
  - Engaging stakeholders, through partnerships and other means, to better understand the barriers to and motivators for adoption of best practices
  - Addressing emerging issues and exploring new technologies
  - Evaluating promising research translation products and dissemination strategies
  - Disseminating good practices to small employers

Data Center

- **Data Dashboards**: detailed information in an interactive graphic format.
- **Data Bulletins**: published six times a year to share timely data-driven information.
- March 2022 Data Bulletin on *Employment Trends and Projections in Construction* provides a baseline for tracking the effect of the IIJA on the industry.
- **Presentations** to industry and research audiences and **peer-reviewed journal articles**.

Promotional Resources

- [CPWR Safety Briefing]
- One-Pager + Executive Summary



Communications Plan

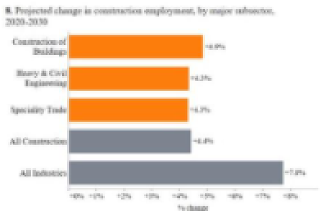
- CPWR Monthly Newsletter
- NABTU Monthly Toolkit Emails
- Webinars
- Podcasts
- Social media (Facebook, Twitter, Instagram, LinkedIn)
- Industry events
- Paid Advertising

CPWR THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

CPWR UPDATE March 2022

From the Desk of Chris Trahan Cain, Executive Director

New Data Bulletin Examines Construction Employment



The March 2022 issue of CPWR's Data Bulletin focuses on two topics: 1) employment trends from 2011 to 2021, including the impact of COVID-19, and 2) employment projections through 2030. It finds that from 2011 to 2019, while employment grew 12.6% in all industries, it rose 26.7% in construction. Over the past decade, there were increases in the construction workforce among those who were 55 years or older, Hispanic, and/or female. Construction employment is projected to grow 4.4% in total from 2020 to 2030, with Construction of Buildings (NAICS 236) increasing the fastest (+4.9%), and the largest number of openings during this period will be for laborers, 1.4 million.

Three New Data Dashboards on Employment in Construction
CPWR's Data Center has launched three Data Dashboards, all of which examine construction employment. The first looks at employment trends, including overall increases or decreases and differences among workforce segments, such as age groups. The second explores forecasts for future employment in the industry, including specific occupational categories. The third concentrates on women's employment, with details on characteristics, such as age and occupation. As with all of the dashboards, the data for these three can be downloaded as a spreadsheet.

TOOLS FOR SAFETY AND HEALTH

Take Part in This Year's Struck-By and Falls Stand-Downs
2022 promises to be a big year for construction, particularly with infrastructure work. As new projects begin and new workers enter the industry, it is critical for employers to put safety front and center, and the stand-downs can help build safer job sites.

Focus on Roadway Safety

Roadway Construction Is Dangerous

- According to federal data, in 2020:
  - 857 people died in work zone crashes
  - 170 were “persons on foot” and bicyclists
- On average, about 135 roadway workers are killed on the job annually.
  - The leading cause of death and injury for these workers are struck-by incidents

Key IIJA Roadway Safety Provisions

- Increases funding for Highway Safety Improvement Program
- Allows funding for Automated Speed Enforcement in Work Zones
- Allows creation of “Safety Contingency Funds”
- Emphasizes and requires safety benchmarks for “Vulnerable Road Users” which includes roadway construction workers
- The IIJA delivers a 44 percent increase in core federal highway funding between FY 2021 and FY 2022

Credit: Brad Sant, ARTBA

What is the impact on work zone safety?

ARTBA estimates the IIJ funding will result in at least 4,000 additional work sites annually, beginning in 2023.

Credit: Brad Sant, ARTBA

QUESTIONS FOR DISCUSSION

1. Taking into consideration both industry need and ability to make an impact, what other sectors, trades, or types of work might be good to partner with for more focused, project-level outreach?
2. What new or additional safety and health research is needed?
3. If you could design a CPWR small study, what might it look like?

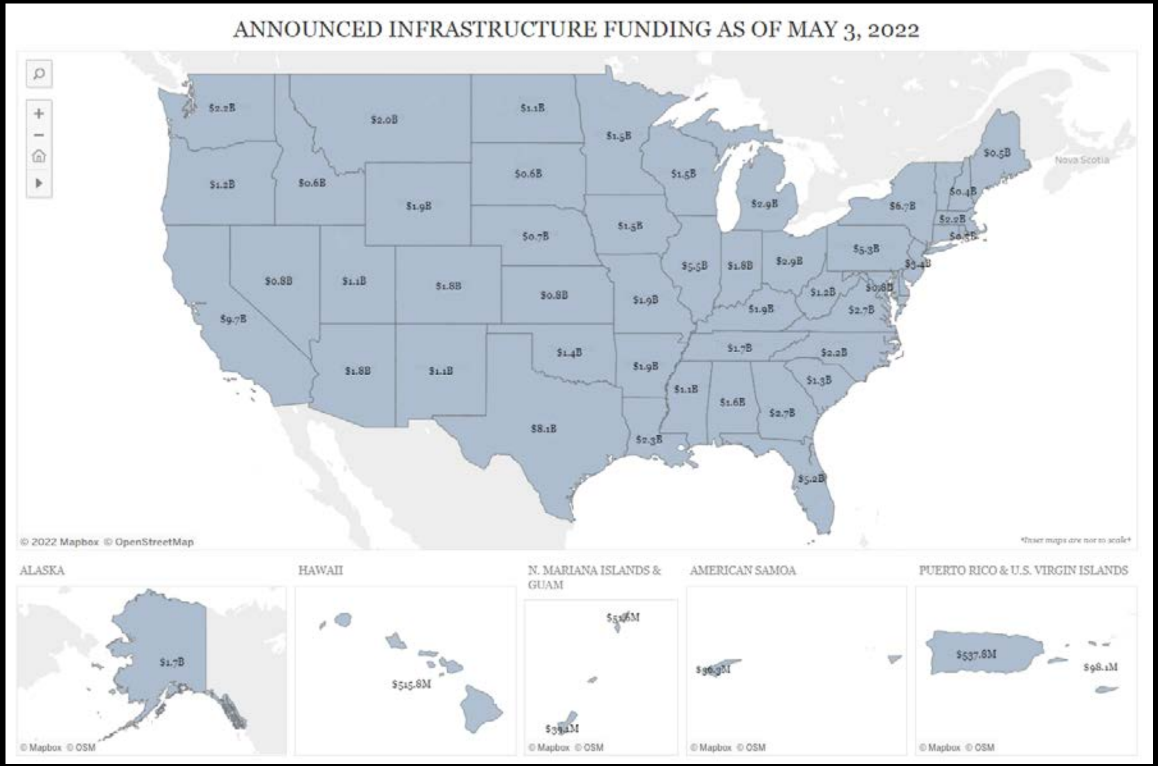
QUESTIONS FOR DISCUSSION

4. Are there key partners to engaged that weren’t previously mentioned? If so, who are they?

5. Are there specific resources that don’t currently exist and would be beneficial to contractors, workers, or others engaging in IIJA-funded work?

QUESTIONS FOR DISCUSSION

6. How could the White House funding map be leveraged to connect target audiences with safety and health information or researchers locally where there is likely to be a significant number of new jobs?



THURSDAY, JUNE 2ND

RESEARCH TO PRACTICE (r2p) UPDATES

Research to Practice (r2p) Core Program

Jessica Bunting, MPH
Director

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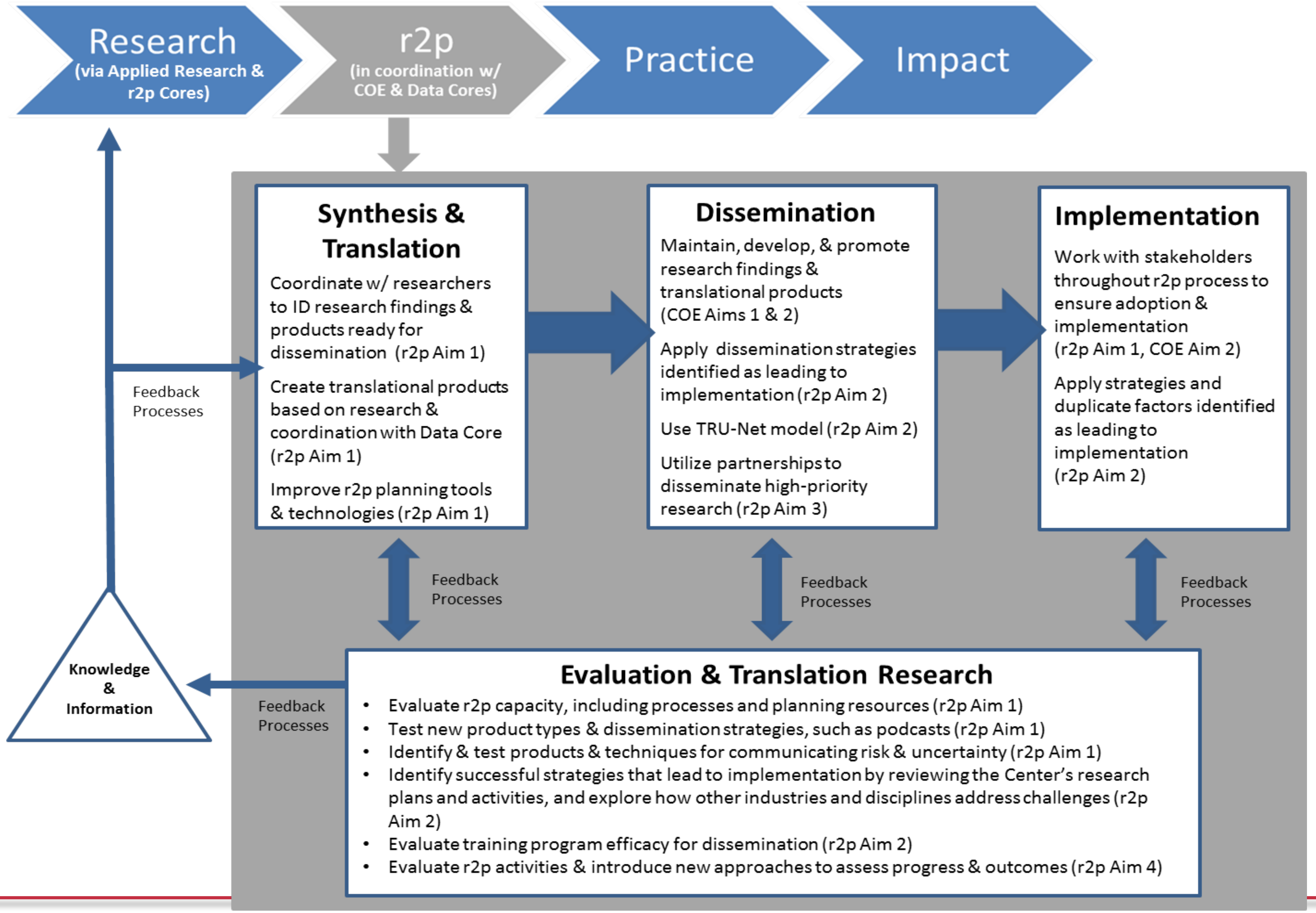
R2p Model & Systematic Approach



Specific Aims

Aim 1: Expand, improve and evaluate research synthesis, translation and dissemination capacity and resources, including:
1a) enhancing tools and support for dissemination planning and evaluating the process;
1b) identifying best practices for conveying uncertainty and risk information in translational products; and
1c) developing and testing new translational products, technologies, and dissemination strategies.

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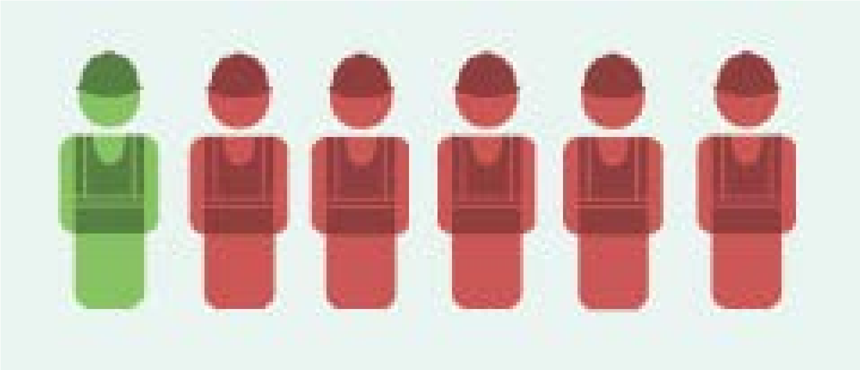

Specific Aims

Aim 2: Identify and apply successful strategies that advance the implementation of research findings, including:

2a) analyzing completed r2p plans to understand the barriers and facilitators to implementation and using the findings to inform future r2p plans and activities;

2b) exploring the use of behavioral economics to influence decisions related to implementation; and

2c) evaluating the efficacy of training programs for dissemination and implementation.

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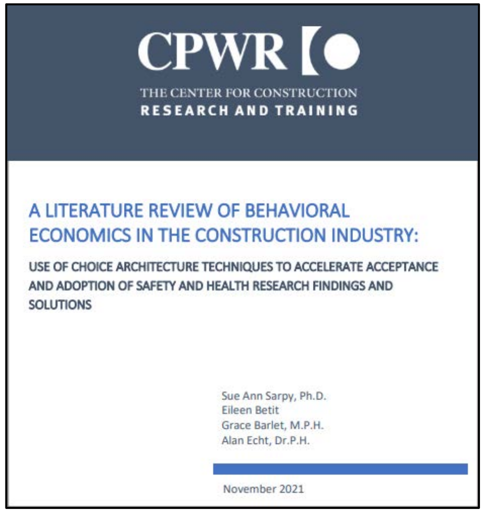
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A LITERATURE REVIEW OF BEHAVIORAL ECONOMICS IN THE CONSTRUCTION INDUSTRY:

USE OF CHOICE ARCHITECTURE TECHNIQUES TO ACCELERATE ACCEPTANCE AND ADOPTION OF SAFETY AND HEALTH RESEARCH FINDINGS AND SOLUTIONS

Sue Ann Sarpy, Ph.D.
Eileen Betit
Grace Barlet, M.P.H.
Alan Echt, Dr.P.H.

November 2021

Specific Aims

Aim 3: Maximize partnership opportunities, linkages and available resources for r2p initiatives, including:

3a) collaborating with OSHA and NIOSH to grow r2p capacity for high priority research;

3b) engaging intermediaries and researchers in developing and implementing strategies for reaching construction audiences at disproportionate risk; and

3c) planning and hosting an annual r2p seminar to ensure maximum integration and shared learning, and to encourage collaborations.

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Partnerships & Networks

Industry r2p Partnerships:

Masonry r2p Partnership

Roofing r2p Partnership

Sheet Metal Worker r2p Partnership

Interagency Work Groups:

OSHA-NIOSH-CPWR r2p Working Group

CPWR-OSHA Alliance

NORA Construction Sector Council Work Groups: Falls, COVID-19, Struck-by

ANSI Z-359 National Work at Heights Task Force

Community of Practice:

Ergonomics Community of Practice

Networks:

Trainers & Researchers United Network (TRU-Net)

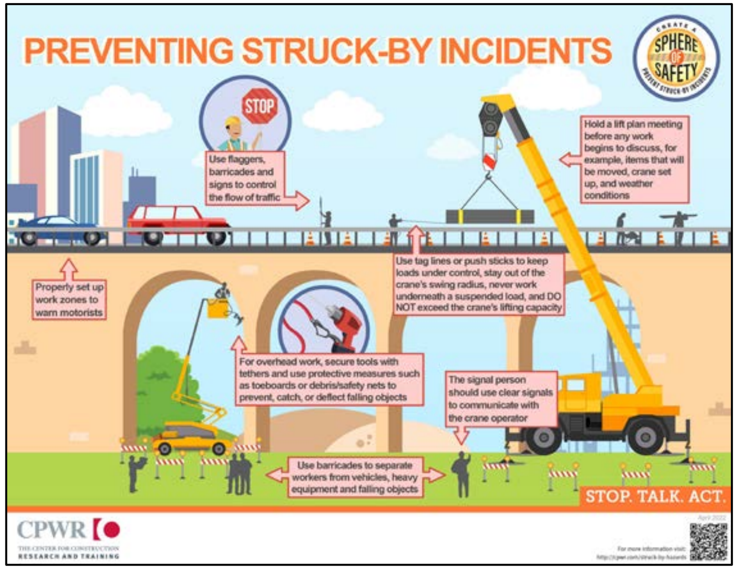
Online Construction Safety & Health Network

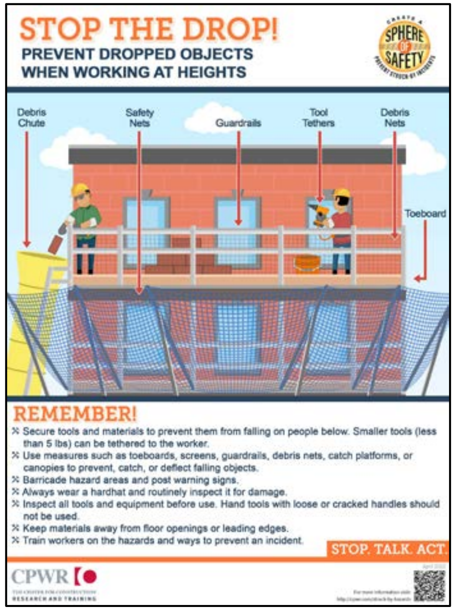
National Stand-Down to Prevent Struck-by Incidents

- April 11 - 15, 2022 (in coordination with Work Zone Awareness Week)
- **Virtual Events**
  - *Preventing Struck-by Incidents in Roadway Work Zones*
  - *Prevención de Incidentes por Atropellos: Zonas de Trabajo, Equipos Pesados e Impacto de Objetos*
  - *What's the risk? Best Practices to reduce the likelihood of struck-by injuries from heavy equipment and crane activities*
  - *Preventing Struck-by Incidents from Dropped Tools & Other Objects*

CREATE A SPHERE OF SAFETY PREVENT STRUCK-BY INCIDENTS

https://cpwr.com/struck-by-hazards





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National Safety Stand-Down to Prevent Falls

May 2-6, 2022

Part of the **National Campaign**, which began in 2012 to encourage construction contractors to PLAN ahead, PROVIDE the right equipment, and TRAIN employees properly

Main Partners: OSHA, NORA, NIOSH, CPWR

https://stopconstructionfalls.com/

Virtual Events

- Uso adecuado de los sistemas personales de protección contra caídas
- Pre-Recorded OSHA-NIOSH-CPWR Kick-Off
- Fall Protection Expert Q&A Panel (3)
- UAGM OSHA NIOSH CPWR Evento de la Campaña Nacional de Prevención de Caídas

Specific Aims

Aim 4: Explore new approaches to assess progress and outcomes in construction intervention research, including:
4a) establishing panels of industry stakeholders to identify and measure intermediate and end outcomes; and
4b) piloting developmental evaluation with the Ergonomic Community of Practice's project to reduce strain and sprain injuries.

Specific Aims

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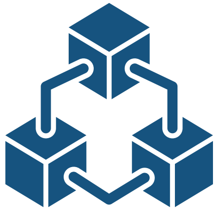


r2p Planning & Dissemination Resources

- R2p Roadmaps
- Construction Safety & Health Social Marketing Toolkit
- Technology Transfer Resources
- Resources on Reaching Vulnerable Workers
- Construction Research to Practice (r2p) Partnership Toolkit
- Clear Writing for a Construction Audience

https://www.cpwr.com/research/research-to-practice-r2p/r2p-library/

Thank You!

Jessica Bunting
jbunting@cpwr.com

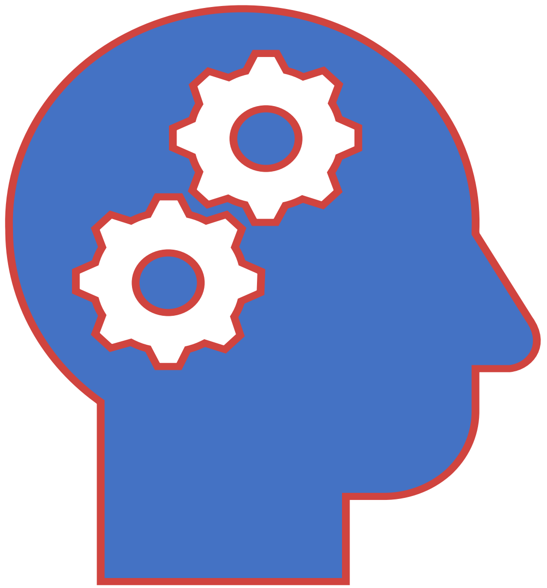
USING BEHAVIORAL ECONOMICS IN THE CONSTRUCTION INDUSTRY: NUDGING TOWARD SAFER DECISIONS AND USE OF SAFETY SOLUTIONS

Sue Ann Sarpy, MS, PhD

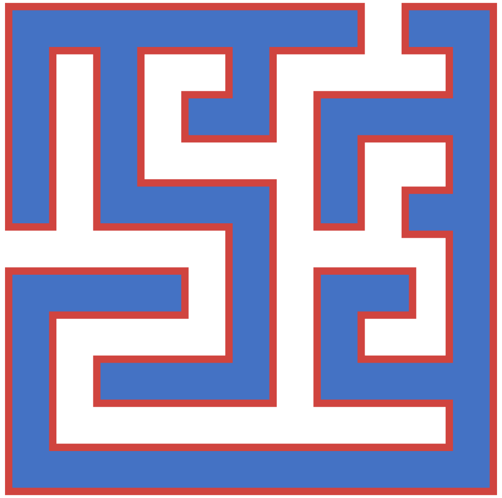
WHAT IS BEHAVIORAL ECONOMICS?

BEHAVIORAL ECONOMICS

- Combines insights from Economics and Psychology for influencing decision-making behavior
- Traditional Economics: **Rational Choice** (consider **all available information**, process information **correctly and completely** to make the **optimal decision**)
- Behavioral Economics – **Bounded Rationality** (limits on time, information available, knowledge, and computational capacity)
- Individuals rely on strategies such as **heuristics** (rules of thumb) to assist with decision-making



COMMON BIASES AND HEURISTICS: HEALTH AND SAFETY



- **Status quo bias** – preference for familiar and current (leads to procrastination)
- **Present Bias –** focus on the present and long-term is not as relevant
- **Loss aversion** – focus on the losses rather than gains
- **Availability bias** – use information that readily comes to mind
- **Overconfidence bias** – take risks based on perceived rather than actual ability

INFLUENCING DECISION-MAKING

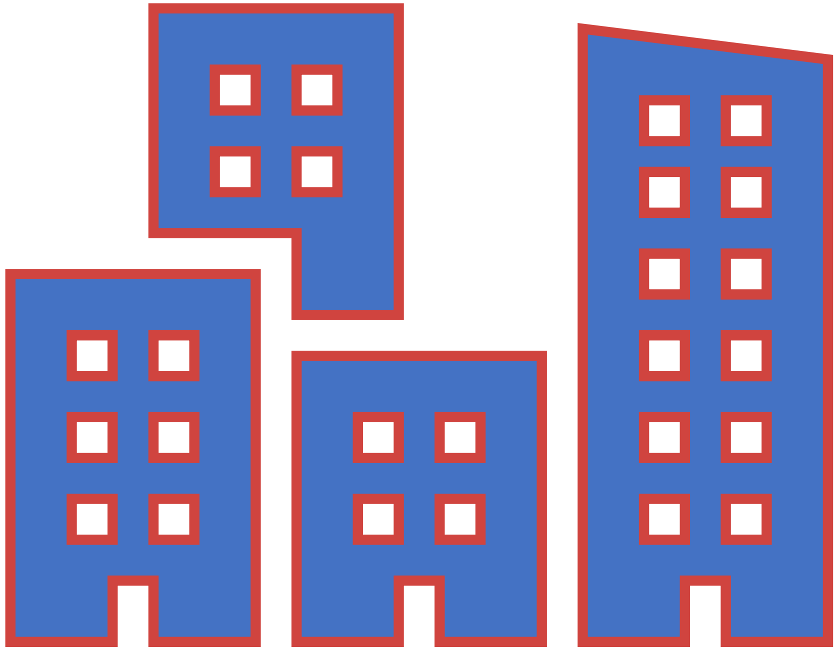
- Thaler & Sunstein (2008) introduced "Nudge" Theory
- Individuals can be influenced toward better choices
- HOW choices are presented affects decision-making
- Choice architecture to design a context that "nudges" individuals toward improved decision-making (safer decisions and practices)
- Choice architecture techniques: low cost, maintain freedom of choice, transparent to the decision-maker

CHOICE ARCHITECTURE TECHNIQUES TO ENHANCE SAFETY

EXAMPLES OF TECHNIQUES TO “NUDGE” INDIVIDUALS TOWARD SAFER DECISIONS

- Signage and stickers on floor to stand 6 feet apart (reminders and prompts)
- Convenient handwashing sanitizer stations (reducing physical effort)
- Signage to wear masks (reminders)
- Vaccines with chance to win lotteries and college scholarships (incentives)
- Mass vaccination clinics/Free rides/ Uber rides (reducing physical effort)

CHOICE ARCHITECTURE AND SAFETY INTERVENTIONS IN THE CONSTRUCTION INDUSTRY



LITERATURE SEARCH

- Pub Med, PsycInfo, EconLit Databases
- Peer reviewed articles
- CA techniques to influence health or safety decision or practice in occupational setting relevant to the construction industry
- Subjects: Adults 18 to 65 years old
- 56 Primary Studies; 6 Meta-analyses/Systematic Reviews
- 12 CA Techniques: 3 Decision-Making Categories
- Effectiveness of CA Techniques in Influencing Decision-Making and Related Practices and Outcomes

PRIMARY STUDY CHARACTERISTICS

Study Design	Number of Studies
Randomized Controlled Trial	21
Quasi-Experimental	33
Computer Simulation	2

Number of Techniques	Number of Studies
1	21
2	20
3	11
4	4

PRIMARY STUDY OCCUPATIONAL SETTINGS AND MEASURES

Occupational Settings

hospitals, farms, manufacturing plants, cafeterias, primary care clinics, fire stations, postal stations, and laundry and linen facilities

Outcome Measures

Immunization uptake, hand hygiene, ergonomics (e.g., lifting, posture, patient transfer), physical activity, food choices, healthy eating, weight loss, healthcare best practices (screening, prescribing, standards of care), safe driving practices, smoking cessation, and workplace safety

CATEGORIES OF CHOICE ARCHITECTURE TECHNIQUES IN INFLUENCING SAFETY DECISIONS

Decision Information: how available information is presented	Feedback, Social Norms, Framing, Simplify
Decision Structure: arrangement of options or decision-making format	Incentives, Prompts, Decrease Physical Effort, Defaults, Change Range of Options
Decision Assistance: follow through with decision intentions	Reminders, Priming, Commitment

Adapted from Münscher, et al. (2015)

EXAMPLE OF EFFECTIVE USE OF CHOICE ARCHITECTURE TECHNIQUES

CHOICE ARCHITECTURE INTERVENTION: MAYER ET AL. (2007; 2009)

Two RCT studies influencing **safety decisions concerning sun protection strategies** for U.S. letter carriers in California

Supplemented educational training and complemented existing safety culture of 70 postal stations

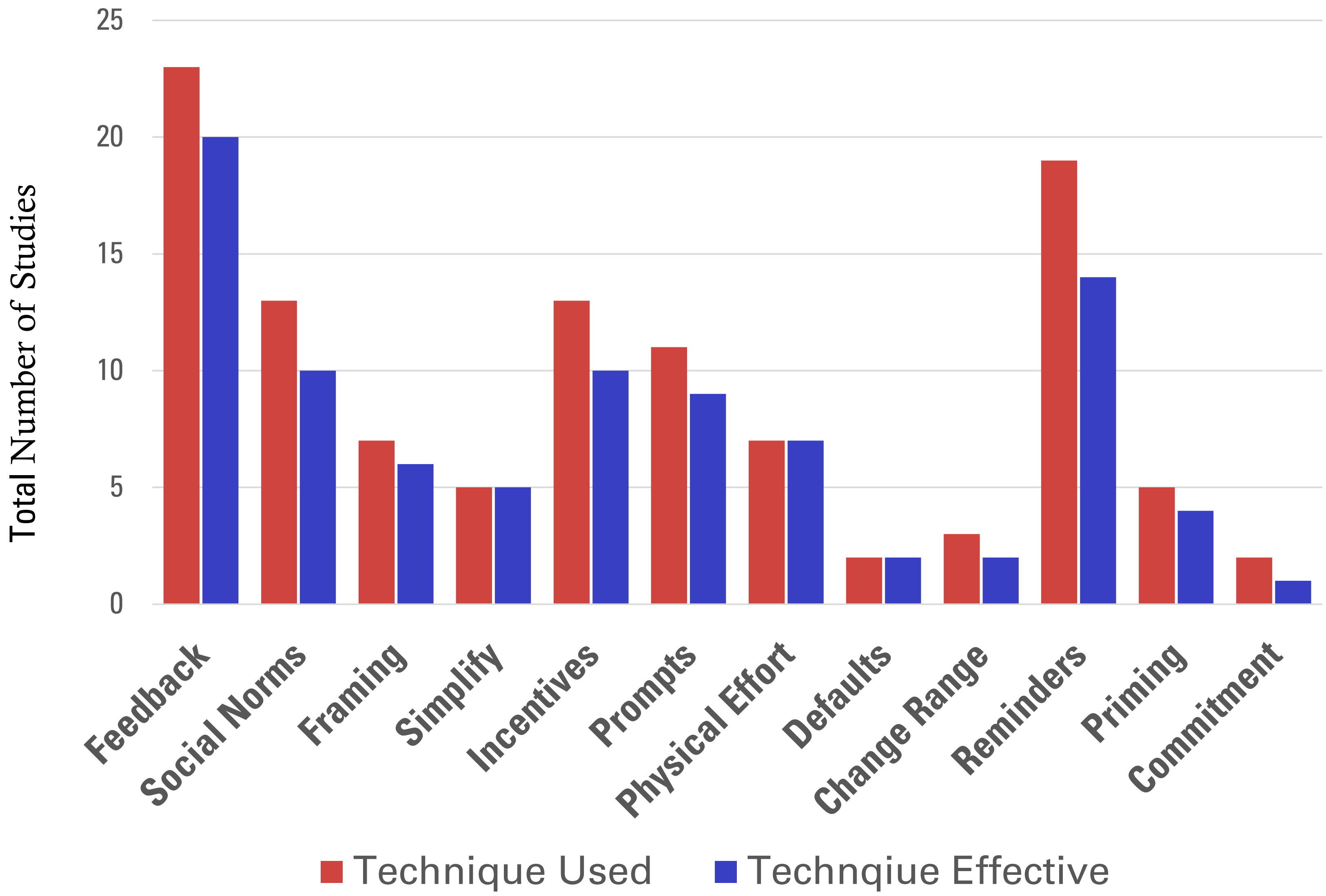
Decreasing physical effort (distributed wide-brim hats and bottles of sunscreen)

Prompts (Safety messages that promoted use of sun protection strategies)

Reported significantly higher hat use and **2.8 times greater sunscreen use** at the 3-month follow-up, significantly higher rates **2 years post** than those at the control stations

Intervention remained effective over the **3-year follow-up**

FREQUENCY AND EFFECTIVENESS OF CHOICE ARCHITECTURE TECHNIQUES



OVERALL FINDINGS

Effectively enhance a **wide array of health and safety decisions** and related practices/outcomes **across occupational settings**

Simple, cost-effective, and can be incorporated into **existing health and safety interventions**

Can be **tailored and used in combination with safety interventions to enhance decisions**

Evidence of effectiveness and support **across stakeholder groups**

Choice architecture in the form of "nudges" **empower** individuals

RECENT META-ANALYSES OF NUDGES AND BEHAVIORAL ECONOMICS

Merten, Herbetz, Hahne, & Brosch (2022):

Analyzed 214 studies since 2008 across various behavioral domains and populations

Interventions targeting Decision Structure were most effective

Small to Moderate effective sizes

Beshears & Kosowsky (2022):

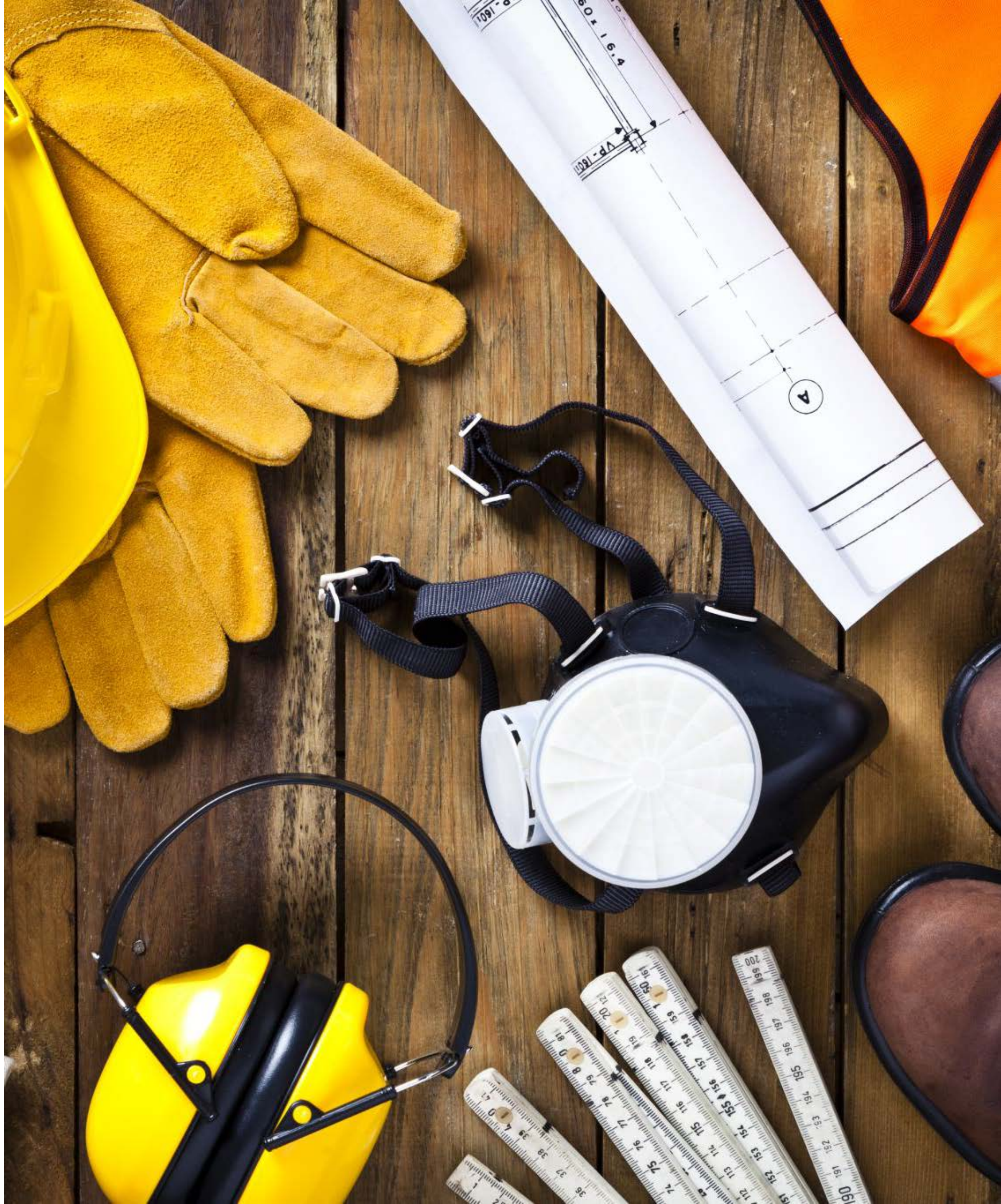
Analyzed 174 studies across academic disciplines, behavioral domains, research settings

Moderate effect sizes for nudges targeting health and safety-related decisions

Nudges that automate decision-making process are more effective

Timing is important (nudge is framed as a “new beginning”

NEXT STEPS FOR USING NUDGES TO ENHANCE SAFETY DECISIONS IN CONSTRUCTION



NEXT STEPS

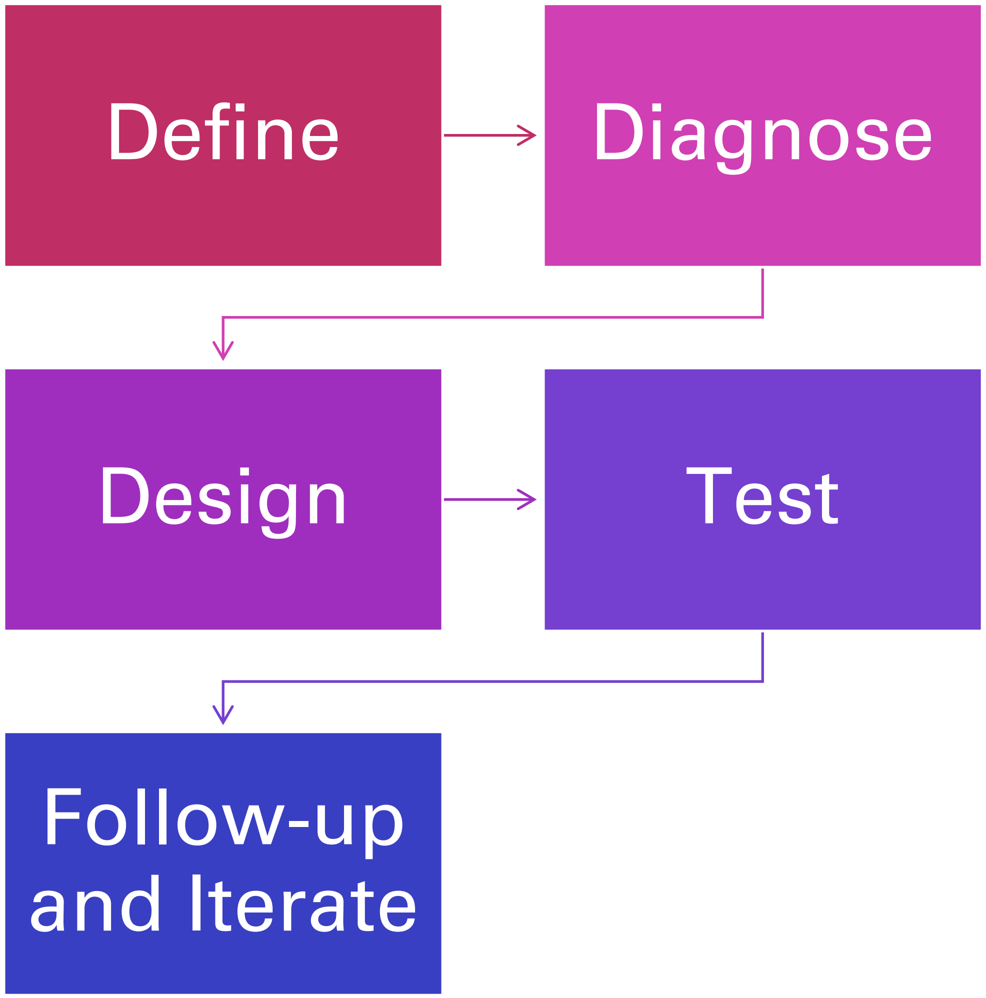
Identify CA techniques tailored toward acceptance and adoption of evidence-based safety solutions in construction

Design a pilot study that systematically address barriers and assess effectiveness of the nudges and monitor effectiveness over time

Systematic approach identifying contextual and individual variables influencing (moderating) the effectiveness of the interventions

Focusing on Planning Toolkit for Struck-by Incidents

NUDGING TOWARD SAFER DECISIONS IN PREVENTING STRUCK-BY INCIDENTS



STRUCK BY SURVEY: HAZARDS, BARRIERS, AND OPPORTUNITIES TO PREVENT INCIDENTS

Struck-by incidents involve an object forcibly impacting a person

Leading cause of fatal and non-fatal injuries in construction industry

CPWR and NORA Construction Sector Council Struck-by Work Group conducted on-line survey

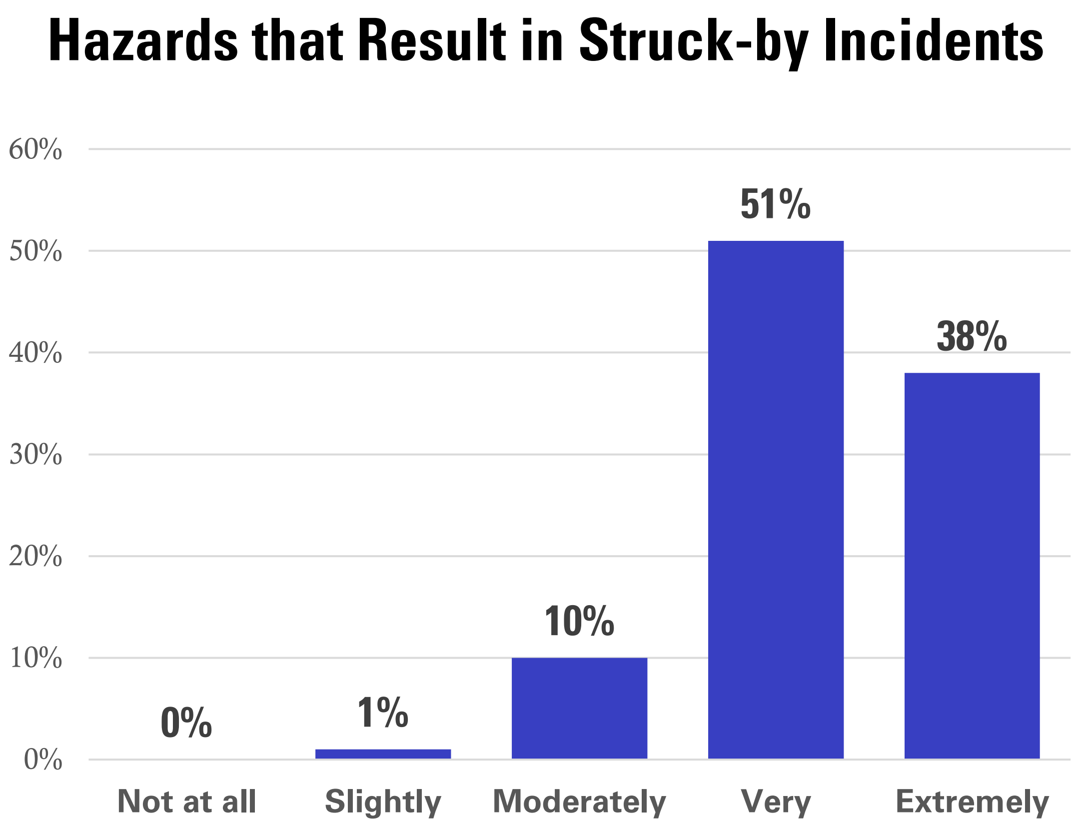
On-line Survey: primary causes of struck-by injuries; barriers to engaging in practices to prevent them; ways to raise awareness and encourage safe practices

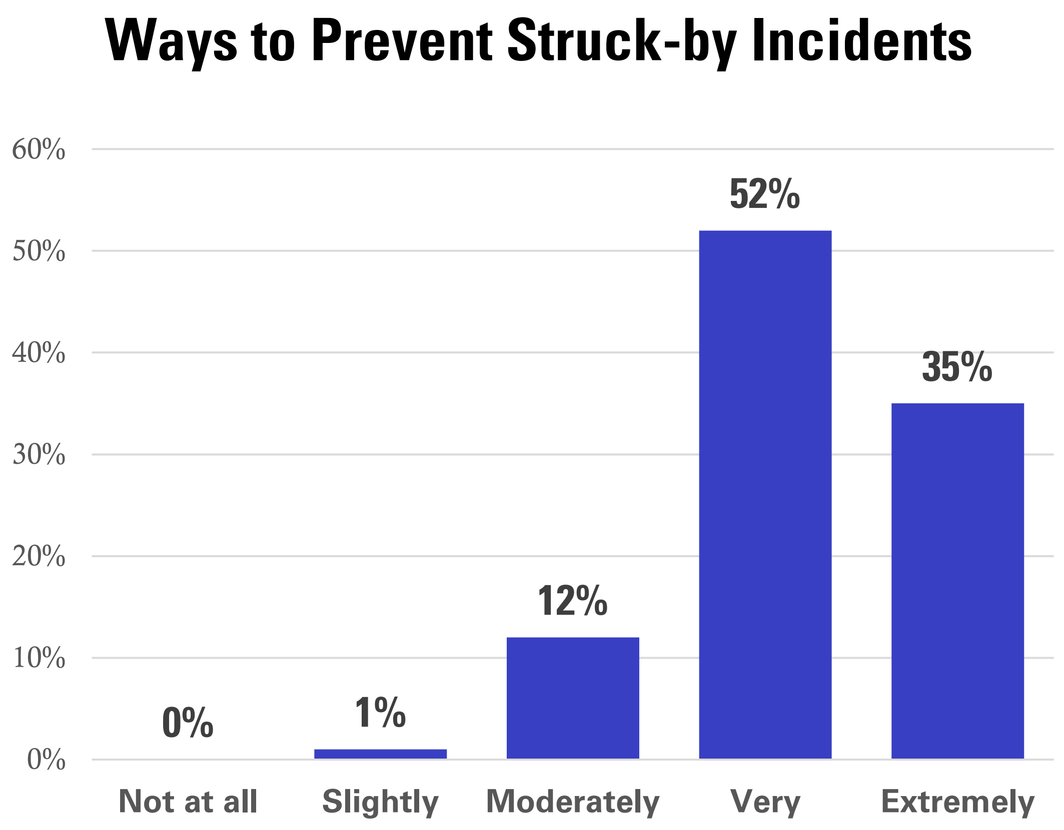
STRUCK-BY SURVEY: PRELIMINARY FINDINGS

- On-line questionnaire – 43 items
- Convenience sample
- 208 individuals responded
- Most had 10 years or more experience in the construction industry (88%)
- Most were employed in commercial construction (44.7%)

Current Position	N	Percent
Safety & Health Professional	145	69.7%
Supervisor/Manager/Foreperson	17	8.2%
Trainer	17	8.2%
Contractor/Construction Employer	16	7.7%
Construction Worker	4	1.9%
Engineer	1	0.5%
Operating Engineer/Driver	1	0.5%
Other	7	3.4%
Total	208	100%

RESPONDENTS SELF-REPORTED KNOWLEDGE





BIGGEST BARRIERS FOR EMPLOYERS TO ENGAGE IN PRACTICES TO PREVENT STRUCK-BY INJURIES

- Lack of Understanding/Information to Address Hazards
- Scheduling Pressure
- Lack of Training (hazardous identification and prevention)
- Costs Associated with Implementing Controls
- Not Including Materials/Labor to Prevent Struck-by Injuries in Bid
- Other: Complacency/Inattention, Management Commitment

BIGGEST BARRIERS FOR WORKERS TO ENGAGE IN PRACTICES TO PREVENT STRUCK-BY INJURIES

- Lack of Pre-task Planning
- Emphasis on Production
- Lack of Training (hazardous identification and prevention)
- Lack of Management Commitment
- Lack of Safety Equipment/Tools
- Other: Complacency/Inattention

HELPING YOUR ORGANIZATION PREVENT STRUCK-BY INCIDENTS

- Training on how to identify and prevent struck-by hazards
- Training on how to conduct job hazard analysis for struck-by hazards
- Information/best practices from other job sites
- Daily checklists listing hazards and equipment, tools, practices to prevent struck-by incidents
- Easy access to free information on how to prevent struck-by incidents
- Signs on job sites showing how to prevent a struck-by incidents
- Signs showing how to identify a struck-by hazard
- Daily text messages to crew members: hazards and work practices; available equipment/tools to prevent struck-by incidents

BEST WAYS TO RAISE AWARENESS/ENSURE USE OF PRACTICES TO PREVENT STRUCK-BY INCIDENTS

- Toolbox Talks
- Training Programs
- Posters/Signs Near the Hazard
- Checklists
- Videos
- Hard Hat Stickers
- Equipment Stickers/Labels
- Posters/Signs Near the Job Trailer/Entrance
- Posters/Signs near Porta Potties and Break Rooms
- Text Messages

FEAST FRAMEWORK (Sunstein, 2021)

F	• Fun (positive affect: instead of fear)
E	• Easy (simplify the process; automaticity)
A	• Attractive: (draw attention to the relevant choice)
S	• Social: (clarify norms; learn through their network)
T	• Timely: (provide when making the relevant choice)

01

Identifying nudges for enhancing construction safety decisions and practices

02

Examining nudges that complement health and safety solutions across org. stakeholders

03

Examining effectiveness and long-term impact on safer decisions and practices

04

Examining effectiveness of nudges directed at different types of barriers and org. factors

05

Examining effectiveness of nudges across various health and safety interventions

---

CONSIDERATIONS FOR FUTURE RESEARCH

SPECIAL THANKS

CPWR: The Center for Construction Research and Training

Eileen Betit; Grace Barlet, MPH; Jessica Bunting, MPH; Alan Echt, MPH, DrPH, CIH

NORA Construction Sector Council Struck-by Work Group

Full text of literature review available at: https://www.cpwr.com/wp-content/uploads/Behavioral-Economics-Literature-Review.pdf

QUESTIONS?

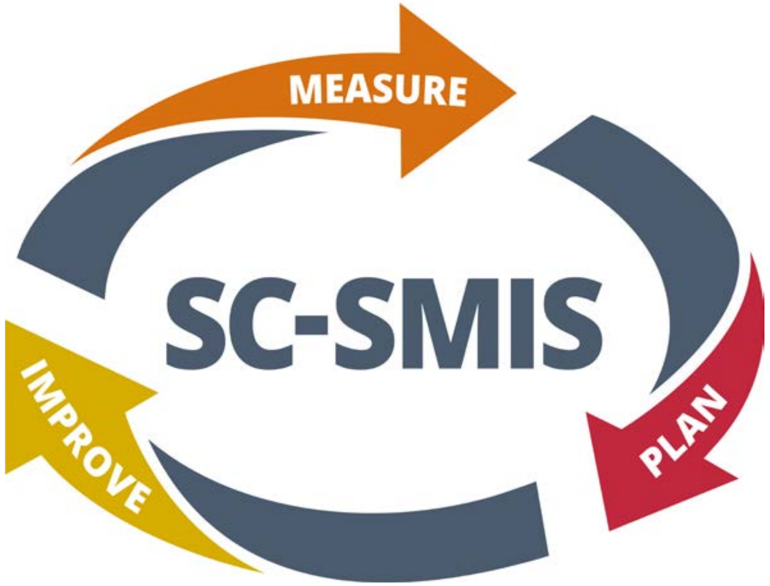
SUE ANN SARPY, PH.D.

www.sarpyassociates.com

FRIDAY, JUNE 3RD

IMPROVING WORKPLACE SAFETY CULTURE AND CLIMATE

Safety Climate – Safety Management Information System



Why we created the SC-SMIS

Make available an easy-to-use, interactive, web-based system that construction companies, regardless of size or available resources, can use – **at no cost** – to engage in continuous Safety Climate and Safety Management improvement.

Project Team

CPWR

Linda M. Goldenhar, MS, PhD

Babak Memarian, PhD, CSP, CHST

Jean Christopher Le, MPH

Sherri Wilson

Web Design/Developer

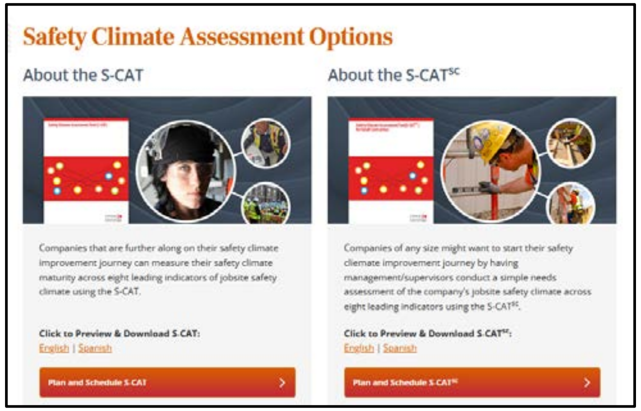
Wood Street, Inc www.woodst.com

User Development Team (UDT)

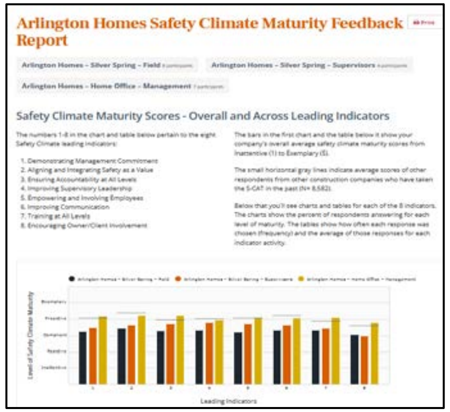
- Bruce & Merrilees Electric Company
- Christenson Electric
- Choate Construction
- Jamerson-Lewis Construction
- Keller - North America
- Leopardo Companies, Inc.
- Manafort-Precision, LLC
- Metcon, Ltd
- NTD Mechanical
- Phase 2 Construction Company
- Wildcat Construction

Continuous Safety Management & Safety Climate Improvement

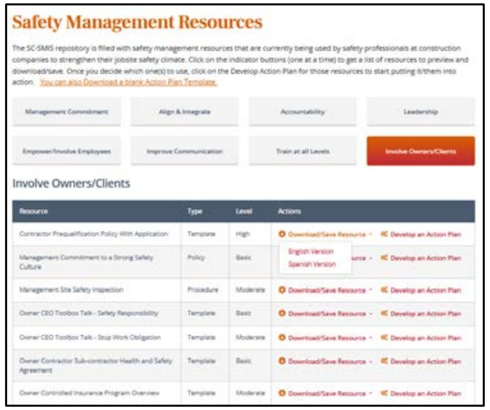
Conduct safety climate assessments



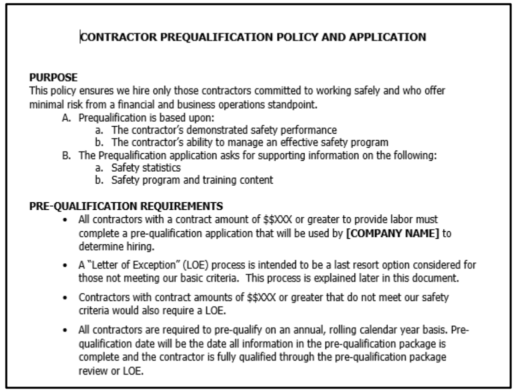
Run reports



Safety management resource repository



Download/tailor resources


CONTRACTOR PREQUALIFICATION POLICY AND APPLICATION

PURPOSE

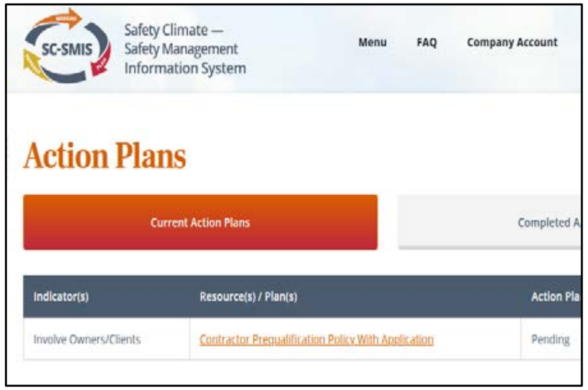
This policy ensures we hire only those contractors committed to working safely and who offer minimal risk from a financial and business operations standpoint.

A. Prequalification is based upon:
   a. The contractor's demonstrated safety performance
   b. The contractor's ability to manage an effective safety program
B. The Prequalification application asks for supporting information on the following:
   a. Safety statistics
   b. Safety program and training content

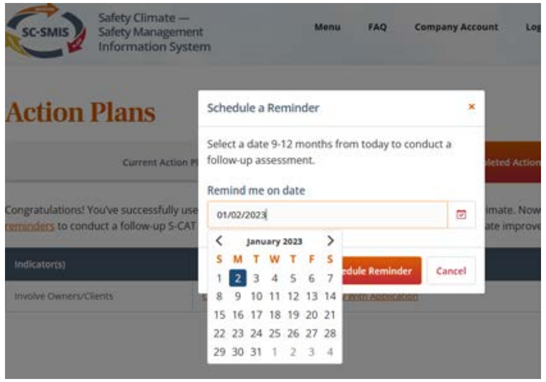
PRE-QUALIFICATION REQUIREMENTS

- All contractors with a contract amount of $$XXX or greater to provide labor must complete a pre-qualification application that will be used by **[COMPANY NAME]** to determine hiring.
- A "Letter of Exception" (LOE) process is intended to be a last resort option considered for those not meeting our basic criteria. This process is explained later in this document.
- Contractors with contract amounts of $$XXX or greater that do not meet our safety criteria would also require a LOE.
- All contractors are required to pre-qualify on an annual, rolling calendar year basis. Pre-qualification date will be the date all information in the pre-qualification package is complete and the contractor is fully qualified through the pre-qualification package review or LOE.

Plan implementation



Schedule annual assessment



SC-SMIS Use (Jan 1- May 25)

How’s it going so far?

- Pilot test
- CPWR announcement
- CPWR Webinar
- Presentations

SC-SMIS Use (Jan 1- May 25)

Where are Users From?

5,332 new user visits

Top 10

- US
- Canada
- China
- Czechia
- United Kingdom
- Germany
- S. Korea
- Australia
- India
- South Africa

SC-SMIS Use (Jan 1- May 25)

Company Users

Type	Number
Guests	114
Accounts Created	147 Construction
	85 Non-construction
Total	**232**

SC-SMIS Use (Jan 1- May 25)

Safety Climate Assessments

	# Companies Conducting an Assessment	Total # of Responses
S-CAT	54 (54/232 = 23%)	2,175*
S-CAT^{SC}	21 (21/232 = 9%)	385

* Benchmark database – 9,705 responses (includes prior S-CAT data)

SC-SMIS Use (Jan 1- May 25)

Safety Management Resources Downloaded

Indicator (# of resources)	# Downloaded
Accountability (13)	3,893
Align and Integrate (9)	2,371
Empower and Involve (11)	1,583
Improve Communication (10)	2,227
Involve Owners/Clients (11)	655
Supervisor Leadership (9)	3,038
Management Commitment (14)	2,670
Train at All Levels (12)	2,147
Total across all indicators (89)	**18,584**

SC-SMIS Use (Jan 1- May 25)

Top 10 Resources Downloaded

Indicator	Resource
Leadership	Foundations for Safety Leadership handbook
Leadership	Foundations for Safety Leadership course description
Align & Integrate	Site safety audit
Leadership	Foundations for Safety Leadership self-assessment & action plan
Accountability	Safety recognition program guidelines
Accountability	Near miss-Good catch program with sample reporting templates
Accountability	Good catch-Near miss reporting program with sample templates
Improve Communication	New hire identification
Management Commitment	Management site safety inspection
Empower/Involve Employees	Report unsafe condition - Stand up moment

Testimonials

“For what a contractor would expect to pay for a comprehensive safety climate evaluation and mitigation plan, the ‘Safety Climate-Safety Management Information System’ is a valuable tool available for all. As a mid-size general contractor, we have been able to supplement our own systems and approaches with industry-tested, scientifically-backed resources and enhance our organization’s overall safety program.” *(Medium-sized General Contractor, Washington State)*

Testimonials

"I showed the graphs and stats to our project managers and supervisors to help decide which areas to work on and then downloaded many of the excellent safety management resources in the repository to target them. What's great about the resources is we didn't have to start from scratch or reinvent the wheel and can just tailor them for our company. I plan to use the SC-SMIS on an on-going basis to keep us on track." *(Small Specialty Subcontractor, Connecticut)*

Testimonials

“I think the SC-SMIS is a great resource, and I have found great information in the S-CAT to help formulate FY strategic and tactical objectives. I think that the Action Planning feature would be a great tool for companies that currently do not develop annual strategic goals and objectives.” *(Medium-size General Contractor, Ohio)* www.scsmis.org

What is the SC-SMIS?

How to use the SC-SMIS

Safety Leadership Training to Improve Fall Prevention in Residential Construction: FSL4Res

Washington University in St. Louis
School of Medicine

Healthy Work Center

Bradley Evanoff, Anna Kinghorn, Ann Marie Dale, Barry Steltzer[1], Linda Goldenhar[2]

[1]Carpenters Joint Apprenticeship Program, StL

[2] Senior Advisor, CPWR

The Problem

- Residential construction lags behind commercial construction in safety practices
- Foremen and other supervisors may lack the skills to effectively lead their teams to safer behaviors
- Fall prevention and other safety practices not fully implemented at many sites, particularly smaller contractors

Foundations for Safety Leadership (FSL)

- Training program created by CPWR in 2016
- 2.5 hr training, teaches 6 essential safety leadership skills
- Video scenarios with interactive discussion of effective and less effective leadership behaviors
- Approved as an OSHA 30 elective 2017 – widely disseminated (over 500,000 trained in OSHA 30 or free-standing training)

FSL **Leadership** Skills

Skill	Practice
Lead by Example	"Walk the talk." Make Safety a core value and make sure everyone owns safety.
Engage and Empower Team Members	Encourage and empower crew members to identify, report, and remove hazards – and to come up with solutions.
Actively Listen	Listen to hear and understand what crew members are telling you.
Practice 3-way Communication	Make sure crew members understand what is being said or asked.
Develop Team Members by Teaching, Coaching, & Feedback	Act as a teacher and coach and provide constructive feedback using the FIST principle: Facts, Impact, Solutions, and Timely.
Recognize Team Members for a Job Well Done	This can be done in private or public if the employee is comfortable with it.

FSL for Residential Construction (FSL4Res)

- Uptake lower in residential sector
- Residential construction is different than commercial
- Smaller contractors, fewer resources, higher injury and fatality rates (particularly falls)
- Residential workers harder to reach than commercial
- Few foremen have OSHA 30 training
- FSL could be highly effective in this high-risk sector

Project goals: Develop, Disseminate, and Evaluate a version of the FSL to address the unique needs of residential construction, including an emphasis on fall prevention.

- Used a formal adaptation framework (Stirman et al, 2019 Implementation Science)
- Needs assessment with 47 construction stakeholders
- Project Advisory Committee and Curriculum Development Committee developed changes in Content, Context, Organization of the training

Adaptations

- Keep all the good didactic material, integrate with existing FSL
- FSL would be even better if……
  - More real-world scenarios relevant to residential sector, emphasizing use of FSL leadership skills to reduce falls
  - Alter the delivery format to facilitate multiple shorter sessions, training at worksite, refresher training
  - Modify materials to facilitate jobsite training, expand pool of trainers

Scenarios retained from original FSL

Title	Situation
Cover Up!	Foreman asks a trainee to cover a large hole in the floor, without communicating any other directions.*
It's Too Hot	Foreman suspects that a worker may have heat exhaustion.
Fritz's Shortcut	Foreman ignores worker's warning that the rigging equipment is damaged, and pushes the crew to proceed with a dangerous lift.
Stormy Weather	Trying complete a task before a storm moves in, a foreman cuts safety corners to save time.*
Oh Solar Mio	Foreman pressured to stay on schedule and proceeds with a crane that is too small.

*= Scenario content focuses on fall hazards

New Scenarios in FSL4Res

Title	Situation
Derailing the Job	A trainee removes a guardrail to finish a taping job and forgets to replace it, creating a safety hazard for the crew.*
Reality Check	An experienced worker suspects trainees have not properly inspected their fall protection.*
Don’t Shortcut Safety	The foreman of a framing crew sends a trainee to install shutters without communicating safety expectations.*

*= Scenario content focuses on fall hazards

Reality Check

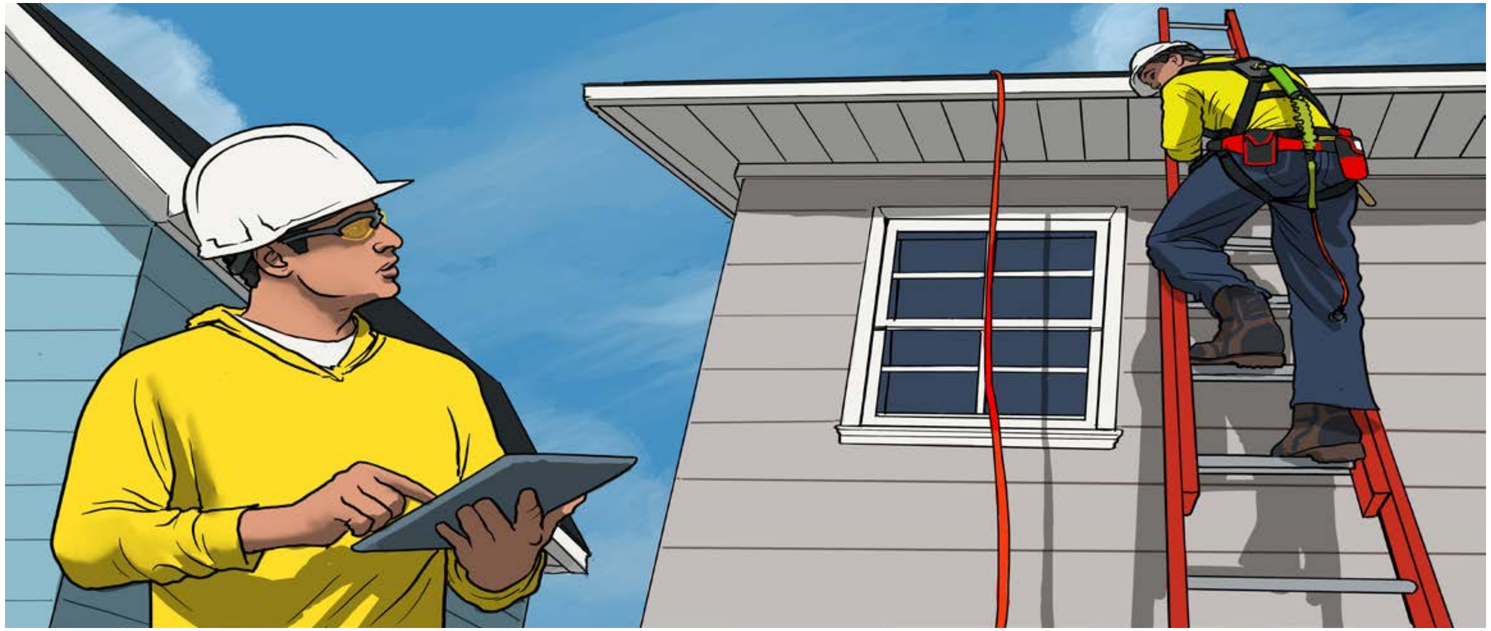
Situation – Key Points

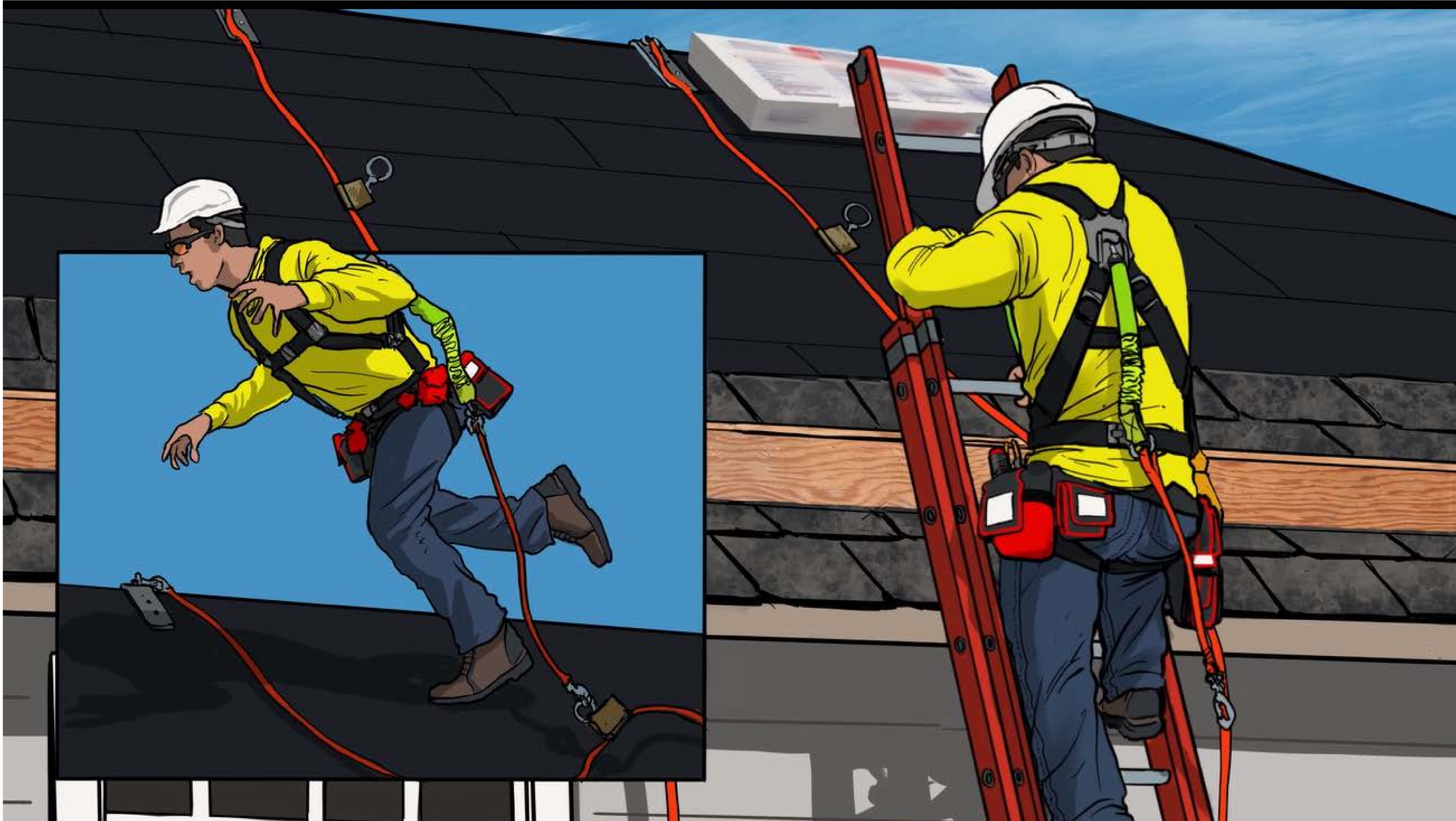
- As Eduardo, an experienced roofer, arrives at the worksite, he sees trainees Troy and Tara start to climb onto the roof to begin their work. Eduardo asks if they've secured the ladder and inspected all of the fall protection harnesses, anchor points, and lines they'll be using.

Reality Check

Situation – Key Points

- Troy snaps back, saying they'd just put the ladder up and the rest of the equipment was checked yesterday. Tara chimes in, saying she's sure it's all fine.





Schedule for Multi-session FSL4Res Training

Session 1 (30 min)
• Welcome, introductions, goals & learning objectives
• Characteristics of ineffective and effective leaders
• Importance and benefits of effective safety leadership
• Introduction of safety leadership skills and self-assessment
Session 2 (30 min)
• Safety leadership skill review
• *"Derailing the Job"* and discussion
Session 3 (30 min)
• Brief skill review
• *"Reality Check"* and discussion
• Discussion of recent experiences/opportunities for using skills

Session 4 (30 min)
• Brief skill review
• "*Cover Up*" and discussion
• Discussion of recent experiences/opportunities for using skills
Session 5 (30 min)
• Brief skill review
• "*Don't Shortcut Safety*" and discussion
• Setting up for success
Session 6 (15 min)
• Brief skill review
• Check in
• Wrap-up

Develop, Disseminate, Evaluate

- **Develop** the FSL4Res
- **Disseminate**: trade publications, meetings
  - Working with regional and national partners: NAHB, NRCA, ASSP, NSC, unions
  - Connect to other events like safety stand downs
- **Evaluate**: downloads, email surveys and short interviews
  - Measure **Reach** (did you hear about this?)
  - **Uptake** (did you use it?)
  - Assess determinants of reach and uptake

Email for Additional Info: bevanoff@wustl.edu, akinghorn@wustl.edu

Washington University in St. Louis

SCHOOL OF MEDICINE

Healthy Work Center

https://oshr.wustl.edu
healthyworkcenter@wustl.edu

Mentoring SMART Women: Project Update

Marissa Baker, PhD & Lily Monsey
bakermg@uw.edu

CPWR r2p Seminar and Partnership Workshop
June 3, 2022

ENVIRONMENTAL & OCCUPATIONAL HEALTH SCIENCES
UNIVERSITY of WASHINGTON | SCHOOL OF PUBLIC HEALTH

Today's Agenda

> Review of mentor training, feedback, evaluation
> Status update and upcoming study activities
> Updates on potential future research

Multi-modal mentor training:

videos, audio examples, step by step text

Home

Relationship Building

Goal Practices

Active Listening

- Introduction
- What Is Active Listening?
- Active Listening In Action
- Active Listening, Step By Step
- First: Connect
- Second: Clarify
- Third: Validate
- Blocks To Active Listening
- Drilling Down: Communicating Effectively
- Review

First: Connect

Connecting means giving your full attention to the conversation. This can be hard, but it might be the most important part of active listening.

Most times as listeners, our attention is somewhere else. But when listening actively, we give *all of our attention* to the speaker. This tells the speaker that what they're saying matters, and we're interested in what they have to share.

So, how do you do this?

Check Your Surroundings

It helps to first choose the right setting. **Try finding a place that is as distraction-free as possible as possible**.

Remember how Val called Kendra from her car, so it could be quiet and private? This gave Val a better chance to connect with Kendra than if she tried to call from the worksite, where there was a lot of background noise.

Show You're Interested

You can also use **body language** and **voice** to **show that you're interested**.

Drilling Down: Self-Advocacy In Action

Kendra is anxious to learn that she will be paired with Kenny, a journeyman in her crew. She's heard that Kenny uses demeaning language around the women he's working with, and doesn't feel safe working with him. She gives Val a ring to discuss her concerns.

Let's listen in:

Media Activity: Audio Call

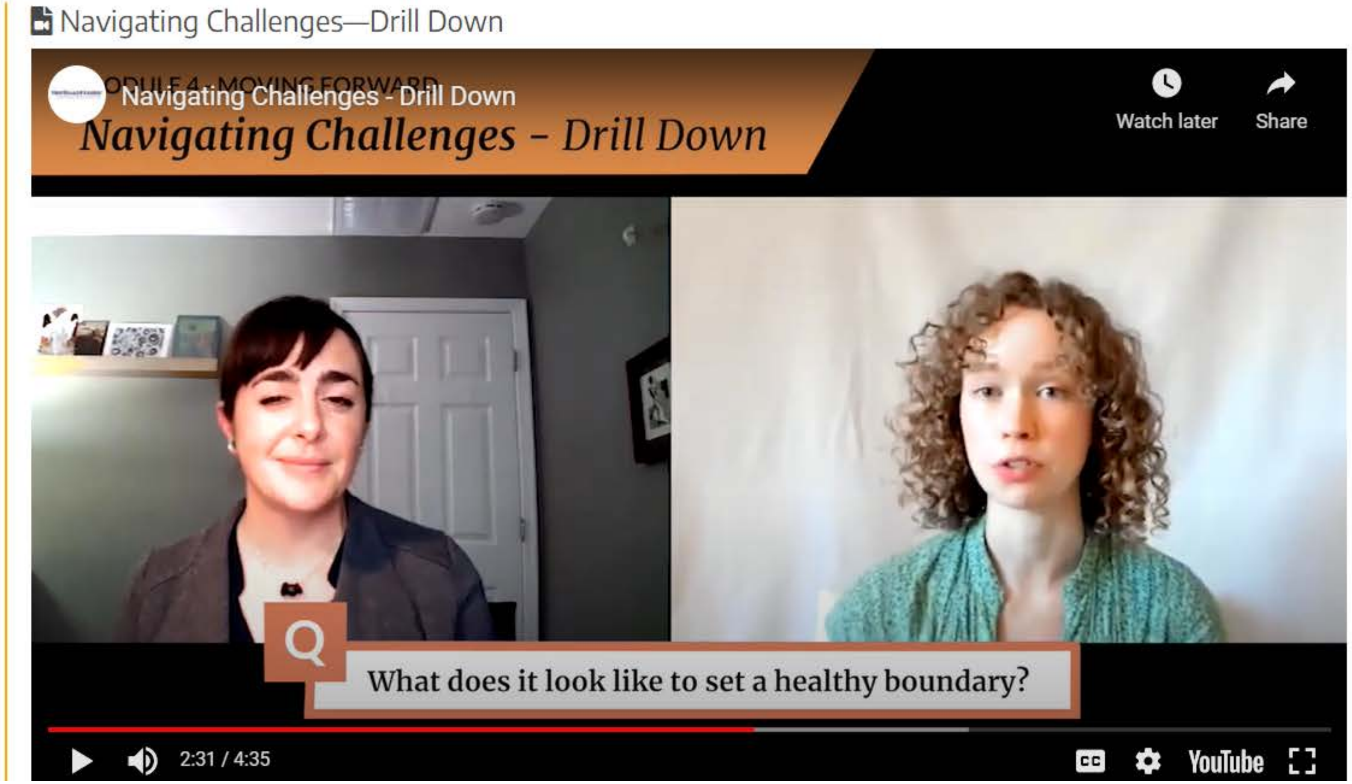
Use the controls below to play back an audio recording of a call between Val and Kendra. You can read a transcript of the call using the "Audio Transcript" button.

0:00 / 2:22

Audio Transcript

Multi-modal mentor training:

videos, audio examples, step by step text



Mentor Training Feedback

[It would be helpful to learn more about] how to overcome the “I don’t need a mentor right now” issue.

-Mentor after Zoom 2

I really enjoyed the real-life example between Lisa and Rachel, gave me a lot of insight into how a real-life situation could evolve and how to use the tools I have available…

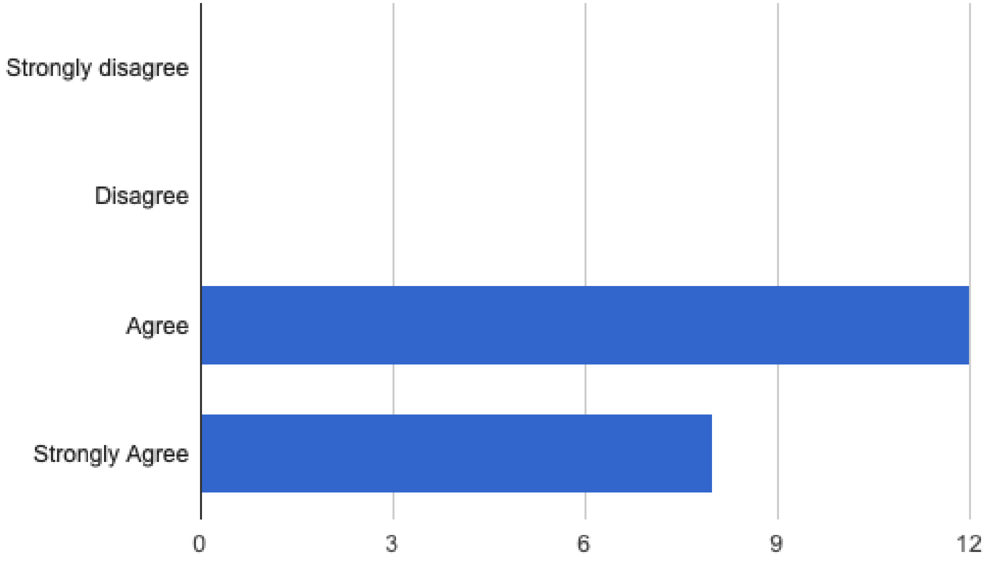
-Mentor after Zoom 1

This was my favorite session. Lisa’s heartfelt story hit home and made me want to share more.

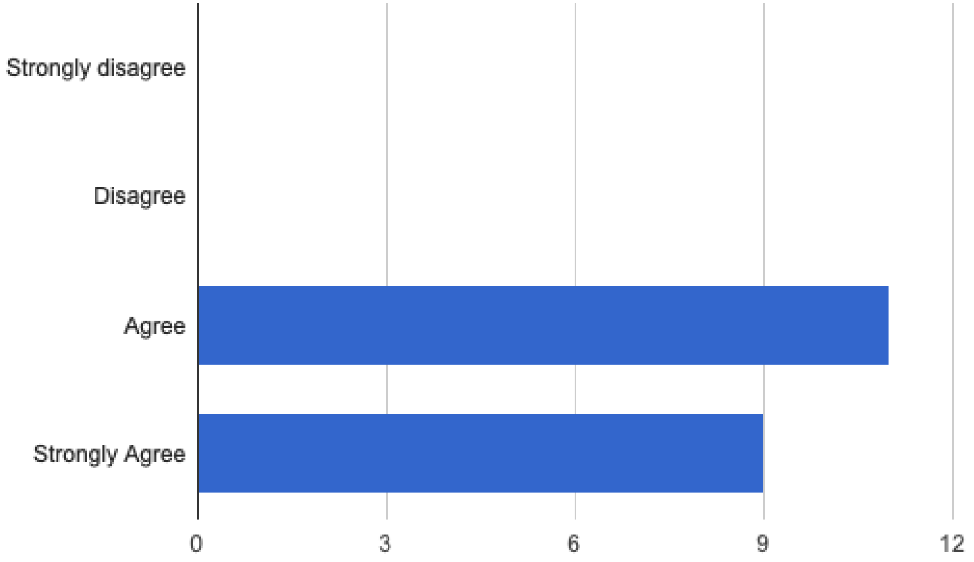
-Mentor after Zoom 3

Mentor Training Evaluation

After receiving this training, my overall confidence as a mentor has increased. (n=20)



This training series was effective in advancing my understanding of mentoring relationships. (n=20)



Highlights from Spring Quarterly Check-Ins

April 2022

- One mentor reported working with her mentee helped her see generational differences in how to approach harassment on the job, leading her to question her own strategies
- Text is the most popular mode of communication for mentor/mentee pairs to stay in touch
- Lack of engagement from mentees is the most frequent challenge mentors describe

Where are we now?

- Finishing up first year of mentor/mentee relationships
- Continuing our quarterly check-ins with mentors
- Analyzing baseline survey data (mentors, mentees, and apprentices without a mentor)
  - Survey will be administered every 6 months to all participants for longitudinal analysis

Looking Ahead:

- Enrolling for mentorship round 2
- Qualitative evaluation project
  - Interviews with mentors, mentees, project coordinators
  - Learn about mentorship experiences, areas for additional support, and how local culture/programs may impact program success
- Additional recorded videos of skills in action—born from mentor feedback!

Directions for our future research

- How can we improve the training based on what we have learned from mentors?
- Dissemination and implementation of our mentorship training program
  - Throughout SMART
  - Across other trades
  - All genders?
  - How do existing programs/female representation impact implementation and outcomes?

Thank you!

Marissa: bakermg@uw.edu

Lily: lilymm04@uw.edu

FRIDAY, JUNE 3RD

DEVELOPING AND TESTING SAFETY AND HEALTH INTERVENTIONS TO REDUCE HAZARD EXPOSURE

Prevention through Augmented Pre-Task Planning

Babak Memarian, Ph.D., CSP, CHST
Director of Exposure Control Technologies Research

Chris Le, MPH
Solutions Database Program Manager

Sara Brooks, MPH
Industrial Hygienist

CPWR- The Center for Construction Research and Training

June 3, 2022

Problem Statement

- Work-related incidents can be prevented if hazards are proactively recognized and addressed.
- Pre-task planning and JHA are intended to serve this goal.
- Challenges and shortcomings:
  - Mainly from a compliance perspective.
  - Lack of opportunity for workers' input.
  - Lack of task-specific content based on actual site conditions.
  - Inconsistency in design and implementation methods.
  - Lack of workers' engagement and "buy-in."

Project AIMS

“Learn and incorporate what <u>workers</u> say about the <u>task</u>.”

- **Aim 1:** Establish partnership with electrical contractors, unions, and associations
- **Aim 2:** Develop a repository for high-risk electrical tasks
- **Aim 3:** Develop enhanced JHA and Pre-task Planning add-ons
- **Aim 4:** Evaluate the impact and effectiveness
- **Aim 5:** Dissemination

Aim 1: Partnership & Industry Advisory Group

Unions & Associations

- NECA (DC & Seattle Chapters)
- IBEW

General Contractors

- Clark Construction
- Penta Group

Electrical Contractors

- Rosendin Electric
- MC Dean Building Intelligence
- FreeState Electric
- Contemporary Electric
- Valley Electric
- Aarow Electric

Conducted 16 meetings to date to:

- Provide guidance on project direction
- Provide access to jobsites
- Provide feedback on research findings and outputs

Aim 2: High-risk Electrical Tasks Repository

Step 2:

- Identified 14 high-risk electrical tasks/operations based on input from 15 electrical contractors.
- Identified contributing work factors.
- A manuscript on these findings was accepted for publication by the Professional Safety Journal (ASSP).

High-risk Electrical Tasks and Contributing Work Factors

Babak Memarian, Sara B. Brooks, Jean Christophe Le, and Jerry E. Rivera

Professional Safety Journal (Accepted – in print August 2022)

PROFESSIONAL SAFETY
JOURNAL OF THE AMERICAN SOCIETY OF SAFETY PROFESSIONALS
PSJ

Aim 3: Enhanced JHA & Pre-task Planning

Step 1:

JHA/JSA gap analysis; shortcomings, challenges, and effective practices

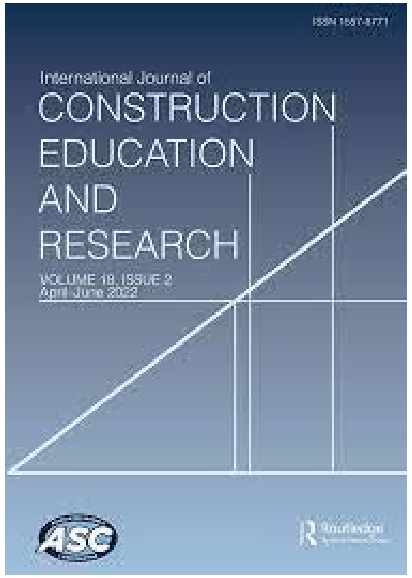
- Reviewed 30 sample JHA documents
- Interviewed 23 individuals representing 17 companies
- A peer-reviewed article published based on findings of this step

Obstacles and Solutions to Implementing Job Hazard Analysis in Construction: A Case Study

Babak Memarian, Sara B. Brooks, and Jean Christophe Le.

International Journal of Construction Education and Research (January 2022)

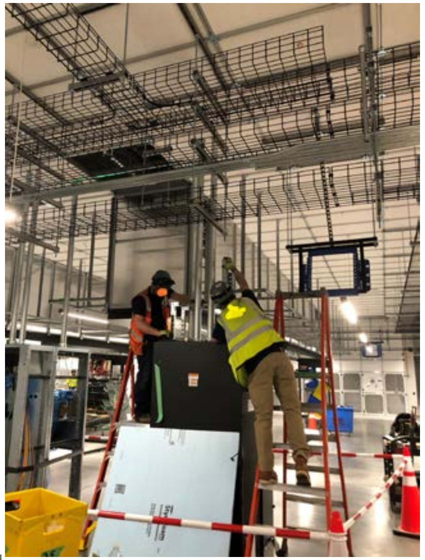
https://doi.org/10.1080/15578771.2022.2027053



Aim 3: Enhanced JHA & Pre-task Planning

Step 2:

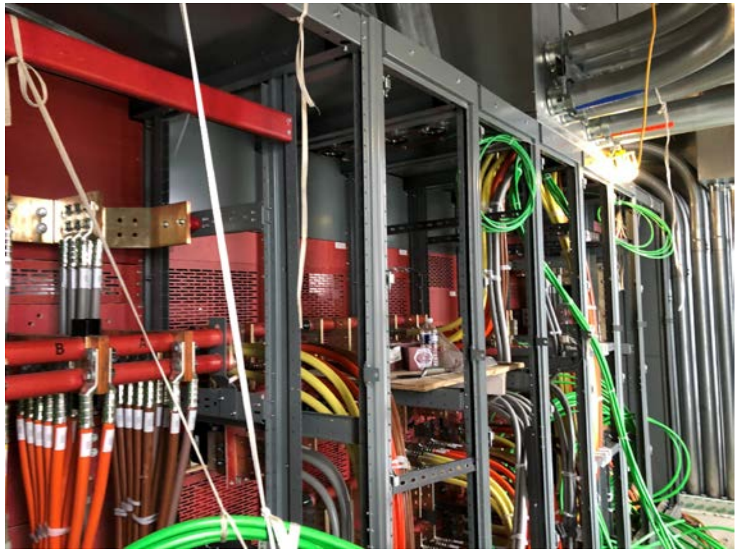
- Interviews to assess workers' challenges and explore contributing work factors:
  - Physical
  - Mental
  - Time
  - Frustration
  - Other
- Conducted 6 site visits to date.
- Conducted 80 in-person interviews with electrical workers.

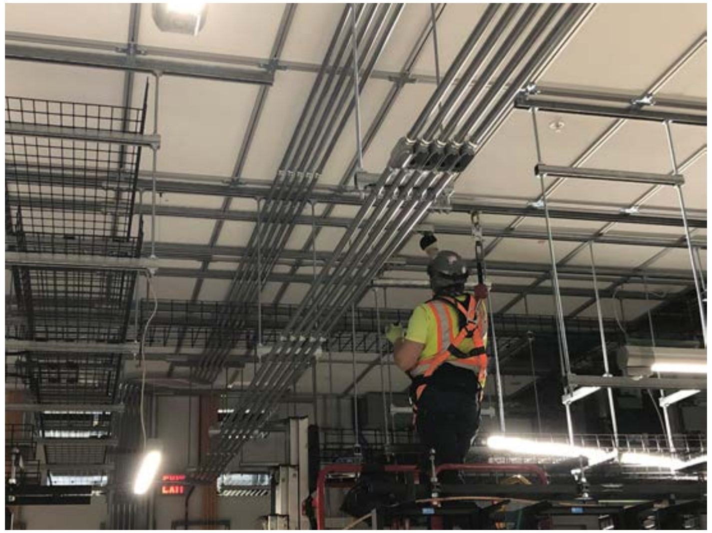


Electrical Tasks Studied to Date

13 electrical tasks studied to date:

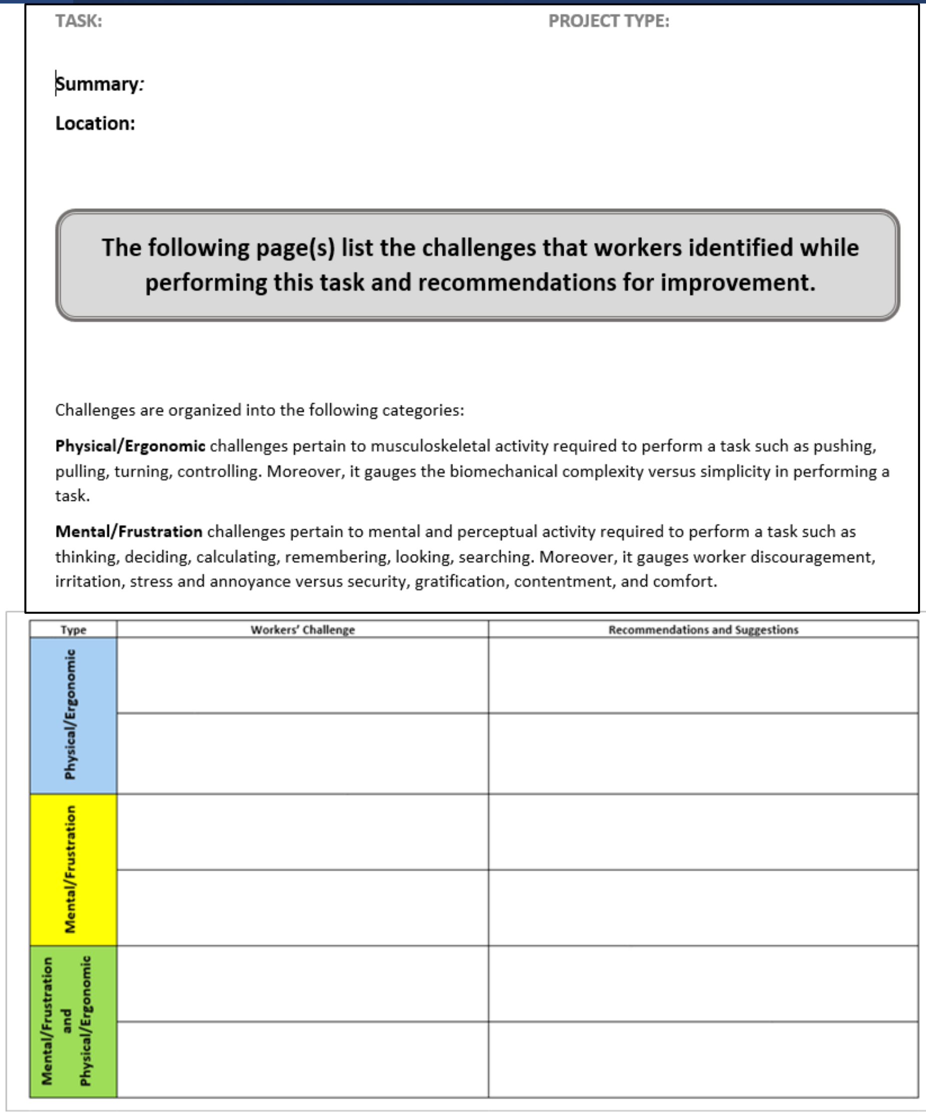
- Overhead Conduit Installation
- Installing Lighting Tracks & Supports
- Site Preparation and Layout
- Pulling Wire
- Terminating Junction Boxes
- Electrical Demolition
- Cable Tray Installation
- Grounding
- Busway Installation
- Terminating Cables/Wires
- Material Handling/Logistics
- Wiring AC Units
- QA/QC





Task Analysis Template

- Designed the Task Analysis Template
- Revised the template based on feedback from IAG members and R2P Director
- Organized based on Task and Project Type
- Contains task-specific challenges raised by workers
- Visualizes the situation using images
- Recommends solutions



TASK: **PROJECT TYPE:**

Summary:

Location:

The following page(s) list the challenges that workers identified while performing this task and recommendations for improvement.

Challenges are organized into the following categories:

Physical/Ergonomic challenges pertain to musculoskeletal activity required to perform a task such as pushing, pulling, turning, controlling. Moreover, it gauges the biomechanical complexity versus simplicity in performing a task.

Mental/Frustration challenges pertain to mental and perceptual activity required to perform a task such as thinking, deciding, calculating, remembering, looking, searching. Moreover, it gauges worker discouragement, irritation, stress and annoyance versus security, gratification, contentment, and comfort.

Type	Workers' Challenge	Recommendations and Suggestions
Physical/Ergonomic		
Mental/Frustration		
Mental/Frustration and Physical/Ergonomic		

Sample Task Analysis Document

TASK: Overhead Conduit Installation **PROJECT TYPE:** Commercial Building Renovation

TASK: Overhead Conduit Installation **PROJECT TYPE:** Commercial Building Renovation

Summary: Overhead conduit and component installation took place in a partially closed public museum undergoing renovation and expansion in winter. Work was performed in the presence of fragile, unmovable historic artifacts.

Location: Urban center in US Mid-Atlantic region.

The following page(s) list the challenges that workers identified while performing this task and recommendations for improvement.

Challenges are organized into the following categories:

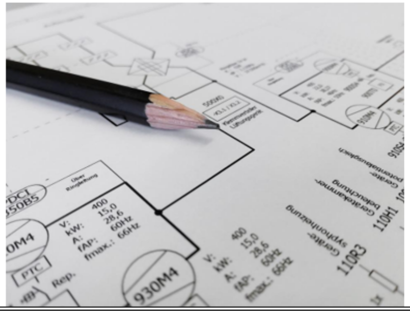
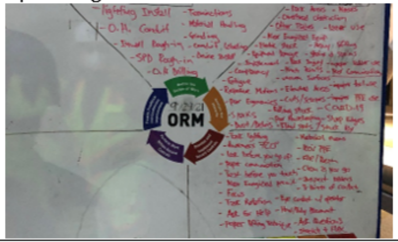
Physical/Ergonomic challenges pertain to musculoskeletal activity required to perform a task such as pushing, pulling, turning, controlling. Moreover, it gauges the biomechanical complexity versus simplicity in performing a task.

Mental/Frustration challenges pertain to mental and perceptual activity required to perform a task such as thinking, deciding, calculating, remembering, looking, searching. Moreover, it gauges worker discouragement, irritation, stress and annoyance versus security, gratification, contentment, and comfort.

Type	Workers' Challenge	Recommendations and Suggestions
Physical/Ergonomic	**Tight space:** Assembling conduit in tight spaces requires awkward postures. 	***Substitution:*** • Use manageable prefabricated components if feasible ***Administrative Control:*** • Conduct daily pre-task planning with crew at beginning of work shift
	Manual wire pulling: Cannot use tuggers for wire size 8 or smaller, or for larger wire when it is shorter than 300 ft. 	***Engineering Control:*** • Use wire-dispensing cart ***Administrative Control:*** • Conduct daily pre-task planning with crew at beginning of work shift • Pull with a partner • Rotate workers if feasible • Plan for breaks ***Personal Protective Equipment:*** • Use proper gloves for pulling

Sample Task Analysis Document

TASK: Overhead Conduit Installation **PROJECT TYPE:** Commercial Building Renovation

Type	Workers' Challenge	Recommendations and Suggestions
Mental/Frustration	**Information retention:** Remembering circuits installed and conduits run months earlier. 	***Administrative Control:*** • Provide Toolbox Talks on [Workplace Stress]
	Poor communication and coordination: • Miscommunication with GC, coworkers, and other trades onsite. • Lack of coordination and proper work sequencing. 	***Administrative Control:*** • [Use Safety Climate-Safety Management Information System] • Conduct daily pre-task planning with crew at beginning of work shift • Involve all project stakeholders (subs, GC, engineers, architects) during pre-planning meetings • Use a unified communication platform to coordinate information among all stakeholders

Type	Workers' Challenge	Recommendations and Suggestions
Mental/Frustration and Physical/Ergonomic	**Working at heights:** Tying off and pulling wire on ladders at heights and in tight spaces. 	***Engineering Control:*** • [Use scissor lift if feasible] • Use a tool harness or build a temporary table/shelf or beam clamp to hold material if feasible • Install improved lighting ***Administrative Control:*** • Conduct daily pre-task planning with crew at beginning of work shift • Use signage to inform others worker of current location • Use the buddy system • [Provide ladder, fall protection, and ergonomics training, including visual aids and recent incidents] • Plan ahead to avoid multiple trips up/down the ladder
	Obstacle obstruction: Multiple measurements required to bend materials to accommodate existing racks and ducts. 	***Administrative Control:*** • [Use Building Information Modeling to pre-plan] • Conduct daily pre-task planning with crew at beginning of work shift • Involve all project stakeholders (subs, GC, engineers, architects) during pre-planning meetings Use a unified communication platform to coordinate information among all stakeholders

Benefits of Task Analysis Documents

- Applicable for JHA, Pre-Task Planning, and Training
- Easy to download and use in PDF and MS Word format
- Customizable for specific project needs
- Work in progress; improved as more data collected

Positive Events

- Rosendin Electric learned about the project through CPWR Highlights
  - Provided access to jobsites and other resources
  - Piloting the ORM approach to enhance Pre-task Planning

- An opportunity to collaborate with the WVU OSHA OTIEC
  - To collaborate with Oil & Gas JHA training team

- Requests for publications and research findings
  - CPWR highlights and articles key findings

- Enhanced awareness about JHA/PtP and its benefits
  - A representative of a small electrical contractor reached out at the 2022 NECA Conference and asked:

"How can we start the JHA process? We haven't done JHA at all, but now we see the need."

Project at a Glance

COVID Impacts

- Field studies and data collection on hold for a long while
- Slower response from contractors and practitioners

Progress Summary

- Partnership with electrical contractors of various sizes, NECA, IBEW, and other organizations
- 16 Industry Advisory Group meetings
- 80 onsite interviews with electrical workers
- 23 interviews with management
- 7 presentations
- 2 peer-reviewed journal articles
- Studied 13 electrical tasks and drafted Task Analysis Documents

Next Steps

- Explore opportunities with other electrical companies in different regions
- Continue conducting field interviews
- Continue developing Task Analysis Documents
- Work on a modified JHA/PtP guideline and an evaluation tool
- Assessment of project findings
- Dissemination and outreach activities

Thanks!

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Prevention through Design (PtD)

Industry Diffusion

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Virginia Tech
Healthy Work Design Laboratory

PtD Industry Diffusion

Project Aims

To design, implement, and evaluate intervention strategies to improve adoption of hazard controls among small firms, large firms, and workers in the following trades:

- **Concrete**
- **Masonry**
- **Asphalt Roofing**

PtD Industry Diffusion

Project Accomplishments

Large Firm Study:

Status: COMPLETE

2 manuscripts have been submitted:

“Construction health hazard control innovations: a web-based intervention to change perceptions" International Journal of Construction Education and Research (submitted May 2022)

“Silica exposure control methods in concrete and masonry trades: before and after OSHA Crystalline Silica Rule 1926.1153” Journal of Construction Engineering and Management (submitted May 2022)

PtD Industry Diffusion

Project Accomplishments

Small Firm and Worker Studies:

Status: Data Collection to Begin Summer 2022

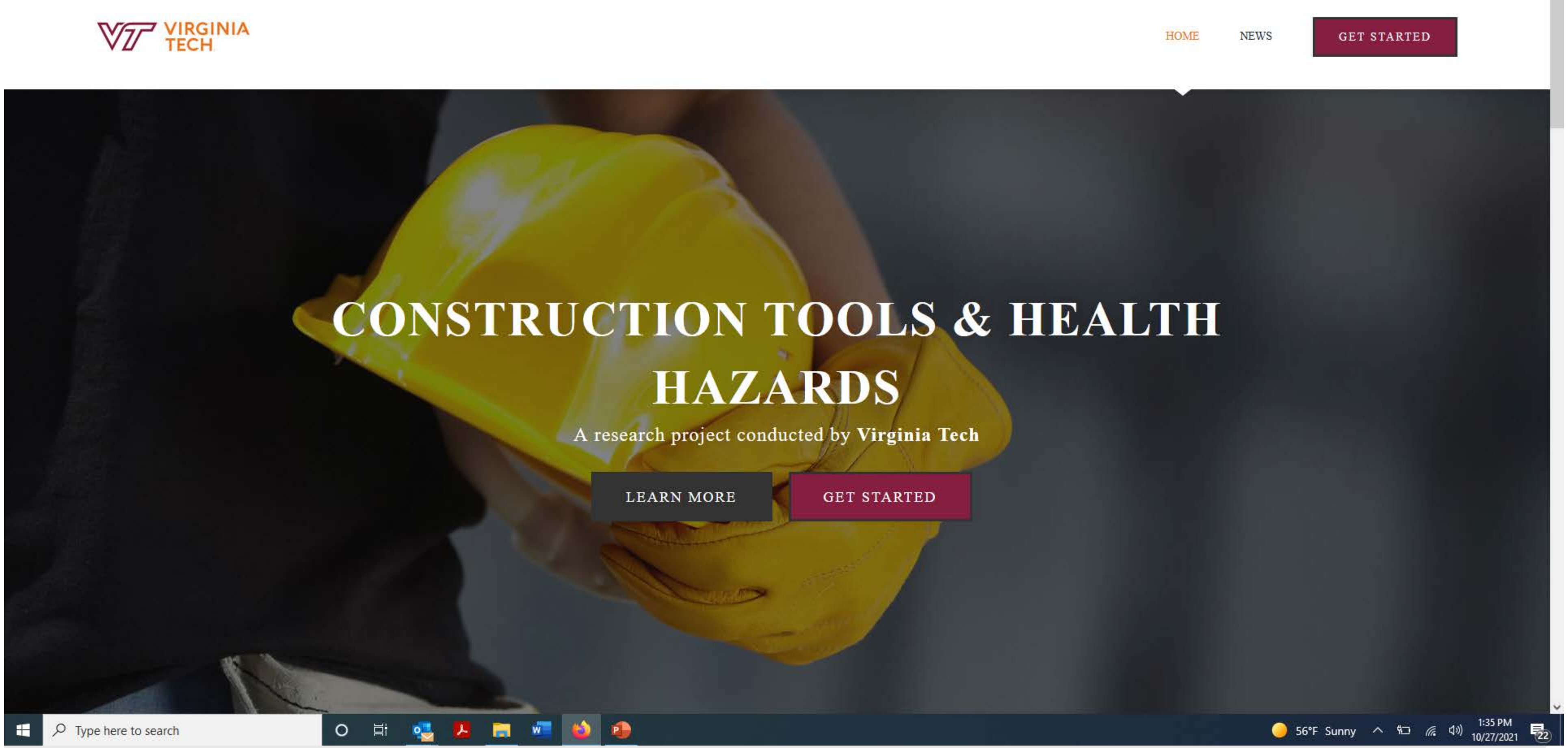
Intervention materials have been prepared

Delays due to pandemic

Goal	Year 1	Year 2	Year 3	Year 4	Year 5
Form Research Teams					
Intervention Design					
Instrument Development					
Large Firm Intervention Study					
Small Firm Study					
Worker Study					
Data Analysis					
Dissemination of Outputs					
Research to Practice					

PtD Industry Diffusion

Large Firm Study:



Abstract

A theory-based intervention strategy to improve perceptions of construction health hazard control innovations was developed and tested in the following trades: masonry (n=90), concrete (n=52), and asphalt roofing (n=105). A web-based intervention was designed to target constructs of the Prevention through Design Adoption Readiness Model (PtD ARM) (Weidman et al, 2015) and included information about the health impacts of construction health hazards; side-by-side videos of both conventional and innovative tools; information about control effectiveness, productivity, and task performance. The interventions were evaluated using a pre-test/post-test, within-subjects experimental design, with control groups. Post-test data were collected immediately, three months, and six months following the intervention. A validated survey instrument was used to collect data regarding dependent variables: health knowledge (HK), perceived ease of use (PEOU), perceived impacts on productivity (PU), perceived worker susceptibility to health effects (SUS), perceived health-effect severity (SEV), adoption readiness (AR), and actual use (AU). Open-ended questions generated qualitative data regarding benefits and barriers to adoption of the innovations and were analysed using Content Analysis. Gain-score ANOVA found significant improvements in PEOU and PU in all intervention groups. In addition, significant improvements HK, risk, and AR were found in the asphalt roofing intervention group.

Methods

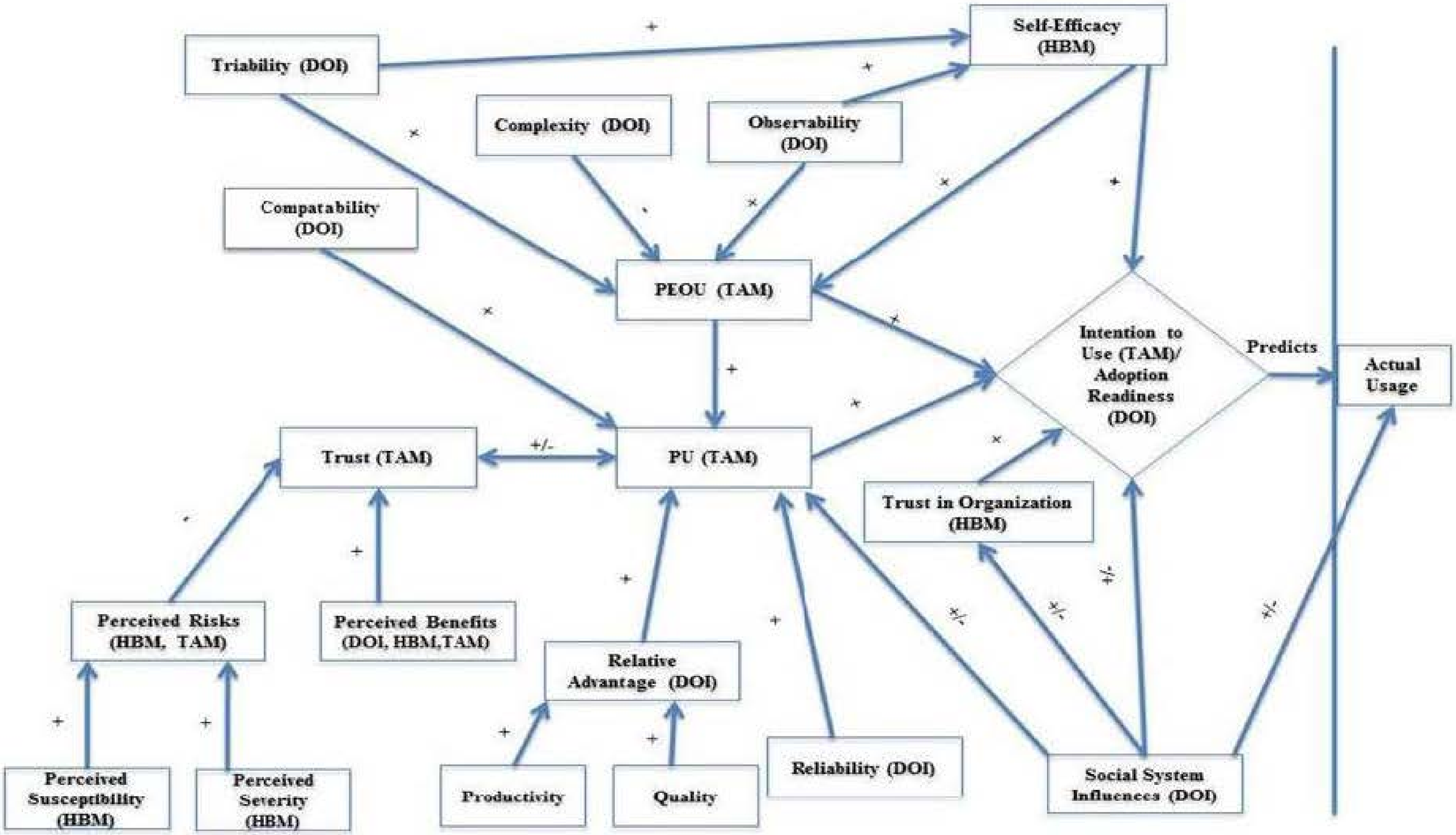


Figure 1: Prevention through Design Adoption Readiness Model (PtDAR)

Weidman et al, 2015

Methods

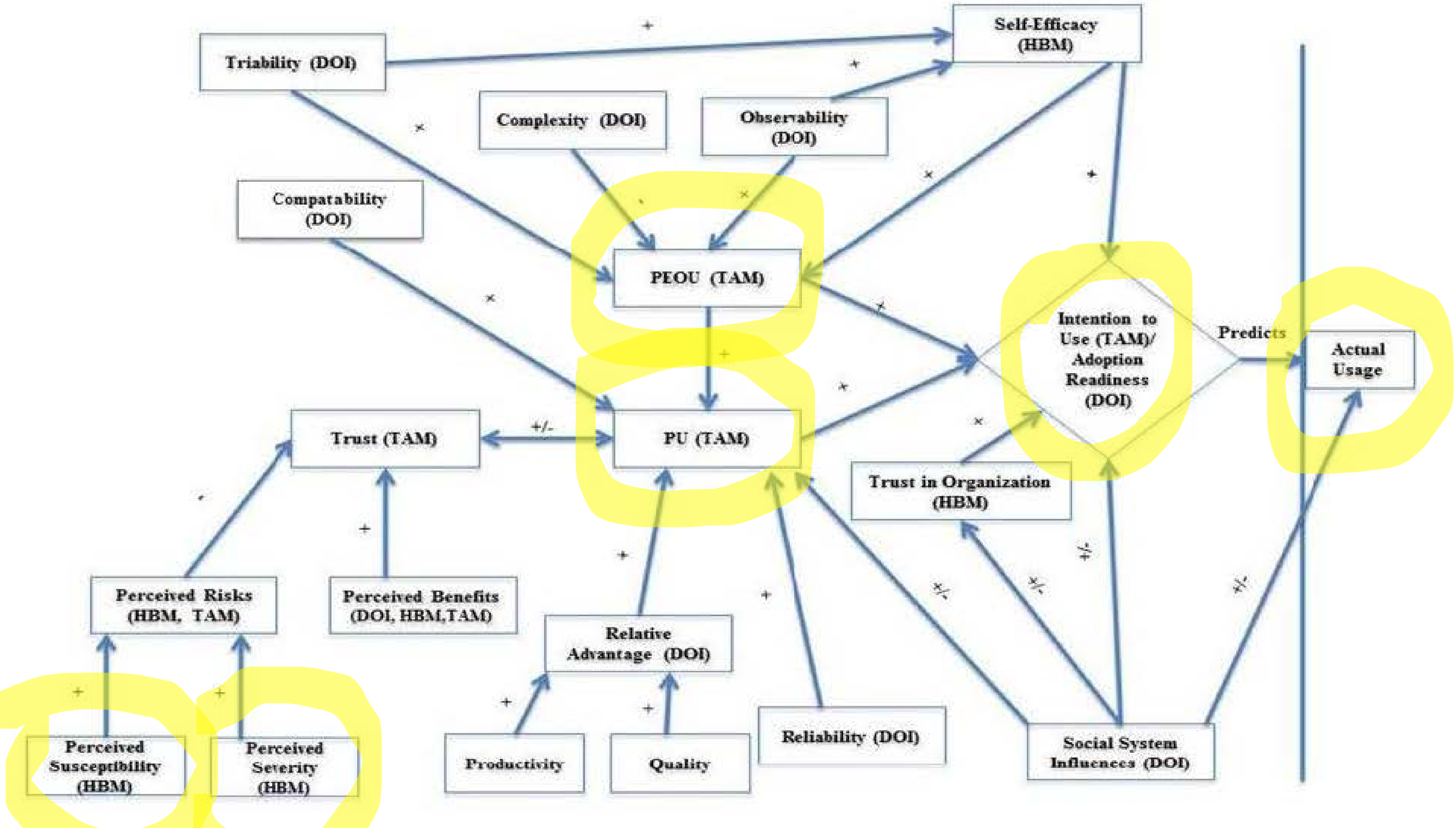


Figure 1: Prevention through Design Adoption Readiness Model (PtDAR)

Weidman et al, 2015

Methods

Intervention Design

An intervention (web-based educational platform) was created for each of the three trades of interest: masonry, concrete, and asphalt roofing. Each intervention adhered to the following outline: overview of health hazards, overview of PtD innovations to control health hazards (Table I), and specific materials to target the PtD ARM constructs of interest. These targeted materials are described below.

Methods

Intervention Design

To target the model constructs health knowledge (HK), perceived worker susceptibility to health effects (SUS), perceived health-effect severity (SEV), and risk (RK), the intervention provided participants with information aimed at improving purchasing decision-maker knowledge of the health risks and health impacts. This content covered the health effect specific to masonry, concrete, and asphalt roofing trades. Also covered was the evidence of prevalence of illness among workers of these trades.

Methods

Intervention Design

To target the constructs PEOU and PU:

- Side-by-side video of use
- Side-by-side video of clean-up
- Technology champion testimonials
- Productivity and return-on-investment data

Methods

Participants.

The intervention aimed at improving PtD ARM constructs within the population of purchasing decision-makers in of large construction firms. Large firms were defined as those having more than 500 employees. Purchasing decision-makers play a sizeable role in the adoption of new products and methods in large companies and are responsible for the decisions made and innovative risks taken (Koebel 2008).

Methods

Data Analysis

Each scaled item was scored as a 7-point Likert Scale with the following scale anchors: 1= strongly disagree, 2=disagree, 3=somewhat disagree, 4=neither disagree or agree, 5=somewhat agree, 6=agree, 7=strongly agree. For the intervention groups (n=25), data were collected at initial time of contact (pre-test), immediately following the intervention (post-test 1), three months following the intervention (post-test 2), and six months following the intervention (post-test 3). For the control group (n=25), data were collected at the initial time of contact (pre-test), one day following (post-test 1), three months following (post-test 2) and six months following (post-test 3) initial contact.

The statistic of interest was the ‘gain score’ which is defined as:

$$\text{gain score} = (\text{post-test score}) - (\text{pre-test score})$$

Results

Table II: Disposition of Participant Firms Contacted

	CSDA	MCAA	NRCA
Initial Dataset	541	700	4000
Out of Business	168	226	231
Unresponsive or Too Small	201	263	516
Not Performing Work of Interest	0	0	3048
Contacted and Provided Study Information	172	211	205
Data Collected (initial and all post-tests)	52	90	105
Response Rate (% Collected from Contacted)	30%	42%	51%

CSDA = Concrete Sawing and Drilling Association
MCAA = Mason Contractors Association of America
NRCA = National Roofing Contractors Association

Table IV: Asphalt roofing perception changes post intervention (Gain-score ANOVA)

Construct	df	Mean	SE	p-value	Significance
Health Knowledge Post-test 1					
Control	52	0.09	0.38	0.01	***
Intervention	51	2.75	0.37		
Health Knowledge Post-test 2					
Control	52	0.08	0.48	0.01	***
Intervention	51	2.05	0.54		
Health Knowledge Post-test 3					
Control	52	0.09	0.38	0.01	***
Intervention	51	2.15	0.41		
Perceived Risk to Health Post-test 1					
Control	52	0.01	0.54	0.05	**
Intervention	51	2.01	0.53		
Perceived Risk to Health Post-test 2					
Control	52	0.03	0.13	0.04	**
Intervention	51	1.87	0.40		
Perceived Risk to Health Post-test 3					
Control	52	0.03	0.21	0.05	**
Intervention	51	1.94	0.41		
Perceived Usefulness Post-test 1					
Control	52	1.22	1.28	0.09	*
Intervention	51	2.24	1.25		
Perceived Usefulness Post-test 2					
Control	52	1.21	0.66	0.10	*
Intervention	51	2.87	0.88		
Perceived Usefulness Post-test 3					
Control	52	1.18	0.57	0.08	*
Intervention	51	2.25	0.89		
Perceived Ease of Use Post-test 1					
Control	52	0.50	1.01	0.06	*
Intervention	51	1.53	0.99		
Perceived Ease of Use Post-test 2					
Control	52	0.43	1.45	0.09	*
Intervention	51	1.01	1.64		
Perceived Ease of Use Post-test 3					
Control	52	0.08	0.95	0.10	*
Intervention	51	0.80	0.73		
Adoption Readiness Post-test 1					
Control	52	0.01	0.41	0.01	***
Intervention	51	1.59	0.40		
Adoption Readiness Post-test 2					
Control	52	0.05	0.53	0.08	**
Intervention	51	1.03	0.70		
Adoption Readiness Post-test 3					
Control	52	0.09	0.70	0.09	**
Intervention	51	0.72	0.79		

*significant at 0.10; ** significant at 0.05; *** significant at 0.01

Table V: Concrete trade perception changes post intervention (Gain-score ANOVA)

Construct		df	Mean	SE	p-value	Significance
Health Knowledge Post-test 1						
	Control	25	0.09	0.38	0.70	
	Intervention	25	0.11	0.37		
Health Knowledge Post-test 2						
	Control	25	0.08	0.23	0.65	
	Intervention	25	0.13	0.21		
Health Knowledge Post-test 3						
	Control	25	0.09	0.28	0.80	
	Intervention	25	0.10	0.15		
Perceived Risk to Health Post-test 1						
	Control	25	0.03	0.24	0.70	
	Intervention	25	0.09	0.23		
Perceived Risk to Health Post-test 2						
	Control	25	0.03	0.13	0.71	
	Intervention	25	0.12	0.20		
Perceived Risk to Health Post-test 3						
	Control	25	0.03	0.21	0.67	
	Intervention	25	0.08	0.41		
Perceived Usefulness Post-test 1						
	Control	25	0.22	0.28	0.09	*
	Intervention	25	1.24	0.45		
Perceived Usefulness Post-test 2						
	Control	25	0.71	0.66	0.10	*
	Intervention	25	1.87	0.88		
Perceived Usefulness Post-test 3						
	Control	25	1.03	0.57	0.06	*
	Intervention	25	2.25	0.89		
Perceived Ease of Use Post-test 1						
	Control	25	0.05	1.01	0.03	**
	Intervention	25	1.53	0.99		
Perceived Ease of Use Post-test 2						
	Control	25	0.23	0.42	0.03	**
	Intervention	25	1.81	0.84		
Perceived Ease of Use Post-test 3						
	Control	25	0.08	0.75	0.10	*
	Intervention	25	0.85	0.73		
Adoption Readiness Post-test 1						
	Control	25	0.01	0.41	0.75	
	Intervention	25	0.39	0.40		
Adoption Readiness Post-test 2						
	Control	25	0.01	0.13	0.81	
	Intervention	25	0.23	0.20		
Adoption Readiness Post-test 3						
	Control	25	0.09	0.15	0.83	
	Intervention	25	0.12	0.09		

*significant at 0.10; ** significant at 0.05; *** significant at 0.01

Table VI: Masonry trade perception changes post intervention (Gain-score ANOVA)

Construct		df	Mean	SE	p-value	Significance
Health Knowledge Post-test 1						
	Control	44	0.01	0.33	0.51	
	Intervention	44	0.05	0.34		
Health Knowledge Post-test 2						
	Control	44	0.08	0.48	0.44	
	Intervention	44	0.11	0.54		
Health Knowledge Post-test 3						
	Control	44	0.09	0.36	0.57	
	Intervention	44	0.15	0.39		
Perceived Risk to Health Post-test 1						
	Control	44	0.11	0.54	0.48	
	Intervention	44	0.23	0.53		
Perceived Risk to Health Post-test 2						
	Control	44	0.13	0.13	0.40	
	Intervention	44	0.09	0.22		
Perceived Risk to Health Post-test 3						
	Control	44	0.03	0.21	0.55	
	Intervention	44	0.07	0.41		
Perceived Usefulness Post-test 1						
	Control	44	0.22	0.28	0.10	*
	Intervention	44	0.84	0.25		
Perceived Usefulness Post-test 2						
	Control	44	0.21	0.26	0.10	*
	Intervention	44	0.87	0.18		
Perceived Usefulness Post-test 3						
	Control	44	0.18	0.27	0.10	*
	Intervention	44	0.75	0.19		
Perceived Ease of Use Post-test 1						
	Control	44	0.09	0.11	0.05	**
	Intervention	44	1.53	0.94		
Perceived Ease of Use Post-test 2						
	Control	44	0.13	0.45	0.07	*
	Intervention	44	1.01	0.64		
Perceived Ease of Use Post-test 3						
	Control	44	0.08	0.45	0.09	*
	Intervention	44	0.80	0.73		
Adoption Readiness Post-test 1						
	Control	44	0.01	0.31	0.66	
	Intervention	44	0.09	0.20		
Adoption Readiness Post-test 2						
	Control	44	0.05	0.53	0.91	
	Intervention	44	0.03	0.30		
Adoption Readiness Post-test 3						
	Control	44	0.09	0.50	0.87	
	Intervention	44	0.11	0.49		

*significant at 0.10; ** significant at 0.05; *** significant at 0.01

Results

Table VII: Reported Rates of Actual Use

Trade Sector	PtD Innovation	Usage Rate (% of Respondents)
Concrete/Masonry	Ventilated tools	43
Concrete/Masonry	Wet-method systems	89
Asphalt Roofing	Hot luggers, mechanical spreaders, felt-laying machines	31
Asphalt Roofing	Insulated kettles, insulated hot luggers	25
Asphalt Roofing	Local-exhaust ventilation	15

Results

Open-ended Survey Items

Inter-rater reliability was within acceptable limits for the Content Analysis methodology for the open-ended survey items. Krippendorff's alpha exceeded the established level of 0.80, therefore agreement between the evaluators was deemed acceptable. Of the 275 units of response to the open-ended survey item on barriers, 79 identified cost barriers, 71 were concerns about diminished productivity, 57 concerned the effectiveness of the tools, 26 pertained to specific limitations of the tools, 23 related to a lack of experience with the tool, 9 were concerns of reduced quality, 9 identified specific conditions of use that would render the tool useless, 8 claimed the tools were too new to the market, and 2 responses stated that other methods were superior.

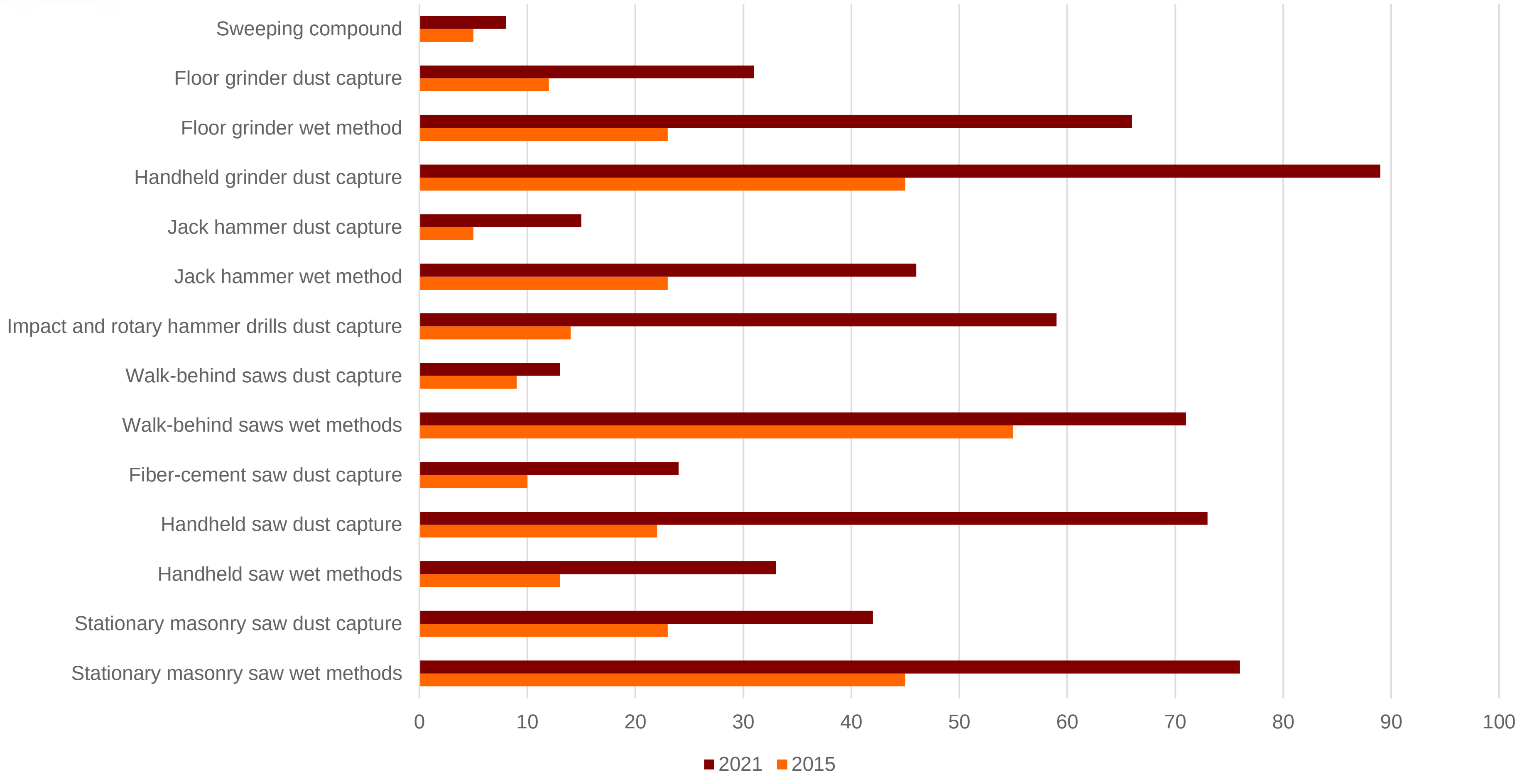
“Bonus” Study

- “Silica exposure control methods in concrete and masonry trades: before and after OSHA Crystalline Silica Rule 1926.1153” Journal of Construction Engineering and Management (submitted May 2022)
- “Bonus” Study – collected data during Large Firm Study
- Compared actual use data with 2014 survey study

Methods

- Surveys completed in 2015 and 2021
- OSHA 1926.1153 in effect in 2017
- OSHA rule has Table I, which specifies control methods per task/tool
- Firms of the Concrete Sawing and Drilling Association (CSDA) and the Mason Contractors Association of America (MCAA)
- Asked about usage rates on various dust-control methods

Results


Sweeping compound
Floor grinder dust capture
Floor grinder wet method
Handheld grinder dust capture
Jack hammer dust capture
Jack hammer wet method
Impact and rotary hammer drills dust capture
Walk-behind saws dust capture
Walk-behind saws wet methods
Fiber-cement saw dust capture
Handheld saw dust capture
Handheld saw wet methods
Stationary masonry saw dust capture
Stationary masonry saw wet methods
0 10 20 30 40 50 60 70 80 90 100
2021 2015

Results

- Tools mentioned in 1926.1153 Table I show more significant usage increase
- Respondents not familiar with some tools
- Cost, unfamiliarity, and productivity factors most frequently named barriers to adoption

Reactive Chemical Systems in Construction: Part B Developing Data-Driven Interventions

Dhimiter Bello, Sc.D., MSc.
Anila Bello, Sc.D., MSc
Kushal Biswas, doctoral student
Paridhi Patel, doctoral students
Rebecca Gore, PhD

UMass Lowell
Zuckerberg College of Health Sciences

May 25th, 2021

Aims

Aim 1: Identify tasks and application conditions with high exposures to part B ingredients of reactive resin systems in construction

- Focus: *Amine cross-linkers and catalysts, engineered nanomaterials, flame retardants and solvents.*
- *Prioritize hazardous part B ingredients for field testing & identify alternatives*
- *Assess inhalation and dermal exposures*

Aim 2: Evaluate effectiveness of exposure controls for Part B ingredients

- *Urinary biomonitoring and cross-shift biomarker changes*
- *Urinary OS markers as global indicators of totality of exposures*
- *Determine relative contribution of different exposure pathways*

Aim 3. Translate and disseminate the findings and promote best work practices

- Pubs, presentation, webinars, alerts, safety cards: CPWR R2P, NIOSH, OccMed clinics, ACC/CPI, ALIPA, Epoxy association

Approach

A. Workplace observations

- Site layout, job size,
- Worker activities, task duration
- Product composition (SDS)

B. Personal Inhalation exposures (task-based)

- Personal : CIP10-MI

C. Skin exposures

- Glove dosimetry

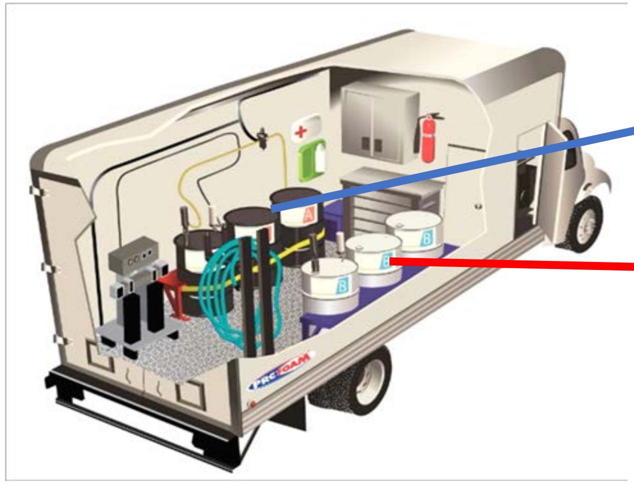
D. Biomarkers of exposures

- Urine collection pre- and post-shift
- Creatinine and specific gravity

E. Biomarkers of effects

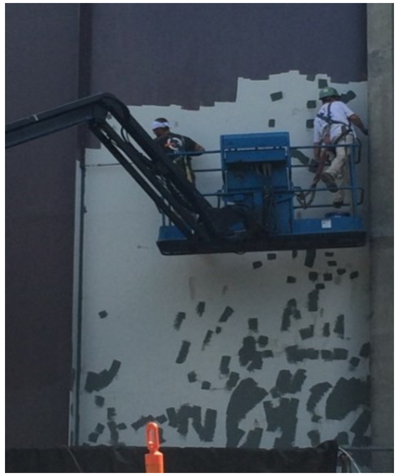
- Oxidative stress markers – panel of eight markers
- Kidney function markers – panel of nine markers

Cohort I: Spray Polyurethane Foam insulation workers



Two –part reactive chemical system:
Part A – Isocyanate
Part B – Polyols, Amine Catalysts,
Flame retardants , Blowing Agents

Cohort II: Steel structure coating painters



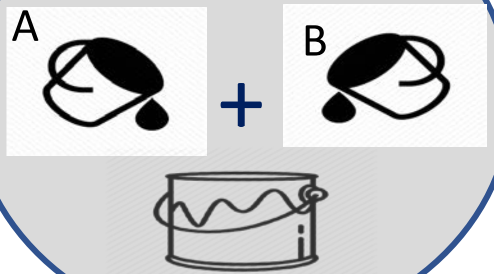
Part A

EPOXY (BADGE)

or

ISOCYANATE

(pHDI, pMDI, pTDI,
+ proprietary hybrid
chemistries)



Roller/brush and spray painting

Part B

HARDENERS:
AMINES & Polyols

SOLVENTS

Nano FILLERS
Zn, TiO_2, Fe_2O_3,
nano/Quartz, etc.

CATALYSTS

Other
additives

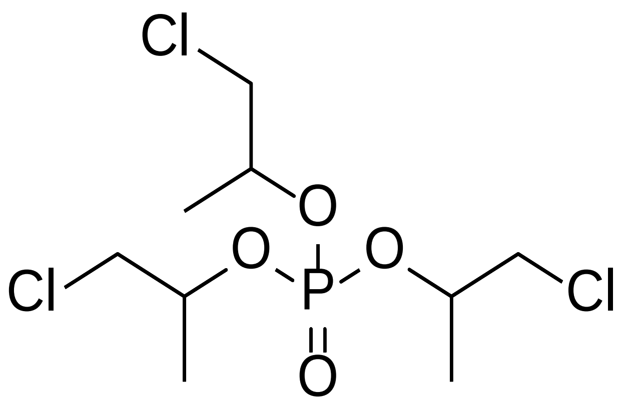
Roadmap for part B assessment in coatings and SPF

1. Systematic review of product composition based on SDS (21 NEPCOAT products)
    - 57 chemicals in primers; 46 in intermediate layer; 51 in topcoat
    - >10 amines; 33 solvents; >11 nanofilllers; 23 other additives
2. Frequency of use and content in products
    - 9 OPFRs in SPF
    - 15 amine catalysts in SPF
    - 10 amine cross-linkers in coatings
3. Considerations of toxicity profile and regulatory standards
    - Carcinogens, sensitizers, or chemicals of high concern

Completed work this past year

- OPFRs in SPF – chemical and statistical analysis in air, gloves, and urinary biomarkers
- Completed statistical and data analysis of kidney toxicity biomarkers
- Completed urine analysis of OS markers
- LC-MS/MS method development for amines in SPF and coatings

OPFR present in products used as the study sites (SDS data)

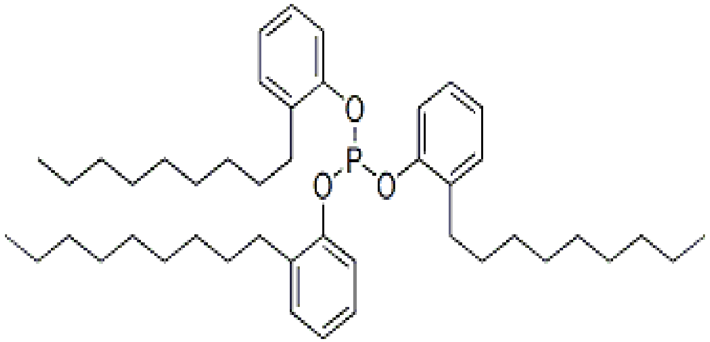


Tris-(2-chloro isopropyl)-phosphate (TCIPP)

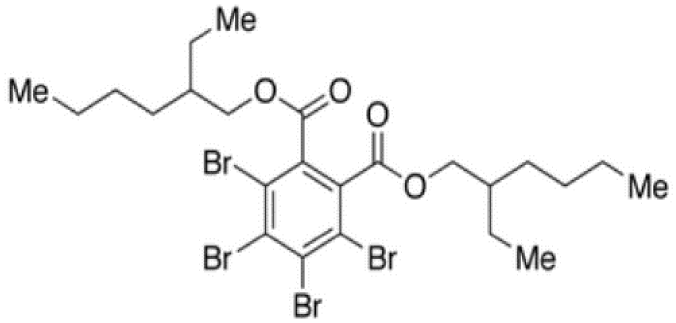
Type of SPF Foam	Flame retardants as reported in the products		
	Chemical	Cas No.	weight (%)
Closed cell foam	Tris-(2-chloroisopropyl)-phosphate (TCIPP)	13674-84-5	0 -10%
	Bis(2-chloropropy1)1-chloro-2-propyl phosphate	76649-15-5	0.1 -1%
	Brominated Flame Retardant	Trade Secret	5 – 10%
Open cell foam	Tris (2-chloro isopropyl) – phosphate (TCIPP)	13674-84-5	30 - 60%
Roofing	Chlorinated phosphate ester	Trade Secret	3 - 7%
Injection	Tris-(2-chloroisopropyl)-phosphate (TCIPP)	13674-84-5	10 - 30%

Additional flame retardants targeted for chemical analysis

Parent Compound	Urinary Biomarker
Tris (1,3-dichloro-2-propyl) phosphate (TDCPP)	Bis(1,3-dichloro-2-propyl) phosphate (BDCPP)
Triphenyl phosphate (TPHP)	Diphenyl phosphate (DPHP)
2-isopropyl triphenyl phosphate (ip-TPHP)	p-isopropylphenyl phenyl Phosphate (ip-DPHP p)
	o-isopropylphenyl phenyl Phosphate (ip-DPHP o)
	m-isopropylphenyl phenyl Phosphate (ip-DPHP m)



Tri (nonylphenol) Phosphite **(TNPP)**

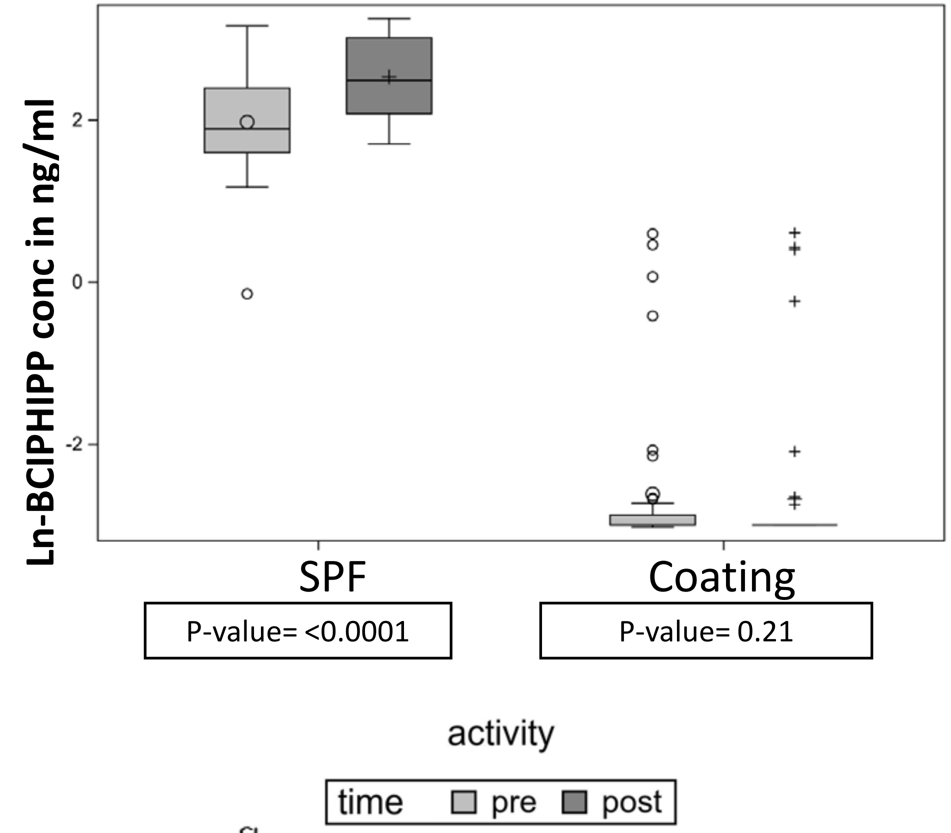


3,4,5,6-Tetrabromo-1,2-benzenedicarboxylic Acid 1,2-Bis(2-ethylhexyl) Ester **(Pyronil 45)**

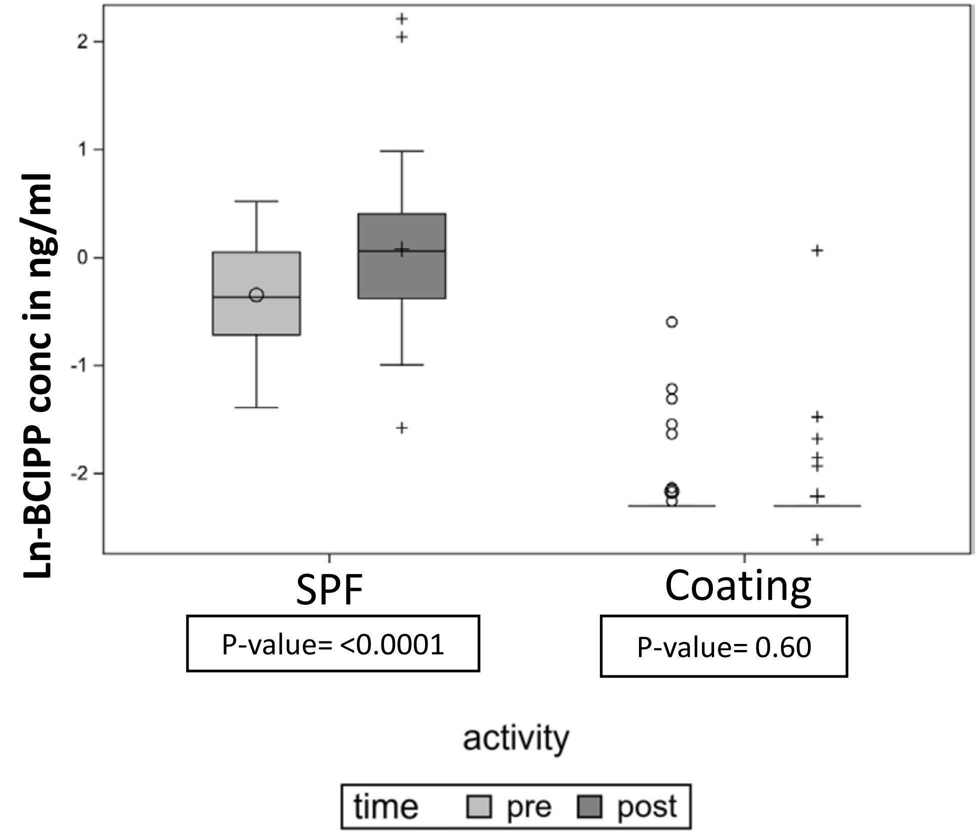
Biomarkers of flame retardant TCIPP in pre- and post-shift urine samples

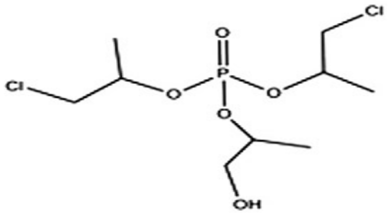
	# Samples	
	Pre	Post
SPF	38	42
Coating	43	45

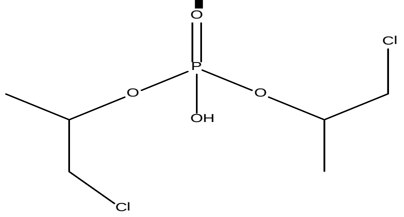
Pre- vs. Post- shift BCIPHIPP conc. in urine by activity



Pre vs Post levels of BCIPP Levels in urine by activity



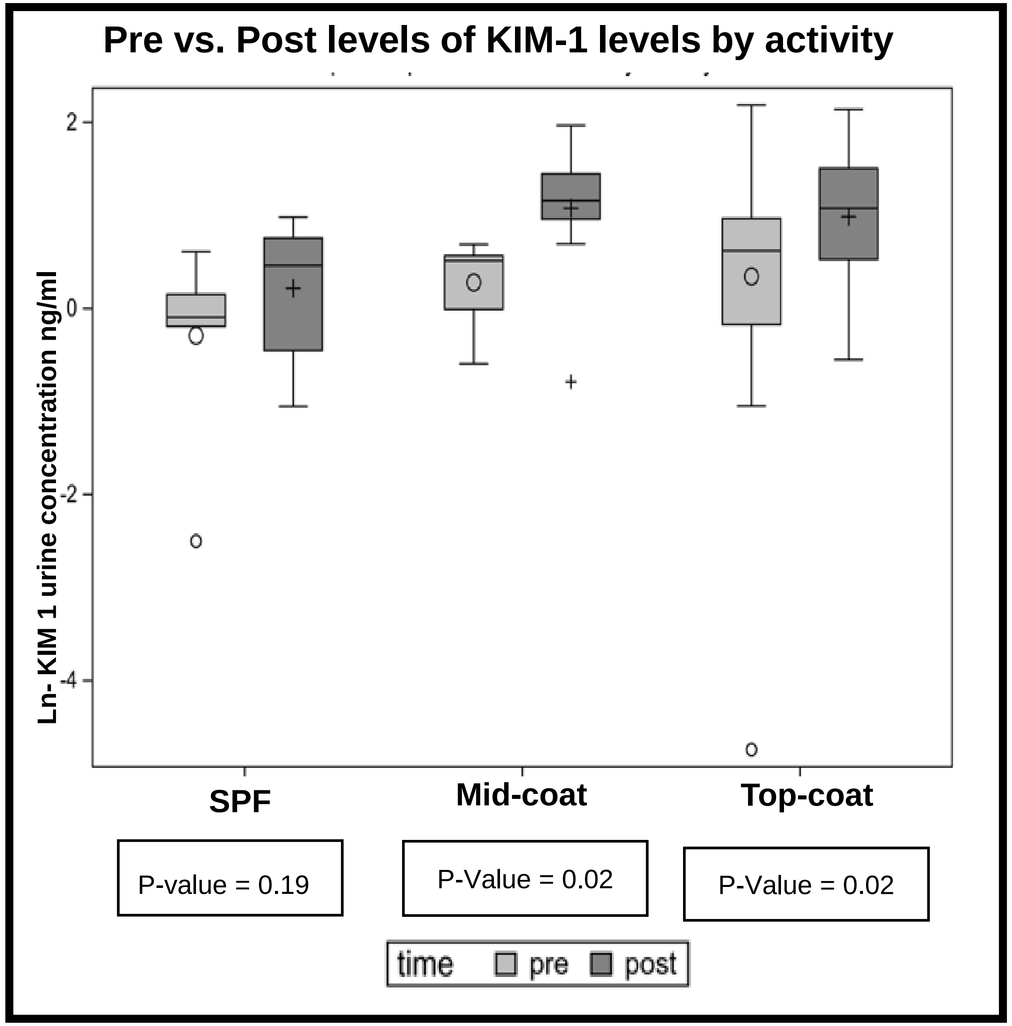




bis(2-chloropropyl) phosphate (BCPP)

Post-shift KIM 1 is significantly higher than pre-shift urine in coating workers but not in SPF workers !!!

	KIM-1 (ng/ml)
SPF (n=7)	
Pre-Shift GM(GSD)	0.7 (2.8)
Post-Shift GM(GSD)	1.2 (2.1)
Range	0.1 – 2.7
Mid-coat (n=10)	
Pre-Shift GM(GSD)	1.3 (1.6)
Post-Shift GM(GSD)	2.9 (2.2)
Range	0.5 – 7.1
Top-coat (n=20)	
Pre-Shift GM(GSD)	1.4 (4.3)
Post-Shift GM(GSD)	2.7 (2.1)
Range	0.01 – 8.9



Kidney Biomarkers = $\beta_0 + \beta_1$*Exposure biomarker + ε

Coating workers

	Parameter Est β_1	Standard Error	t - Value	Pr. > t	95 % CI
KIM-1					
HDA (n=30)	0.18	0.08	2.17	0.04	0.01 – 0.34
Badge*2H20 (n=30)	0.09	0.16	0.59	0.56	-0.23 – 0.41
OPN					
HDA (n=30)	99.06	25.32	3.91	<0.05	47.19 – 150.92
Badge*2H20 (n=30)	103.99	52.33	1.99	0.06	-3.21 – 211.2
Clusterin					
HDA (n=30)	-0.38	0.17	-2.17	0.04	-0.73 - -0.02
Badge*2H20 (n=30)	-0.11	0.33	-0.34	0.74	-0.79 – 0.57

The rest of kidneys biomarkers were not associated with urinary exposure biomarkers !

Next steps

- Infrastructure bill and industrial painters
- Comprehensive national biomonitoring program for industrial painters
- Holistic approach to intervention
  - Chemical exposures
  - Dehydration/heat stress
  - Antioxidant defense
  - Product selection/substitution

Example from copier operators study

Thank you for your attention

Q&A session

FRIDAY, JUNE 3RD

INCREASING AWARENESS OF SAFETY AND HEALTH RISKS AND SOLUTIONS

Nanomaterials in Construction: Evaluating Exposures, Control Methods, and Training

CPWR's Research to Practice (r2p) Seminar and Partnership Workshop
June 3rd, 2022

Photo credit: Neil Lippy

Gavin West, MPH

Director, Nanomaterials Research

gwest@cpwr.com

CPWR

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Big Nano Team

- Gavin West
- Sara Brooks
- Bruce Lippy
- Michael Cooper
- Leonard Burrelli
- Mark Nealley
- William (Bill) Kojola
- William (Bill) Perry
- Andreas Saldivar
- Keith Rickabaugh

Today's presentation will give an overview of progress for each aim

1 Applications

2 Exposures

3 r2p

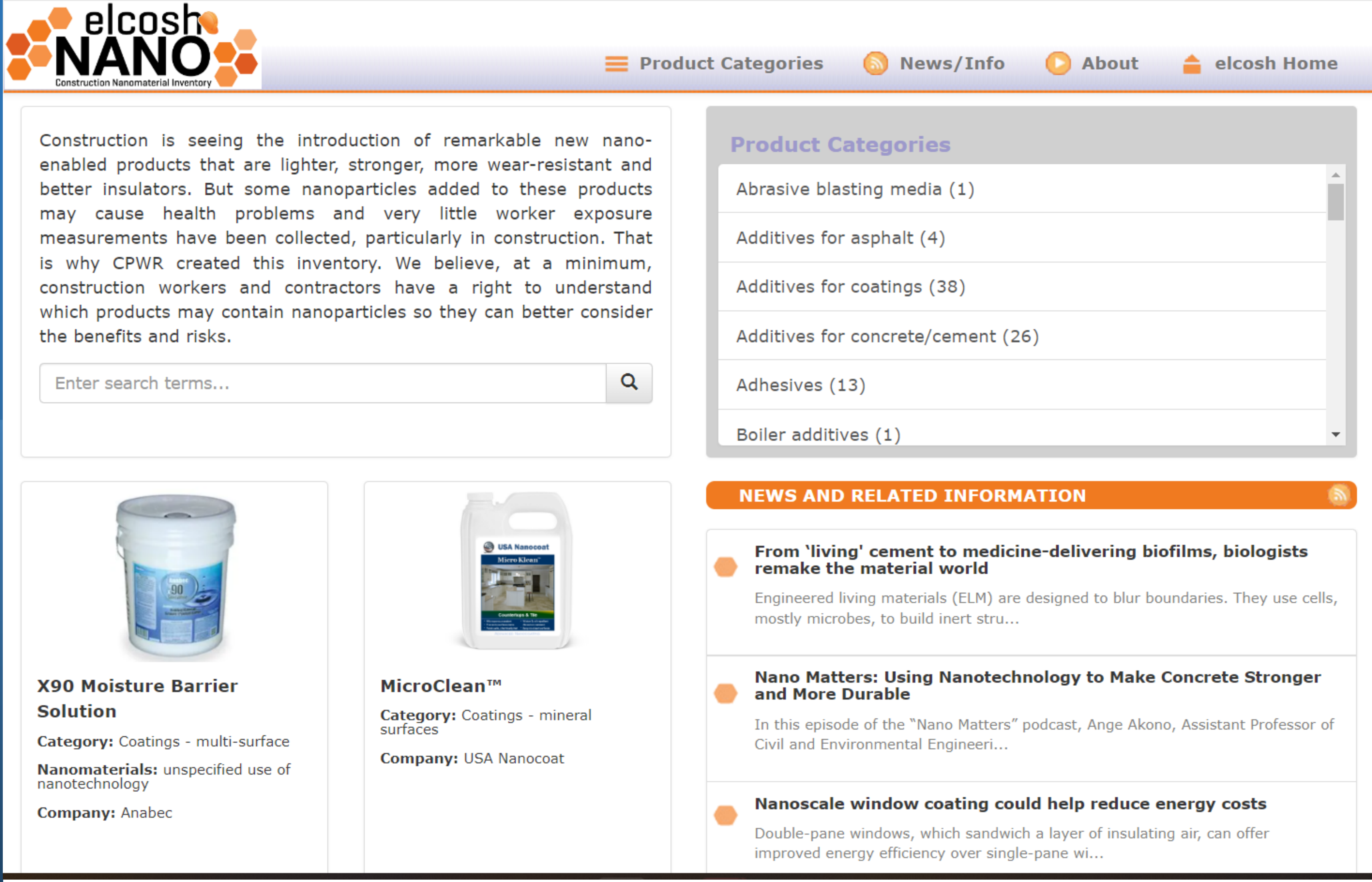
Aim 1

Identify tasks and materials that could result in occupational exposure to manufactured nanomaterials

elcosh NANO
Construction Nanomaterial Inventory

www.nano.elcosh.org

~100 products added since last year's r2p workshop, bringing the total to >800

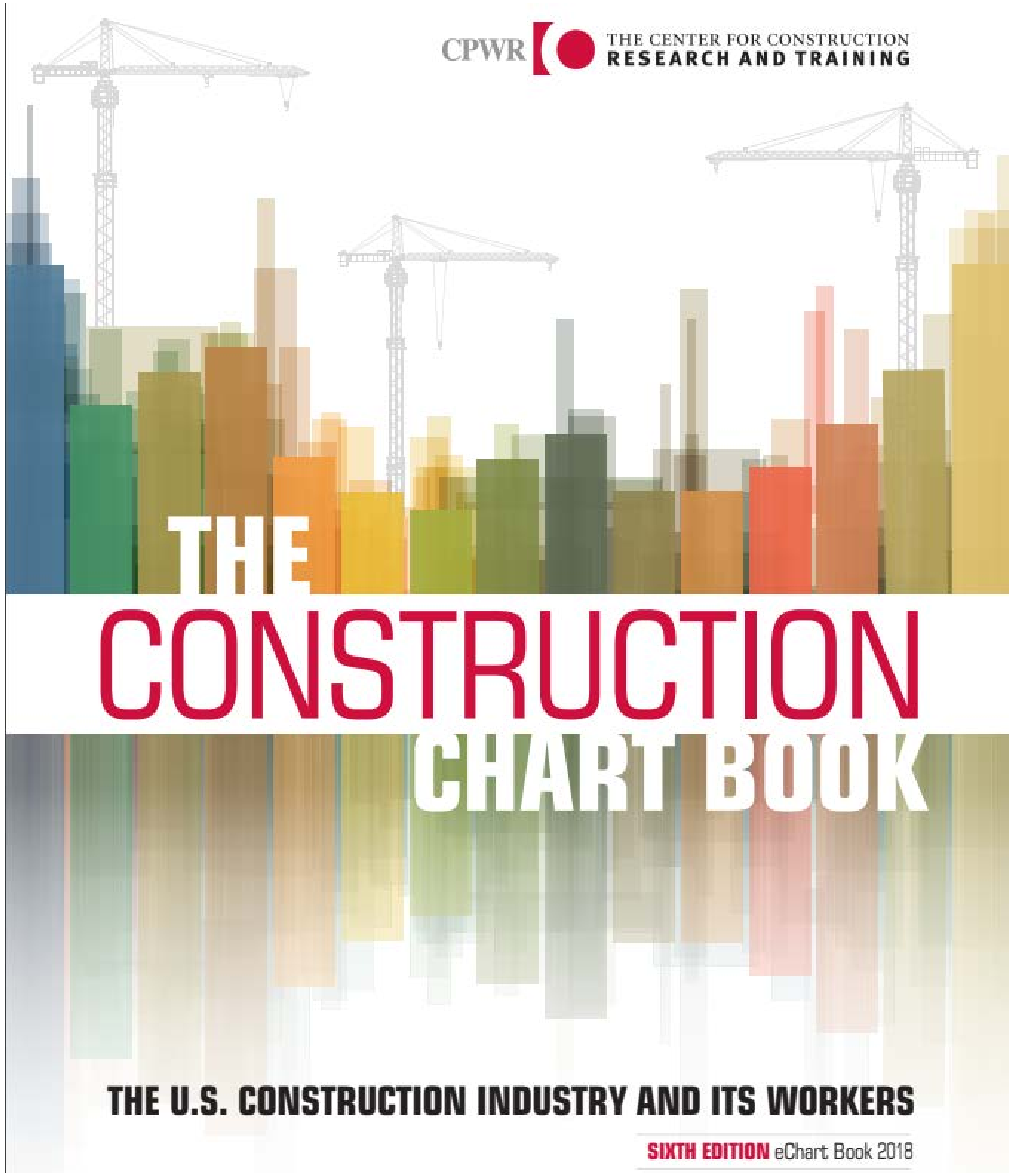


www.nano.elcosh.org

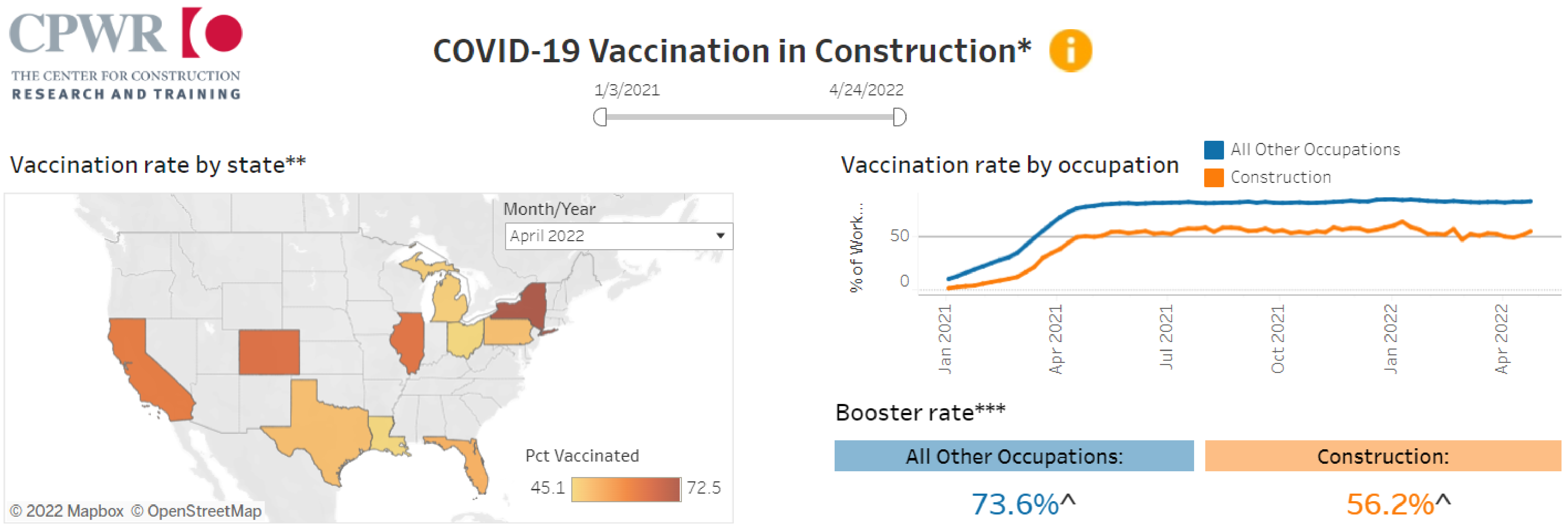
Many exposure scenarios exist based on typical product use

Product Category	Examples of Potential Exposure Scenarios	Product Category	Examples of Potential Exposure Scenarios
Insulation	handling, application, cutting	**Drywall**	cutting and installation
Additives for coatings	weighing, mixing	**Miscellaneous**	various
Roofing	cutting, drilling, nailing	**HVAC**	spraying and manual application
Lubricants	spraying or manual application to construction equipment and tools	**Prepregs**	mechanical abrasion
Surface preparation	dermal exposure during handling, spray application	**Weatherproofing membranes**	cutting and installation
Thermal sprays	welding, grinding thermal spray coated substrates	**Additives for asphalt**	weighing, mixing, milling, paving
Adhesives	application, removal, separation or machining of bonded substrates	**Caulking**	installation and removal of windows, door frames, masonry columns
Additives for cement	weighing, mixing	**Joint Sealants**	removal and renovation, mechanical abrasion of adjacent materials
Flooring	cutting and removal	**Lumber**	sanding and sawing
Glass and solar panels	cutting and installation	**Boiler additives**	cleaning and repairing boilers and boiler surfaces
Metal	welding	**Fasteners**	little or no exposure potential
Weld overlays	welding	**Fuel Additives**	construction equipment exhaust

We last published a summary of the inventory data in 2018



We teamed up with the Data Center this year to develop a new nano data dashboard



The dashboard will summarize data from the inventory and possibly safety data sheets

What would be helpful to see on the dashboard?

We'd be happy to hear from you!

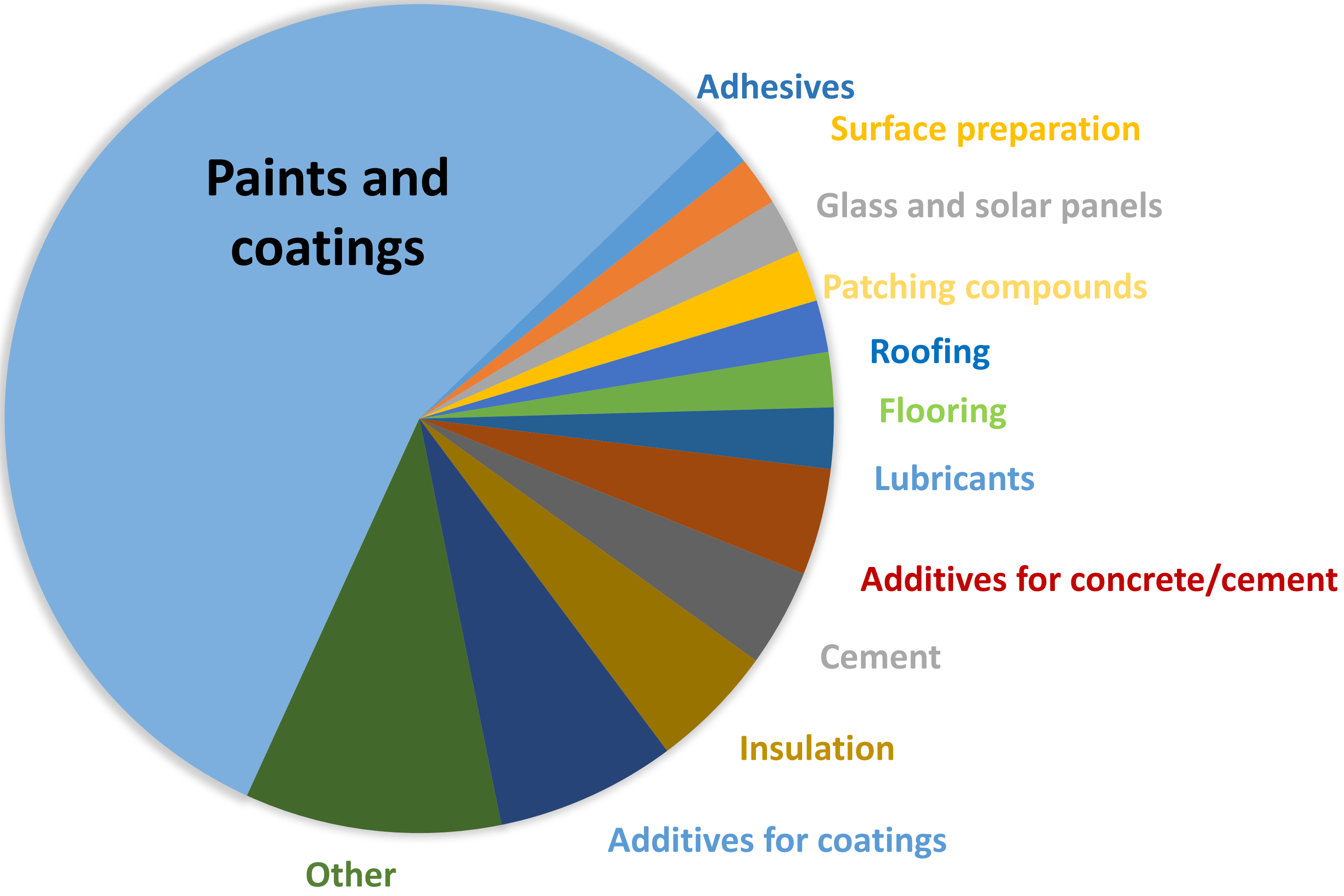
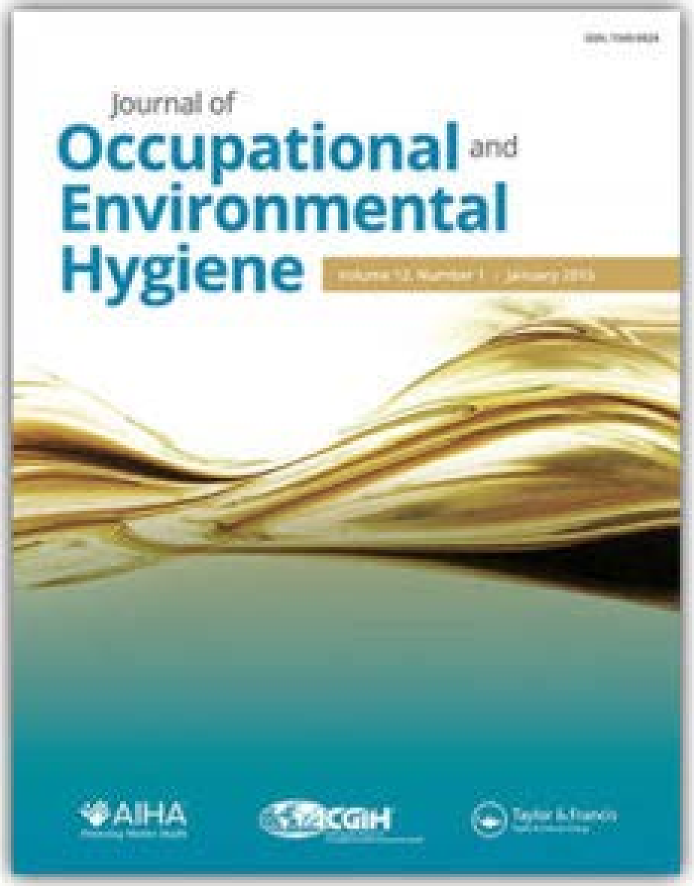


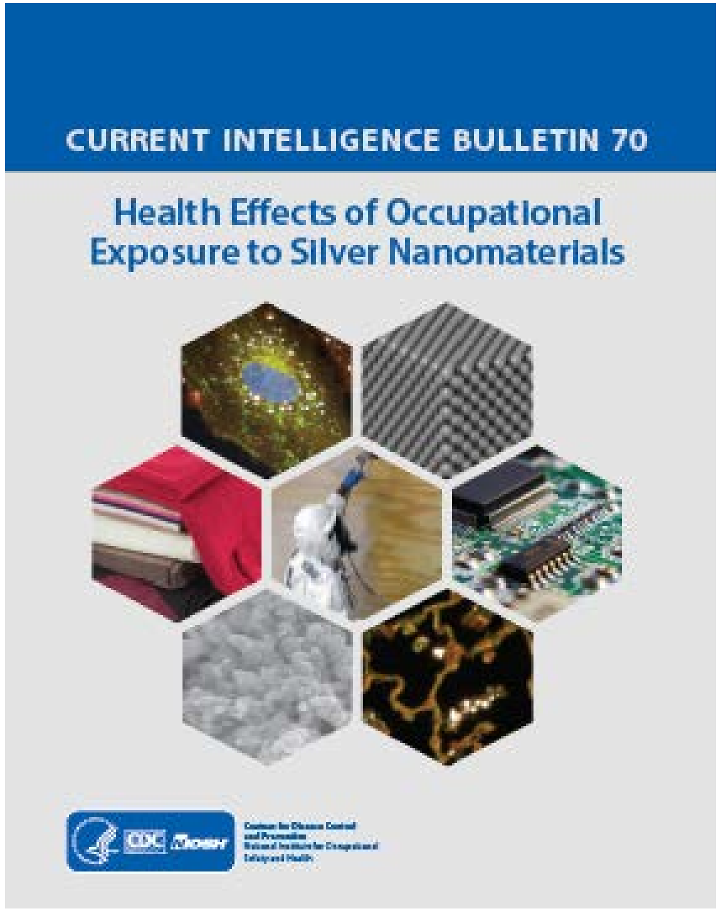
Photo courtesy Neil Lippy

Photo courtesy Earl Dotter

Aim 2
Assess how exposures are affected by workplace factors, engineering controls, weathering, and chemical degradation

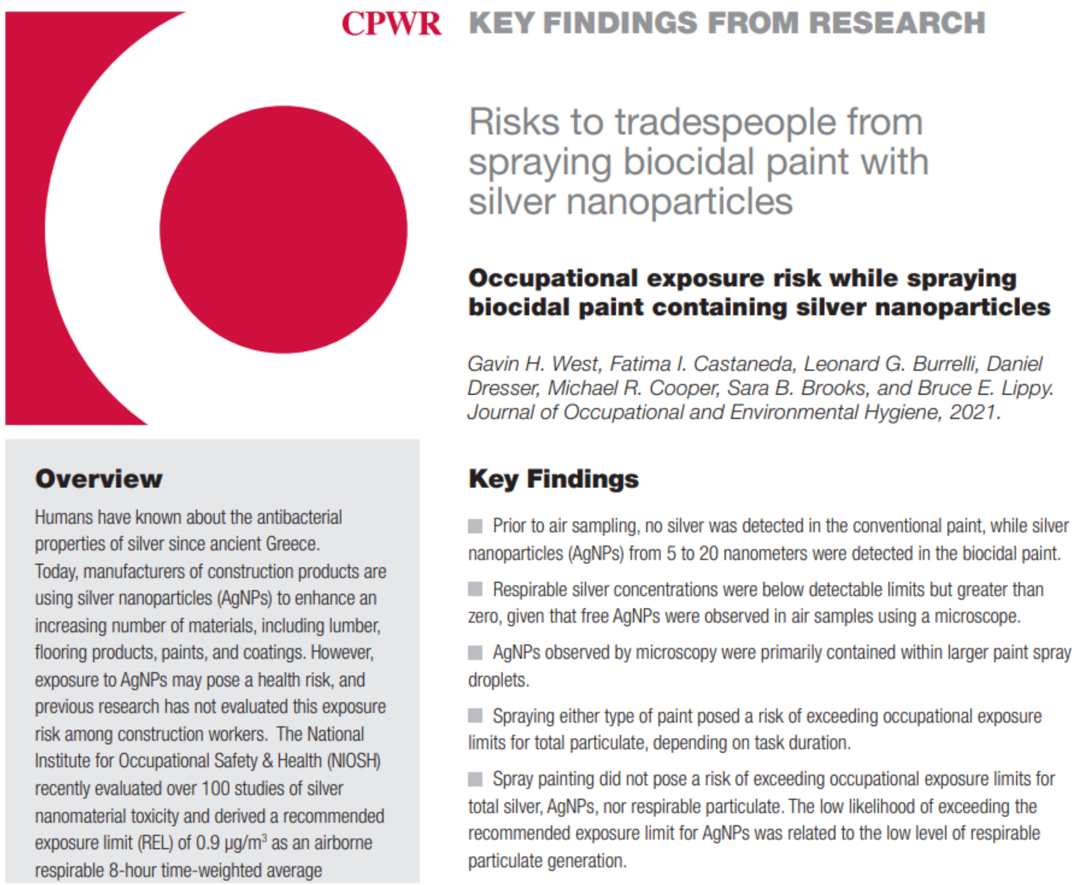
You might remember the study we published on silver nanoparticle exposure if you attended last year’s workshop





https://doi.org/10.1080/15459624.2021.1910277
https://www.cdc.gov/niosh/docs/2021-112/default.html

We followed up on that study this year with a Key Findings document and a Toolbox Talk



CPWR KEY FINDINGS FROM RESEARCH

Risks to tradespeople from spraying biocidal paint with silver nanoparticles

Occupational exposure risk while spraying biocidal paint containing silver nanoparticles

Gavin H. West, Fatima I. Castaneda, Leonard G. Burrelli, Daniel Dresser, Michael R. Cooper, Sara B. Brooks, and Bruce E. Lippy. Journal of Occupational and Environmental Hygiene, 2021.

Overview

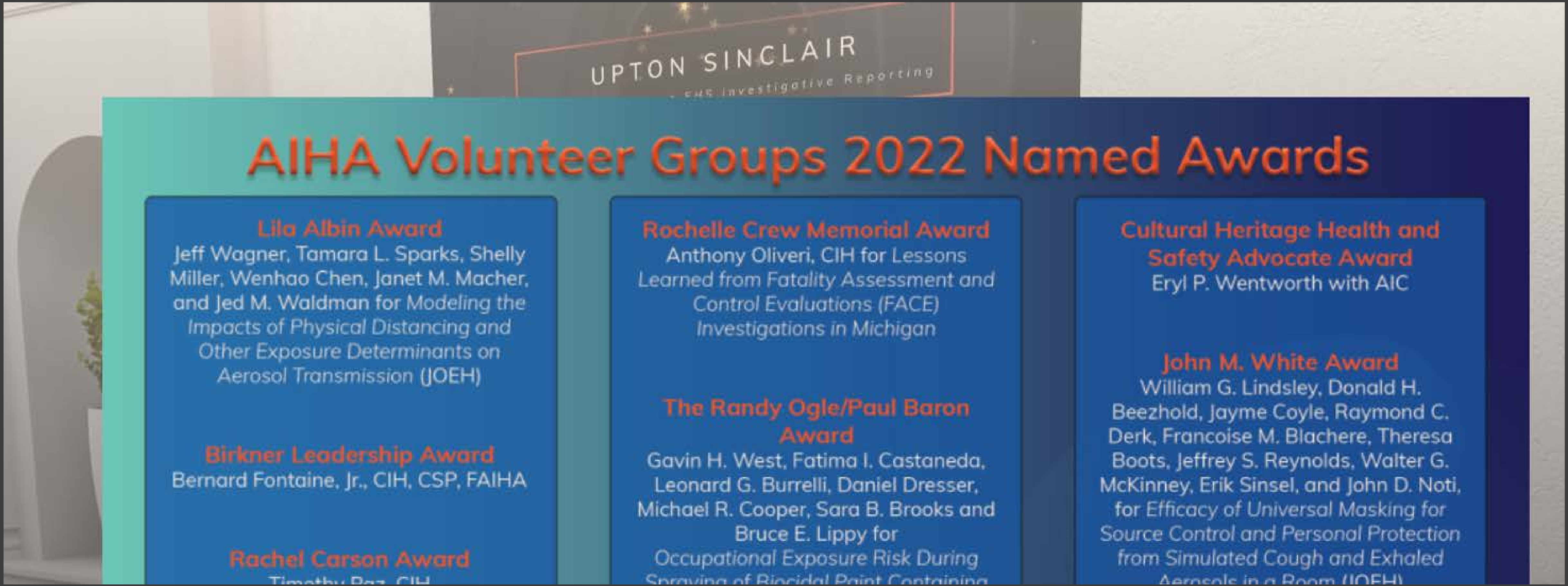
Humans have known about the antibacterial properties of silver since ancient Greece. Today, manufacturers of construction products are using silver nanoparticles (AgNPs) to enhance an increasing number of materials, including lumber, flooring products, paints, and coatings. However, exposure to AgNPs may pose a health risk, and previous research has not evaluated this exposure risk among construction workers. The National Institute for Occupational Safety & Health (NIOSH) recently evaluated over 100 studies of silver nanomaterial toxicity and derived a recommended exposure limit (REL) of 0.9 µg/m³ as an airborne respirable 8-hour time-weighted average

Key Findings

- Prior to air sampling, no silver was detected in the conventional paint, while silver nanoparticles (AgNPs) from 5 to 20 nanometers were detected in the biocidal paint.
- Respirable silver concentrations were below detectable limits but greater than zero, given that free AgNPs were observed in air samples using a microscope.
- AgNPs observed by microscopy were primarily contained within larger paint spray droplets.
- Spraying either type of paint posed a risk of exceeding occupational exposure limits for total particulate, depending on task duration.
- Spray painting did not pose a risk of exceeding occupational exposure limits for total silver, AgNPs, nor respirable particulate. The low likelihood of exceeding the recommended exposure limit for AgNPs was related to the low level of respirable particulate generation.

https://www.cpwr.com/research/published-research/key-findings/

https://www.cpwr.com/research/research-to-practice-r2p/r2p-library/toolbox-talks/



Received Randy Ogle/Paul Baron Award last week at AIHce 2022

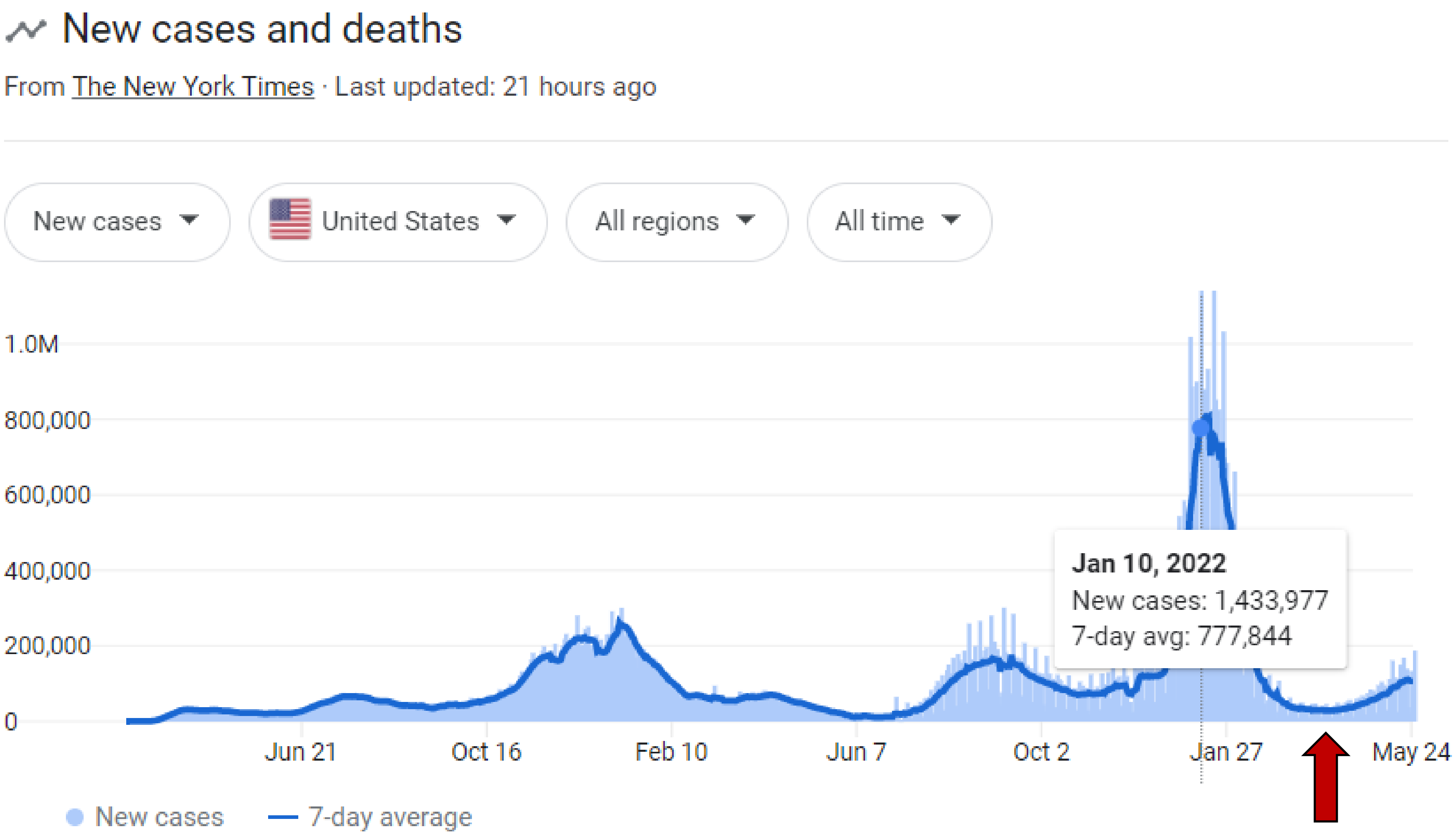
"This award honors the work of Mr. Randy Ogle and Dr. Paul Baron who led the way in providing the management tools and the data that laid the groundwork for future generations of EHS professionals working in the field of Nano Technology and Advanced Materials."

Last year we described plans to conduct a study through CPWR's r2p masonry partnership

BAC/IMI International Training Center

After many unpredictable delays, it was great to get the band together again!

Omicron delayed plans to conduct the study in January



Study took place during 1st week of April & May

The IMI facility required masking and COVID-19 vaccination

Photos by Neil Lippy


Most of the work took place outdoors
Photo credit: Neil Lippy

Differences in the concrete with graphene were obvious

Photos by Neil Lippy

Photos by Gavin West

We collected air samples while varying tasks and engineering controls

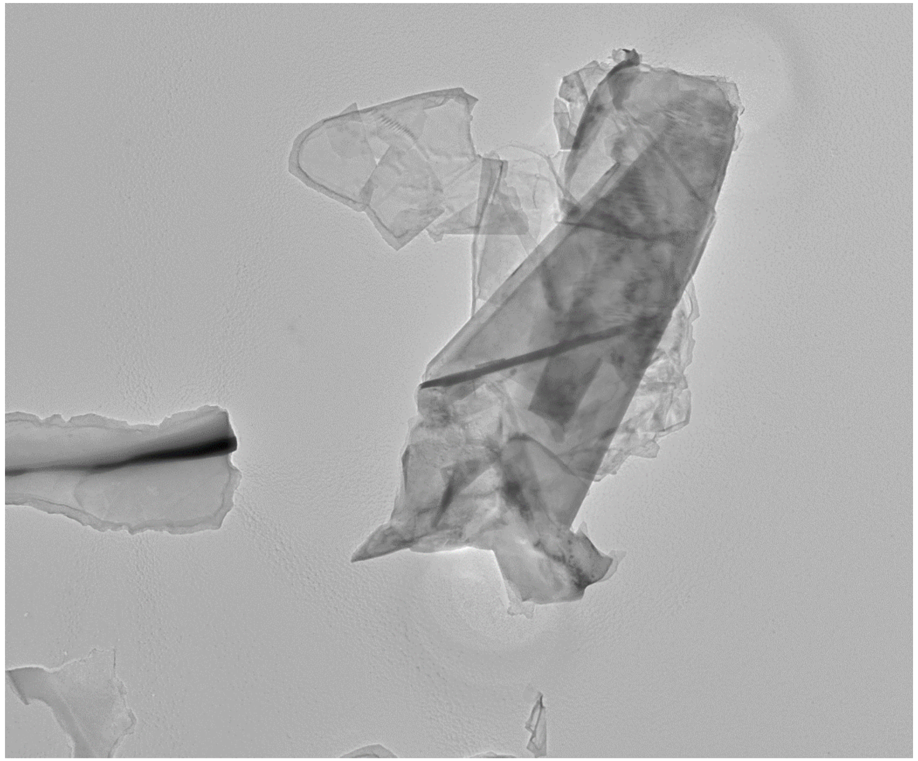
https://www.thegraphenecouncil.org/page/GrapheneToxicity

The Graphene Council interviewed Dr. Andrew Maynard about graphene toxicity

- Brown University study indicated **edges of graphene platelets could cut or pierce human lung tissue.**
- They placed the graphene next to lung, skin, and immune cells **in a petri dish**.
- “The vast majority of **research papers on nanomaterial toxicity have focused on precursor materials**, and not materials released from a matrix… Graphene embedded in a polymer matrix would most likely **become irreversibly bound to the polymer** for instance. But it’s possible that ill-conceived uses might lead to small clusters of platelets entering the lungs.” – *Andrew Maynard*

Preliminary results from the CPWR study show releases of unbound graphene

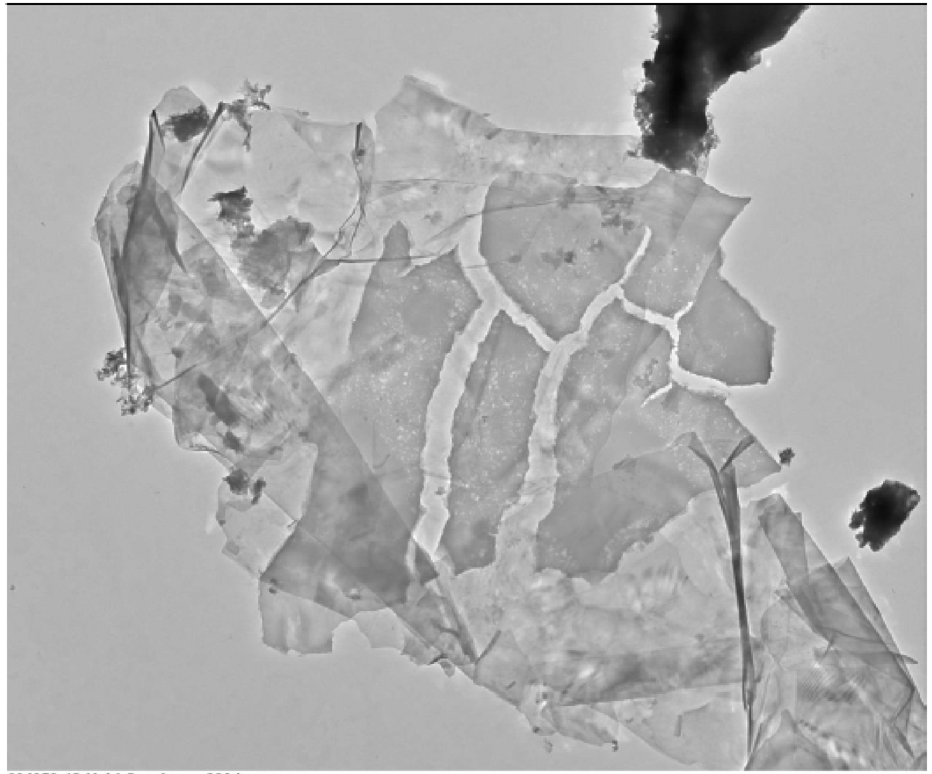
Graphene before it was added to mortar



graphene_009.tif
graphene
Cal: 0.003548 µm/pix
14:38 2/12/2020
TEM Mode: Imaging
Microscopist: Andreas Saldivar
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

1 µm
HV=100kV
Direct Mag: 2900 x
AMA Analytical Services, Inc

Graphene released during tuckpointing



634959 JS Held Graphene_003.jpg
634959-3
Graphene and other particles
Cal: 0.003702 µm/pix
13:40 4/11/2022
Microscopist: Andreas Saldivar
Camera: NANOSPRT5, Exposure: 840 (ms) x 5 drift frames, Gain: 1, Bin: 1
Gamma: 1.00, No Sharpening, Normal Contrast

1 µm
HV=100kV
Direct Mag: 2900 x
AMA Analytical Services, Inc

Special thanks to our partners and collaborators!

International Masonry Institute (IMI)

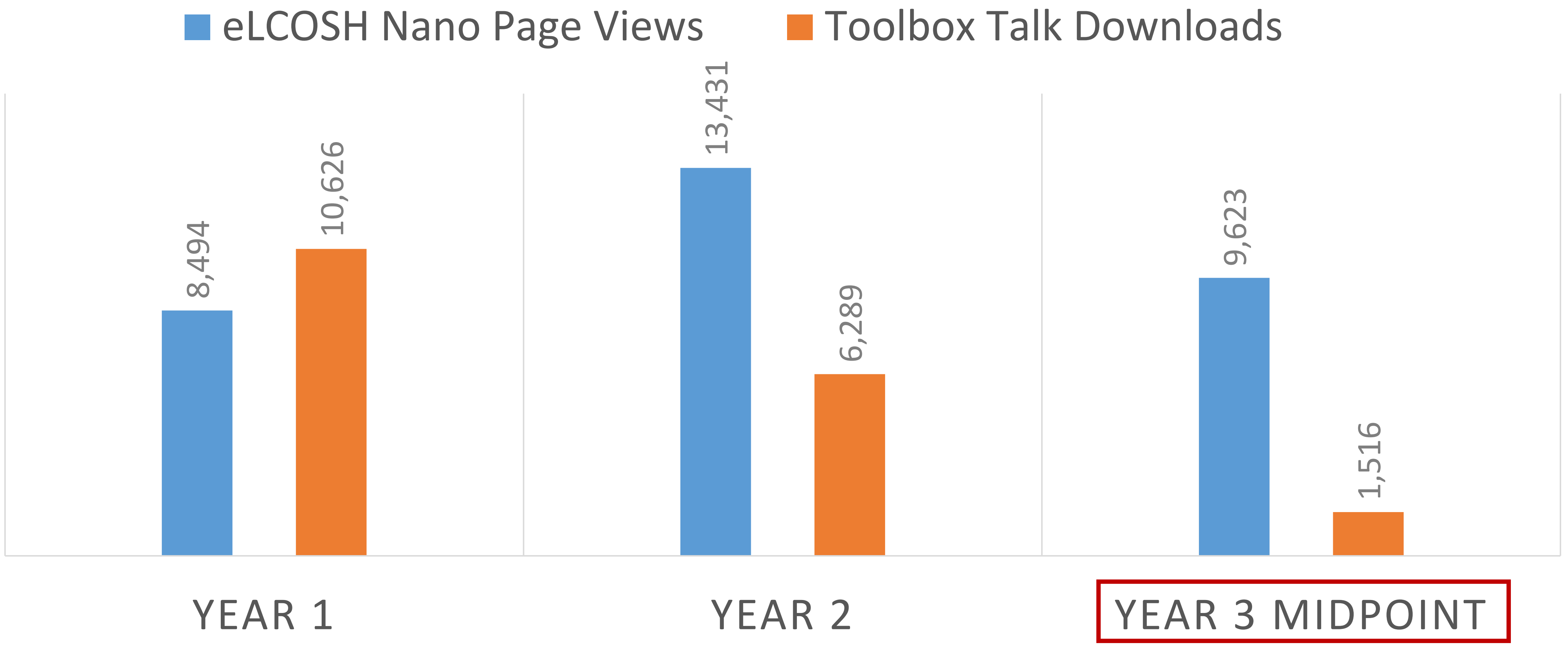
- Anthony DiPerna
- Dave Wysocki
- Pete Kohl
- Ricky Frank
- Joe Pugliano

NIOSH

- Jenny Roberts
- Emily Lee
- Vamsi Kodali
- Kelly Fraser
- Aaron Erdely

Aim 3
Develop, disseminate, and track the use of training and outreach materials

People continue to use the eLCOSH nano inventory and download nano toolbox talks



Our next toolbox talk will focus on incidental versus engineered nanomaterials

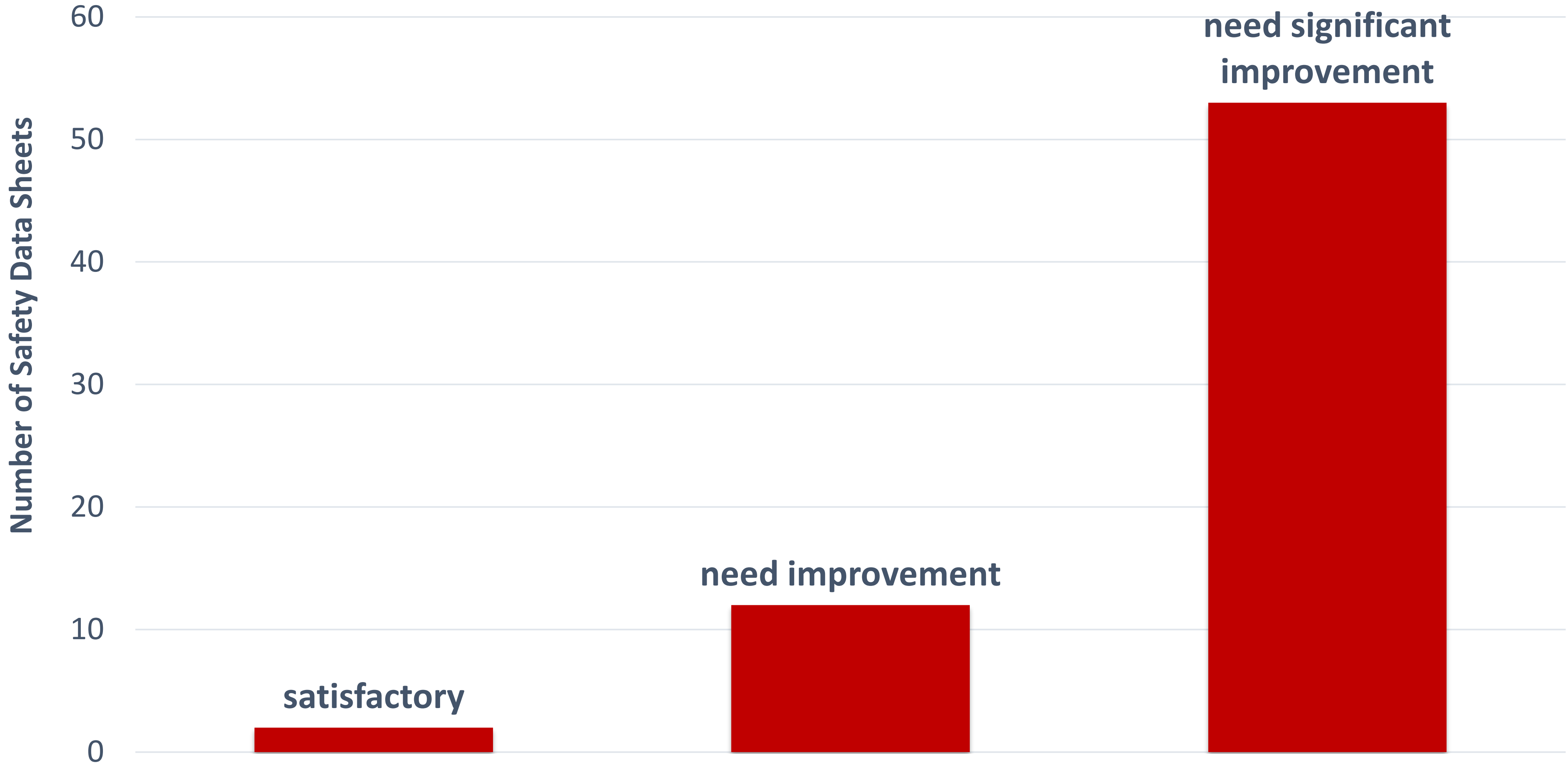
Photo credit: J. Vinton Schafer & Sons, Inc. and CCBC

Notable Year 3 Outcome: DOE staff requested eLCOSH nano inventory data to share with OSH professionals across the complex

Image: DOE-SR Salt Waste Processing Facility

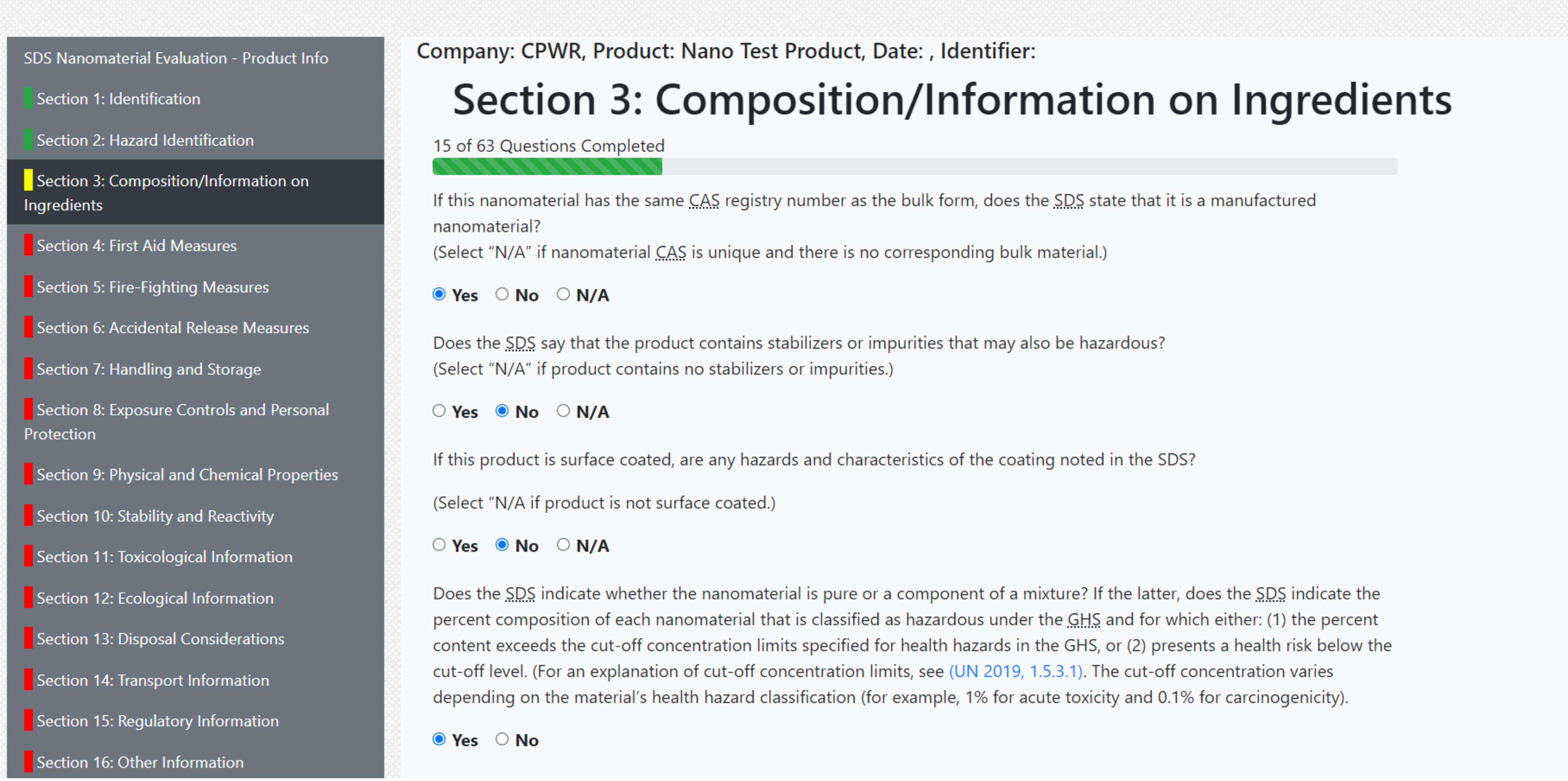
Courtesy: Office of Environmental Management

NIOSH researchers documented serious problems with nanomaterial safety data sheets



Hodson, Eastlake & Herbers (2019) https://doi.org/10.1016/j.jchas.2018.10.002

We will be launching a new website this year to help people write more informative safety data sheets for nanomaterials



SDS Nanomaterial Evaluation - Product Info

- Section 1: Identification
- Section 2: Hazard Identification
- Section 3: Composition/Information on Ingredients
- Section 4: First Aid Measures
- Section 5: Fire-Fighting Measures
- Section 6: Accidental Release Measures
- Section 7: Handling and Storage
- Section 8: Exposure Controls and Personal Protection
- Section 9: Physical and Chemical Properties
- Section 10: Stability and Reactivity
- Section 11: Toxicological Information
- Section 12: Ecological Information
- Section 13: Disposal Considerations
- Section 14: Transport Information
- Section 15: Regulatory Information
- Section 16: Other Information

Company: CPWR, Product: Nano Test Product, Date: , Identifier:

Section 3: Composition/Information on Ingredients

15 of 63 Questions Completed

If this nanomaterial has the same CAS registry number as the bulk form, does the SDS state that it is a manufactured nanomaterial?
(Select "N/A" if nanomaterial CAS is unique and there is no corresponding bulk material.)

Yes No N/A

Does the SDS say that the product contains stabilizers or impurities that may also be hazardous?
(Select "N/A" if product contains no stabilizers or impurities.)

Yes No N/A

If this product is surface coated, are any hazards and characteristics of the coating noted in the SDS?

(Select "N/A if product is not surface coated.)

Yes No N/A

Does the SDS indicate whether the nanomaterial is pure or a component of a mixture? If the latter, does the SDS indicate the percent composition of each nanomaterial that is classified as hazardous under the GHS and for which either: (1) the percent content exceeds the cut-off concentration limits specified for health hazards in the GHS, or (2) presents a health risk below the cut-off level. (For an explanation of cut-off concentration limits, see (UN 2019, 1.5.3.1). The cut-off concentration varies depending on the material's health hazard classification (for example, 1% for acute toxicity and 0.1% for carcinogenicity).

Yes No

We delivered two nanomaterials awareness train-the-trainer sessions this year

International Association of Heat and Frost Insulators and Allied Workers
Est. 1903
ENERGY CONSERVATION SPECIALISTS

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RESEARCH AND TRAINING

Annual Trainer Enhancement

Among respondents to our follow-up survey six months after the CPWR Trainer Enhancement:

- 50% used CPWR info to train workers on nanomaterials during the past 6 months
  - 25 courses taught
  - > 600 workers trained
- 71% said CPWR info on nano was “definitely” helpful for their students
- 29% said it was “probably” helpful

Thanks!
Questions or comments?

Gavin West, MPH
gwest@cpwr.com
301-495-8522

COMMUNICATIONS CORE

Bill Wright
Director of Communications

Sharretta Benjamin
Communications Coordinator

Tyler Simpson
Communications Specialist (shared with r2p)

THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

r2p Seminar

Washington, DC

6/3/2022

2019

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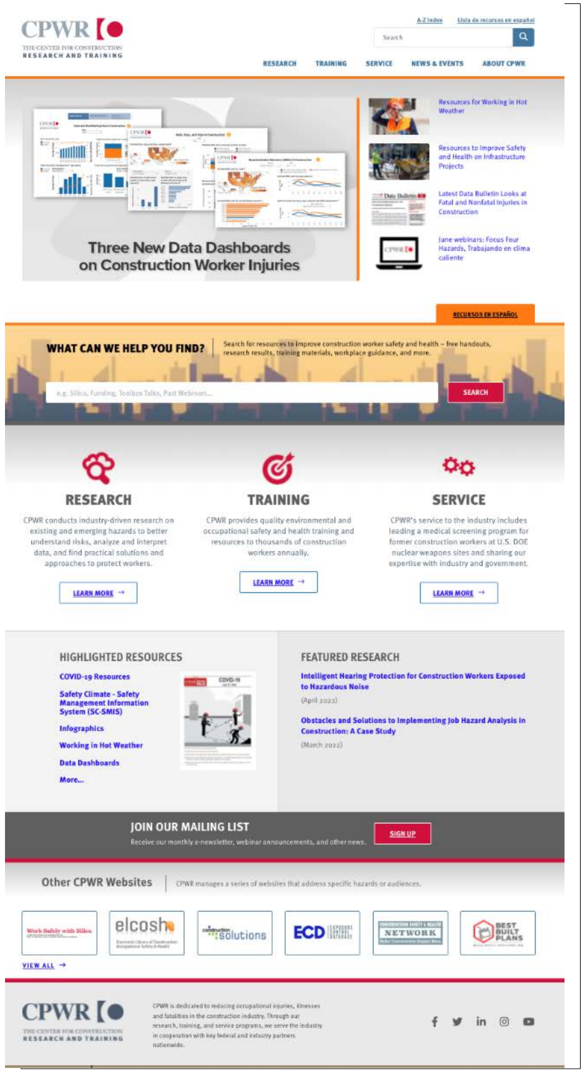
Website

cpwr.com



Websites

Analytics Dashboards

CPWR
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Website

Analytics Dashboard – Search

CPWR
THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

Google Analytics Data Visualization

click here to change date range

Apr 18, 2022 - May 17, 2022

[Google Analytics Page ->]

Internal Search terms

	Search Term	Unique Searches ▾
1.	toolbox talks	58
2.	Toolbox talks	17
3.	tool box talks	15
4.	silica	14
5.	heat	14
6.	opioids	13
7.	toolbox	13
8.	fall protection	13
9.	toolbox talk	12
10.	highways worker safety	10
11.	mental health	9
12.	ppe	9
13.	falls	8
14.	alert cards	7
15.	noise	7
16.	struck-by	7
17.	FSL	7
18.	struck by	7
19.	hot weather	7
	Grand total	**1,192**

1 - 20 / 773

Google Search terms

	Query	Clicks ▾	Impressions	Average Position	CTR %
1.	cpwr	608	972	1	62.55%
2.	cpwr toolbox talks	165	199	1	82.91%
3.	toolbox talks	72	4,146	10.58	1.74%
4.	tool box talks	45	1,807	9.53	2.49%
5.	center for construction research and training	37	59	1.03	62.71%
6.	cwpr	35	131	1.81	26.72%
7.	construction site safety checklist	31	725	4.36	4.28%
8.	foundations for safety leadership	31	46	1.07	67.39%
9.	protección auditiva charla	30	125	2	24%
10.	icra training	27	265	1.97	10.19%
11.	construction safety checklist pdf	26	69	1.88	37.68%
12.	cpwr toolbox talk	26	34	1	76.47%
13.	protección auditiva charla de seguridad	23	104	1.74	22.12%
14.	construction site safety checklist pdf	22	66	1.7	33.33%
15.	free toolbox talks	22	473	6.15	4.65%
16.	the center for construction research and training	21	32	1	65.63%
17.	cpwr osha portal	20	32	1.19	62.5%
18.	construction safety checklist	18	353	3.18	5.1%
19.	areas of the body with high absorption rates	18	138	3.95	13.04%
	Grand total	**11,206**	**641,822**	**33.47**	**1.75%**

1 - 20 / 24556

INDIETECH SOLUTIONS
https://indietechsolutions.com
info@indietechsolutions.com

Email

9/19-9/20
+39.8%
9/20-9/21
+20.8%
9/21-4/22 + 5.8%

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Social Media

	Fall 2019	Spring 2022	Change
Facebook	2,804 (2020)	3,501	+25%
LinkedIn	1,062	2,426	+128%
Twitter	1,917	2,893	+51%
Instagram	0	483	

As of Spring 2022: 177 videos

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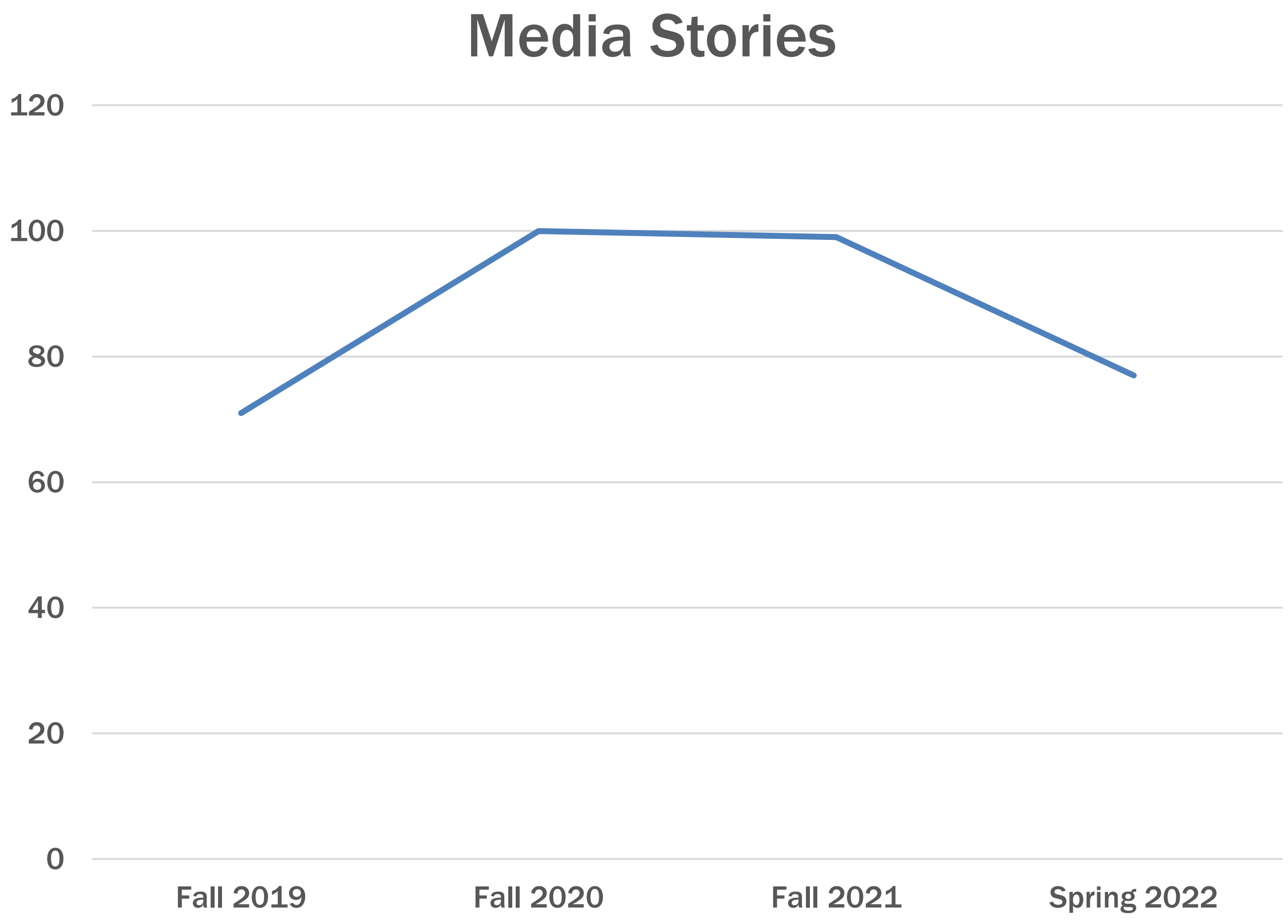
Mail

Audiences for our annual mailing:

- Staff at:
  - ENR 400 (general contractors)
  - ENR 500 (design firms)
  - ENR 600 (specialty contractors)
- Safety consultants/trainers
- Apprenticeship trainers
- Academics

Media



Topics

- COVID-19
- Falls
- Mental Health
- Struck-By

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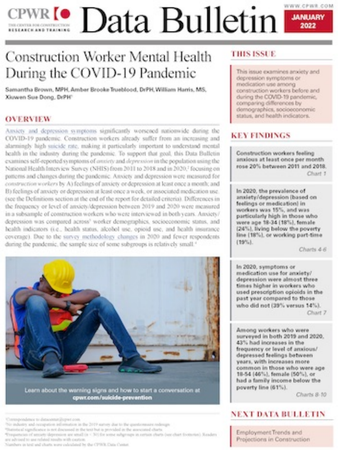
Current Project

Prevention through Design

- 10 Interviews
- Quantitative survey with 210 architects, 122 engineers

Coordinating and Promoting


CPWR Data Bulletin JANUARY 2022

Construction Worker Mental Health During the COVID-19 Pandemic

Samantha Brown, MPH, Amber Brooke Trueblood, DrPH, William Harris, MS, Xiuwen Sue Dong, DrPH

THIS ISSUE

This issue examines anxiety and depression symptoms or medication use among construction workers before and during the COVID-19 pandemic, comparing differences by demographics, socioeconomic status, and health indicators.

OVERVIEW

KEY FINDINGS

Construction workers feeling anxious at least once per month rose 20% between 2011 and 2018.

In 2020, the prevalence of anxiety/depression (based on feelings or medication) in workers was 15%, and was particularly high in those who were age 18-34 (18%), female (24%), living below the poverty line (18%), or working part-time (19%).

In 2020, symptoms or medication use for anxiety/depression were almost three times higher in workers who used prescription opioids in the past year compared to those who did not (39% versus 14%).

Among workers who were surveyed in both 2019 and 2020, 43% had increases in the frequency or level of anxious/depressed feelings between years, with increases more common in those who were age 18-54 (46%), female (50%), or had a family income below the poverty line (61%).

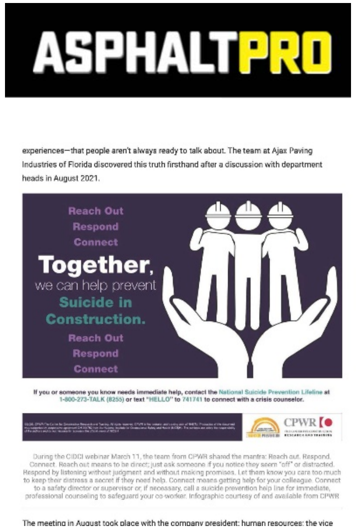
Learn about the warning signs and how to start a conversation at cpwr.com/suicide-prevention

NEXT DATA BULLETIN

Employment Trends and Projections in Construction

The Mental Health Crisis in the Construction Industry: How Can...

By 2019, suicide had become the leading cause of death in the construction industry,...


ASPHALTPRO

experiences—that people aren't always ready to talk about. The team at Ajax Paving Industries of Florida discovered this truth firsthand after a discussion with department heads in August 2021.

If you or someone you know needs immediate help, contact the National Suicide Prevention Lifeline at 1-800-273-TALK (8255) or text "HELLO" to 741741 to connect with a crisis counselor.

The meeting in August took place with the company president; human resources; the vice

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Communications

Questions?