

A. COVER PAGE

Project Title: Oregon Healthy Workforce Center	
Grant Number: U19OH010154	Project/Grant Period: 9/2016-8/2021
Reporting Period: 9/2016-8/2021 (complete cycle)	Date Submitted: 3/1/2022
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Change of Contact PD/PI: Change from Kent Anger, PhD (leadership transition in Dec 31, 2019)	
Human Subjects:	Vertebrate Animals:
hESC:	Inventions/Patents:

B. ACCOMPLISHMENTS

B.1. What are the major goals of the project?

The theme of the Oregon Healthy Workforce Center (OHWC) in 2016-2021 was intervention effectiveness. OHWC's goals were to (a) Amplify TWH Intervention Research, (b) Disseminate & Translate Research to Practice, (c) Collaborate & Build Sustainable Partnerships with Industry, and (d) Effect Regional TWH Impact.

Specific aims across OHWC's components include:

Planning & Evaluation Core

Aim 1: Guide and manage the Center.

Aim 2: Evaluate and inform the research projects, education, outreach, dissemination and translation.

Aim 3: Enhance interactions between PIs, faculty and staff to broaden the highly collaborative milieu in the Center.

Aim 4: Initiate an incubator for new intervention ideas and escalate dissemination through targeted forums.

Pilot Project

The Pilot Project program was geared toward facilitating new research projects that focused on improving employee safety, health, and well-being using the *Total Worker Health*® approach.

Research Core

Tech4Rest (randomized controlled intervention study)

Aim 1: Pilot test intervention and experimental procedures.

Aim 2: Determine the effectiveness of the enhanced cab intervention alone and in combination with behavioral intervention alone and in combination with behavioral intervention for improving sleep and reducing fatigue.

Aim 3: Conduct cost-utility analyses for interventions.

Active Workplace Study (randomized controlled intervention study)

Aim 1: Tailor *Total Worker Health* intervention components to the call center environment.

Aim 2: Determine the independent and synergistic effects of organizational and individual level intervention factors.

Aim 3: Measure the durability of intervention effects at follow-up.

Outreach Core (aims and focus)

(1) Create sustainable partnerships and outreach networks throughout Oregon, the Pacific Northwest, and beyond with employers, associations and unions, and community-based organizations for two-way communications on needs and findings on Total Worker Health.

(2) Facilitate the steady and effective translation of research to practice, and create packaged toolkits resulting from OHWC research interventions to be disseminated among partners, stakeholders, supporters, and followers.

(3) Leverage current contacts to expand our reach to include new community-based organizations, small businesses, and vulnerable work sectors.

- (4) Measure reach, utilization, and effectiveness of Outreach Core connections, and translation activities and products.
- (5) Develop and provide educational opportunities on new and relevant topics pertaining to Total Worker Health.
- (6) Expand our digital strategy that unifies products and services, and delivers them in an accessible way.

B.2. What did you accomplish under these goals?

Project Overview

In the 2016-2021 grant cycle the Oregon Healthy Workforce Center (OHWC) included collaborations with Portland State University, University of Washington, and Johns Hopkins University. We are housed at the Oregon Institute of Occupational Health Sciences (the Institute) at the Oregon Health & Science University (OHSU). For the first part of this reporting period, the OHWC was led by Director, Dr. Kent Anger and Associate Directors, Dr. Leslie Hammer and Dr. Ryan Olson through December 31, 2019 at which time Drs. Hammer and Olson took over as Co-Directors of the Center. The theme for the Center was Intervention Effectiveness with the focus being on intervention research and dissemination.

Selected accomplishments are highlighted for each OHWC component. More detailed versions are provided within each core's report.

PLANNING & EVALUATION

- Transition of leadership: In January 2020, the Center transitioned leadership from its founding Director, Dr. Kent Anger, who moved into semi-retirement, to Dr. Leslie Hammer and Dr. Ryan Olson, who were the former Associate Directors of the Center and now serve as the OHWC's Co-Directors.
- Expansion of EAC: During the 2016-2021 cycle, we expanded the diversity of our Center members by adding new members from labor (Shirley Block from Amalgamated Transit Union Local 757 and Kelly Kupcak from Oregon Tradeswomen).
- Adaptation and responsiveness to the COVID-19 pandemic: The Co-Directors have successfully led the OHWC in the face of the COVID-19 pandemic. This includes advising research and pilot project adaptations in response to disruptions, and activating the OHWC as a major resource to our University, Region 10, NIOSH and OSHA.
- Diversity, Equity, and Inclusion: At OHWC, we believe that diversity, equity, and inclusion (DEI) is the bedrock of any effort to ensure worker safety, health, and well-being. As a *Total Worker Health* Center, OHWC commits to practicing a DEI-informed approach in all aspects of our work – research planning and operations, resource development and dissemination, and partnership building and outreach.
- Program evaluation: We continue to evaluate the success and impact of our efforts using a mixed-methods approach and a combination of process and outcome evaluation indicators. Such an approach is well-suited in the context of our multi-faceted program—research, outreach, education, and dissemination. Our goals continue to guide us in our move to meaningfully expand our TWH intervention research repertoire, pursue impactful interdisciplinary collaborations, and build strategic partnerships with organizations that make a positive TWH impact.
- Affiliated research projects: In addition to our monthly ISC meetings noted above, and our currently- and previously-funded OHWC research projects, we have expanded the OHWC's Total Worker Health portfolio by welcoming affiliated projects into OHWC (i.e., non-Center-funded projects with a

TWH focus). We have invited these project teams to deliver periodic chalk talks at the ISC, which has served to increase interdisciplinary partnerships between Institute researchers (many of who are part of the OHWC), encouraged exchange of ideas and feedback, and facilitated collaborative project development. Further, OHWC's home partner institute, the Oregon Institute of Occupational Health Sciences invites faculty members to share their ongoing basic and applied research during weekly science seminars. Over the years, OHWC scientists have shared their TWH research findings and organizational partnerships.

- **Intervention Incubator:** One of the aims of the Outreach Core is to create mechanisms for incubating new research at OHWC. We have continued our intervention incubator processes, including monthly Behavior Change journal clubs, two partners' luncheon events, science-industry meetups, and we have initiated new pilot studies. To date, over a dozen potential projects have been generated, and the following projects and partnerships have secured support and resources to continue their development:

---Contract between Oregon Institute of Occupational Health Sciences (home of OHWC) with SAIF Corporation (a TWH Affiliate) to design/improve/validate SAIF's Ansbro Safety Culture Spectrum to become a leading assessment tool for organization safety. Title: *Validating Ansbro Safety Culture Spectrum as a leading indicator of organization safety* [PI: Emily Huang]

---Safety climate contract between Oregon Institute of Occupational Health Sciences (home of OHWC) with Fortis Construction. Title: *Research-to-Reality: Utilizing Safety Climate Survey Data to Advance Safety Climate Research* [PI: Emily Huang]

---Dr. Andrew McHill received a career development award (1K01HL146992-01) that grew from an idea generated during the Behavior Change Journal Club. Title: *Uncovering Circadian Mechanisms of Poor Cardiometabolic Health* [PI: Andrew McHill]

MEASURES OF EFFECTIVENESS: We report our impact across these four activities during 2016-2021:

RESEARCH: We evaluate and guide our research projects through chalk talks at ISC meetings by study teams each year. The Center Manager regularly attends research project planning meetings to be involved with and monitor intervention effectiveness outcomes; correlational research on relationships between working conditions and health, safety, and well-being outcomes; and presentations and publications. Research projects also report on, and are assisted in developing, their partnerships to accomplish research aims through our ISC processes and meetings between the outreach and research teams.

- OHWC-funded research publications: 24 publications; 3 book chapters (list of publications included in section C)
- OHWC project chalk talks: 19
- Internal Steering Committee meetings: 60 (monthly meetings)
- External Advisory Committee meetings: 5 (annual meetings)
- Pilot projects funded: 3

Two core research projects, Tech4Rest and Active Workplace Study within this cycle demonstrated these positive effects:

Sleep and Fatigue	Tech4Rest: sleep duration (d=0.37), sleep quality (d=1.49), sleep-related impairment (d=-0.93), fatigue (d=-0.56), sleep hygiene (d=-0.52)
Physical Activity	Active Workplace: percentage of time spent pedaling at desk (d=0.68), percentage of time spent sitting/lying (d=0.26), percentage of time spent in moderate to vigorous physical activity (d=0.74), general physical activity (d=1.83);

	Tech4Rest: days per week with 30 min moderate physical activity (d=1.83), actigraphically measured weekly activity bouts of 10+ min (d=0.30-1.07).
Eating Behaviors	Tech4Rest: sugary drinks consumed per day (d=-0.80), sugary snacks consumed per day (d=-0.75), fast food consumed per day (d=-1.30)
Musculoskeletal Pain	Tech4Rest: musculoskeletal pain in the neck (d=-0.54), shoulders (d=-0.53), and low back (d=-0.20)

Pilot Project program: In OHWC's current cycle, we funded 3 pilot projects in Year 4, all of which have become large (per the FOA) research projects in our Center's Research Core renewal application for 2021-2026. A summary of each study's outcomes are included here:

- A natural experiment for the impact of schedules on sleep, health, and safety in firefighters (Nicole Bowles): Qualitative studies examining firefighters' work schedule suggest that increased consecutive days off-shift despite increased consecutive days on-shift improve family relationships through increased recovery. Initial surveys also suggest a reduction in work-family conflict with increased consecutive days off. However, this was a pilot cross-sectional study that is currently being expanded and will include a prospective study that follows a department before and after a schedule change.
- Community of Practice and Safety Support-Tailored for Pain Management (COMPASS-NP; Ryan Olson): Over half of the home care workers studied reported chronic or currently elevated pain, and nearly 70% reported using pharmacological pain management strategies. Compared to respondents with no pain, those with chronic or elevated pain reported higher financial strain, interpersonal conflict with clients, minor and major injuries, and reported diagnoses of anxiety and/or depression. These workers are in great need of workplace programs that integrate cognitive-behavioral pain management strategies with injury prevention in order to prevent the progression of pain-related problems.
- Pilot-testing the feasibility of a Total Worker Health interpersonal burnout intervention (David Hurtado & Abigail Lenhart): This pilot study provided information about the feasibility, reach, and further refinements of a conducting regular one-on-one supervisor-staff check-ins as a strategy to address burnout in primary care clinics. Interviews revealed that the check-ins were separate from performance reviews and were intended to gather information affecting each worker's work or life matters. Supervisors were asked to listen to worker's input, acknowledge the problems, and improve workflow issues. However, staff mentioned that they needed to trust and feel safe as a prerequisite to disclose any information. As a next step, we will conduct a cluster randomized controlled trial to test the effectiveness of the check-ins to reduce burnout.

Common Measures Data Repository: A manuscript from OHWC's common measures data repository has been published. The paper brings to light our effort to utilize a common set of measures across OHWC's research studies—this composite data will then enable us to draw comparative profiles across worker populations and industries, illuminate patterns and safety and health outcomes, and highlight avenues for intervention.

Other select scientific collaborative efforts: NIOSH Pioneer Book on TWH

OHWC's published two chapters in NIOSH's pioneering book on *Total Worker Health*. The book titled, "*Total Worker Health*", was released in July 2019. References included in section C.

OUTREACH CORE: Selected accomplishments are reported for the major areas of focused within the Outreach Core – outreach, education, and dissemination-implementation.

Outreach: We evaluate our outreach impact through attendee feedback from outreach events such as bi-annual symposia (survey + testimonials), podcast listens and subscribers, social media metrics (followers, retweets, likes, posts, etc.), website analytics (e.g., page views, repeat visits), blog posts and followers, reach at hosted exhibit booths at regional conferences, and numbers of workplaces reached.

- Attendees reached at exhibits and meetings: ~ 3,000
- Organizations represented through partnerships and event attendance: 218
- Blog posts: Average of 4-6 posts per month; 15k+ average 6-month page views
- Facebook: 476 followers
- Twitter: 1144 followers
- LinkedIn: 244 followers (since start in 2020)
- YouTube: 6400+ total video views
- *What's Work Got To Do With It?* podcast episodes: 23 episodes, 4,067+ plays (since 2018 launch)
- OHWC website: 4500+ average 6-month page views
- OHWC's home Institute, Oregon Institute of Occupational Health Sciences website: 31,000+ average 6-month page views
- YourWorkpath.com (dissemination website): 3,240+ visitors, 9,613 views (since 2018 launch)

Outreach highlights:

- Oregon Total Worker Health Alliance. Launched in 2017, the Oregon TWH Alliance is a state-wide stakeholder partnership that consists of OHWC, the Institute, SAIF (Oregon workers' compensation provider and NIOSH TWH Affiliate), and Oregon OSHA. This Alliance has spearheaded the TWH curriculum geared toward building TWH implementation capacity. The curriculum is comprised of core and topic-specific modules to help practitioners implement the TWH approach within organizations. The curriculum has been successfully delivered to hundreds of practitioners, in-person and remotely.
- Communications and Social Media. . We prioritize frequent communications with our practitioners, organizational leaders, employees, and stakeholders in occupational safety and health, wellness, loss control, human resources, and research. We do so via the *Oregon and the Workplace blog*, social media, *What's Work Got To Do With It* podcast, exhibits, and presentations at conferences and virtual meetings.
- What's Work Got To Do With It? Podcast. Started in 2018, this podcast is focused on informing the community about how work can affect safety, health, and well-being; discuss the public health significance of occupational health; and make science accessible for all by featuring conversations with scientists, practitioners, and employers as we explore TWH issues. We have produced 23 episodes (until end of grant cycle) on topics such as epigenetics, parental leave, sedentary work, sleep and shiftwork, positive workplace culture, and emergency preparedness, all from a worker safety, health, and well-being perspective.
- Engagement on stakeholder committees and partnerships. Members of the Outreach Core serve on multiple stakeholder-led committee focused on mobilizing on-the-ground efforts for worker safety,

health, and well-being. Examples include: collaborative efforts with safety and wellness groups including American Heart Association, Center for Parental Leave Leadership, Cascade Centers, American Society of Safety Professionals (ASSP), American Industrial Hygiene Association, Oregon State Association of Occupational Health Nurses, Portland Human Resource Management Association, Oregon Public Health Association, Non-Profit Association of Oregon, the Safe From Hate Alliance geared toward ensuring safe and inclusive workplaces for people in the trades, and PCUN (Oregon's largest Latino union in the U.S.).

Education: We evaluate our education efforts through attendee feedback from biennial Occupational Health Psychology (OHP) Summer Institute (survey + testimonials), *Total Worker Health* 101 practitioner workshops, participant feedback at workshops (survey + testimonials), TWH graduate awards, science seminars pertinent to TWH, number of people trained, and MPH student intern experiences.

- TWH practitioner curriculum sessions: 15
- Practitioners trained: 675
- Science seminars pertinent to TWH: 66
- Students trained in TWH research: 7 (TWH Dissertation Award, TWH Graduate Travel Award, and MPH placements)
- Undergraduate student summer internships in TWH-themed studies: 24
- Average attendee rating at hosted bi-annual symposia events: 4.6/5
- Average OHP Summer Institute attendee rating: 4.7/5

Education highlights:

- *Total Worker Health Dissertation Award & MPH placement:* The program was launched in the Fall of 2018 and the award went to Sean Rice (Washington State University) for his project, *Conceptualizing Worker Well-being: A Longitudinal Investigation into Relationship between Types of Safety and Well-being Outcomes*. Sean defended his dissertation in February 2020 and was subsequently hired as a post-doctoral researcher in Ryan Olson's lab. Additionally, our placement program offers opportunities to students in Masters of Public Health programs to join OHWC PI labs for a specific period to get hands-on experience in worker safety, health, and well-being research.
- *Total Worker Health Graduate Travel Award:* OHWC offered a new *Total Worker Health* Graduate Travel Award, which is geared toward supporting graduate students to disseminate their occupational safety & health research at regional and national conferences. The following proposals have been awarded thus far, both presentations were at the Work + Family Researchers Network:
 - Equity considerations for monitoring the implementation of state-level family leave policies: a case example using Oregon PRAMS data* [Anna Steeves-Reece]
 - Using administrative records to understand policy impact* [Lisset Dumet Poma]
- *Total Worker Health 101 practitioner trainings:* An effort of the Oregon *Total Worker Health* Alliance, the 101 curriculum is a workshop-style training specifically informed by and geared toward the needs of practitioners. Since its launch in March 2019, Outreach Core MPI Dede Montgomery, has led multiple workshops in Oregon. We are in the process of developing follow-up TWH modules such as Worksite Solutions and Diversity, Equity, & Inclusion.
- *Fall and Spring Symposia.* These full-day continuing education events bring together professionals, practitioners and researchers to address emerging issues relevant to workplace safety, health and well-being. Spring 2020 introduced our first virtual symposium. Each symposium draws between 80-140 attendees with recent topics including workplace aggression and relational aggression,

substance use in the workplace, and most recently, work as a social determinant of health, and worker safety and health in the context of climate change.

- Occupational Health Psychology Summer Institute. The aim of the Summer Institute has been to educate audiences on the theory and practice of OHP as a key driver of TWH. Attendees participate in sessions with scientists, practitioners, and experts over a 3-day period, to learn the skills and methods for workplace application of OHP and TWH principles. We held three Summer Institutes during the current cycle (2016, 2018, 2020).
- Undergraduate summer internship program: The 3-month summer internships are geared toward providing an in-depth experience to become involved in a mentor's research and/or dissemination project, prepare an academic-style abstract, and present findings via a poster and verbal presentation.
- The Cascadia Occupational and Environmental Health Academic Consortium (COEHAC) was formed in Summer 2020 and represents a collaborative effort between our Center, OHSU, Portland State University, Oregon State University, University of Washington, and University of British Columbia to streamline Occupational Health course offerings in our region.

Dissemination & implementation: We evaluate our dissemination through our (a) monthly dissemination workgroup meetings and associated engagement at these workgroups, (b) meetings with end users of toolkits to help inform toolkit packaging and enhancement, (c) meetings between dissemination and outreach members with research teams to help inform intervention research and better prepare for translation, dissemination, and implementation, and (d) tracking of people/organizations interested in learning about and adopting the tools and toolkits, and number of connections via YourWorkpath.com, our website/online repository dedicated to disseminating OHWC's resources. Research findings and successful research-to-practice impacts are disseminated via traditional routes such as publications in peer-reviewed journals and presentation at conferences as well as through non-traditional channels such as blogs, practitioners-focused and professional newsletters (e.g., ASSP, AIHA), our Institute monthly newsletter, and NIOSH's quarterly TWH in Action e-newsletter.

- Organizations interested in OHWC resource adoption: 10
- Publications and mentions in non-academic platforms (excluding blog posts): 12
- Resources disseminated: 582 views, 167 downloads
- Visitors to YourWorkpath.com (dissemination website): 3,240+ visitors, 9,613 views (since 2018 launch)
- Dissemination workgroup sessions: 34

We maintain our Center Accomplishments webpage, which includes data from some of the above evaluation methods. All the evaluation data gathered have helped inform OHWC's collective activity.

Translation, dissemination, and implementation highlights:

- YourWorkpath website and YourWorkpath program. YourWorkpath was launched in July 2018 to curate and disseminate our ready-to-use toolkits and resources. It is designed as an online repository of OHWC'S research-based resources with goals to: reach HR departments, workplace safety managers, wellness committees, and consultants across industries; to give organizations access to evidence-based TWH toolkits in exchange for implementation data, feedback, and case-studies and subsequently, inform the development of future toolkits; contribute to OHP and well-being research; and highlight organizations engaging in TWH-informed practices and policies. Developed as an

interactive platform, it includes a live chat tool to give organizations the opportunity to connect with OHWC in real-time.

- Dissemination Workgroup. The goal of the Dissemination Workgroup meetings is to help researchers learn basic concepts and exercise best practices for disseminating intervention research. Each workgroup is dedicated to a topic, some presented by invited speakers with pertinent expertise, and each session is discussion-based and action-oriented. Some sample topics covered at these meetings include: technology transfer and licensing, reaching the end-user and target audience for OHWC tools and toolkits, common measures for dissemination, dissemination strategies through popular media, Lean Canvas method, dissemination planning and lifecycle of tools and toolkit, and creating a communications plan.
- Research to Practice (including toolkit enhancements, translation, dissemination-implementation partnerships). We regularly reach out to our community stakeholders and toolkit end-users for feedback to further improve our toolkits, making them more amenable to organizational adoption. Since 2017, OHWC has reviewed and updated all TWH toolkits (e.g., online trainings, user guides, team-based activities) that were developed in the first funding cycle. All newly redesigned user guides can be downloaded at YourWorkpath. Examples include the following:
 - The *Safety and Health Improvement Program* (SHIP) redesign: The SHIP toolkit was redesigned in August 2020 after receiving feedback from OHWC's first participants in the YourWorkpath Program, Eskenazi Health, on the user experience of the user guide. The SHIP user guide, templates, and leadership slides were improved to provide easier program implementation instructions, and a more streamlined package with quick access to essential tools for everyday practice.
 - SAIF "Leadership Project": In our inaugural top-down dissemination partnership, OHWC has formalized a technology transfer and partnership agreement with SAIF to include our Safety and Health Improvement Program (SHIP) training program in their new "Leadership Project", geared toward improving workplace culture via a menu of leadership-oriented online and in-person trainings. The license specifies that SAIF will disseminate SHIP to their policy holders (which comprises nearly half of Oregon's employees) free of charge, that it will be disseminated directly to their catalog of partnering organizations by SAIF consultants, and that implementation and feedback data will be shared with us quarterly. This will allow us to track both feedback and data from individual organizations and meta-data from SAIF on how many organizations have engaged the training and whether they plan to maintain the training internally following initial engagement.
 - The *COMPASS* toolkit has been adopted by the Oregon Home Care Commission and is offered statewide as a paid training to 60% of Oregon's home care workforce (those who are publicly funded). COMPASS guidebooks were updated to be inclusive of personal support workers. Updates were made to content and activities to reflect worker diversity. Additionally, OHWC developed an online facilitator orientation training to help onboard new Oregon Home Care Commission COMPASS facilitators. This involved video shoots of real and mock COMPASS meetings. The Commission has translated the new curriculum into Somali and Russian to increase reach and accessibility.
 - Consultations with potential adopting organizations*: We receive and actively seek out dissemination partnerships and consultation opportunities with organizations interested in implementing on TWH strategies.

COVID-19 ACTIVITIES

In response to COVID-19, the OHWC began publishing articles and developing trainings and tools to provide

guidance and ease some of the burden faced by industry leaders, employees, and community members. Our materials were released through our new webpage *COVID and the World of Work*, our *Oregon and the Workplace* blog, and non-academic dissemination channels (e.g., articles, social media). To date, our articles and blog posts related to COVID have reached more than 60,000 readers nationwide. We developed a micro training, "Pandemic Response Training for Supervisors," which has now reached more than 1,300 views and has averaged 5.7 unique visitors per day as of 2020. Our Outreach Core continues to respond to inquiries, develop materials, and provide guidance for community members and industry leaders who have reached out to our Center with inquiries. Our Center also guided the OHSU COVID Wellness Task Force in a COVID Pulse Survey implemented in May, September, and January 2021 to track mental health and work experiences among OHSU employees. Highlighted COVID-19-related activities include:

- **Pandemic Response Training for Supervisors and Managers:** 10-minute online leadership training to provide supervisor and managers with evidence-based strategies to support their workers during the pandemic.
- **COVID Conversations:** Launched in February 2021, the *COVID Conversations* series was an online series geared toward sharing current practices with occupational health nurses, industrial hygienists, and safety professionals.
- **Agriculture:** OHWC served as technical advisor to several groups and worker advocates in support of safety and health for farmworkers, specifically promoting engineering and behavioral control policies for fields and housing.
- **COVID-19 Safety Climate Survey** One of the first COVID Safety Climate assessments designed to help organizations evaluate culture, predict outcomes and promote safety and health of employees as they return to work.
- **Oregon COVID-19 Construction Task Force:** Outreach MPI Dede Montgomery provides technical support to enhance safety, health, and well-being. The task force is a partnership of union and non-union industry professionals, with support from Oregon OSHA. OHWC created a webpage to share task force resources
- **Wellness Task Force:** OHWC's home institution, Oregon Health & Science University established a COVID Wellness Task Force and asked OHWC Co-Director, Leslie Hammer, PhD and Researcher, David Hurtado, ScD to serve on the task force to develop and evaluate a Wellness Pulse Survey to assess employee psychological health and well-being, workplace experience, and wellness resources.
- **Region 10 Efforts:** Dede Montgomery was requested by NIOSH to provide COVID-19 industrial hygiene and safety support to workplaces in the Pacific Northwest and Region 10.
- **Mental Health & Suicide Prevention:** Outreach Specialist, Nichole Guilfooy is engaged on two state and regional committees to support mental health and suicide prevention with a focus on safety, health, well-being during COVID-19.

B.3. Competitive Revisions/Administrative Supplements

Nothing to report here.

B.4. What opportunities for training and professional development did the project provide?

All metrics pertaining to activities below are reported in section B.2.

(a) STUDENT EDUCATION

- **Total Worker Health Dissertation Award:** The program was launched in the Fall of 2018 and the award went to Sean Rice (Washington State University) for his project, *Conceptualizing Worker Well-being: A Longitudinal Investigation into Relationship between Types of Safety and Well-being Outcomes*. Sean defended his dissertation in February 2020 and was subsequently hired as a post-doctoral researcher in Ryan Olson's lab.
- **MPH placement:** Additionally, our placement program offers opportunities to students in Masters of Public Health programs to join OHWC PI labs for a specific period to get hands-on experience in ongoing research projects.
- **Undergraduate summer intern program:** The 3-month summer internships are geared toward providing an in-depth experience to become involved in a mentor's research and/or dissemination project, prepare an academic-style abstract, and present findings via a poster and verbal presentation.
- **Total Worker Health Graduate Travel Award:** OHWC offered *Total Worker Health* Graduate Travel Award, which is geared toward supporting graduate students to disseminate their occupational safety & health research at regional and national conferences.
- **The Cascadia Occupational and Environmental Health Academic Consortium (COEHAC)** was formed in Summer 2020 and represents a collaborative effort between our Center, OHSU, Portland State University, Oregon State University, University of Washington, and University of British Columbia to streamline Occupational Health course offerings in our region.
- **Graduate course:** Occupational Health (ESHH 521/621) for students in the MPH program, OHSU-PSU School of Public Health.

(b) SCIENTIST PROFESSIONAL DEVELOPMENT

- **Pilot Project Program:** Three pilot projects were funded, all of which have become large (per the FOA) research projects in our Center's Research Core renewal application for 2021-2026.
 - A natural experiment for the impact of schedules on sleep, health, and safety in firefighters (Nicole Bowles)
 - Community of Practice and Safety Support-Tailored for Pain Management (COMPASS-NP; Ryan Olson)
 - Pilot-testing the feasibility of a *Total Worker Health* interpersonal burnout intervention (David Hurtado & Abigail Lenhart)
- **K Award:** Dr. Andrew McHill received a career development award (1K01HL146992-01) that grew from an idea generated during the Behavior Change Journal Club. Title: Uncovering Circadian Mechanisms of Poor Cardiometabolic Health [PI: Andrew McHill]
- **Dissemination Workgroups:** The goal of the Dissemination Workgroup meetings is to help researchers learn basic concepts and exercise best practices for disseminating intervention research. Each workgroup is dedicated to a topic, some presented by invited speakers with pertinent expertise, and each session is discussion-based and action-oriented. Workgroup topics have included technology transfer and licensing, reaching the end-user and target audience for OHWC tools and toolkits, common measures for dissemination, dissemination strategies through popular media, Lean Canvas method, dissemination planning and lifecycle of tools and toolkit, and creating a communications plan.

(c) PRACTITIONER EDUCATION

- **Total Worker Health 101 practitioner trainings:** An effort of the Oregon *Total Worker Health* Alliance, the 101 curriculum is a workshop-style training specifically informed by and geared toward the needs of practitioners. Since its launch in March 2019, Outreach Core MPI Dede Montgomery, has led multiple workshops in Oregon. We are in the process of developing follow-up TWH modules such as Worksite Solutions and Diversity, Equity, & Inclusion.
- **Fall and Spring Symposia.** These full-day continuing education events bring together professionals, practitioners and researchers to address emerging issues relevant to workplace safety, health and well-being. Spring 2020 introduced our first virtual symposium. Each symposium draws between 80-140 attendees with topics including workplace aggression and relational aggression, substance use in the workplace, and most recently, work as a social determinant of health, and worker safety and health in the context of climate change.

(d) GENERAL AUDIENCE EDUCATION

- **Occupational Health Psychology Summer Institute.** The aim of the Summer Institute has been to educate audiences on the theory and practice of OHP as a key driver of TWH. Attendees participate in sessions with scientists, practitioners, and experts over a 3-day period, to learn the skills and methods for workplace application of OHP and TWH principles. We held three Summer Institutes during the current cycle.
 - Building a Culture of Health, Safety, and Well-Being (2020)
 - Translation of Workplace Interventions: Dissemination and Implementation (2018)
 - OHP Innovation and Creative Strategies Leading to *Total Worker Health* (2016)
- **Science seminars:** OHWC's home partner institute, the Oregon Institute of Occupational Health Sciences invites faculty members to share their ongoing basic and applied research. Over the years, OHWC scientists have shared their TWH research findings and organizational partnerships.

B.5. How did you disseminate the results to communities of interest?

OHWC disseminates research findings and conducts outreach through a variety of channels. These include:

- Peer-reviewed publications: Journal articles and book chapters
- Popular media
- Oregon and the Workplace* blog
- Presentations and exhibit presence at conferences: Academic, practitioner-focused, and mixed audience events
- What's Work Got To Do With It?* podcast

Outputs pertaining to listed items here are included in section C.

B.6 - What do you plan to do during the next reporting period to accomplish the goals?

Not applicable. This is the final, close-out report of the current cycle (2016-2021).

C. PRODUCTS

C.1. Publications, conference papers, and presentations

(a) PEER-REVIEWED PUBLICATIONS

Journal articles

1. Hammer, L.B. (2021). The Interplay of Workplace Redesign and Public Policy in the 21st Century. *American Journal of Public Health*, 11 (10), 1784-1786, DOI: [10.2105/AJPH.2021.306368](https://doi.org/10.2105/AJPH.2021.306368)
2. Wipfli, B., Wild, S., Richardson, D. M., & Hammer, L. (2021). Work as a Social Determinant of Health: A Necessary Foundation for Occupational Health and Safety. *Journal of occupational and environmental medicine*, 10.1097/JOM.0000000000002370. Advance online publication. <https://doi.org/10.1097/JOM.0000000000002370>.
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Book Chapters

1. Hammer, L.B. & Brady, J. M. (2021). The Evolution of Worker Well-Being and Work-Life Issues. In L. Koppes Bryan (Ed.), *Historical perspectives in industrial and organizational psychology* (2nd ed., pp. xx). Routledge/Taylor and Francis Group.
2. Anger, K., Rameshbabu, A., Parker, K., Wan, W., Hurtado, D., Olson, R., Rohlman, D., Wipfli, B., Bodner, T. (2019). Effectiveness of Total Worker Health Interventions: A Systematic Review. In

Hudson, H.L., Nigam, J.A., Sauter, S.L., Chosewood, L.C., Schill, A.L. (Eds.). Total Worker Health. Washington, DC: American Psychological Association.

3. Hammer, L.B. & Perry, M. (2019). Reducing Work-Life Stress: The Place for Integrated Interventions. In H. L. Hudson, J. A. S. Nigam, S. L. Sauter, L. C. Chosewood, A. L. Schill, & J. Howard (Eds.). Total Worker Health. Washington, DC: American Psychological Association.

(b) POPULAR MEDIA

1. Schuckers, Helen (2021). [Learning from different industries to improve safety, health, and well-being at work](#). *Medium*.
2. Hammer, L and Alley, L. (2021). [How managers can support employee well-being during a pandemic](#). *Medium*.
3. Schuckers, H. and Rameshbabu, A. (2021). [Looking for ways to support your employees? Start with work-life balance](#). *Medium*.
4. Hammer, L and Alley, L. (2020). [4 Key Strategies to Support Employee Well-Being During COVID-19](#). *Medium*.
5. Hammer, L and Alley, L. (2020). [Lead with Empathy During the COVID-19 Crisis](#). *The Conversation*.
6. Hammer, L. & Alley, L. (2020). [Supporting Worker Sleep is Good for Business](#). *The Conversation*.
7. Schuckers, H. (2020). [10 Things to Know About Total Worker Health](#). *Medium.com*.
8. Olson, R. & Hill, A. (2020). [Sleep, Circadian Biology, and Health: Action in the Behavioral Interactions!](#) *Association of Behavior Analysis International Blog*.
9. Montgomery, D., Hill, L., & Wood, M. (2019). Oregon Organizations [Collaborate to Move the Needle Toward Total Worker Health](#). *Professional Safety*.
10. Alley, L. (2019). [Breaking the Silo: Modern Research on Employee Well-being](#). *Medium*.
11. Hill, L., Montgomery, D., Bowers-Payne, R. (2019) [The Journey to "Be Well: Implementing Total Worker Health in Eugene, Oregon"](#). *American Industrial Hygiene Association Synergist*.

(c) RESEARCH REPORT/WHITE PAPER

- Research report for PCUN: *Mandated, But Not Compensated: Exploring the Multifaceted Impacts of Overtime on Farm Workers' Health, Safety, and Well-being* (2021)
- Dede Montgomery led development of internal white paper for ASSE national and participated in discussion of Society's role in TWH including participation in national meetings (ASSE Safety 2018, WCI 2018).

(d) OREGON and the WORKPLACE BLOG

An average of 4-6 blogs are posted each month. A **sampling of our blogs** is provided here:

- [Total Worker Health® practitioner education: Full steam ahead](#)
- [International Symposium to Advance Total Worker Health® call for proposals](#)
- [Social determinants of health meets Total Worker Health®](#)
- [Oregon workplace vaccine mandate status](#)
- [2021 Team for Inclusion, Diversity and Equity \(TIDE\) update](#)
- [Active Workplace Toolkit](#)
- [Actionable HR strategies abound at PHRMA Strategic Management Conference](#)

(e) PRESENTATIONS and EXHIBIT PRESENCE AT CONFERENCES

Research and outreach members present at academic and practitioner-focused conferences. Prior to

COVID, outreach members also hosted in-person booths where OHWC's resources are disseminated directly to industry safety and wellness practitioners. Below are some **examples of events** we have presented at:

Academic conferences

- APA Work, Stress, and Health
- European Academy of Occupational Health Psychology
- European Association of Work and Organizational Psychology
- Internal Commission on Occupational Health
- Society for Occupational Health Psychology
- American Public Health Association conference
- Oregon Public Health Association conference

Practitioner-focused conferences

- American Society of Safety Professionals
- American Industrial Hygiene Association
- Regional Oregon OSHA-sponsored occupational safety and health conferences
- Oregon Governor's Occupational Safety & Health Conference
- Health Enhancement Research Organization
- Portland HR Management Association
- American Heart Association Workplace Wellness Summit

Mixed audience-focused conferences

- Presentations to organizational research partners
- International Symposium to Advance *Total Worker Health*®

(f) PODCAST *What's Work Got To Do With It?*: (since launch in 2018 through end of cycle)

1. [2021 Student Intern Program](#)
2. [NIOSH 50th Anniversary](#)
3. [COVID-19 and wildfire smoke on wildland firefighters](#)
4. [COVID-19 and farmworkers](#)
5. [Mental health and suicide prevention in construction](#)
6. [Part 3: Three decades at the Institute](#)
7. [Safety climate](#)
8. [Changing a toxic workplace culture](#)
9. [Part 2: Three decades at the Institute](#)
10. [Part 1: Three decades at the Institute](#)
11. [Nation's opioid epidemic](#)
12. [Summer interns](#)
13. [Positive workplace culture](#)
14. [Toxicology](#)
15. [Workplace aggression](#)
16. [Parental leave](#)
17. [Cascadia subduction zone](#)
18. [Sitting](#)
19. [Sleep](#)

20. [Total Worker Health®](#)
21. [Epigenetics](#)
22. [Introduction](#)
23. [OHSU Week Episode](#)

C.2. Website(s) or other Internet site(s) – include URL(s)

- OHWC: <http://www.ohsu.edu/ohwc>
- Oregon Institute of Occupational Health Sciences (home of OHWC): <https://www.ohsu.edu/oregon-institute-occupational-health-sciences>
- YourWorkpath: <https://www.yourworkpath.com/>
- Oregon and the Workplace Blog: <https://blogs.ohsu.edu/occupational-health-sciences/>
- LinkedIn: <https://www.linkedin.com/company/occhealthsci/>
- Twitter: <https://twitter.com/OHSUOccHealth>
- Facebook: <https://www.facebook.com/occhealthsci.ohsu/>
- Podcast: <https://www.ohsu.edu/oregon-institute-occupational-health-sciences/whats-work-got-do-it-podcast>
- YouTube: https://www.youtube.com/channel/UCXF8ZmB51EM_H3KMy4X8oYw/videos

C.3. Technologies or techniques

Nothing to report here.

C.4. Inventions, patent applications, and/or licenses

License/inventions are filed with Tech Transfer department at OHWC's home institution, Oregon Health & Science University. Licenses were obtained during this grant period for projects completed during OHWC's previous cycle.

- Safety & Health Improvement Program (SHIP):
 - License with SAIF Corporation, license # AGR-2602-02
 - License with Eskenazi Health Inc., license # AGR-2602-01
- COMmunity of Practice And Safety Support program (COMPASS): License with Oregon Home Care Commission, license # AGR-2109-01
- Promoting U Through Safety & Health (PUSH): License with St. Louis Community College, license #s AGR-2248-02

C.5. Other products and resource sharing

- Leslie Hammer was invited by Cascade Centers EAP to speak in their Human Resources Webinar series on the topic, "The Role of Leaders in Reducing Work-Life Stress" <https://www.youtube.com/watch?v=7OcGKb5qfS0&feature=youtu.be>
- Recordings from bi-annual symposia: <https://www.ohsu.edu/oregon-institute-occupational-health-sciences/training-and-symposia>
- Recordings from Occupational Health Psychology Summer Institute: <https://www.ohsu.edu/oregon-healthy-workforce-center/occupational-health-psychology-summer-institute>
- Podcast episodes: <https://soundcloud.com/occhealthsci>

D. PARTICIPANTS

D.1. What individuals have worked on the project? Please include calendar, academic, and summer months.

Commons ID	S/K	Name	Degrees(s)	Role	Cal	Aca	Sum	Foreign	Country	SS

PLEASE SEE TABLE BELOW.

D.2 Personnel updates: PLEASE SEE TABLE BELOW.

- a. Level of Effort:**
- b. New Senior/Key Personnel:**
- c. Changes in Other Support:**
- d. New Other Significant Contributors:**

D. OVERALL PARTICIPANTS

D.1 WHAT INDIVIDUALS HAVE WORKED ON THE PROJECT?

Commons ID	S/ K	Name	Degree(s)	Role	Cal	Aca	Sum	Foreign Org	Component(s)	Coun try	SS
HAMMERL	Y	Hammer, Leslie	BS,MS, PHD	PD/PI	1.8				Admin Core- (Planning & Evaluation Core), Core-(Outreach Core)		NA
OLSONRY	Y	Olson, Ryan	BS,MA, PHD	PD/PI	3.0				Admin Core- (Planning & Evaluation Core), Core-(Outreach Core) Project- (Engineering and Behavioral Tech 4Rest Study)		NA
	N	Donovan, Courtney	MPH	Non-Student Research Assistant	9.0				Project- (Engineering and Behavioral Tech 4Rest Study)		NA
	N	Rimby, Jarred	BA	Non-Student Research Assistant	7.7				Project- (Engineering and Behavioral Tech 4Rest Study)		NA
	N	Springer, Rachel	MS	Statistician	1.8				Project- (Engineering and Behavioral Tech 4Rest Study)		NA
	N	Greenspan,Samuel	MPH	Non-Student Research Assistant	4.6				Admin Core- (Planning & Evaluation Core-Pilot Project)		NA
	N	Velasco, Josie	BS	Non-Student Research Assistant	4.0				Project- (Engineering and Behavioral Tech 4Rest Study)		NA
	N	Watkins, Shelby	MPH	Non-Student Research Assistant	2.0				Admin Core- (Planning & Evaluation Core-Pilot Project)		NA
	N	Wild, Sara	MPH	Non-Student Research Assistant	9.8				Project- (Multilevel Intervention-Active Workplace Study)		NA
	N	Alley, Lindsey	MS	Non-Student Research Assistant	2.8				Core- (Outreach Core)		NA

	Y	Montgomery, Dede	BA, MS, CIH	Project MPI	2.2				Admin Core- (Planning & Evaluation Core), Core-(Outreach Core)		NA
	N	Rice, Sean	PHD, MS	Non-Student Research Assistant	2.8				Project (Engineering and Behavioral Tech 4Rest Study)		NA
	N	Greenspan, Leah	BA, MPH	Non-Student Research Assistant	1.0				Admin Core- (Planning & Evaluation Core-Pilot Project)		NA
GCHANSON	Y	Hanson, Ginger	BS,MS, PHD	Sub award PI	1.8				Admin Core- (Planning & Evaluation Core)		NA
	N	Trullinger Dwyer, Caitlyn	BA	Non-Student Research Assistant	6.8				Project- (Engineering and Behavioral Tech 4Rest Study)		NA
RAMESHBAB	Y	Rameshbabu , Anjali	PHD	Project MPI; Center Manager	12.0				Admin Core- (Planning & Evaluation Core), Core-(Outreach Core)		NA
SAS123	Y	SHEA, STEVEN A	PHD,BS	Project MPI	.5				Project (Engineering and Behavioral Tech 4Rest Study) Project- (Multilevel Intervention-Active Workplace Study)		NA
WIPFLIB	Y	Wipfli, Brad	PHD,BA	Project MPI	1.5				Admin Core- (Planning & Evaluation Core), Core-(Outreach Core) Project- (Multilevel Intervention-Active Workplace Study)		NA

Glossary of acronyms:

S/K - Senior/Key
DOB - Date of Birth
Cal - Person Months (Calendar)
Aca - Person Months (Academic)
Sum - Person Months (Summer)

Foreign Org - Foreign Organization Affiliation

SS - Supplement Support
RE - Reentry Supplement
DI - Diversity Supplement
OT - Other
NA - Not Applicable

E. IMPACT

E.1 - What is the impact on the development of human resources, if applicable?

OHWC's collective activities (research, dissemination, education, and outreach) and their outputs are geared toward producing evidence-based (i.e., emerging directly from our research) and evidence-informed (informed by existing literature) resources that industry and public health professionals (such as human resource) and organizational leaders can implement within their setting. The impact of our activities have been reported in the above sections.

Institute Senior Research Associate and Oregon Healthy Workforce Center Outreach Co-Principal Investigator, Dede Montgomery received a CDC National Institute for Occupational Safety and Health (NIOSH) COVID-19 Intergovernmental Personnel Assignment (IPA) to support safe return of workers during the pandemic in Region X. Through her 0.15 FTE (9/2020-9/2021), Montgomery provided training and educational videos, and technical expertise to industry requests including agriculture, construction and general industry.

E.2 - What is the impact the Public Health Relevance and Impact? The investigator should address how the findings of the project relate beyond the immediate study to improved practices, prevention or intervention techniques, legislation, policy, or use of technology in public health.

We have published a number of peer-reviewed publications, which could serve as foundational evidence for the effectiveness of *Total Worker Health* strategies to protect and promote worker safety, health, and well-being across industries. In particular, our systematic review chapter in NIOSH's pioneering book on *Total Worker Health* will allow future researchers to build on and integrate into their work. Center co-director, Dr. Leslie Hammer's article in the American Journal of Public Health dwells on the *The Interplay of Workplace Redesign and Public Policy in the 21st Century*, while emphasizing work as a key social determinant of health. Our robust efforts to disseminate OHWC's evidence-based resources have led to the development of YourWorkpath, an online repository and the YourWorkpath program, which allows organizations to test and adopt our tools and toolkits. OHWC's resources have been adopted by organizations as listed in the above sections. Further, our Oregon *Total Worker Health* Alliance, a first of its kind partnership between research, regulatory, and workers compensation entities, has helped to spearhead the *Total Worker Health* trainings for occupational safety and wellness professionals, thus facilitating capacity-building for implementing the *Total Worker Health* approach in practice. With regard to policy action, we produced a research report for PCUN, Oregon's largest Latino union in the U.S., titled, *Mandated, But Not Compensated: Exploring the Multifaceted Impacts of Overtime on Farm Workers' Health, Safety, and Well-being* (2021) – this report is helping PCUN to bring the issue of unpaid overtime work among farmers to legislation. Institute Senior Research Associate and Oregon Healthy Workforce Center Outreach Co-Principal Investigator, Dede Montgomery received a CDC National Institute for Occupational Safety and Health (NIOSH) COVID-19 Intergovernmental Personnel Assignment (IPA) to support safe return of workers during the pandemic in Region X. Through her 0.15 FTE (9/2020-9/2021), Montgomery provided training and educational videos, and technical expertise to industry requests including agriculture, construction and general industry. OHWC's Outreach Core served to broaden our outreach by leveraging existing connections and accomplishments to translate the TWH approach into practice. Our communication and dissemination

activities are geared toward making immediate and long-term impact. Because members of the Outreach Core serve both OHWC and the Oregon Institute of Occupational Health Sciences, our work is co-ordinated and cross-promoted, thus amplifying our research and dissemination efforts.

F. CHANGES

F.1 – Changes in approach and reasons for change, including changes that have a significant impact on expenditures

Nothing to report here.

F.2 - Actual or anticipated challenges or delays and actions or plans to resolve them

Nothing to report here.

F.3 - Significant changes to human subjects, vertebrate animals, biohazards, and/or select agents

Nothing to report here.

G. Special Reporting Requirements

G.1 Special Notice of Award Terms and Funding Opportunities Announcement Reporting Requirements

Nothing to report here.

G.2 Responsible Conduct of Research

Nothing to report here.

G.3 Mentor's Research Report or Sponsor Comments

Nothing to report here.

G.4 Human Subjects: *Please note: All reporting pertinent to human subjects are reported within each Research Core project.*

G.4.a Does the project involve human subjects?

Nothing to report here.

G.4.b Inclusion Enrollment Data

Nothing to report here.

G.4.c ClinicalTrials.gov

Does this project include one or more applicable clinical trials that must be registered in ClinicalTrials.gov under FDAAA?

Nothing to report here.

G.5 Human Subject Education Requirement

Are there personnel on this project who are newly involved in the design or conduct of human subject's research?

Nothing to report here.

G.6 Human Embryonic Stem Cells (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

Nothing to report here.

G.7 Vertebrate Animals

Does this project involve vertebrate animals?

Nothing to report here.

G.8 Project/Performance Sites

Nothing to report here.

G.9 Foreign Component

Nothing to report here.

G.10 Estimated Unobligated Balance

G.10.a Is it anticipated that an estimated unobligated balance (including prior year carryover) will be greater than 25% of the current year's total approved budget?

Our current non-obligated balance is \$425,822. We will be submitting a detailed carryforward request pending acceptance of our Final Financial Report.

G.11 Program Income

Is program income anticipated during the next budget period?

Nothing to report here.

G.12 F&A Costs

Is there a change in performance sites that will affect F&A costs?

Nothing to report here.

I. OUTCOMES

I. Provide a concise summary of the outcomes or findings of the award, written for the general public in clear and comprehensible language, without including any proprietary, confidential information or trade secrets

Note: project outcome information will be made public in NIH RePORTER

OHWC's overall, collective activity across the Planning & Evaluation, Research, and Outreach Cores demonstrates a compelling record of innovation and accomplishment. In this cycle (2016-2021), OHWC has made consistent and demonstrable strides toward its four aims within the Planning & Evaluation Core. Specifically, there has been a successful transition of leadership; our External Advisory Committee has been meaningfully expanded to include members with diverse stakeholder expertise; we have adapted and actively responded to the COVID-19 pandemic and rapidly changing needs of the workforce; our core funded projects have yielded positive effects included reduced sleep and fatigue, and musculoskeletal pain, and improved physical activity and eating behaviors; further, 3 pilot projects were funded in this cycle, all of which became full-fledged research projects in OHWC's subsequent cycle. As of this cycle, OHWC has produced 24 peer-reviewed articles, and 3 book chapters. Given our goal to create evidence-based comprehensive toolkits and evidence-informed easy-to-use tools, we have created resources for workers across industries such as construction, home care, parks and recreation, trucking, public works, and call centers. We have supplemented our research success with robust activities within the Outreach Core – these include forging new partnerships with stakeholder-led and worker community groups, disseminating our research through peer-reviewed journals and book chapters; we published lay audience articles in popular media; we have maintained a strong social media and blog presence; and created a podcast. Next, we have created and sustained a variety of TWH professional development and educational opportunities for practitioners and students such as the OHP Summer Institute for academic audiences, bi-annual symposia for practitioners, and internship opportunities for graduate and undergraduate students. Through our landmark Oregon *Total Worker Health* Alliance, we have helped spearhead the *Total Worker Health* curriculum and delivered the training to hundreds of practitioners through in-person and online formats. Finally, the outcomes of our research have been translated into ready-to-use multi-component toolkits,

which along with our collective resources from previous cycles are housed and disseminated through a dedicated online repository, YourWorkpath.com.

A. COVER PAGE

Project Title: Planning & Evaluation Core	
Grant Number: U19OH010154	Project/Grant Period: 9/2016-8/2021
Reporting Period: 9/2016-8/2021 (complete cycle)	Date Submitted:
Program Director/ Principal Investigator Leslie Hammer, PhD (Contact), and Ryan Olson, PhD hammerl@ohsu.edu 503-725-3971	Administrative Official Information Mark Derby derbym@ohsu.edu 503-494-8893
Change of Contact PD/PI:	
Human Subjects:	Vertebrate Animals:
hESC:	Inventions/Patents:

B. ACCOMPLISHMENTS

B.1. What are the major goals of the project?

Aim 1: Guide and manage the Center.

Aim 2: Evaluate and inform the research projects, education, outreach, dissemination, and translation.

Aim 3: Enhance interactions between PIs, faculty and staff to broaden the highly collaborative milieu in the Center.

Aim 4: Initiate an incubator for new intervention ideas and escalate dissemination through targeted forums.

B.2. What did you accomplish under these goals?

Project Overview

In the 2016-2021 grant cycle, Oregon Healthy Workforce Center (OHWC) was an affiliation of the Oregon Institute of Occupational Health Sciences, Portland State University, and Johns Hopkins University. We are housed at the Oregon Institute of Occupational Health Sciences (the Institute) at the Oregon Health & Science University (OHSU). For the reporting period, OHWC was led by Director, Dr. Kent Anger and Associate Directors, Dr. Leslie Hammer and Dr. Ryan Olson through December 31, 2019 at which time Drs. Hammer and Olson took over as Co-Directors of the Center. The theme for the Center was Intervention Effectiveness with the focus being on intervention research and dissemination.

Aim 1: Guide and manage the Center

The Planning & Evaluation Core (P& E Core) guides the overall functioning of the Center. It consists of the Internal Steering Committee (ISC) comprising the Director, Associate Directors, Research Project and Outreach Core PIs, the Center Manager and the lead of the Design & Analysis Group. We also invite to our ISC meetings post-doctoral researchers, project managers, and other research faculty and staff related to our research projects and affiliated projects. OHWC's External Advisory Committee (EAC) is comprised of professionals from academia, business, and labor, who provide expert oversight during annual meetings. In addition to the ISC, the administrative functioning of the Center is managed by the Finance Manager, Grants Coordinator, and Administrative Coordinator. Through monthly ISC meetings and annual EAC meeting, the P&E Core has continued to facilitate and support the overarching goals and mission of the Center.

Selected highlights:

- **Transition of leadership:** In January 2020, the Center transitioned leadership from its founding Director, Dr. Kent Anger, who moved into semi-retirement, to Dr. Leslie Hammer and Dr. Ryan Olson, who were the former Associate Directors of the Center and now serve as OHWC's Co-Directors.
- **Expansion of EAC:** During the 2016-2021 cycle, we expanded the diversity of our Center members by adding new members from labor (Shirley Block from Amalgamated Transit Union Local 757 and Kelly Kupcak from Oregon Tradeswomen).
- **Adaptation and responsiveness to the COVID-19 pandemic:** The Co-Directors have successfully led OHWC in the face of the COVID-19 pandemic. This includes advising research and pilot project adaptations in response to disruptions, and activating OHWC as a major resource to our University, Region 10, NIOSH and OSHA.
- **Diversity, Equity, and Inclusion:** At OHWC, we believe that diversity, equity, and inclusion (DEI) is the bedrock of any effort to ensure worker safety, health, and well-being. As a *Total Worker Health Center*, OHWC commits to practicing a DEI-informed approach in all aspects of our work –

research planning and operations, resource development and dissemination, and partnership building and outreach. We have a dedicated webpage that describe our DEI efforts.

Aim 2: Evaluate and inform the research projects, education, outreach, dissemination, and translation.

We continue to evaluate the success and impact of our efforts using a mixed-methods approach and a combination of process and outcome evaluation indicators. Such an approach is well-suited in the context of our multi-faceted program—research, outreach, education, and dissemination. Our goals continue to guide us in our move to meaningfully expand our TWH intervention research repertoire, pursue impactful interdisciplinary collaborations, and build strategic partnerships with organizations that make a positive TWH impact.

MEASURES OF EFFECTIVENESS: We report our impact across these four activities during 2016-2021:

RESEARCH: We evaluate and guide our research projects through chalk talks at ISC meetings by study teams each year. The Center Manager regularly attends research project planning meetings to be involved with and monitor intervention effectiveness outcomes; correlational research on relationships between working conditions and health, safety, and well-being outcomes; and presentations and publications. Research projects also report on, and are assisted in developing, their partnerships to accomplish research aims through our ISC processes and meetings between the outreach and research teams.

- OHWC-funded research publications: 24 publications; 3 book chapters (list of publications included in section C)
- OHWC project chalk talks: 19
- Internal Steering Committee meetings: 60 (monthly meetings)
- External Advisory Committee meetings: 5 (annual meetings)
- Pilot projects funded: 3

Two core research projects, Tech4Rest and Active Workplace Study within this cycle demonstrated these positive effects:

Sleep and Fatigue	<i>Tech4Rest:</i> sleep duration ($d=0.37$), sleep quality ($d=1.49$), sleep-related impairment ($d=-0.93$), fatigue ($d=-0.56$), sleep hygiene ($d=-0.52$)
Physical Activity	<i>Active Workplace:</i> percentage of time spent pedaling at desk ($d=0.68$), percentage of time spent sitting/lying ($d=0.26$), percentage of time spent in moderate to vigorous physical activity ($d=0.74$), general physical activity ($d=1.83$); <i>Tech4Rest:</i> days per week with 30 min moderate physical activity ($d=1.83$), actigraphically measured weekly activity bouts of 10+ min ($d=0.30-1.07$).
Eating Behaviors	<i>Tech4Rest:</i> sugary drinks consumed per day ($d=-0.80$), sugary snacks consumed per day ($d=-0.75$), fast food consumed per day ($d=-1.30$)
Musculoskeletal Pain	<i>Tech4Rest:</i> musculoskeletal pain in the neck ($d=-0.54$), shoulders ($d=-0.53$), and low back ($d=-0.20$)

Pilot Project program: In OHWC's current cycle, we funded 3 pilot projects in Year 4, all of which have become large (per the FOA) research projects in our Center's Research Core renewal application for 2021-2026.

- A natural experiment for the impact of schedules on sleep, health, and safety in firefighters (Nicole Bowles)

- Community of Practice and Safety Support-Tailored for Pain Management (COMPASS-NP; Ryan Olson)
- Pilot-testing the feasibility of a *Total Worker Health* interpersonal burnout intervention (David Hurtado & Abigail Lenhart)

Common Measures Data Repository: A manuscript from OHWC's common measures data repository has been published. The paper brings to light our effort to utilize a common set of measures across OHWC's research studies—this composite data will then enable us to draw comparative profiles across worker populations and industries, illuminate patterns and safety and health outcomes, and highlight avenues for intervention.

Other select scientific collaborative efforts: NIOSH Pioneer Book on TWH

OHWC's published two chapters in NIOSH's pioneering book on *Total Worker Health*. The book titled, "*Total Worker Health*", was released in July 2019. References included in section C.

OUTREACH: We evaluate our outreach impact through attendee feedback from outreach events such as bi-annual symposia (survey + testimonials), podcast listens and subscribers, social media metrics (followers, retweets, likes, posts, etc.), website analytics (e.g., page views, repeat visits), blog posts and followers, reach at hosted exhibit booths at regional conferences, and numbers of workplaces reached.

- Attendees reached at exhibits and meetings: ~ 3,000
- Organizations represented through partnerships and event attendance: 218
- Blog posts: Average of 4-6 posts per month; 15k+ average 6-month page views
- Facebook: 476 followers
- Twitter: 1144 followers
- LinkedIn: 244 followers (since start in 2020)
- YouTube: 6400+ total video views
- *What's Work Got To Do With It?* podcast episodes: 23 episodes, 4,067+ plays (since 2018 launch)
- OHWC website: 4500+ average 6-month page views
- OHWC's home Institute, Oregon Institute of Occupational Health Sciences website: 31,000+ average 6-month page views
- YourWorkpath.com (dissemination website): 3,240+ visitors, 9,613 views (since 2018 launch)

Outreach highlights:

- **Oregon Total Worker Health Alliance.** Launched in 2017, the Oregon TWH Alliance is a state-wide stakeholder partnership that consists of OHWC, the Institute, SAIF (Oregon workers' compensation provider and NIOSH TWH Affiliate), and Oregon OSHA. This Alliance has spearheaded the TWH curriculum geared toward building TWH implementation capacity. The curriculum is comprised of core and topic-specific modules to help practitioners implement the TWH approach within organizations. The curriculum has been successfully delivered to hundreds of practitioners, in-person and remotely.
- **Communications and Social Media.** We prioritize frequent communications with our practitioners, organizational leaders, employees, and stakeholders in occupational safety and health, wellness, loss control, human resources, and research. We do so via the *Oregon and the Workplace blog*, social media, *What's Work Got To Do With It* podcast, exhibits, and presentations at conferences and virtual meetings.

- ***What's Work Got To Do With It? Podcast.*** Started in 2018, this podcast is focused on informing the community about how work can affect safety, health, and well-being; discuss the public health significance of occupational health; and make science accessible for all by featuring conversations with scientists, practitioners, and employers as we explore TWH issues. We have produced 23 episodes (until end of grant cycle) on topics such as epigenetics, parental leave, sedentary work, sleep and shiftwork, positive workplace culture, and emergency preparedness, all from a worker safety, health, and well-being perspective.
- ***Engagement on stakeholder committees and partnerships:*** Members of the Outreach Core serve on multiple stakeholder-led committee focused on mobilizing on-the-ground efforts for worker safety, health, and well-being. Examples include: collaborative efforts with safety and wellness groups including American Heart Association, Center for Parental Leave Leadership, Cascade Centers, American Society of Safety Professionals (ASSP), American Industrial Hygiene Association, Oregon State Association of Occupational Health Nurses, Portland Human Resource Management Association, Oregon Public Health Association, Non-Profit Association of Oregon, the Safe From Hate Alliance geared toward ensuring safe and inclusive workplaces for people in the trades, and PCUN (Oregon's largest Latino union in the U.S.).

EDUCATION: We evaluate our education efforts through attendee feedback from biennial Occupational Health Psychology (OHP) Summer Institute (survey + testimonials), *Total Worker Health* 101 practitioner workshops, participant feedback at workshops (survey + testimonials), TWH graduate awards, science seminars pertinent to TWH, number of people trained, and MPH student intern experiences.

- TWH practitioner curriculum sessions: 15
- Practitioners trained: 675
- Science seminars pertinent to TWH: 66
- Students trained in TWH research: 7 (TWH Dissertation Award, TWH Graduate Travel Award, and MPH placements)
- Undergraduate student summer internships in TWH-themed studies: 24
- Average attendee rating at hosted bi-annual symposia events: 4.6/5
- Average OHP Summer Institute attendee rating: 4.7/5

Education highlights:

- ***Total Worker Health Dissertation Award & MPH placement:*** The program was launched in the Fall of 2018 and the award went to Sean Rice (Washington State University) for his project, *Conceptualizing Worker Well-being: A Longitudinal Investigation into Relationship between Types of Safety and Well-being Outcomes*. Sean defended his dissertation in February 2020 and was subsequently hired as a post-doctoral researcher in Ryan Olson's lab. Additionally, our placement program offers opportunities to students in Masters of Public Health programs to join OHWC PI labs for a specific period to get hands-on experience in worker safety, health, and well-being research.
- ***Total Worker Health Graduate Travel Award:*** OHWC offered a new *Total Worker Health* Graduate Travel Award, which is geared toward supporting graduate students to disseminate their occupational safety & health research at regional and national conferences. The following proposals have been awarded thus far, both presentations were at the Work + Family Researchers Network:
 - Equity considerations for monitoring the implementation of state-level family leave policies: a case example using Oregon PRAMS data* [Anna Steeves-Reece]
 - Using administrative records to understand policy impact* [Lisset Dumet Poma]

- **Total Worker Health 101 practitioner trainings:** An effort of the Oregon *Total Worker Health* Alliance, the 101 curriculum is a workshop-style training specifically informed by and geared toward the needs of practitioners. Since its launch in March 2019, Outreach Core MPI Dede Montgomery, has led multiple workshops in Oregon. We are in the process of developing follow-up TWH modules such as *Worksite Solutions* and *Diversity, Equity, & Inclusion*.
- **Fall and Spring Symposia.** These full-day continuing education events bring together professionals, practitioners and researchers to address emerging issues relevant to workplace safety, health and well-being. Spring 2020 introduced our first virtual symposium. Each symposium draws between 80-140 attendees with recent topics including workplace aggression and relational aggression, substance use in the workplace, and most recently, work as a social determinant of health, and worker safety and health in the context of climate change.
- **Occupational Health Psychology Summer Institute.** The aim of the Summer Institute has been to educate audiences on the theory and practice of OHP as a key driver of TWH. Attendees participate in sessions with scientists, practitioners, and experts over a 3-day period, to learn the skills and methods for workplace application of OHP and TWH principles. We held three Summer Institutes during the current cycle (2016, 2018, 2020).
- **Undergraduate summer internship program:** The 3-month summer internships are geared toward providing an in-depth experience to become involved in a mentor's research and/or dissemination project, prepare an academic-style abstract, and present findings via a poster and verbal presentation.
- **The Cascadia Occupational and Environmental Health Academic Consortium (COEHAC)** was formed in Summer 2020 and represents a collaborative effort between our Center, OHSU, Portland State University, Oregon State University, University of Washington, and University of British Columbia to streamline Occupational Health course offerings in our region.

DISSEMINATION & IMPLEMENTATION: We evaluate our dissemination through our (a) monthly dissemination workgroup meetings and associated engagement at these workgroups, (b) meetings with end users of toolkits to help inform toolkit packaging and enhancement, (c) meetings between dissemination and outreach members with research teams to help inform intervention research and better prepare for translation, dissemination, and implementation, and (d) tracking of people/organizations interested in learning about and adopting the tools and toolkits, and number of connections via YourWorkpath.com, our website/online repository dedicated to disseminating OHWC's resources. Research findings and successful research-to-practice impacts are disseminated via traditional routes such as publications in peer-reviewed journals and presentation at conferences as well as through non-traditional channels such as blogs, practitioners-focused and professional newsletters (e.g., ASSP, AIHA), our Institute monthly newsletter, and NIOSH's quarterly TWH in Action e-newsletter.

- Organizations interested in OHWC resource adoption: 10
- Publications and mentions in non-academic platforms (excluding blog posts): 12
- Resources disseminated: 582 views, 167 downloads
- Visitors to YourWorkpath.com (dissemination website): 3,240+ visitors, 9,613 views (since 2018 launch)
- Dissemination workgroup sessions: 34

We maintain our Center Accomplishments webpage, which includes data from some of the above evaluation methods. All the evaluation data gathered have helped inform OHWC's collective activity.

Translation, dissemination, and implementation highlights:

- ***YourWorkpath website and YourWorkpath program.*** YourWorkpath was launched in July 2018 to curate and disseminate our ready-to-use toolkits and resources. It is designed as an online repository of OHWC'S research-based resources with goals to: reach HR departments, workplace safety managers, wellness committees, and consultants across industries; to give organizations access to evidence-based TWH toolkits in exchange for implementation data, feedback, and case-studies and subsequently, inform the development of future toolkits; contribute to OHP and well-being research; and highlight organizations engaging in TWH-informed practices and policies. Developed as an interactive platform, it includes a live chat tool to give organizations the opportunity to connect with OHWC in real-time.
- ***Dissemination Workgroup.*** The goal of the Dissemination Workgroup meetings is to help researchers learn basic concepts and exercise best practices for disseminating intervention research. Each workgroup is dedicated to a topic, some presented by invited speakers with pertinent expertise, and each session is discussion-based and action-oriented. Some sample topics covered at these meetings include: technology transfer and licensing, reaching the end-user and target audience for OHWC tools and toolkits, common measures for dissemination, dissemination strategies through popular media, Lean Canvas method, dissemination planning and lifecycle of tools and toolkit, and creating a communications plan.
- ***Research to Practice (including toolkit enhancements, translation, dissemination-implementation partnerships).*** We regularly reach out to our community stakeholders and toolkit end-users for feedback to further improve our toolkits, making them more amenable to organizational adoption. Since 2017, OHWC has reviewed and updated all TWH toolkits (e.g., online trainings, user guides, team-based activities) that were developed in the first funding cycle. All newly redesigned user guides can be downloaded at YourWorkpath. Examples include the following:
 - The *Safety and Health Improvement Program (SHIP)* redesign: The SHIP toolkit was redesigned in August 2020 after receiving feedback from OHWC'S first participants in the YourWorkpath Program, Eskenazi Health, on the user experience of the user guide. The SHIP user guide, templates, and leadership slides were improved to provide easier program implementation instructions, and a more streamlined package with quick access to essential tools for everyday practice.
 - SAIF "Leadership Project": In our inaugural top-down dissemination partnership, OHWC has formalized a technology transfer and partnership agreement with SAIF to include our Safety and Health Improvement Program (SHIP) training program in their new "Leadership Project", geared toward improving workplace culture via a menu of leadership-oriented online and in-person trainings. The license specifies that SAIF will disseminate SHIP to their policy holders (which comprises nearly half of Oregon's employees) free of charge, that it will be disseminated directly to their catalog of partnering organizations by SAIF consultants, and that implementation and feedback data will be shared with us quarterly. This will allow us to track both feedback and data from individual organizations and meta-data from SAIF on how many organizations have engaged the training and whether they plan to maintain the training internally following initial engagement.
 - The *COMPASS* toolkit has been adopted by the Oregon Home Care Commission and is offered statewide as a paid training to 60% of Oregon's home care workforce (those who are publicly funded). COMPASS guidebooks were updated to be inclusive of personal support workers. Updates were made to content and activities to reflect worker diversity. Additionally, OHWC developed an online facilitator orientation training to help onboard new Oregon Home Care Commission COMPASS facilitators. This involved video shoots of real and mock COMPASS meetings. The

Commission has translated the new curriculum into Somali and Russian to increase reach and accessibility.

--*Consultations with potential adopting organizations:* We receive and actively seek out dissemination partnerships and consultation opportunities with organizations interested in implementing on TWH strategies.

COVID-19 ACTIVITIES

In response to COVID-19, the OHWC began publishing articles and developing trainings and tools to provide guidance and ease some of the burden faced by industry leaders, employees, and community members. Our materials were released through our new webpage *COVID and the World of Work*, our *Oregon and the Workplace* blog, and non-academic dissemination channels (e.g., articles, social media). To date, our articles and blog posts related to COVID have reached more than 60,000 readers nationwide. We developed a micro training, "Pandemic Response Training for Supervisors," which has now reached more than 1,300 views and has averaged 5.7 unique visitors per day as of 2020. Our Outreach Core continues to respond to inquiries, develop materials, and provide guidance for community members and industry leaders who have reached out to our Center with inquiries. Our Center also guided the OHSU COVID Wellness Task Force in a COVID Pulse Survey implemented in May, September, and January 2021 to track mental health and work experiences among OHSU employees. Highlighted COVID-19-related activities include:

- **Pandemic Response Training for Supervisors and Managers:** 10-minute online leadership training to provide supervisor and managers with evidence-based strategies to support their workers during the pandemic.
- **COVID Conversations:** Launched in February 2021, the *COVID Conversations* series was an online series geared toward sharing current practices with occupational health nurses, industrial hygienists, and safety professionals.
- **Agriculture:** OHWC served as technical advisor to several groups and worker advocates in support of safety and health for farmworkers, specifically promoting engineering and behavioral control policies for fields and housing.
- **COVID-19 Safety Climate Survey** One of the first COVID Safety Climate assessments designed to help organizations evaluate culture, predict outcomes, and promote safety and health of employees as they return to work.
- **Oregon COVID-19 Construction Task Force:** Outreach MPI Dede Montgomery provides technical support to enhance safety, health, and well-being. The task force is a partnership of union and non-union industry professionals, with support from Oregon OSHA. OHWC created a webpage to share task force resources.
- **Wellness Task Force:** OHWC's home institution, Oregon Health & Science University established a COVID Wellness Task Force and asked Drs. Leslie Hammer and David Hurtado to serve on the task force to develop and evaluate a Wellness Pulse Survey to assess employee psychological health and well-being, workplace experience, and wellness resources.
- **Region 10 Efforts:** Dede Montgomery was requested by NIOSH to provide COVID-19 industrial hygiene and safety support to workplaces in the Pacific Northwest and Region 10.
- **Mental Health & Suicide Prevention:** Outreach Specialist, Nichole Guilfooy is engaged on two state and regional committees to support mental health and suicide prevention with a focus on safety, health, well-being during COVID-19.

Aim 3: Enhance interactions between PIs, faculty and staff to broaden the highly collaborative milieu in the Center

Affiliated research projects: In addition to our monthly ISC meetings noted above, and our currently- and previously-funded OHWC research projects, we have expanded the OHWC's *Total Worker Health* portfolio by welcoming affiliated projects into OHWC (i.e., non-Center-funded projects with a TWH focus). We have invited these project teams to deliver periodic chalk talks at the ISC, which has served to increase interdisciplinary partnerships between Institute researchers (many of who are part of the OHWC), encouraged exchange of ideas and feedback, and facilitated collaborative project development. Further, OHWC's home partner institute, the Oregon Institute of Occupational Health Sciences invites faculty members to share their ongoing basic and applied research during weekly science seminars. Over the years, OHWC scientists have shared their TWH research findings and organizational partnerships.

Aim 4: Initiate an incubator for new intervention ideas and escalate dissemination through targeted forums

Intervention Incubator: One of the aims of OHWC's Outreach Core was to create mechanisms for incubating new research at OHWC. We have continued our intervention incubator processes, including monthly Behavior Change journal clubs, two partners' luncheon events, science-industry meetups, and we have initiated new pilot studies. To date, over a dozen potential projects have been generated, and the following projects and partnerships have secured support and resources to continue their development:

- *Contract between Oregon Institute of Occupational Health Sciences (home of OHWC) with SAIF Corporation (a TWH Affiliate) to design/improve/validate SAIF's Ansbros Safety Culture Spectrum to become a leading assessment tool for organization safety. Title: Validating Ansbros Safety Culture Spectrum as a leading indicator of organization safety [PI: Emily Huang]*
- *Safety climate contract between Oregon Institute of Occupational Health Sciences (home of OHWC) with Fortis Construction. Title: Research-to-Reality: Utilizing Safety Climate Survey Data to Advance Safety Climate Research [PI: Emily Huang]*
- *Dr. Andrew McHill received a career development award (1K01HL146992-01) that grew from an idea generated during the Behavior Change Journal Club. Title: Uncovering Circadian Mechanisms of Poor Cardiometabolic Health [PI: Andrew McHill]*

B.3. Competitive Revisions/Administrative Supplements

Nothing to report here.

B.4. What opportunities for training and professional development did the project provide?

All metrics pertaining to activities below are reported in section B.2.

(a) STUDENT EDUCATION

- **Total Worker Health Dissertation Award:** The program was launched in the Fall of 2018 and the award went to Sean Rice (Washington State University) for his project, *Conceptualizing Worker Well-being: A Longitudinal Investigation into Relationship between Types of Safety and Well-being Outcomes*. Sean defended his dissertation in February 2020 and was subsequently hired as a post-doctoral researcher in Ryan Olson's lab.
- **MPH placement:** Additionally, our placement program offers opportunities to students in Masters of Public Health programs to join OHWC PI labs for a specific period to get hands-on experience in ongoing research projects.

- **Undergraduate summer intern program:** The 3-month summer internships are geared toward providing an in-depth experience to become involved in a mentor's research and/or dissemination project, prepare an academic-style abstract, and present findings via a poster and verbal presentation.
- **Total Worker Health Graduate Travel Award:** OHWC offered *Total Worker Health* Graduate Travel Award, which is geared toward supporting graduate students to disseminate their occupational safety & health research at regional and national conferences.
- **The Cascadia Occupational and Environmental Health Academic Consortium (COEHAC)** was formed in Summer 2020 and represents a collaborative effort between our Center, OHSU, Portland State University, Oregon State University, University of Washington, and University of British Columbia to streamline Occupational Health course offerings in our region.
- **Graduate course:** Occupational Health (ESHH 521/621) for students in the MPH program, OHSU-PSU School of Public Health.

(b) SCIENTIST PROFESSIONAL DEVELOPMENT

- **Pilot Project Program:** Three pilot projects were funded, all of which have become large (per the FOA) research projects in our Center's Research Core renewal application for 2021-2026.
 - A natural experiment for the impact of schedules on sleep, health, and safety in firefighters (Nicole Bowles)
 - Community of Practice and Safety Support-Tailored for Pain Management (COMPASS-NP; Ryan Olson)
 - Pilot-testing the feasibility of a *Total Worker Health* interpersonal burnout intervention (David Hurtado & Abigail Lenhart)
- **K Award:** Dr. Andrew McHill received a career development award (1K01HL146992-01) that grew from an idea generated during the Behavior Change Journal Club. Title: Uncovering Circadian Mechanisms of Poor Cardiometabolic Health [PI: Andrew McHill]
- **Dissemination Workgroups:** The goal of the Dissemination Workgroup meetings is to help researchers learn basic concepts and exercise best practices for disseminating intervention research. Each workgroup is dedicated to a topic, some presented by invited speakers with pertinent expertise, and each session is discussion-based and action-oriented. Workgroup topics have included technology transfer and licensing, reaching the end-user and target audience for OHWC tools and toolkits, common measures for dissemination, dissemination strategies through popular media, Lean Canvas method, dissemination planning and lifecycle of tools and toolkit, and creating a communications plan.

(c) PRACTITIONER EDUCATION

- **Total Worker Health 101 practitioner trainings:** An effort of the Oregon *Total Worker Health* Alliance, the 101 curriculum is a workshop-style training specifically informed by and geared toward the needs of practitioners. Since its launch in March 2019, Outreach Core MPI Dede Montgomery, has led multiple workshops in Oregon. We are in the process of developing follow-up TWH modules such as *Worksite Solutions* and *Diversity, Equity, & Inclusion*.
- **Fall and Spring Symposia.** These full-day continuing education events bring together professionals, practitioners and researchers to address emerging issues relevant to workplace safety, health and well-being. Spring 2020 introduced our first virtual symposium. Each symposium draws between 80-140 attendees with topics including workplace aggression and relational aggression, substance use in

the workplace, and most recently, work as a social determinant of health, and worker safety and health in the context of climate change.

(d) GENERAL AUDIENCE EDUCATION

- **Occupational Health Psychology Summer Institute.** The aim of the Summer Institute has been to educate audiences on the theory and practice of OHP as a key driver of TWH. Attendees participate in sessions with scientists, practitioners, and experts over a 3-day period, to learn the skills and methods for workplace application of OHP and TWH principles. We held three Summer Institutes during the current cycle.
 - Building a Culture of Health, Safety, and Well-Being (2020)
 - Translation of Workplace Interventions: Dissemination and Implementation (2018)
 - OHP Innovation and Creative Strategies Leading to *Total Worker Health* (2016)
- **Science seminars:** OHWC's home partner institute, the Oregon Institute of Occupational Health Sciences invites faculty members to share their ongoing basic and applied research. Over the years, OHWC scientists have shared their TWH research findings and organizational partnerships.

B.5. How did you disseminate the results to communities of interest?

OHWC disseminates research findings and conducts outreach through a variety of channels. These include:

- (a) Peer-reviewed publications: Journal articles and book chapters
- (b) Popular media
- (c) *Oregon and the Workplace* blog
- (d) Presentations and exhibit presence at conferences: Academic, practitioner-focused, and mixed audience events
- (e) *What's Work Got To Do With It?* podcast

Outputs pertaining to listed items here are included in section C.

B.6 - What do you plan to do during the next reporting period to accomplish the goals?

Not applicable. This is the final, close-out report of the current cycle (2016-2021).

C. PRODUCTS

C.1. Publications, conference papers, and presentations

(a) PEER-REVIEWED PUBLICATIONS

Journal articles

1. Hammer, L.B. (2021). The Interplay of Workplace Redesign and Public Policy in the 21st Century. *American Journal of Public Health*, 11 (10), 1784-1786, DOI: [10.2105/AJPH.2021.306368](https://doi.org/10.2105/AJPH.2021.306368)
2. Wipfli, B., Wild, S., Richardson, D. M., & Hammer, L. (2021). Work as a Social Determinant of Health: A Necessary Foundation for Occupational Health and Safety. *Journal of occupational and*

- environmental medicine*, 10.1097/JOM.0000000000002370. Advance online publication. <https://doi.org/10.1097/JOM.0000000000002370>.
3. Wipfli, B., Wild, S., Donovan, C., Hanson, G. C., & Thosar, S. S. (2021). Sedentary work and physiological markers of health. *International Journal of Environmental Research and Public Health*, 18(6), 3230. <https://doi.org/10.3390/ijerph18063230>
 4. Hanson, G., Rameshbabu, A., Bodner, T., Hammer, L., Rohlman, D., Olson, R., Wipfli, B., Kuehl, K., Perrin, N., Alley, L., Schue, A., Thompson, S., Parish, M. (2021). A comparison of safety, health, and well-being risk factors across five occupational samples. *Frontiers in Public Health, section Occupational Health and Safety*, 9:614725. <https://doi.org/10.3389/fpubh.2021.614725>
 5. Wipfli, B., Wild, S., Hanson, G. C., Shea, S. A., Winters-Stone, K., & Thosar, S. S. (2021). The active workplace study: Protocol for a randomized controlled trial with sedentary workers. *Contemporary Clinical Trials*, 103, 106311. Advance online publication. <https://doi.org/10.1016/j.cct.2021.106311>
 6. Olson, R., Johnson, P., Shea, S., Marino, M., Rimby, J., Womack, K., Wang, F., Springer, R., Donovan, C., & Rice, S. (2020). Advancing the safety, health, and well-being of commercial driving teams who sleep in moving semi-trucks: The Tech4rest pilot study. *Journal of Occupational and Environmental Medicine*, 62 (12), 1082-1096. doi: 10.1097/JOM.0000000000002063
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 8. Watkins, S., Shannon, S., Hurtado, A., Shea, S., Bowles, N. (2020). Interactions between home, work, and sleep among firefighters. *American Journal of Industrial Medicine*. <https://doi.org/10.1002/ajim.23194>
 9. Greenspan, L. S., Alley, L., Rice, S. P., & Olson, R. (2020). Exploring biopsychosocial correlates of pain, pain management strategies, and risk for opioid misuse among home care workers in Washington State. *Home Health Care Services Quarterly*, 1-21. DOI: 10.1080/01621424.2020.1810191
 10. Womack, K.N.; Alvord, T.W.; Trullinger-Dwyer, C.F.; Rice, S.P.; Olson, R. (2020) Challenging Aggressive Behaviors Experienced by Personal Support Workers in Comparison to Home Care Workers: Relationships between Caregiver Experiences and Psychological Health. *Int. J. Environ. Res. Public Health*, 17, 5486. DOI: 10.3390/ijerph17155486.
 11. Newman, L., Scott, J., Childress, A.,Hammer, L.,Watkins, C. (2020). Education and Training to Build Capacity in Total Worker Health^(R): Proposed Competencies for an Emerging Field. *Journal of Occupational and Environmental Medicine*, e-pub ahead of print. doi: 10.1097/JOM.0000000000001906
 12. Wipfli, B. & Wild, S. (2019). Sedentary Work and Measuring Physical Activity in Applied Sedentary Behavior Research. *Society for Occupational Health Psychology Newsletter*, Volume 21, 11-12, <http://sohp-online.org/wp-content/uploads/2019/06/2019-Spring.pdf>.
 13. Aryal, A., Parish, M., Rohlman, D.S. (2019) Generalizability of the Total Worker Health[®] online training for young Workers. *International Journal of Environmental Research and Public Health*, 16 (4). <https://doi.org/10.3390/ijerph16040577>
 14. Hammer, L. B., Truxillo, D. M., Bodner, T., Pytlovany, A. C., & Richman, A. (2019). Exploration of the impact of organizational context on a workplace safety and health intervention. *Work and Stress*, 33(2), 192-210. <https://doi.org/10.1080/02678373.2018.1496159>
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Book Chapters

1. Hammer, L.B. & Brady, J. M. (2021). The Evolution of Worker Well-Being and Work-Life Issues. In L. Koppes Bryan (Ed.), *Historical perspectives in industrial and organizational psychology* (2nd ed., pp. xx). Routledge/Taylor and Francis Group.
2. Anger, K., Rameshbabu, A., Parker, K., Wan, W., Hurtado, D., Olson, R., Rohlman, D., Wipfli, B., Bodner, T. (2019). Effectiveness of Total Worker Health Interventions: A Systematic Review. In Hudson, H.L., Nigam, J.A., Sauter, S.L., Chosewood, L.C., Schill, A.L. (Eds.). *Total Worker Health*. Washington, DC: American Psychological Association.
3. Hammer, L.B. & Perry, M. (2019). Reducing Work-Life Stress: The Place for Integrated Interventions. In H. L. Hudson, J. A. S. Nigam, S. L. Sauter, L. C. Chosewood, A. L. Schill, & J. Howard (Eds.). *Total Worker Health*. Washington, DC: American Psychological Association.

(b) POPULAR MEDIA

1. Schuckers, Helen (2021). [Learning from different industries to improve safety, health, and well-being at work](#). *Medium*.

2. Hammer, L and Alley, L. (2021). [How managers can support employee well-being during a pandemic](#). *Medium*.
3. Schuckers, H. and Rameshbabu, A. (2021). [Looking for ways to support your employees? Start with work-life balance](#). *Medium*.
4. Hammer, L and Alley, L. (2020). [4 Key Strategies to Support Employee Well-Being During COVID-19](#). *Medium*.
5. Hammer, L and Alley, L. (2020). [Lead with Empathy During the COVID-19 Crisis](#). *The Conversation*.
6. Hammer, L. & Alley, L. (2020). [Supporting Worker Sleep is Good for Business](#). *The Conversation*.
7. Schuckers, H. (2020). [10 Things to Know About Total Worker Health](#). *Medium.com*.
8. Olson, R. & Hill, A. (2020). [Sleep, Circadian Biology, and Health: Action in the Behavioral Interactions!](#) *Association of Behavior Analysis International Blog*.
9. Montgomery, D., Hill, L., & Wood, M. (2019). Oregon Organizations [Collaborate to Move the Needle Toward Total Worker Health](#). *Professional Safety*.
10. Alley, L. (2019). [Breaking the Silo: Modern Research on Employee Well-being](#). *Medium*.
11. Hill, L., Montgomery, D., Bowers-Payne, R. (2019) [The Journey to "Be Well: Implementing Total Worker Health in Eugene, Oregon](#). *American Industrial Hygiene Association Synergist*.

(c) RESEARCH REPORT/WHITE PAPER

- Research report for PCUN: *Mandated, But Not Compensated: Exploring the Multifaceted Impacts of Overtime on Farm Workers' Health, Safety, and Well-being* (2021)
- Dede Montgomery led development of internal white paper for ASSE national and participated in discussion of Society's role in TWH including participation in national meetings (ASSE Safety 2018, WCI 2018).

(d) OREGON and the WORKPLACE BLOG

An average of 4-6 blogs are posted each month. A sampling of our blogs is provided here:

- [Total Worker Health® practitioner education: Full steam ahead](#)
- [International Symposium to Advance Total Worker Health® call for proposals](#)
- [Social determinants of health meets Total Worker Health®](#)
- [Oregon workplace vaccine mandate status](#)
- [2021 Team for Inclusion, Diversity and Equity \(TIDE\) update](#)
- [Active Workplace Toolkit](#)
- [Actionable HR strategies abound at PHRMA Strategic Management Conference](#)

(e) PRESENTATIONS and EXHIBIT PRESENCE AT CONFERENCES

Research and outreach members present at academic and practitioner-focused conferences. Prior to COVID, outreach members hosted in-person booths where OHWC's resources were disseminated directly to industry safety and wellness practitioners. Below are some examples of events we have presented at:

Academic conferences

- APA Work, Stress, and Health
- European Academy of Occupational Health Psychology
- European Association of Work and Organizational Psychology
- Internal Commission on Occupational Health
- Society for Occupational Health Psychology

- American Public Health Association conference
- Oregon Public Health Association conference

Practitioner-focused conferences

- American Society of Safety Professionals
- American Industrial Hygiene Association
- Regional Oregon OSHA-sponsored occupational safety and health conferences
- Oregon Governor's Occupational Safety & Health Conference
- Health Enhancement Research Organization
- Portland HR Management Association
- American Heart Association Workplace Wellness Summit

Mixed audience-focused conferences

- Presentations to organizational research partners
- International Symposium to Advance *Total Worker Health*®

(f) PODCAST *What's Work Got To Do With It?*: (since launch in 2018 through end of cycle)

1. [2021 Student Intern Program](#)
2. [NIOSH 50th Anniversary](#)
3. [COVID-19 and wildfire smoke on wildland firefighters](#)
4. [COVID-19 and farmworkers](#)
5. [Mental health and suicide prevention in construction](#)
6. [Part 3: Three decades at the Institute](#)
7. [Safety climate](#)
8. [Changing a toxic workplace culture](#)
9. [Part 2: Three decades at the Institute](#)
10. [Part 1: Three decades at the Institute](#)
11. [Nation's opioid epidemic](#)
12. [Summer interns](#)
13. [Positive workplace culture](#)
14. [Toxicology](#)
15. [Workplace aggression](#)
16. [Parental leave](#)
17. [Cascadia subduction zone](#)
18. [Sitting](#)
19. [Sleep](#)
20. [Total Worker Health®](#)
21. [Epigenetics](#)
22. [Introduction](#)
23. [OHSU Week Episode](#)

C.2. Website(s) or other Internet site(s) – include URL(s)

- OHWC: <http://www.ohsu.edu/ohwc>
- Oregon Institute of Occupational Health Sciences (home of OHWC): <https://www.ohsu.edu/oregon-institute-occupational-health-sciences>

- YourWorkpath: <https://www.yourworkpath.com/>
- Oregon and the Workplace Blog: <https://blogs.ohsu.edu/occupational-health-sciences/>
- LinkedIn: <https://www.linkedin.com/company/occhealthsci/>
- Twitter: <https://twitter.com/OHSUOccHealth>
- Facebook: <https://www.facebook.com/occhealthsci.ohsu/>
- Podcast: <https://www.ohsu.edu/oregon-institute-occupational-health-sciences/whats-work-got-do-it-podcast>
- YouTube: https://www.youtube.com/channel/UCXF8ZmB51EM_H3KMy4X8oYw/videos

C.3. Technologies or techniques

Nothing to report here.

C.4. Inventions, patent applications, and/or licenses

License/inventions are filed with Tech Transfer department at OHWC's home institution, Oregon Health & Science University. Licenses were obtained during this grant period for projects completed during OHWC's previous cycle.

- Safety & Health Improvement Program (SHIP):
---License with SAIF Corporation, license # AGR-2602-02
---License with Eskenazi Health Inc., license # AGR-2602-01
- COMmunity of Practice And Safety Support program (COMPASS): License with Oregon Home Care Commission, license # AGR-2109-01
- Promoting U Through Safety & Health (PUSH): License with St. Louis Community College, license #s AGR-2248-02

C.5. Other products and resource sharing

- Leslie Hammer was invited by Cascade Centers EAP to speak in their Human Resources Webinar series on the topic, "The Role of Leaders in Reducing Work-Life Stress"
<https://www.youtube.com/watch?v=7OcGKb5qfS0&feature=youtu.be>
- Recordings from bi-annual symposia: <https://www.ohsu.edu/oregon-institute-occupational-health-sciences/training-and-symposia>
- Recordings from Occupational Health Psychology Summer Institute: <https://www.ohsu.edu/oregon-healthy-workforce-center/occupational-health-psychology-summer-institute>
- Podcast episodes: <https://soundcloud.com/occhealthsci>

D. PARTICIPANTS

D.1. What individuals have worked on the project? Please include calendar, academic, and summer months.

Commons ID	S/K	Name	Degrees(s)	Role	Cal	Aca	Sum	Foreign	Country	SS

This information is reported within Overall report.

D.2 Personnel updates

a. Level of Effort:

b. New Senior/Key Personnel:

c. Changes in Other Support:

d. New Other Significant Contributors:

This information is reported within Overall report.

E. IMPACT

E.1 - What is the impact on the development of human resources, if applicable?

OHWC's collective activities (research, dissemination, education, and outreach) are geared toward producing evidence-based (i.e., emerging directly from our research) and evidence-informed (informed by existing literature) resources that industry professionals (such as human resource) and organizational leaders can implement within their setting. The impact of our activities have been reported in the above sections.

E.2 - What is the impact the Public Health Relevance and Impact? The investigator should address how the findings of the project relate beyond the immediate study to improved practices, prevention or intervention techniques, legislation, policy, or use of technology in public health.

We have published a number of peer-reviewed publications, which could serve as foundational evidence for the effectiveness of *Total Worker Health* strategies to protect and promote worker safety, health, and well-being across industries. In particular, our systematic review chapter in NIOSH's pioneering book on *Total Worker Health* will allow future researchers to build on and integrate into their work. Center co-director, Dr. Leslie Hammer's article in the American Journal of Public Health dwells on the *The Interplay of Workplace Redesign and Public Policy in the 21st Century*, while emphasizing work as a key social determinant of health. Our robust efforts to disseminate OHWC's evidence-based resources have led to the development of YourWorkpath, an online repository and the YourWorkpath program, which allows organizations to test and adopt our tools and toolkits. OHWC's resources have been adopted by organizations as listed in the above sections. Further, our Oregon *Total Worker Health* Alliance, a first of its kind partnership between research,

regulatory, and workers compensation entities, has helped to spearhead the *Total Worker Health* trainings for occupational safety and wellness professionals, thus facilitating capacity-building for implementing the *Total Worker Health* approach in practice. With regard to policy action, we produced a research report for PCUN, Oregon's largest Latino union in the U.S., titled, *Mandated, But Not Compensated: Exploring the Multifaceted Impacts of Overtime on Farm Workers' Health, Safety, and Well-being* (2021) – this report is helping PCUN to bring the issue of unpaid overtime work among farmers to legislation. Institute Senior Research Associate and Oregon Healthy Workforce Center Outreach Co-Principal Investigator, Dede Montgomery received a CDC National Institute for Occupational Safety and Health (NIOSH) COVID-19 Intergovernmental Personnel Assignment (IPA) to support safe return of workers during the pandemic in Region X. Through her 0.15 FTE (9/2020-9/2021), Montgomery provided training and educational videos, and technical expertise to industry requests including agriculture, construction and general industry. OHWC's Outreach Core served to broaden our outreach by leveraging existing connections and accomplishments to translate the TWH approach into practice. Our communication and dissemination activities are geared toward making immediate and long-term impact. Because members of the Outreach Core serve both OHWC and the Oregon Institute of Occupational Health Sciences, our work is co-ordinated and cross-promoted, thus amplifying our research and dissemination efforts.

F. CHANGES

F.1 – Changes in approach and reasons for change, including changes that have a significant impact on expenditures

Nothing to report here.

F.2 - Actual or anticipated challenges or delays and actions or plans to resolve them

Nothing to report here.

F.3 - Significant changes to human subjects, vertebrate animals, biohazards, and/or select agents

Nothing to report here.

G. Special Reporting Requirements

G.1 Special Notice of Award Terms and Funding Opportunities Announcement Reporting Requirements

Nothing to report here.

G.2 Responsible Conduct of Research

Nothing to report here.

G.3 Mentor's Research Report or Sponsor Comments

Nothing to report here.

G.4 Human Subjects

G.4.a Does the project involve human subjects?

Nothing to report here.

G.4.b Inclusion Enrollment Data

Nothing to report here.

G.4.c ClinicalTrials.gov

Does this project include one or more applicable clinical trials that must be registered in ClinicalTrials.gov under FDAAA?

Nothing to report here.

G.5 Human Subject Education Requirement

Are there personnel on this project who are newly involved in the design or conduct of human subject's research?

Not Applicable

G.6 Human Embryonic Stem Cells (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

Nothing to report here.

G.7 Vertebrate Animals

Does this project involve vertebrate animals?

Nothing to report here.

G.8 Project/Performance Sites

Nothing to report here.

G.9 Foreign Component

Nothing to report here.

G.10 Estimated Unobligated Balance

G.10.a Is it anticipated that an estimated unobligated balance (including prior year carryover) will be greater than 25% of the current year's total approved budget?

This information is reported within Overall report.

G.11 Program Income

Is program income anticipated during the next budget period?

Nothing to report here.

G.12 F&A Costs

Is there a change in performance sites that will affect F&A costs?

Nothing to report here.

I. OUTCOMES

I. Provide a concise summary of the outcomes or findings of the award, written for the general public in clear and comprehensible language, without including any proprietary, confidential information or trade secrets

Note: project outcome information will be made public in NIH RePORTER

OHWC's collective activity across the Planning & Evaluation, Research, and Outreach Cores demonstrates a compelling record of innovation and accomplishment. In this cycle (2016-2021), OHWC has made consistent and demonstrable strides toward its four aims within the Planning & Evaluation Core. Specifically, there has been a successful transition of leadership; our External Advisory Committee has been meaningfully expanded to include members with diverse stakeholder expertise; we have adapted and actively responded to the COVID-19 pandemic and rapidly changing needs of the workforce; our core funded projects have yielded positive effects included reduced sleep and fatigue, and musculoskeletal pain, and improved physical activity and eating behaviors; further, 3 pilot projects were funded in this cycle, all of which became full-fledged research projects in OHWC's subsequent cycle. We have supplemented our research success with robust activities within the Outreach Core – these include forging new partnerships with stakeholder-led and worker community groups, disseminating our research through peer-reviewed journals and book chapters; we published lay audience articles in popular media; we have maintained a strong social media and blog presence; and created a podcast. Next, we have created and sustained a variety of TWH

professional development and educational opportunities for practitioners and students such as the OHP Summer Institute for academic audiences, bi-annual symposia for practitioners, and internship opportunities for graduate and undergraduate students. Through our landmark Oregon *Total Worker Health* Alliance, we have helped spearhead the *Total Worker Health* curriculum and delivered the training to hundreds of practitioners through in-person and online formats. Finally, the outcomes of our research have been translated into ready-to-use multi-component toolkits, which along with our collective resources from previous cycles are housed and disseminated through a dedicated online repository, YourWorkpath.com.

A. COVER PAGE

Project Title: Outreach Core	
Grant Number: 5U19OH010154-08	Project/Grant Period: 09/01/2016 - 08/31/2021
Reporting Period: 09/01/2016 - 08/31/2021	Date Submitted:
Program Director/ Principal Investigator Dede Montgomery, MS, CIH (Contact), and Anjali Rameshbabu, PhD montgomd@ohsu.edu 503-494-4090	Administrative Official Information Mark Derby derbym@ohsu.edu 503-494-8893
Change of Contact PD/PI:	
Human Subjects:	Vertebrate Animals:
hESC:	Inventions/Patents:

B. ACCOMPLISHMENTS

B.1. What are the major goals of the project?

- 1) Create sustainable partnerships and outreach networks throughout Oregon, the Pacific Northwest, and beyond with employers, associations and unions, and community-based organizations for two-way communications on needs and findings on *Total Worker Health*.
- (2) Facilitate the steady and effective translation of research to practice, and create packaged toolkits resulting from OHWC research interventions to be disseminated among partners, stakeholders, supporters, and followers.
- (3) Leverage current contacts to expand our reach to include new community-based organizations, small businesses, and vulnerable work sectors.
- (4) Measure reach, utilization, and effectiveness of Outreach Core connections, and translation activities and products.
- (5) Develop and provide educational opportunities on new and relevant topics pertaining to *Total Worker Health*.
- (6) Expand our digital strategy that unifies products and services, and delivers them in an accessible way

B.2. What did you accomplish under these goals?

While we began the cycle with unique, planned activities for each component, in practice our activities organically have fallen into 3 categories: outreach and communication, education, and dissemination. OHWC has led robust TWH outreach, education, and dissemination efforts in the Pacific Northwest and beyond, in collaboration with our home Institute at OHSU. We engaged existing contacts and partners while also reaching out to those new to us to better understand their worker and workplace needs, and to share our TWH resources, along with creating research opportunities. We developed and delivered, as part of the Oregon *Total Worker Health* Alliance, training curriculum for practitioners and professionals in occupational safety and health (OSH), workers' compensation, and HR, in addition to conducting our bi-annual symposia and 3-day summer institute (2020, 2018, 2016). Finally, we systematically and strategically activated our dissemination channels to share the results of these projects and to maximize OHWC's impact on improving workplace safety, health, and well-being. More detailed reporting is provided in subsequent sections below.

B.3. Competitive Revisions/Administrative Supplements

Nothing to report here.

B.4. What opportunities for training and professional development did the project provide?

A. Events & Educational Activities: Symposia, Other

- Fall 2016: Diversity and Inclusion in the Workplace: Impact on Worker Health and Well-Being
- Spring 2017: Creating a Positive Work Environment for Safety and Health
- Fall 2017: Navigating Mental Health in Workplace: What do we know and where do we go?
- Spring 2018: Pain at Work: How to prevent, recognize and treat
- Fall 2018: Workplace aggression: Best practices to prevent, identify and safely mitigate aggressive behavior and violence.

- Spring 2019: Workplace Aggression: Best Practices to Prevent, Identify and Safely Mitigate Aggressive Behavior and Violence
- Fall 2019: Substance Use and the Workplace: Building safe and healthy workplaces for all employees
- Spring 2020: Workplace Aggression: Deeper Dive
- Fall 2020: Worker Health: Work as a Social Determinant of Health
- Spring 2021: Adapting to Climate Change for Worker Safety, Health, and Well-being
- COVID-19 Conversations: 10 virtual and recorded discussion episodes, February 2021-June 2021

B. Practitioner education activities: *Total Worker Health 101 Curriculum*: Developed as part of the Oregon *Total Worker Health* Alliance (Oregon Institute of Occupational Health Sciences (Institute)/OHWC, Oregon OSHA, and SAIF Corporation (a NIOSH TWH Affiliate))

- Montgomery, D. (2019) TWH 101 and Workplace Solutions, University of Washington ERC Continuing Education Program
- Montgomery, D. (2019) TWH 101 and Workplace Solutions, Oregon SHARP
- Montgomery, Guilfooy, Hammer (2019) TWH 101 and Workplace Solutions, Oregon GOSH
- Montgomery, D., TWH 101 and sleep: Central Oregon Occupational Safety and Health Conference (9/2019)
- Montgomery, D., TWH Awareness Oregon Wine Board Symposium [February 2020]
- Montgomery, D. (2019), Fatigue at Work and *Total Worker Health*, Pacific Northwest Pulp, Paper and Forest Products Safety and Health Conference.
- Montgomery, D. (2019), *Total Worker Health 101: The Basics*, Pacific Northwest Pulp, Paper and Forest Products Safety and Health Conference.
- Montgomery, D. (2019), *Total Worker Health 101: The Basics*, Oregon Workers Compensation Educational Conference.
- Montgomery, D. (2020), *Total Worker Health 101: The Basics*, Apollo Mechanical Contractor and Hanford Site Washington area safety, health and occupational professionals.
- Montgomery, D. (2020), Introduction to Safety and *Total Worker Health*, Oregon Wine Board.
- Montgomery, D. (2020), *Total Worker Health 101: The Basics*, Oregon Cascade Occupational Safety and Health Conference.
- Montgomery, D. (2020), *Total Worker Health 101: The Basics*, Oregon Region 10 VPPPA Occupational Safety and Health Summit
- Montgomery, D. (2020), *Total Worker Health 101: The Basics*, ASSP Columbia-Willamette Chapter Broken Top Section
- Montgomery, D. (2020) *Total Worker Health 101: The Basics*, ASSP Columbia-Willamette Chapter Broken Top Section.
- Montgomery, D. (2020), What Industrial Hygienists Need to Know about Total Worker Health, American Industrial Hygiene Conference and Exposition.
- Montgomery, D. (2021), *Total Worker Health 101: The Basics*, ASSP Columbia-Willamette Chapter
- Montgomery, D. (2021), *Total Worker Health 101: The Basics*, ASSP Chapter Broken Top Chapter
- Montgomery, D. (2020), *Total Worker Health 101 and Beyond*, American Industrial Hygiene Conference and Exposition (full day PDC)
- Montgomery, D. (2021), *Total Worker Health 101: The Basics*, ASSP Southern Oregon Columbia-Willamette Chapter
- Montgomery, D. (2021), *Total Worker Health 101: The Basics*, ASSP San Jose Chapter

C. Occupational Health Psychology Summer Institute

- OHP Innovation and Creative Strategies Leading to *Total Worker Health* (July 2016)
- Translation of Workplace Interventions: Dissemination and Implementation (July 2018)
- Building a Culture of Safety, Health, and Well-being (July 2020)

D. Dissemination Workgroup (selected):

- Translating Research to Practice (Anjali Rameshbabu, 3/2019)
- Communicating research outside academia (Mary Sawyer, 3/2019)
- Dissemination Planning and Lifecycle of Tools and Toolkits (Helen Schuckers, 1/2020)
- OHSU Technology Transfer (Arvin Paranjpe, 2/2020)
- One Pagers and Lean Canvas Exercise (Helen Schuckers, 3/2020)
- Dissemination Measures and Reaction Questions or SmartSheet Project Management Workshop (Helen Schuckers, 4/2020)
- OccHealthSci and OHWC Social Media and Communications Channel (Helen Schuckers, 5/2020)
- Dissemination and Communication Resources (OHSU Library 6/2020)
- Toolkit Focus Group (Helen Schuckers, 7/2020)
- Preparing Dissemination During the Study (Helen Schuckers or guest, 8/2020)
- Developing Your Pitch Workshop, Value Proposition Workshop, Expert D&I guest speakers, 2021
- Identifying your Channels and Target Audience, 2021
- SmartSheet Project Management Workshop, 2021

E. Regional and National Conferences Exhibits and Presentations

We present and/or host exhibit booths at academic and practitioner-focused conferences. Some key events included:

- American Heart Association Workplace Wellness Summit (9/2018), Washington
- Governor's Industrial Safety Conference (9/2018), Central Oregon Occupational Safety and Health Conference (9/2018)
- Southern Oregon Occupational Safety and Health Conference (10/2018)
- Northwest Occupational Health Conference (10/2018)
- Oregon Public Health Association Conference (10/2018)
- Business Health Services Conference (10/2018)
- Northwest Pulp and Paper and Forest Products Occupational Safety and Health Conference (11/2018)
- 2nd International Symposium to Advance Total Worker Health (5/2018)
- Oregon Governor's Occupational Safety & Health Conference (3/2019)
- Art & Science of Health Promotion (4/2019)
- Society of Industrial Organizational Psychology (4/2019)
- Safety 2019 (6/2019)
- European Association of Work and Organizational Psychology (5/2019)
- American Society of Safety Professionals (6/2019)
- Oregon OSHA SHARP Alliance meetings (1/2020)
- Oregon Wine Board Symposium (2/2020)
- Mid-Oregon Construction Safety Conference (1/2020)

- Cascade Occupational Safety and Health Conference (3/2020)
- Region 10 VPPPPA Occupational Safety & Health Conference (5/2020)
- American Industrial Hygiene Association Conference and Exposition (6/2020)
- American Society of Safety Professionals (6/2020 and 6/2021)

Metrics pertaining to the above categories

- # Attendees at exhibits and meetings reached: over 3,000
- # Organizations represented through partnerships and event attendance: 218
- # Outreach-focused presentations: 200
- # Oregon TWH practitioner curriculum sessions: 15
- # Practitioners trained at TWH curriculum sessions: 675
- # Occupational Summer Institute
 - # of events: 3 (2016, 2018, 2020)
 - # of attendees (across 3 years): 298
 - Average Summer Institute attendee rating: 4.7/5

B.5. How did you disseminate the results to communities of interest?

A. Science-Industry meet-ups: these meet-ups are geared toward enhancing collaborations between OHWC researchers, organizational leaders, and practitioners with the goal of identifying needs of workers and developing avenues for interventions to address those needs.

2017: Representatives across Oregon gathered for the Study for Employment Retention of Veterans (SERVe) Employer Summit. The SERVe (a Center affiliated project) study team and guest speakers discussed project progress, future endeavors, and resources with 65 community professionals and researchers. Additionally, OHWC's toolkits and resources for occupational safety, health and well-being were presented.

2018: Fortis Construction: We gathered with Fortis' leadership, staff, and safety committee to develop an intervention to advance the safety, health, and well-being of employees at a new construction site.
Citycounty Insurance Services (CIS): Met with CIS leadership to discuss ideas to improve safety culture and incorporate a TWH approach in the workplace.

B. What's Work Got To Do With It? Podcast

We have produced 23 episodes on topics such as epigenetics, parental leave, sedentary work, sleep and shiftwork, positive workplace culture, and emergency preparedness, all from a worker safety, health, and well-being perspective. Curated topics address important questions such as the relationship between work and well-being, and how organizations can facilitate worker well-being by using TWH-informed approaches.

Completed Episodes include (since launch of 2018):

- [2021 Student Intern Program](#)
- [NIOSH 50th Anniversary](#)
- [COVID-19 and wildfire smoke on wildland firefighters](#)
- [COVID-19 and farmworkers](#)
- [Mental health and suicide prevention in construction](#)
- [Part 3: Three decades at the Institute](#)

- [Safety climate](#)
- [Changing a toxic workplace culture](#)
- [Part 2: Three decades at the Institute](#)
- [Part 1: Three decades at the Institute](#)
- [Nation's opioid epidemic](#)
- [Summer interns](#)
- [Positive workplace culture](#)
- [Toxicology](#)
- [Workplace aggression](#)
- [Parental leave](#)
- [Cascadia subduction zone](#)
- [Sitting](#)
- [Sleep](#)
- [Total Worker Health®](#)
- [Epigenetics](#)
- [Introduction](#)
- [OHSU Week Episode](#)

C. Writing in non-academic platforms for practitioner/professional/worker community audiences:

- 1. Schuckers, Helen (2021). [Learning from different industries to improve safety, health, and well-being at work](#). *Medium*.
- Hammer, L and Alley, L. (2021). [How managers can support employee well-being during a pandemic](#). *Medium*.
- Schuckers, H. and Rameshbabu, A. (2021). [Looking for ways to support your employees? Start with work-life balance](#). *Medium*.
- Hammer, L and Alley, L. (2020). [4 Key Strategies to Support Employee Well-Being During COVID-19](#). *Medium*.
- Hammer, L and Alley, L. (2020). [Lead with Empathy During the COVID-19 Crisis](#). *The Conversation*.
- Hammer, L. & Alley, L. (2020). [Supporting Worker Sleep is Good for Business](#). *The Conversation*.
- Schuckers, H. (2020). [10 Things to Know About Total Worker Health](#). *Medium.com*.
- Olson, R. & Hill, A. (2020). [Sleep, Circadian Biology, and Health: Action in the Behavioral Interactions!](#) *Association of Behavior Analysis International Blog*.
- Montgomery, D., Hill, L., & Wood, M. (2019). Oregon Organizations [Collaborate to Move the Needle Toward Total Worker Health](#). *Professional Safety*.
- Alley, L. (2019). [Breaking the Silo: Modern Research on Employee Well-being](#). *Medium*.
- Hill, L., Montgomery, D., Bowers-Payne, R. (2019) [The Journey to "Be Well: Implementing Total Worker Health in Eugene, Oregon"](#). *American Industrial Hygiene Association Synergist*.
- Media mention: Russo, M. & Morandin, G. (2019). Better Work-Life Balance Starts with Managers. Harvard Business Review. Retrieved from: https://hbr.org/2019/08/better-work-life-balance-starts-with-managers?utm_medium=social&utm_source=twitter&utm_campaign=hbr

D. Other

- Dissemination Playbook: An internal facing website with resources geared toward educating scientists on the dissemination and implementation process, and how to effectively engage with

potential implementers, decision makers, and end users. In this internal website, users will find dissemination and implementation literature, templates to create one-pagers, user guide and other promotional materials, as well as other communication tools to impact tool and toolkit awareness. These resources can help scientists and research staff develop project deliverables and sustain efforts in the continuous lifecycle of resources.

- Comprehensive toolkits resulting from our *Total Worker Health* intervention research projects:
 - Safety & Health Improvement Project (SHIP): The SHIP toolkit is designed to promote employee safety, health, and work-life balance by increasing supervisor support and team effectiveness.
 - Promoting U through Safety and Health (PUSH): This toolkit combines the NIOSH Talking Safety-Youth @Work training with wellness and communication topics in an online training curriculum for young workers, ages 14-24.
 - Be Super!: This supervisor training plus employee-led discussion toolkit is geared toward improving safety, health, and well-being among construction workers.
 - COMPASS: Is a peer-led social support group intervention designed to improve social resources, reduce the risk of injuries, and promote health among home care workers
- “A Year of Impact”: This 12-set guide, intended as one implementable guide for each month, is designed for worksite safety and wellness practitioners to discuss worker safety, health, and well-being issues with a focus on actionable strategies.
- YourWorkPath.com: Designed as an online resource repository, YourWorkpath launched July 2018 and serves as an opportunity to enhance user experience, disseminate our ready-to-use toolkits, and increase uptake of TWH toolkits and tools. This website aims to reach human resource departments, workplace safety managers, wellness and safety committees, and consultants for health and safety within organizations from various industries. Your Workpath.com offers mostly free and low-cost resources to help enhance workplace safety, health, and well-being.
- Research Report/White paper:
 - Research report for PCUN: *Mandated, But Not Compensated: Exploring the Multifaceted Impacts of Overtime on Farm Workers’ Health, Safety, and Well-being* (2021)
 - Dede Montgomery led development of internal white paper for ASSE national and participated in discussion of Society’s role in TWH including participation in national meetings (ASSE Safety 2018, WCI 2018).

E. Websites

- OHWC: <http://www.ohsu.edu/ohwc>
- Oregon Institute of Occupational Health Sciences (home of OHWC): <https://www.ohsu.edu/oregon-institute-occupational-health-sciences>
- YourWorkpath: <https://www.yourworkpath.com/>
- Oregon and the Workplace Blog: <https://blogs.ohsu.edu/occupational-health-sciences/>
- LinkedIn: <https://www.linkedin.com/company/occhealthsci/>
- Twitter: <https://twitter.com/OHSUOccHealth>
- Facebook: <https://www.facebook.com/occhealthsci.ohsu/>
- Podcast: <https://www.ohsu.edu/oregon-institute-occupational-health-sciences/whats-work-got-do-it-podcast>
- YouTube: https://www.youtube.com/channel/UCXF8ZmB51EM_H3KMy4X8oYw/videos

Metrics pertaining to the above categories

- Attendees reached at exhibits and meetings: ~ 3,000
- Organizations represented through partnerships and event attendance: 218
- *Oregon and the Workplace* blog posts: Average of 4-6 posts per month; 15k+ average 6-month page views
- Facebook: 476 followers
- Twitter: 1144 followers
- LinkedIn: 244 followers (since start in 2020)
- YouTube: 6400+ total video views
- *What's Work Got To Do With It?* podcast episodes: 23 episodes, 4,067+ plays (since 2018 launch)
- OHWC website: 4500+ average 6-month page views
- OHWC's home Institute, Oregon Institute of Occupational Health Sciences website: 31,000+ average 6-month page views
- YourWorkpath.com (dissemination website): 3,240+ visitors, 9,613 views (since 2018 launch)

B.6 - What do you plan to do during the next reporting period to accomplish the goals?

We are reporting on completion of all projects during this grant cycle. Dissemination of research findings, toolkits and developed educational curricula continue into the future through our existing outreach program.

Not applicable. This is the final, close-out report of the current cycle (2016-2021).

C. PRODUCTS

C.1. Publications, conference papers, and presentations

Academic (peer-reviewed) publications:

Journal articles

1. Hammer, L.B. (2021). The Interplay of Workplace Redesign and Public Policy in the 21st Century. *American Journal of Public Health*, 11 (10), 1784-1786, DOI: [10.2105/AJPH.2021.306368](https://doi.org/10.2105/AJPH.2021.306368)
2. Wipfli, B., Wild, S., Richardson, D. M., & Hammer, L. (2021). Work as a Social Determinant of Health: A Necessary Foundation for Occupational Health and Safety. *Journal of occupational and environmental medicine*, 10.1097/JOM.0000000000002370. Advance online publication. <https://doi.org/10.1097/JOM.0000000000002370>.
3. Wipfli, B., Wild, S., Donovan, C., Hanson, G. C., & Thosar, S. S. (2021). Sedentary work and physiological markers of health. *International Journal of Environmental Research and Public Health*, 18(6), 3230. <https://doi.org/10.3390/ijerph18063230>
4. Hanson, G., Rameshbabu, A., Bodner, T., Hammer, L., Rohlman, D., Olson, R., Wipfli, B., Kuehl, K., Perrin, N., Alley, L., Schue, A., Thompson, S., Parish, M. (2021). A comparison of safety, health, and well-being risk factors across five occupational samples. *Frontiers in Public Health*, section *Occupational Health and Safety*, 9:614725. <https://doi.org/10.3389/fpubh.2021.614725>
5. Wipfli, B., Wild, S., Hanson, G. C., Shea, S. A., Winters-Stone, K., & Thosar, S. S. (2021). The active workplace study: Protocol for a randomized controlled trial with sedentary workers. *Contemporary Clinical Trials*, 103, 106311. Advance online publication. <https://doi.org/10.1016/j.cct.2021.106311>

6. Olson, R., Johnson, P., Shea, S., Marino, M., Rimby, J., Womack, K., Wang, F., Springer, R., Donovan, C., & Rice, S. (2020). Advancing the safety, health, and well-being of commercial driving teams who sleep in moving semi-trucks: The Tech4rest pilot study. *Journal of Occupational and Environmental Medicine*, 62 (12), 1082-1096. doi: [10.1097/JOM.0000000000002063](https://doi.org/10.1097/JOM.0000000000002063)
7. Perry, M. L., El-Askari, L. M., Hammer, L. B., & Brown, N. D. (2020). Securing your own mask before assisting others: Effects of a supervisor training intervention on supervisors and employees. *Occupational Health Science*, 4, 417-443, <https://doi.org/10.1007/s41542-020-00075-0>.
8. Watkins, S., Shannon, S., Hurtado, A., Shea, S., Bowles, N. (2020). Interactions between home, work, and sleep among firefighters. *American Journal of Industrial Medicine*. <https://doi.org/10.1002/ajim.23194>
9. Greenspan, L. S., Alley, L., Rice, S. P., & Olson, R. (2020). Exploring biopsychosocial correlates of pain, pain management strategies, and risk for opioid misuse among home care workers in Washington State. *Home Health Care Services Quarterly*, 1-21. DOI: [10.1080/01621424.2020.1810191](https://doi.org/10.1080/01621424.2020.1810191)
10. Womack, K.N.; Alvord, T.W.; Trullinger-Dwyer, C.F.; Rice, S.P.; Olson, R. (2020) Challenging Aggressive Behaviors Experienced by Personal Support Workers in Comparison to Home Care Workers: Relationships between Caregiver Experiences and Psychological Health. *Int. J. Environ. Res. Public Health*, 17, 5486. DOI: [10.3390/ijerph17155486](https://doi.org/10.3390/ijerph17155486).
11. Newman, L., Scott, J., Childress, A.,Hammer, L.,Watkins, C. (2020). Education and Training to Build Capacity in Total Worker Health^(R): Proposed Competencies for an Emerging Field. *Journal of Occupational and Environmental Medicine*, e-pub ahead of print. doi: [10.1097/JOM.0000000000001906](https://doi.org/10.1097/JOM.0000000000001906)
12. Wipfli, B. & Wild, S. (2019). Sedentary Work and Measuring Physical Activity in Applied Sedentary Behavior Research. *Society for Occupational Health Psychology Newsletter*, Volume 21, 11-12, <http://sohp-online.org/wp-content/uploads/2019/06/2019-Spring.pdf>.
13. Aryal, A., Parish, M., Rohlman, D.S. (2019) Generalizability of the Total Worker Health[®] online training for young Workers. *International Journal of Environmental Research and Public Health*, 16 (4). <https://doi.org/10.3390/ijerph16040577>
14. Hammer, L. B., Truxillo, D. M., Bodner, T., Pytlovany, A. C., & Richman, A. (2019). Exploration of the impact of organizational context on a workplace safety and health intervention. *Work and Stress*, 33(2), 192-210. <https://doi.org/10.1080/02678373.2018.1496159>
15. Brossoit, R. M., Crain, T. L., Leslie, J. J., Hammer, L. B., Truxillo, D. M., & Bodner, T. E. (2019). The effects of sleep on workplace cognitive failure and safety. *Journal of Occupational Health Psychology*, 24, 411-422. <https://doi.org/10.1037/ocp0000139>.
16. Olson, R., Hess, J.A., Parker, K.N., Thompson, S.V., Rameshbabu, A., Luther Rhoten, K., & Marino, M. From Research-to-Practice: An Adaptation and Dissemination of the COMPASS Program for Home Care Workers (2018). *International Journal of Environmental Research and Public Health*, 15, 2777. <https://doi.org/10.3390/ijerph15122777>
17. Anger, W.K., Kyler-Yano, J., Vaughn, K., Wipfli, B., Olson, R., Blanco, M. (2018). Total Worker Health[®] intervention for construction workers alters safety, health, well-being measures. *Journal of Occupational and Environmental Medicine*, 60 (8), 700-709. DOI: [10.1097/JOM.0000000000001290](https://doi.org/10.1097/JOM.0000000000001290)
18. Postma, J., Tuell, E., James, L., Graves, J., Butterfield, P. (2017) Nursing Students' Perceptions of the Transition to Shift Work: A Total Worker Health Perspective. *Workplace Health & Safety*, 65 (11), 533-538. <https://doi.org/10.1177%2F2165079917719713>
19. Nery-Hurwit, M., Kincl, L., Driver, S., Heller, B. (2017). Stakeholder evaluation of an online program to promote physical activity and workplace safety for individuals with disability. *Evaluation and Program Planning*, 63, 39-44. <https://doi.org/10.1016/j.evalprogplan.2017.03.005>

20. Rineer, J. R., Truxillo, D.M., Bodner, T., Hammer, L.B., & Krainer, M. (2017). The Moderating Effects of Perceived Organizational Support on the Relationship between Organizational Justice and Objective Measures of Cardiovascular Health. *European Journal of Work and Organizational Psychology*, 26 (3), 399-410. <https://doi.org/10.1080/1359432X.2016.1277207>
21. Olson, R., Thompson, S.V., Elliot, D.L., Hess, J.A., Rohten, K.L., Parker, K.L., et al. (2016). Safety and health support for home care workers: The COMPASS randomized controlled trial. *American Journal of Public Health*, 106, 1823-1832. <https://doi.org/10.2105/AJPH.2016.303327>
22. Rohlman, D.S., Parish, M., Elliot D.L., Hanson, G., & Perrin, N. (2016). Addressing young workers' needs: the Promoting U through Safety and Health (PUSH) trial outcomes. *Healthcare: Special Issue Occupational Health Issues in the New Millennium*, 4(3), 55. <https://doi.org/10.3390/healthcare4030055>
23. Zaniboni, S., Truxillo, D. M., Rineer, J. R., Bodner, T. E., Hammer, L. B., & Kraner, M. (2016). Relating age, decision authority, job satisfaction, and mental health: A study of construction workers. *Work, Aging and Retirement*, 1-8. <https://doi.org/10.1093/workar/waw006>
24. Parish, M., Rohlman, D.S., Elliot, D.L., Lasarev, M. (2016). Factors associated with occupational injuries in seasonal young workers. *Occupational Medicine*, 66(2), 166-167. DOI: [10.1093/occmed/kqv183](https://doi.org/10.1093/occmed/kqv183)

Book Chapters

1. Hammer, L.B. & Brady, J. M. (2021). The Evolution of Worker Well-Being and Work-Life Issues. In L. Koppes Bryan (Ed.), *Historical perspectives in industrial and organizational psychology* (2nd ed., pp. xx). Routledge/Taylor and Francis Group.
2. Anger, K., Rameshbabu, A., Parker, K., Wan, W., Hurtado, D., Olson, R., Rohlman, D., Wipfli, B., Bodner, T. (2019). Effectiveness of Total Worker Health Interventions: A Systematic Review. In Hudson, H.L., Nigam, J.A., Sauter, S.L., Chosewood, L.C., Schill, A.L. (Eds.). *Total Worker Health*. Washington, DC: American Psychological Association.
3. Hammer, L.B. & Perry, M. (2019). Reducing Work-Life Stress: The Place for Integrated Interventions. In H. L. Hudson, J. A. S. Nigam, S. L. Sauter, L. C. Chosewood, A. L. Schill, & J. Howard (Eds.). *Total Worker Health*. Washington, DC: American Psychological Association.

Popular media articles:

1. Schuckers, Helen (2021). [Learning from different industries to improve safety, health, and well-being at work](#). *Medium*.
2. Hammer, L and Alley, L. (2021). [How managers can support employee well-being during a pandemic](#). *Medium*.
3. Schuckers, H. and Rameshbabu, A. (2021). [Looking for ways to support your employees? Start with work-life balance](#). *Medium*.
4. Hammer, L and Alley, L. (2020). [4 Key Strategies to Support Employee Well-Being During COVID-19](#). *Medium*.
5. Hammer, L and Alley, L. (2020). [Lead with Empathy During the COVID-19 Crisis](#). *The Conversation*.
6. Hammer, L. & Alley, L. (2020). [Supporting Worker Sleep is Good for Business](#). *The Conversation*.
7. Schuckers, H. (2020). [10 Things to Know About Total Worker Health](#). *Medium.com*.
8. Olson, R. & Hill, A. (2020). [Sleep, Circadian Biology, and Health: Action in the Behavioral Interactions!](#) *Association of Behavior Analysis International Blog*.
9. Montgomery, D., Hill, L., & Wood, M. (2019). Oregon Organizations [Collaborate to Move the Needle Toward Total Worker Health](#). *Professional Safety*.
10. Alley, L. (2019). [Breaking the Silo: Modern Research on Employee Well-being](#). *Medium*.

11. Hill, L., Montgomery, D., Bowers-Payne, R. (2019) [The Journey to "Be Well: Implementing Total Worker Health in Eugene, Oregon"](#). *American Industrial Hygiene Association Synergist*.

Research reports/White papers

- Research report for PCUN: *Mandated, But Not Compensated: Exploring the Multifaceted Impacts of Overtime on Farm Workers' Health, Safety, and Well-being* (2021)
- Dede Montgomery led development of internal white paper for ASSE national and participated in discussion of Society's role in TWH including participation in national meetings (ASSE Safety 2018, WCI 2018).

Media mention:

- Media mention: Russo, M. & Morandin, G. (2019). Better Work-Life Balance Starts with Managers. *Harvard Business Review*. Retrieved from: https://hbr.org/2019/08/better-work-life-balance-starts-with-managers?utm_medium=social&utm_source=twitter&utm_campaign=hbr

Conferences presence and presentations

- 2016-2017: Some key conferences included: American Heart Association Workplace Wellness Summit (9/2016), Northwest Chapter American College Occupational and Environmental Medicine Conference (9/2016), Central Oregon Occupational Safety and Health Conference (9/2017), Southern Oregon Occupational Safety and Health Conference (10/2017), Northwest Occupational Health Conference (10/2016), City of Portland Safety Conference (keynote: TWH) (10/2016), Northwest Pulp and Paper and Forest Products Occupational Safety and Health Conference (11/2016).
- Work, Stress, and Health conference (7/2017): Hello Research, Meet Practice: Plans for Action to Disseminate *Total Worker Health*®
- 2017-2018: Some key conferences included: American Heart Association Workplace Wellness Summit (9/2017), Washington Governor's Industrial Safety Conference (9/2017), Central Oregon Occupational Safety and Health Conference (9/2017), Southern Oregon Occupational Safety and Health Conference (10/2017), Northwest Occupational Health Conference (10/2017), Oregon Public Health Association Conference (10/2017); Business Health Services Conference (10/2017), Northwest Pulp and Paper and Forest Products Occupational Safety and Health Conference (11/2017), 2nd International Symposium to Advance Total Worker Health (scheduled for May 2018).
- Mid-Oregon Construction Safety Conference (1/2020); Cascade Occupational Safety and Health Conference (3/2020); Region 10 VPPPPA Occupational Safety & Health Conference (5/2020); American Industrial Hygiene Association Conference and Exposition (6/2020); American Society of Safety Professionals (6/2020)
(See also previous section listings.)

Outreach Presentations (selected)

- Rameshbabu, A. (2021). *Best practices for translating research to practice* – presenting an infographic. Oregon Institute of Occupational Health Sciences, Dissemination Workgroup.
- Rameshbabu, A. (2021). Facilitating Mental Health, Well-being, and Resilience through *Total Worker Health*®. Health Enhancement Research Organization Forum. (pre-recorded workshop)
- Rameshbabu, A., Hammer, L., Olson, R. (2021). *Overview of the Oregon Healthy Workforce Center*. American Psychological Association Work, Stress, and Health conference. (poster + online discussion format)

- Guilfooy, N. (2020, 2021). Careers in Occupational Health. OHSU-PSU School of Public Health. ESHH 521 Occupational Health and Safety course. Portland, OR.
- Guilfooy, N. (2020). Employee Benefits for Safety Professionals. Oregon SHARP Alliance. Portland, OR
- Rameshbabu, A. (2020). *Reaching beyond Wellness: Bringing Total Worker Health into Organizations* (invited speaker). 2020 Healthy Worksite Summit, Association of Washington Cities in partnership with University of Washington Prevention Research Center and State of Washington Health Care Authority. (Web presentation)
- Rameshbabu, A. (2019). *Outreach activities at the Oregon Healthy Workforce Center*. Presentation at the 2019 Work Stress and Health Conference. Philadelphia, PA. In D. Rohlman (Chair), Approaches that Accelerate Research to Practice: Lessons learned from NIOSH Total Worker Health Centers. Symposium conducted at the 2019 APA Work, Stress and Health conference, Philadelphia, PA. (Oral, Panel Presentation)
- Wipfli, B., Wild, S., Donovan, C., Barnum, M. Rameshbabu, A., & Schuckers, H. (2019). *Active Workplace Study: Research to practice*. 2019 APA Work, Stress, and Health conference. Philadelphia, PA. (Poster)
- Guilfooy, N., Rameshbabu, A., Martinez, L., Nakashima, V. (2019). Collaborating for Total Worker Health®: Solutions for Diversity, Equity, and Inclusion. HERO 2019 (Oral, Deep-Dive Session)
- Montgomery, D. (2019), Fatigue at Work: Causes, Impacts, and Solutions. Washington Governor's Industrial Safety and Health Conference.
- Montgomery, D. (2019), Fatigue at Work: Causes, Impacts, and Solutions. Central Oregon Occupational Safety and Health Conference.
- Montgomery, D. (2019), Understanding *Total Worker Health*: What industrial hygienists should know. Northwest Occupational Health Conference.
- Montgomery, D., Schuckers, H., Guilfooy, N. (2020). Activities of the Outreach Core. Oregon Institute of Occupational Health Sciences External Advisory Board
- Rameshbabu, A. (2020, 2021). Changing Behavior: Motivational controls for individuals and organization. OHSU-PSU School of Public Health. ESHH 521 Occupational Health and Safety course. Portland, OR.
- Rameshbabu, A. (2019). Oregon Healthy Workforce Center. Presentation at the 2019 Work Stress and Health Conference. Philadelphia, PA. In D. Rohlman (Chair), Approaches that Accelerate Research to Practice: Lessons learned from NIOSH *Total Worker Health* Centers. Symposium conducted at the 2019 Work, Stress and Health conference, Philadelphia, PA. (Oral, Panel Presentation)
- Schuckers, H. (2019). *Total Worker Health* and BeSuper in Construction Toolkit. Oregon Bureau of Labor and Industries (Oral Presentation)
- Schuckers, H. (2020). *Total Worker Health* Tools and Toolkits. Health Equity Partners
- Guilfooy, N. (2020). Stressed Out? *Total Worker Health* Can Help! Blue Mountain Occupational Safety and Health Conference. Pendleton, OR (Oral Presentation)
- Guilfooy, N. (2020). House of Cards: Non-Physical Hazards in the Workplace. Northwest Safety and Health Summit by Region X VPPA. Boise, ID. (Oral Presentation)
- Guilfooy, N., Butler, C. (2020). Incident Investigation Training. Northwest Safety and Health Summit by Region X VPPA. Boise, ID. (Oral Presentation)
- Rameshbabu, A. Invited speaker at 2020 Healthy Worksite Summit, Association of Washington Cities in partnership with University of Washington Prevention Research Center and State of

Washington Health Care Authority.

C.2. Website(s) or other Internet site(s) – include URL(s)

- OHWC: <http://www.ohsu.edu/ohwc>
- Oregon Institute of Occupational Health Sciences (home of OHWC): <https://www.ohsu.edu/oregon-institute-occupational-health-sciences>
- YourWorkpath: <https://www.yourworkpath.com/>
- Oregon and the Workplace Blog: <https://blogs.ohsu.edu/occupational-health-sciences/>
- LinkedIn: <https://www.linkedin.com/company/occhealthsci/>
- Twitter: <https://twitter.com/OHSUOccHealth>
- Facebook: <https://www.facebook.com/occhealthsci.ohsu/>
- Podcast: <https://www.ohsu.edu/oregon-institute-occupational-health-sciences/whats-work-got-do-it-podcast>
- YouTube: https://www.youtube.com/channel/UCXF8ZmB51EM_H3KMy4X8oYw/videos

C.3. Technologies or techniques

We utilize several online engagement and production platforms, increasingly so since the pandemic (e.g., WebEx, YouTube, Wordpress, Soundcloud), as well as social media platforms (as indicated in C.2).

C.4. Inventions, patent applications, and/or licenses

License/inventions are filed with Tech Transfer department at OHWC's home institution, Oregon Health & Science University. Licenses were obtained during this grant period for projects completed during OHWC's previous cycle.

- Safety & Health Improvement Program (SHIP):
 - License with SAIF Corporation, license # AGR-2602-02
 - License with Eskenazi Health Inc., license # AGR-2602-01
- COMmunity of Practice And Safety Support program (COMPASS): License with Oregon Home Care Commission, license # AGR-2109-01
- Promoting U Through Safety & Health (PUSH): License with St. Louis Community College, license #s AGR-2248-02

C.5. Other products and resource sharing

Direct advice and support to organizations

- Metric: # Evidence-based toolkits updated and in use by organizations: 4
- Metric: # Organizations engaged in meet-up to discuss uptake of OHWC's tools and toolkits : 46
- Leslie Hammer was invited by Cascade Centers EAP to speak in their Human Resources Webinar series on the topic, "The Role of Leaders in Reducing Work-Life Stress"

<https://www.youtube.com/watch?v=7OcGKb5qfS0&feature=youtu.be>
- Recordings from bi-annual symposia: <https://www.ohsu.edu/oregon-institute-occupational-health-sciences/training-and-symposia>

- Recordings from Occupational Health Psychology Summer Institute: <https://www.ohsu.edu/oregon-healthy-workforce-center/occupational-health-psychology-summer-institute>
- Podcast episodes: <https://soundcloud.com/occhealthsci>

D. PARTICIPANTS

D.1. What individuals have worked on the project? Please include calendar, academic, and summer months.

Commons ID	S/K	Name	Degrees(s)	Role	Cal	Aca	Sum	Foreign	Country	SS

This information is reported within Overall report.

D.2 Personnel updates

- a. Level of Effort:
- b. New Senior/Key Personnel:
- c. Changes in Other Support:
- d. New Other Significant Contributors:

This information is reported within Overall report.

E. IMPACT

E.1 - What is the impact on the development of human resources, if applicable?

OHWC's research, outreach, education, and dissemination activities are geared toward producing evidence-based (i.e., emerging directly from our research) and evidence-informed (informed by existing literature) resources that industry professionals (such as human resource) and organizational leaders can implement within their setting. The impact of our activities have been reported in the above sections.

Institute Senior Research Associate and Oregon Healthy Workforce Center Outreach Co-Principal Investigator, Dede Montgomery received a CDC National Institute for Occupational Safety and Health (NIOSH) COVID-19 Intergovernmental Personnel Assignment (IPA) to support safe return of workers during the pandemic in Region X. Through her 0.15 FTE (9/2020-9/2021), Montgomery provided training and educational videos, and technical expertise to industry requests including agriculture, construction and general industry.

E.2 - What is the impact the Public Health Relevance and Impact? The investigator should address how the findings of the project relate beyond the immediate study to improved practices, prevention or intervention techniques, legislation, policy, or use of technology in public health.

OHWC's Outreach Core has served to broaden our outreach by leveraging existing connections and accomplishments to translate the TWH approach into practice, and our communication and dissemination activities are geared toward making immediate and long-term impact. Further, because members of the Outreach Core serve both OHWC and the Oregon Institute of Occupational Health Sciences, our work is co-ordinated and cross-promoted, thus amplifying our research and dissemination efforts. Our robust efforts to disseminate OHWC's evidence-based resources have led to the development of YourWorkpath, an online repository and the YourWorkpath program, which allows organizations to test and adopt our tools and toolkits. OHWC's resources have been adopted by organizations as listed in the above sections. Further, our Oregon *Total Worker Health* Alliance, a first of its kind partnership between research, regulatory, and workers compensation entities, has helped to spearhead the *Total Worker Health* trainings for occupational safety and wellness professionals, thus facilitating capacity-building for implementing the *Total Worker Health* approach in practice. With regard to policy action, we produced a research report for PCUN, Oregon's largest Latino union in the U.S., titled, *Mandated, But Not Compensated: Exploring the Multifaceted Impacts of Overtime on Farm Workers' Health, Safety, and Well-being* (2021) – this report is helping PCUN to bring the issue of unpaid overtime work among farmers to legislation. Institute Senior Research Associate and Oregon Healthy Workforce Center Outreach Co-Principal Investigator, Dede Montgomery received a CDC National Institute for Occupational Safety and Health (NIOSH) COVID-19 Intergovernmental Personnel Assignment (IPA) to support safe return of workers during the pandemic in Region X. Through her 0.15 FTE (9/2020-9/2021), Montgomery provided training and educational videos, and technical expertise to industry requests including agriculture, construction and general industry.

F. CHANGES

F.1 – Changes in approach and reasons for change, including changes that have a significant impact on expenditures

Nothing to report here.

F.2 - Actual or anticipated challenges or delays and actions or plans to resolve them

Nothing to report here.

F.3 - Significant changes to human subjects, vertebrate animals, biohazards, and/or select agents

Nothing to report here.

G. Special Reporting Requirements

G.1 Special Notice of Award Terms and Funding Opportunities Announcement Reporting Requirements

Nothing to report here.

G.2 Responsible Conduct of Research

Nothing to report here.

G.3 Mentor's Research Report or Sponsor Comments

Nothing to report here.

G.4 Human Subjects

G.4.a Does the project involve human subjects?

Nothing to report here.

G.4.b Inclusion Enrollment Data

Nothing to report here.

G.4.c ClinicalTrials.gov

Does this project include one or more applicable clinical trials that must be registered in ClinicalTrials.gov under FDAAA?

Nothing to report here.

G.5 Human Subject Education Requirement

Are there personnel on this project who are newly involved in the design or conduct of human subject's research?

Nothing to report here.

G.6 Human Embryonic Stem Cells (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

Nothing to report here.

G.7 Vertebrate Animals

<p>Does this project involve vertebrate animals?</p> <p>Nothing to report here.</p>
<p>G.8 Project/Performance Sites</p> <p>Nothing to report here.</p>
<p>G.9 Foreign Component</p> <p>Nothing to report here.</p>
<p>G.10 Estimated Unobligated Balance</p> <p>G.10.a Is it anticipated that an estimated unobligated balance (including prior year carryover) will be greater than 25% of the current year's total approved budget?</p> <p>This information is reported within Overall report.</p>
<p>G.11 Program Income</p> <p>Is program income anticipated during the next budget period?</p> <p>Nothing to report here.</p>
<p>G.12 F&A Costs</p> <p>Is there a change in performance sites that will affect F&A costs?</p> <p>Nothing to report here.</p>

I. OUTCOMES

<p>I. Provide a concise summary of the outcomes or findings of the award, written for the general public in clear and comprehensible language, without including any proprietary, confidential information or trade secrets</p> <p>Note: project outcome information will be made public in NIH RePORTER</p> <p>Our outreach activities organically have fallen into 3 categories: <u>outreach and communication, education, and dissemination</u>. OHWC has led robust TWH outreach, education, and dissemination efforts in the Pacific Northwest and beyond, in collaboration with our home Institute at OHSU. We engaged existing and new contacts and partners to better understand worker and workplace needs, to share TWH resources, and create research opportunities. We developed and provided training curriculum for practitioners and professionals in occupational safety and health (OSH), workers' compensation, and HR, along with our</p>
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symposia and summer institutes. Finally, we systematically and strategically activated our dissemination channels to share project results and maximize OHWC's impact on improving workplace safety, health, and well-being.

We also continue to learn about stakeholder needs through our sustained and collective efforts within the Outreach Core:

- Safety and health, wellness and human resource professionals are motivated, engaged and interested in opportunities to learn more about concepts and paths leading to the *Total Worker Health* Approach. They particularly request and learn from case examples and illustrations.
- We have learned from our outreach with partners, intervention end-users, and stakeholders that for our research-based toolkits and resources to be effectively used by organizations, they must be easy to understand and implement, relevant, and readily available.
- We have observed that the pandemic has brought an increased and widespread organizational interest in the *Total Worker Health* approach.
- Success of outreach programs in academia is dependent on strong and trusting partnerships with industry, public agencies, regulators, and professional associations.

A. COVER PAGE

Project Title: <u>Pilot Project</u> : A natural experiment for the impact of schedules on sleep, health, and safety in firefighters [PI: Nicole Bowles]	
Grant Number: U19OH010154	Project/Grant Period: 9/2016-8/2021
Reporting Period: 9/2016-8/2021 (complete cycle)	Date Submitted:
Program Director/ Principal Investigator Nicole Bowles, PhD bowlesn@ohsu.edu 503-494-2541	Administrative Official Information Mark Derby derbym@ohsu.edu 503-494-8893
Change of Contact PD/PI:	
Human Subjects:	Vertebrate Animals:
hESC:	Inventions/Patents:

B. ACCOMPLISHMENTS

B.1. What are the major goals of the project?

The Pilot Project program is geared toward facilitating new research projects focused on improving employee safety, health, and well-being using the *Total Worker Health*® approach.

B.2. What did you accomplish under these goals?

A NATURAL EXPERIMENT FOR THE IMPACT OF SCHEDULES ON SLEEP, HEALTH, AND SAFETY IN FIREFIGHTERS (PIS: NICOLE BOWLES, ANDREW MCHILL, & DAVID HURTADO)

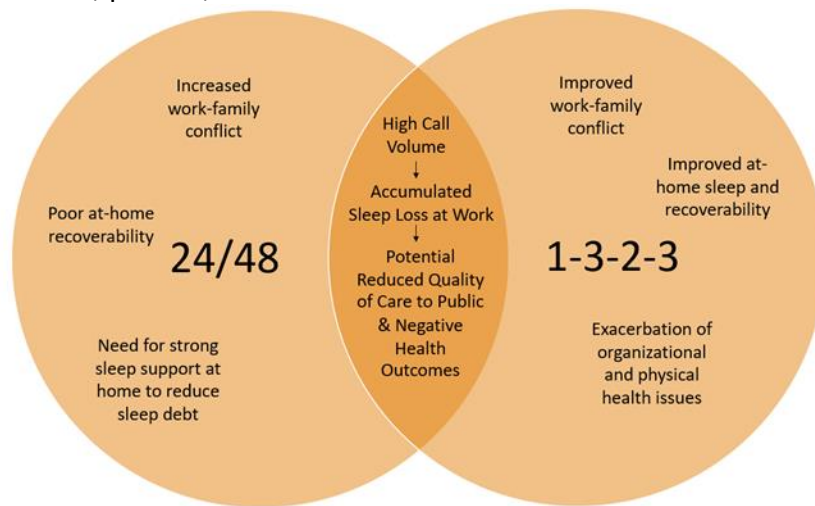
Background and Purpose: Firefighters play a vital role in their communities working to suppress fires and providing emergency and rescue services, commonly working 24 hours on/48 hours off. Due to an increase in call volume caused by societal needs they have decreased and fragmented sleep that is associated with a 4-fold increase in risk of accidents, and face a number of physical, emotional and cognitive stressors that may worsen sleep and recovery, and affect family dynamics. Many fire departments throughout the United States have switched to alternative work schedules [e.g., 48/96 or 24/72/48/72 (a.k.a. 1-3-2-3)] with the goal to alleviate some of these concerns. However, there are currently no reports or objective measures available regarding the short or long-term effects these alternative shift schedules will have on firefighters' physical health and mental well-being. Thus, the purpose of the study is to evaluate the safety and well-being effects of a 24/48 vs. 1-3-2-3 work schedules among firefighters from two high call volume fire departments in Oregon.

Participants

- Firefighters from 2 fire departments in Oregon (Firefighters and Battalion Chiefs)
 - Portland Fire & Rescue (Oregon)
 - Eugene-Springfield Fire Department (Oregon)
- Firefighter partners or significant others

Aim 1 Results: Aim 1: Assess the culture of sleep and well-being among firefighters and their partners before and after operating on a 1-3-2-3 shift schedule. Through qualitative focus groups of a 24/48 fire department and a 1-3-2-3 fire department, major themes suggested that the 24/48 shift schedule increased work-family conflict, created poor at-home recoverability due to limited time to recover from accumulated sleep loss, as well as maintain family/martial relationships. The need for strong sleep support at home to reduce sleep debt was also present (Watkins et al., 2021). The 1-3-2-3 fire department showed themes that were the opposite of the 24/48, praising the schedules' ability to allow for improved family/marital relationships and at-home sleep and recoverability due to increased time off between shifts. However, the 48-hour shifts inherent in the 1-3-2-3 schedule, appear to exacerbate organizational issues such as scheduling inequities, and also increase the use of substances to maintain wakefulness and promote sleep that was absent from the 24/48 fire department. In a comparison analysis of the two work schedules, we have surmised that although increased time off between shifts improves subjective at-home recovery, the high call volume that has increased steadily for the last 20 years is extremely impactful to accumulated sleep loss at work

especially on 48-hour shifts. This can potentially impact quality of care to the public, and create negative health outcomes for firefighters (*manuscript in preparation*). In order to initially assess sleep and health outcomes, we are currently using actigraphy, sleep journals, heart rate and blood pressure monitoring, accident logs, and daily stress surveys. The quantitative portion of the study (Aim 2) was delayed due to COVID-19. We were able to update the study protocol to eliminate our need to meet study participants face to face and start collection in May 2020. However, subsequent scheduled study protocols were further delayed due to protests related to the murder of George Floyd and wildfires on the West Coast. To meet these additional challenges, we were able to introduce additional study questionnaires to assess the impact of COVID, protest, and fire-related stressors.



Supplemental Funding: In addition to the pilot funds obtained from OHWC, we received supplemental funds that will allow us to: 1) Measure and identify cardiovascular biomarkers in a larger study to evaluate the cardiovascular effects of a 24/48 vs. 1-3-2-3 work schedule among firefighters; and 2) Identify and evaluate a dissemination plan for findings of the study pilot that can be expanded for a larger study.

University Shared Resources Grant
(COVID)

12/01/2019-6/30/2021 (NCE because of

Biomarker assessment of a natural experiment for the impact of schedules on sleep and health in firefighters

Professional Training Opportunities Program (PTOP)

10/01/2020-9/30/2021

A qualitative analysis of decision making and research utilization among firefighters

Dissemination of pilot project results

Presentations:

Watkins S.L., Shannon M.A., Hurtado D.A., Shea S.A., Bowles N.P. "Interactions Between Home, Work, and Sleep Among Full-Time Firefighters." (Accepted for 2020 Sleep Conference)

Watkins S.L. "A qualitative analysis of decision making and research utilization among firefighters." 2021 Northwest Occupational Health Conference.

Publication:

Watkins, S., Shannon, S., Hurtado, A., Shea, S., Bowles, N. (2021). Interactions between home, work, and sleep among firefighters. *American Journal of Industrial Medicine*, 64(2), 137-148.
<https://doi.org/10.1002/ajim.23194>

B.3. Competitive Revisions/Administrative Supplements

Nothing to report

B.4. What opportunities for training and professional development did the project provide?

Pilot project PIs presented chalk talks at OHWC's monthly Internal Steering Committee meetings. Chalk talks allow presenters to share their study and receive feedback on various aspects of the research and dissemination process.

- A natural experiment for the impact of schedules on sleep, health, and safety in firefighters [PI: Nicole Bowles]. Chalk talks in 2020 and 2021.

B.5. How did you disseminate the results to communities of interest?

Results were presented at scientific conferences and published in a peer-reviewed journal.

B.6 - What do you plan to do during the next reporting period to accomplish the goals?

This project has transitioned to full-scale "large" (per FOA) research projects in the OHWC's 2021-2026 cycle.

C. PRODUCTS

C.1. Publications, conference papers, and presentations

Presentations:

Watkins S.L., Shannon M.A., Hurtado D.A, Shea S.A., Bowles N.P. "Interactions Between Home, Work, and Sleep Among Full-Time Firefighters." (Accepted for 2020 Sleep Conference)

Watkins S.L. "A qualitative analysis of decision making and research utilization among firefighters." 2021 Northwest Occupational Health Conference.

Publication:

Watkins, S., Shannon, S., Hurtado, A., Shea, S., Bowles, N. (2021). Interactions between home, work, and sleep among firefighters. *American Journal of Industrial Medicine*, 64(2), 137-148.
<https://doi.org/10.1002/ajim.23194>

C.2. Website(s) or other Internet site(s) – include URL(s)

Nothing to report

C.3. Technologies or techniques

Nothing to report

C.4. Inventions, patent applications, and/or licenses

Nothing to report

C.5. Other products and resource sharing

Nothing to report

D. PARTICIPANTS**D.1. What individuals have worked on the project?** Please include calendar, academic, and summer months.

Commons ID	S/K	Name	Degrees(s)	Role	Cal	Aca	Sum	Foreign	Country	SS

This information is reported within Overall report.

D.2 Personnel updates**a. Level of Effort:****b. New Senior/Key Personnel:****c. Changes in Other Support:****d. New Other Significant Contributors:**

This information is reported within Overall report.

E. IMPACT

E.1 - What is the impact on the development of human resources, if applicable?

Nothing to report

E.2 - What is the impact the Public Health Relevance and Impact? The investigator should address how the findings of the project relate beyond the immediate study to improved practices, prevention or intervention techniques, legislation, policy, or use of technology in public health.

Firefighters play a vital role in their communities working to suppress fires and providing emergency and rescue services, commonly working 24 hours on/48 hours off. Due to an increase in call volume caused by societal needs they have decreased and fragmented sleep that is associated with a 4-fold increase in risk of accidents, and face a number of physical, emotional and cognitive stressors that may worsen sleep and recovery, and affect family dynamics. There are currently no reports or objective measures available regarding the short or long-term effects of alternative shift schedules on firefighters' physical health and mental well-being. This study will evaluate the safety and well-being effects of a 24/48 vs.1-3-2-3 work schedules among firefighters from two high call volume fire departments in Oregon. Initial surveys also suggest a reduction in work-family conflict with increased consecutive days off and a larger study will investigate these shift schedules and outcomes further.

F. CHANGES

F.1 – Changes in approach and reasons for change, including changes that have a significant impact on expenditures

Nothing to report

F.2 - Actual or anticipated challenges or delays and actions or plans to resolve them

Nothing to report

F.3 - Significant changes to human subjects, vertebrate animals, biohazards, and/or select agents

Nothing to report

G. Special Reporting Requirements

<p>G.1 Special Notice of Award Terms and Funding Opportunities Announcement Reporting Requirements</p> <p>Not applicable</p>
<p>G.2 Responsible Conduct of Research</p> <p>Not applicable</p>
<p>G.3 Mentor's Research Report or Sponsor Comments</p> <p>Not applicable</p>
<p>G.4 Human Subjects</p> <p>G.4.a Does the project involve human subjects? Yes</p> <p>G.4.b Inclusion Enrollment Data Inclusion: Full time firefighter working either a 24/48 schedule as part of Portland Fire and Rescue or a 1/3/2/3 schedule and part of the Springfield/Eugene Fire Department. See enrollment table.</p> <p>G.4.c ClinicalTrials.gov</p> <p>Does this project include one or more applicable clinical trials that must be registered in ClinicalTrials.gov under FDAAA?</p>
<p>G.5 Human Subject Education Requirement</p> <p>Are there personnel on this project who are newly involved in the design or conduct of human subject's research? No</p>
<p>G.6 Human Embryonic Stem Cells (HESCS)</p> <p>Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?</p> <p>Not applicable</p>

G.7 Vertebrate Animals Does this project involve vertebrate animals? Not applicable
G.8 Project/Performance Sites Not applicable
G.9 Foreign Component Not applicable
G.10 Estimated Unobligated Balance G.10.a Is it anticipated that an estimated unobligated balance (including prior year carryover) will be greater than 25% of the current year's total approved budget? This information is reported within Overall report.
G.11 Program Income Is program income anticipated during the next budget period? Not applicable
G.12 F&A Costs Is there a change in performance sites that will affect F&A costs? Not applicable

Cumulative Inclusion Enrollment Report

This report format should NOT be used for collecting data from study participants.

Study Title: A natural experiment for the impact of schedules on sleep, health, and safety in firefighters

Comments:

Racial Categories	Ethnic Categories									Total
	Not Hispanic or Latino			Hispanic or Latino			Unknown/Not Reported Ethnicity			
	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	
American Indian/ Alaska Native	0	2	0	0	0	0	0	0	0	2
Asian	0	0	0	0	0	0	0	0	0	0
Native Hawaiian or Other Pacific Islander	0	1	0	0	0	0	0	0	0	1
Black or African American	0	2	0	0	0	0	0	0	0	2
White	3	25	0	0	0	0	0	0	0	28
More Than One Race	0	0	0	0	0	0	0	0	0	0
Unknown or Not Reported	0	3	0	0	0	0	0	0	0	3
Total	3	33	0	0	0	0	0	0	0	36

I. OUTCOMES

I. Provide a concise summary of the outcomes or findings of the award, written for the general public in clear and comprehensible language, without including any proprietary, confidential information or trade secrets

Note: project outcome information will be made public in NIH RePORTER

Qualitative studies examining firefighters' work schedule suggest that increased consecutive days off-shift despite increased consecutive days on-shift improve family relationships through increased recovery. Initial surveys also suggest a reduction in work-family conflict with increased consecutive days off. However, this was a pilot cross-sectional study that is currently being expanded and will include a prospective study that follows a department before and after a schedule change.

A. COVER PAGE

Project Title: <u>Pilot Project</u> : Pilot-testing the feasibility of a <i>Total Worker Health</i> interpersonal burnout intervention [MPIs: David Hurtado & Abigail Lenhart]	
Grant Number: U19OH010154	Project/Grant Period: 9/2016-8/2021
Reporting Period: 9/2016-8/2021 (complete cycle)	Date Submitted:
Program Director/ Principal Investigator David Hurtado, ScD (contact), and Abigail Lenhart, MD hurtadod@ohsu.edu 503-494-3132	Administrative Official Information Mark Derby derbym@ohsu.edu 503-494-8893
Change of Contact PD/PI:	
Human Subjects:	Vertebrate Animals:
hESC:	Inventions/Patents:

B. ACCOMPLISHMENTS

B.1. What are the major goals of the project?

The Pilot Project program is geared toward facilitating new research projects focused on improving employee safety, health, and well-being using the *Total Worker Health*® approach.

B.2. What did you accomplish under these goals?

PILOT-TESTING THE FEASIBILITY OF A TOTAL WORKER HEALTH INTERPERSONAL BURNOUT INTERVENTION (MPIS: DAVID HURTADO & ABIGAIL LENHART)

Background and Purpose: The purpose of this pilot is to interview supervisors and staff at the South Waterfront primary care clinic at OHSU who conducted one-on-one staff check-ins as a tactic to reduce burnout. We interviewed these supervisors because a study led by MPI Lenhart found that from 2017 to 2018, burnout prevalence increased across OHSU clinics, except at the South Waterfront (see Figure). The check-in consisted of a one-on-one meeting, where a clinic worker and their respective supervisor had a voluntary monthly meeting to discuss their experience of burnout and well-being. This pilot study aimed at identifying the key components of the “wellbeing check-ins” to inform the development of a subsequent intervention protocol. This pilot aims to systematically identify the rationale of the well-being check-ins and outline its procedures and components in an effort to understand whether these check-ins may have played a role in reducing burnout. Likewise, these interviews will be the basis for developing an intervention protocol infused with *Total Worker Health* principles. This pilot project began in February 2020, but was delayed to the summer of that year due to COVID-19. We interviewed four supervisors (practice manager, medical director, patient-access supervisor, medical assistant supervisor) to learn about the rationale, process, and outcomes related to the check-ins. We also interviewed six clinic employees with different roles (medical assistants, patient-access specialists) to listen to their experience with the check-ins. Interviews indicated that 80% of clinic workers had at least one monthly check-in. The practice manager created the check-ins upon their appointment to learn about well-being needs and to restore trust in management. The check-ins were intended for supervisors to listen to and address issues brought up by employees. The supervisors opened the check-ins with basic questions (e.g., “what is on your mind today?”). If an action plan was created, a follow-up email was sent to the employee. Interviewees shared that often, an employee wanted to feel listened to regarding a challenging situation. We have selected quotes regarding the contents discussed in these check-ins (see table), they pertain to work-flow disruptions (e.g., workers’ input for improving processes, eliminating redundant work, reducing workload, interpersonal conflicts with co-workers), scheduling modification requests (e.g., taking

Burnout prevalence across OHSU primary care clinics

Rationale

“People were leaving, our turnover rate was off the chain”
 “This is just me and you talking. How can I keep you here? We can’t do it all. But the things that we can do, the things they bring them to our attention, we get it done.”

Environmental changes

“It’s very hard for me to sit at this particular desk.” That’s a quick fix. We call ergonomics out. We change, we get a standup desk. Those little things like that, it’s huge when it comes to satisfaction and burnout.”

Administrative/procedural work-life changes

“a nurse lived pretty far, and she came to work every day on time. So we looked into, and this was even prior to COVID. I talked to the leadership team, and said, she can do this work from home. This would be a job satisfier for her, we can keep her”

Administrative/procedural workflow changes

“I started hearing some of the feedback and the challenges that the staff faced. As a supervisor, I don’t always see the barriers on the floor. So, I’ll get feedback with the flu clinic; we have patients who have kids, and it’s like if there’s only one appointment available, and they bring their child, it’s really hard to refuse to give their child a vaccine. We fixed that”.

time off, scheduling changes), changes to workstations (e.g., request of ergonomic evaluations), and work-life matters (e.g., child or adult care needs, personal issues). Finally, the interviews revealed that check-ins were integrated with other clinic-wide practices; non-confidential information was revisited during other staff-level meetings to define actions to address employees' issues.

Supplemental Funding: In addition to the pilot funds obtained from OHWC, we received supplemental funds that will allow us to pilot test the new protocol at a new OHSU primary care clinic in preparation for a subsequent intervention.

Medical Research Foundation of Oregon

08/01/2020-11/30/2021

Pilot-testing the feasibility of a Total Worker Health interpersonal burnout intervention.

B.3. Competitive Revisions/Administrative Supplements

Nothing to report

B.4. What opportunities for training and professional development did the project provide?

Pilot project PIs presented chalk talks at OHWC's monthly Internal Steering Committee meetings. Chalk talks allow presenters to share their study and receive feedback on various aspects of the research and dissemination process.

- Pilot-testing the feasibility of a *Total Worker Health* interpersonal burnout intervention [MPIs: David Hurtado & Abigail Lenhart] Chalk talks in 2020 and 2021.
- Samuel Greenspan, MPH, Research Assistant in the Hurtado/Lenhart project had significant opportunities to learn and refine qualitative research skills, including conducting, analyzing and reporting of participant interviews.

B.5. How did you disseminate the results to communities of interest?

Results were presented at a scientific conference.

B.6 - What do you plan to do during the next reporting period to accomplish the goals?

This project has transitioned to full-scale "large" (per FOA) research projects in the OHWC's 2021-2026 cycle.

C. PRODUCTS

C.1. Publications, conference papers, and presentations

Presentation:

Hurtado, DA., Lenhart, A., Valenzuela, S., McGinnis, W., Greesnpan, SA., Everson, T. The Well-being Check-ins: observational evidence supporting a supervisor-driven practice to reduce burnout in primary care clinics. *Work, Stress and Health Conference, 2021.*

C.2. Website(s) or other Internet site(s) – include URL(s)

Nothing to report

C.3. Technologies or techniques

Nothing to report

C.4. Inventions, patent applications, and/or licenses

Nothing to report

C.5. Other products and resource sharing

Nothing to report

D. PARTICIPANTS**D.1. What individuals have worked on the project?** Please include calendar, academic, and summer months.

Commons ID	S/K	Name	Degrees(s)	Role	Cal	Aca	Sum	Foreign	Country	SS

This information is reported within Overall report.

D.2 Personnel updates

a. Level of Effort:

b. New Senior/Key Personnel:

c. Changes in Other Support:

d. New Other Significant Contributors:

This information is reported within Overall report.

E. IMPACT**E.1 - What is the impact on the development of human resources, if applicable?**

Nothing to report

E.2 - What is the impact the Public Health Relevance and Impact? The investigator should address how the findings of the project relate beyond the immediate study to improved practices, prevention or intervention techniques, legislation, policy, or use of technology in public health.

This pilot study provided information about the feasibility, reach, and further refinements of a practical and swift strategy to address burnout in primary care clinics and can be implemented in the COVID-19 era. As a next step, we will be conducting a cluster randomized controlled trial to test the effectiveness of the check-ins to reduce burnout.

F. CHANGES**F.1 – Changes in approach and reasons for change, including changes that have a significant impact on expenditures**

We planned for in-person interviews but we moved to online interviews due to COVID-19.

F.2 - Actual or anticipated challenges or delays and actions or plans to resolve them

The pilot started in the winter of 2020 but the project was halted in the spring of 2020 due to COVID-10. We resumed activities in the summer of 2020.

F.3 - Significant changes to human subjects, vertebrate animals, biohazards, and/or select agents

Nothing to report

G. Special Reporting Requirements**G.1 Special Notice of Award Terms and Funding Opportunities Announcement Reporting Requirements**

Not applicable

G.2 Responsible Conduct of Research

Not applicable

G.3 Mentor's Research Report or Sponsor Comments

Not applicable

G.4 Human Subjects

G.4.a Does the project involve human subjects?

Yes

G.4.b Inclusion Enrollment Data

See attached table.

G.4.c ClinicalTrials.gov

Does this project include one or more applicable clinical trials that must be registered in ClinicalTrials.gov under FDAAA?

G.5 Human Subject Education Requirement

Are there personnel on this project who are newly involved in the design or conduct of human subject's research?

Not applicable

G.6 Human Embryonic Stem Cells (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

Not applicable

G.7 Vertebrate Animals

Does this project involve vertebrate animals?

Not applicable

G.8 Project/Performance Sites

Not applicable

G.9 Foreign Component

Not applicable

G.10 Estimated Unobligated Balance

G.10.a Is it anticipated that an estimated unobligated balance (including prior year carryover) will be greater than 25% of the current year's total approved budget?

This information is reported within Overall report.

G.11 Program Income

Is program income anticipated during the next budget period?

Not applicable

G.12 F&A Costs

Is there a change in performance sites that will affect F&A costs?

Not applicable

Cumulative Inclusion Enrollment Report

This report format should NOT be used for collecting data from study participants.

Study Title: Work-life Check-ins: A Total Worker Health, supervisor driven burnout intervention pilot

Comments: Demographic data other than gender was not collected for participants in the pilot study.

Racial Categories	Ethnic Categories									Total
	Not Hispanic or Latino			Hispanic or Latino			Unknown/Not Reported Ethnicity			
	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	
American Indian/ Alaska Native	0	0	0	0	0	0	0	0	0	0
Asian	0	0	0	0	0	0	0	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0	0	0	0	0	0	0	0
Black or African American	0	0	0	0	0	0	0	0	0	0
White	0	0	0	0	0	0	0	0	0	0
More Than One Race	0	0	0	0	0	0	0	0	0	0
Unknown or Not Reported	0	0	0	0	0	0	16	3	0	19
Total	0	0	0	0	0	0	16	3	0	19

I. OUTCOMES

I. Provide a concise summary of the outcomes or findings of the award, written for the general public in clear and comprehensible language, without including any proprietary, confidential information or trade secrets

Note: project outcome information will be made public in NIH RePORTER

This pilot study provided information about the feasibility, reach, and further refinements of a conducting regular one-on-one supervisor-staff check-ins as a strategy to address burnout in primary care clinics. Interviews revealed that the check-ins were separate from performance reviews and were intended to gather information affecting each worker's work or life matters. Supervisors were asked to listen to worker's input, acknowledge the problems, and improve workflow issues. However, staff mentioned that they needed to trust and feel safe as a prerequisite to disclose any information. As a next step, we will be conducting a cluster randomized controlled trial to test the effectiveness of the check-ins to reduce burnout.

A. COVER PAGE

Project Title: <u>Pilot Project:</u> COMmunity of Practice And Safety Support for Navigating Pain (COMPASS-NP) [PI: Ryan Olson]	
Grant Number: U19OH010154	Project/Grant Period: 9/2016-8/2021
Reporting Period: 9/2016-8/2021 (complete cycle)	Date Submitted:
Program Director/ Principal Investigator Ryan Olson, PhD olsonry@ohsu.edu 503-494-2501	Administrative Official Information Mark Derby derbym@ohsu.edu 503-494-8893
Change of Contact PD/PI:	
Human Subjects:	Vertebrate Animals:
hESC:	Inventions/Patents:

B. ACCOMPLISHMENTS

B.1. What are the major goals of the project?

The Pilot Project program is geared toward facilitating new research projects focused on improving employee safety, health, and well-being using the *Total Worker Health*® approach.

B.2. What did you accomplish under these goals?

COMMUNITY OF PRACTICE AND SAFETY SUPPORT FOR NAVIGATING PAIN (COMPASS-NP) (PI:OLSON)

Background and Purpose: Home care workers (HCWs) are at significant risk of workplace injury, pain, and pain-related complications including use of opioids and opioid misuse. The need for support and resources is amplified by the projected rapid expansion of the occupation, which is expected to grow 36% by 2028. Although the burden of musculoskeletal problems for HCWs is established (Kim, Geiger-Brown, Trinkoff, & Muntaner, 2010; Wipfli, Olson, Wright, Garrigues, & Lees, 2012) research is lacking on biopsychosocial factors associated with their pain experiences and pain management strategies (pharmacological and non-pharmacological). Interventions that address pain management and biopsychosocial factors together are greatly needed to provide comprehensive support for HCWs who continue to work despite having pain. Within this context, the COMPASS-NP pilot was designed to address two specific aims:

Aim 1: Collect survey data to describe the burden of pain, use of pharmacological and nonpharmacological strategies for pain management, and examine correlates of pain with work and demographic factors in the HCW population. Informed by the biopsychosocial model of pain, a survey of HCWs was designed to collect data on the prevalence of pain and pain management strategies, risk for opioid use, and work and demographic factors. This research was intended to capture the burden and need for pain-related intervention in the HCW population, and also inform the development of initial intervention modules for HCWs with chronic or elevated pain. The planned intervention is a translation of the supportive group COMPASS program (originally developed and evaluated during OHWC's 2011-2015 cycle) to address the needs of HCWs experiencing chronic pain.

Aim 2: Adapt two sessions of the original COMPASS curriculum for HCWs with chronic pain and test them in a virtual setting with HCWs. Using information learned from Aim 1, in addition to materials derived from *The Pain Survival Guide* (Turk & Winter, 2006) we planned to develop two sessions of COMPASS-NP (one adapted, one newly created) to address the needs of workers experiencing chronic pain. The COMPASS intervention model involves a series of group meetings that are scripted and peer-led (Olson, Thompson, Elliot et al., 2016). Each meeting follows the same steps and is designed to last about 2 hours. The group process emphasizes building a community of practice and each scripted meeting includes a lesson with interactive activities, individual and group goal setting, and structured social support. For COMPASS-NP, we planned to adapt existing COMPASS Session 1 titled "How COMPASS Groups Work." Session 2 was planned to be newly created (in the peer-led and scripted format) from content and activities in the *Pain Survival Guide* and was titled "Rethinking Pain."

Aim 1 Methods and Results: A survey of HCWs in Washington State revealed the burden and need for interventions informed by biopsychosocial models of pain management. In collaboration with the SEIU 775 Benefits Group in Washington, we randomly selected a subsample of HCWs to complete a survey (N=421; 89.7% female, 60% white, $M_{age}=46.2$) that included measures of demographics, musculoskeletal pain, pain management strategies, and pain medication use. Eligibility criteria included working > 20 hrs a week for the past 6 months and ability to read English. Results revealed that over half (54.2%; n=228) of the sample reported chronic or currently elevated pain (i.e., self-reported experiences of pain worse than normal in the last week or a perceived need for pain medication every day) (Greenspan, Alley, Rice, & Olson, 2020). Use of pharmacological pain management was reported by 67.3% of all respondents, with 4.8% reporting current prescription opioid use. Compared to respondents with no pain, those with current chronic or elevated pain reported significantly higher financial strain, interpersonal conflict with clients, minor and major injuries, and a reported diagnosis of anxiety and/or depression.

These biopsychosocial factors were also significantly associated (see table) with higher opioid misuse risk (measured via a validated scale to assess risk with individuals not currently taking opioids - the Screener and Opioid Assessment for Patients with Pain-Revised; Butler, Budman, Fernandez, Fanciullo, & Jamison, 2009).

Associations between pain interference and biopsychosocial factors

Variable	1	2	3	4
1. Pain Interference	--			
2. Injuries	.26*	--		
3. Depressive Symptoms	.28*	.11	--	
4. Financial Strain	.28*	.17*	.04	--
5. Opioid Misuse Risk	.42*	.27*	.21*	.17*

Publication: Greenspan, L., Alley, L., Rice, S. & Olson, R. (2020). Exploring Biopsychosocial Correlates of Pain, Pain Management Strategies, and Risk for Opioid Misuse Among Home Care Workers in Washington State. *Home Health Care Services Quarterly*, DOI: 10.1080/01621424.2020.1810191

Aim 2 Methods and Results: Both planned sessions were outlined by the research team with guidance from our survey results. The research team included Ryan Olson (PI), Jennifer Hess (ergonomist), Dennis Turk (pain management specialist), Leah Greenspan (project manager), and Lindsey Alley (senior research associate). Session objectives and a draft of the first scripted lesson were developed. However, due to disruptions caused by the COVID-19 pandemic, an extended copyright permissions process with the American Psychological Association related to *The Pain Survival Guide*, and the competing renewal application for the OHWC, curriculum development and testing was paused. Copyright permissions for *The Pain Survival Guide* have now been finalized (January 2022) and work on the curriculum is resuming. The planned content of the two translated sessions are provided below.

- Session 1: How COMPASS-NP Groups Work

This is an orientation to COMPASS-NP that describes the purpose of the program, curriculum topics, and introduces workers to the COMPASS meeting process and lets them practice each step. Early activities in the session include “team-building” or personal “get-to-know-you” activities so the group can begin to bond and form a community of practice. Session 1 Objectives: Learn about the purpose of COMPASS-NP, get introduced to group members, learn how to use the scripted guidebook, learn how health and safety are connected, examine the chronic pain impacts of health and safety, and set individual and group Take Home Goals.

- Session 2: Rethinking Pain

This session is new to COMPASS-NP. The overall idea of this session is to provide participants with education and facilitate new ways of thinking about their pain that may help to motivate them to make change and get “unstuck” from negative thoughts associated with their pain. Many of the activities are taken from *The Pain Survival Guide* (Turk & Winter, 2006). Session 2 Objectives: Learn about acute and chronic pain, discuss common myths about pain, identify the aspects of pain that are most important to

<p>participants' lives, learn about pacing and how participants can use it as a technique to help them add activity slowly and safely into their lives, and set individual and group Take Home Goals related to pacing.</p>
<p>B.3. Competitive Revisions/Administrative Supplements</p> <p>Nothing to report</p>
<p>B.4. What opportunities for training and professional development did the project provide?</p> <p>Pilot project PIs presented chalk talks at OHWC's monthly Internal Steering Committee meetings. Chalk talks allow presenters to share their study and receive feedback on various aspects of the research and dissemination process.</p> <ul style="list-style-type: none"> • COMMunity of Practice And Safety Support for Navigating Pain (COMPASS-NP) [PI: Ryan Olson] Chalk talk in 2020.
<p>B.5. How did you disseminate the results to communities of interest?</p> <p>Results were published in a peer-reviewed journal.</p>
<p>B.6 - What do you plan to do during the next reporting period to accomplish the goals?</p> <p>This project has transitioned to full-scale "large" (per FOA) research projects in the OHWC's 2021-2026 cycle.</p>

C. PRODUCTS

<p>C.1. Publications, conference papers, and presentations</p> <p>Publication: Greenspan, L., Alley, L., Rice, S. & Olson, R. (2020). Exploring Biopsychosocial Correlates of Pain, Pain Management Strategies, and Risk for Opioid Misuse Among Home Care Workers in Washington State. <i>Home Health Care Services Quarterly</i>, DOI: 10.1080/01621424.2020.1810191</p>
<p>C.2. Website(s) or other Internet site(s) – include URL(s)</p> <p>Nothing to report</p>
<p>C.3. Technologies or techniques</p>

Nothing to report

C.4. Inventions, patent applications, and/or licenses

Nothing to report

C.5. Other products and resource sharing

Nothing to report

D. PARTICIPANTS

D.1. What individuals have worked on the project? Please include calendar, academic, and summer months.

Commons ID	S/K	Name	Degrees(s)	Role	Cal	Aca	Sum	Foreign	Country	SS

This information is reported within Overall report.

D.2 Personnel updates

- a. Level of Effort:** no change
- b. New Senior/Key Personnel:** no change
- c. Changes in Other Support:** see Other Support document for Ryan Olson
- d. New Other Significant Contributors:** not applicable

This information is reported within Overall report.

E. IMPACT

E.1 - What is the impact on the development of human resources, if applicable?

Not applicable

E.2 - What is the impact the Public Health Relevance and Impact? The investigator should address how the findings of the project relate beyond the immediate study to improved practices, prevention or intervention techniques, legislation, policy, or use of technology in public health.

Over half (54.2%; n=228) of the sample of home care workers surveyed in the pilot study reported chronic or currently elevated pain (i.e., self-reported experiences of pain worse than normal in the last week or a perceived need for pain medication every day). Use of pharmacological pain management was reported by 67.3% of all respondents, with 4.8% reporting current prescription opioid use. Compared to respondents with no pain, those with current chronic or elevated pain reported significantly higher financial strain, interpersonal conflict with clients, minor and major injuries, and a reported diagnosis of anxiety and/or depression. These biopsychosocial factors were also significantly associated with higher opioid misuse risk. Overall, this surveillance survey further supported the need for a tailored version of the COMPASS intervention to address the needs of workers experiencing pain.

F. CHANGES

F.1 – Changes in approach and reasons for change, including changes that have a significant impact on expenditures

COMPASS-NP: Completion and pilot testing of the first two draft curriculum lessons was paused due to COVID impacts on research in the community, and the inclusion of the project in the competing renewal of the Oregon Healthy Workforce Center.

F.2 - Actual or anticipated challenges or delays and actions or plans to resolve them

Nothing to report

F.3 - Significant changes to human subjects, vertebrate animals, biohazards, and/or select agents

Nothing to report

G. Special Reporting Requirements

G.1 Special Notice of Award Terms and Funding Opportunities Announcement Reporting Requirements

Not applicable

G.2 Responsible Conduct of Research

Not applicable

G.3 Mentor's Research Report or Sponsor Comments

Not applicable

G.4 Human Subjects

G.4.a Does the project involve human subjects?

Yes

G.4.b Inclusion Enrollment Data

See attached table.

G.4.c ClinicalTrials.gov

Does this project include one or more applicable clinical trials that must be registered in ClinicalTrials.gov under FDAAA?

No

G.5 Human Subject Education Requirement

Are there personnel on this project who are newly involved in the design or conduct of human subject's research?

Not applicable

G.6 Human Embryonic Stem Cells (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

No

G.7 Vertebrate Animals

Does this project involve vertebrate animals?

Not applicable

G.8 Project/Performance Sites

Not applicable

G.9 Foreign Component

Not applicable

G.10 Estimated Unobligated Balance

G.10.a Is it anticipated that an estimated unobligated balance (including prior year carryover) will be greater than 25% of the current year's total approved budget?

This information is reported within Overall report.

G.11 Program Income

Is program income anticipated during the next budget period?

No

G.12 F&A Costs

Is there a change in performance sites that will affect F&A costs?

No

Cumulative Inclusion Enrollment Report

This report format should NOT be used for collecting data from study participants.

Study Title: COMMunity of Practice And Safety Support for Navigating Pain (COMPASS-NP)

Comments:

Racial Categories	Ethnic Categories									Total
	Not Hispanic or Latino			Hispanic or Latino			Unknown/Not Reported Ethnicity			
	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	
American Indian/ Alaska Native			6							6
Asian			27							27
Native Hawaiian or Other Pacific Islander			7							7
Black or African American			31							31
White			278							278
More Than One Race			30							30
Unknown or Not Reported			36							36
Total	0	0	415	0	0	0	0	0	0	415

I. OUTCOMES

I. Provide a concise summary of the outcomes or findings of the award, written for the general public in clear and comprehensible language, without including any proprietary, confidential information or trade secrets

Note: project outcome information will be made public in NIH RePORTER

COMPASS-NP: Over half of the home care workers studied reported chronic or currently elevated pain, and nearly 70% reported using pharmacological pain management strategies. Compared to respondents with no pain, those with chronic or elevated pain reported higher financial strain, interpersonal conflict with clients, minor and major injuries, and reported diagnoses of anxiety and/or depression. These workers are in great need of workplace programs that integrate cognitive-behavioral pain management strategies with injury prevention in order to prevent the progression of pain-related problems.

A. COVER PAGE

Project Title: Multilevel Intervention to Improve Safety and Health in Sedentary Occupations (Active Workplace Study)	
Grant Number: U19010154	Project/Grant Period: 09/01/16 to 08/31/21
Reporting Period: 09/01/16 to 08/31/21	Date Submitted: 01/18/21
Program Director/ Principal Investigator Steven A. Shea, PhD (contact) and Brad Wipfli, PhD sheast@ohsu.edu 503-494-2517	Administrative Official Information Mark Derby derbym@ohsu.edu 503-494-8893
Change of Contact PD/PI: No change	
Human Subjects: No change	Vertebrate Animals: No change
hESC: No change	Inventions/Patents: Not applicable

B. ACCOMPLISHMENTS**B.1. What are the major goals of the project?**

Aim 1: Tailor *Total Worker Health* intervention components to the call center environment.

Aim 2: Determine the independent and synergistic effects of organizational and individual level intervention factors.

Aim 3: Measure the durability of intervention effects at follow-up.

B.2. What did you accomplish under these goals?**Aim 1: Tailor *Total Worker Health* intervention components to the call center environment.**

We developed and adapted a wide range of intervention materials for the call center environment. These materials included developing an intervention website, eight computer-based training modules, six scripted health and safety discussions, twelve health and safety messaging posters, two sets of materials to facilitate team pedaling competitions, six goal setting and behavioral self-monitoring activities, and an inter-supervisor observation activity.

Aim 2: Determine the independent and synergistic effects of organizational and individual level intervention factors.

We recruited four organizations to join the primary randomized controlled study of intervention effectiveness, along with two additional pilot organizations to inform toolkit and dissemination materials development. Overall we enrolled 326 participants, with 241 in the randomized trial, and 85 in the pilot studies. We presented a preliminary evaluation of 6-month outcome data at the 13th international Work, Stress and Health conference in November 2019, and the manuscript with final results from the evaluation of intervention effectiveness is currently under review. The intervention was effective at increasing physical activity, reducing sedentary behavior, prolonged sitting, and musculoskeletal pain, and improving sleep outcomes. Intervention results also showed that while providing employees with health and safety resources can lead to beneficial outcomes, adding mechanisms to support the adoption and use of health and safety resources leads to greater benefits. This study also supports the use of pedal stands as an activity-permissive workstation to increase physical activity and reduce prolonged sitting in sedentary work environments, and adds to the literature showing the effectiveness of the *Total Worker Health*® approach in occupational health and safety interventions.

Aim 3: Measure the durability of intervention effects at follow-up.

We completed follow-up data collection six months after the initial intervention period concluded with three of the four worksites that participated in the evaluation of intervention effectiveness. Data analysis and a manuscript addressing this aim are ongoing.

B.3. Competitive Revisions/Administrative Supplements

Not applicable.

B.4. What opportunities for training and professional development did the project provide?

The project supported a graduate student (MPH in Health Promotion) for two full years. In her Graduate Assistant role, she assisted with data collection, completed a dissemination toolkit, presented at scientific conferences, and is a co-author on a published manuscript,

The project also supported an undergraduate Honors student in a training capacity. She completed one of the two pilot studies in this project, adjacent to our primary aims, related to dissemination. She has contributed to presentation submissions for upcoming conferences, wrote an undergraduate Honors Thesis based on the pilot data she collected, and presented her study at a Portland State University Honors College conference.

The project has also supported four undergraduate summer interns through the Oregon Institute of Occupational Health Sciences summer intern program. Interns receive training and research mentoring, and complete a research project and scientific poster. The most recent undergraduate intern is a co-author on a manuscript that is currently under review, and was hired as a dissemination and outreach student worker by our department.

B.5. How did you disseminate the results to communities of interest?

We have published findings in scientific journals and a professional society publication, presented at numerous regional and national conferences, have been featured in several blog posts and one podcast, and shared results with study partners. We also developed a dissemination toolkit that is freely available to organizations, which is promoted on our Yourworkpath dissemination website, through social media channels, and through our dissemination and outreach specialists.

B.6 - What do you plan to do during the next reporting period to accomplish the goals?

A carryforward request to move non-obligated funds into the current award segment will be submitted. The request will provide detailed information about the use of remaining funds for completion of scientific papers for the Active Work Place Study.

C. PRODUCTS

C.1. Publications, conference papers, and presentations

- Wipfli, B., Wild, S., Richardson, D., & Hammer, L. (2021). Work as a Social Determinant of Health – a necessary foundation for occupational health and safety. *Journal of Occupational and Environmental Medicine*. doi: 10.1097/JOM.0000000000002370
- Wipfli, B., Wild, S., Donovan, C., Hanson, G.C., & Thosar, S.S. (2021). Sedentary work and physiological markers of health. *International Journal of Environmental Research and Public Health*, 18(6), 3230. doi: 10.3390/ijerph18063230.
- Wipfli, B., Wild, S., Hanson, G.C., Shea, S.A., Winters-Stone, K., & Thosar, S.S. (2021). The Active Workplace Study: Protocol for a randomized controlled trial with sedentary workers. *Contemporary Clinical Trials*, 103, 106311. doi: 10.1016/j.cct.2021.106311

- Hanson, G. C., Rameshbabu, A., Bodner, T.E., Hammer, L.B., Rohlman, D.S., Olson, R., Wipfli, B., Kuehl, K., Perrin, N.A., Alley, L., Schue, A., Thompson, S.V., & Parish, M. (2021). A Comparison of Safety, Health, and Well-Being Risk Factors across Five Occupational Samples. *Frontiers in Public Health*, 9, 614725. doi: 10.3389/fpubh.2021.614725
- Wipfli, B. & Wild, S. (2019). Sedentary Work and Measuring Physical Activity in Applied Sedentary Behavior Research. *Society for Occupational Health Psychology Newsletter*, Volume 21, 11-12.
- Kozlowski, R., Wipfli, B., & Wild, S. (2021). The Active Workplace Study, Sedentary Bouts, and Musculoskeletal Pain Prevalence: A Mediation Analysis. Presentation at the Oregon Institute of Occupational Health Sciences Summer Intern Poster Session 2021, Portland, OR.
- Cohen, R., Wipfli, B., & Wild, S. (2019). Supervisors, stress, and sedentary behavior. Poster Presentation, Oregon Institute of Occupational Health Sciences Summer Intern Poster Session 2019, Portland, OR.
- Wipfli, B., Wild, S., Donovan, C., Cohen, R., Barnum, M.B., & Hanson, G. Diffusing a sedentary behavior intervention through supervisors. Symposium presentation, Work, Stress, and Health 2019, Philadelphia, PA.
- Wipfli, B., Wild, S., Donovan, C., Thosar, S., & Hanson, G. Active Workplace Study: Methods, Rationale, and Intervention Outcomes. Symposium presentation, Work, Stress, and Health 2019, Philadelphia, PA.
- Barnum, M.B., Wipfli, B., Wild, S., & Donovan, C. (2019). Pilot Study Investigating the Effectiveness of the Active Workplace Study through a Dissemination Lens. Portland State University Undergraduate Honors College Thesis Presentation, Portland, OR.
- Reynolds, S., Wipfli, B., Wild, S., & Donovan, C. (2018). Sedentary behavior, endothelial health, and hemoglobin A1C in call center agents. Poster Presentation, Oregon Institute of Occupational Health Sciences Summer Intern Poster Session 2018, Portland, OR.
- Wild, S., Donovan, C., Reynolds, S., Thosar, S., & Wipfli, B. (2018). Active Workplace Study: A Total Worker Health intervention for sedentary workers. Poster Presentation, Oregon Public Health Association Conference 2018, Corvallis, OR.
- Wipfli, B. (2018). Active Workplace Study. Virtual presentation at the Bangkok Dusit Medical Services-OHSU Research Retreat 2018, Bangkok, Thailand.
- Wild, S., O'Neill, S., Lagnion, E., & Wipfli, B. (2018). The influence of a team competition on pedal stand use. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD.
- Wild, S., Wipfli, B., & Donovan, C. (2018). Development of a *Total Worker Health intervention*® for sedentary workers. OHSU Research Week 2018.

C.2. Website(s) or other Internet site(s) – include URL(s)

We developed a study website, which has public-facing information and resources, and a section where intervention participants can log in to complete computer-based training, goal setting, and behavioral self-monitoring (<https://www.activestudy.org/>).

We developed dissemination materials, tools, and toolkits, and webpages to host those materials on a pre-existing website maintained by our department (<https://www.yourworkpath.com/activeworkplace>).

C.3. Technologies or techniques

Not applicable

C.4. Inventions, patent applications, and/or licenses

Not applicable

C.5. Other products and resource sharing

We developed dissemination materials, tools, and toolkits, which are freely available for companies on a website maintained by our department (<https://www.yourworkpath.com/activeworkplace>).

D. PARTICIPANTS**D.1. What individuals have worked on the project?** Please include calendar, academic, and summer months.

Commons ID	S/K	Name	Degrees(s)	Role	Cal	Aca	Sum	Foreign	Country	SS

This information is reported within Overall report.

D.2 Personnel updates

a. Level of Effort:

b. New Senior/Key Personnel:

c. Changes in Other Support:

d. New Other Significant Contributors:

This information is reported within Overall report.

E. IMPACT

E.1 - What is the impact on the development of human resources, if applicable?

Not applicable

E.2 - What is the impact the Public Health Relevance and Impact? The investigator should address how the findings of the project relate beyond the immediate study to improved practices, prevention or intervention techniques, legislation, policy, or use of technology in public health.

Employees in sedentary occupations, and call center employees in particular, are at increased risk of significant health and safety consequences including obesity, chronic disease, musculoskeletal pain, and injury. The findings from this study have several important implications for over 500,000 call center employees and over 30 million additional workers in sedentary occupations in the US. First, this study adds to previous evidence showing the effectiveness of the *Total Worker Health*® approach for workplace health and safety interventions. Specifically, an intervention based on the *Total Worker Health* approach led to reductions in sedentary behavior and prolonged sitting, increase in physical activity, and lower ratings of musculoskeletal pain. Intervention results also showed that while providing employees with health and safety resources can lead to beneficial outcomes, adding mechanisms to support the adoption and use of resources is more beneficial. This study also supports the use of pedal stands as an activity-permissive workstation to increase physical activity and reduce prolonged sitting in sedentary work environments. Taken together, this suggests that employers should both provide activity permissive workstands in sedentary environments, and also provide incentives or motivational support for employees to use those resources to positively impact the health and safety of this large population of workers.

F. CHANGES

F.1 – Changes in approach and reasons for change, including changes that have a significant impact on expenditures

The fourth worksite enrolled in the study in January 2020, and was disrupted by COVID two months later. Workers from this organization began working from home. Because of modifications to research operations at OHSU, we had to delay post-study data collection with this organization by several months. In addition, post-study data were collected while workers were at home instead of at the office where study resources were located, which makes their data less comparable to the other three worksites. We therefore decided to exclude this worksite from the primary evaluation of intervention effectiveness.

F.2 - Actual or anticipated challenges or delays and actions or plans to resolve them

As mentioned above, modifications to research operations at OHSU delayed post-study data collection at the fourth worksite, and also prevented us from collecting follow-up data with this organization. However, enrollment from the first three organizations was sufficient to power the study to address our aims. In addition, we were able to use post-study data from the fourth organization to inform a manuscript about how the combination of COVID and the presence of wildfire smoke in the region impacted workers (see

Wipfli, B., Wild, S., Richardson, D., & Hammer, L. (2021) in C.1). Our primary outcomes manuscript and long-term maintenance manuscript also experienced delays from this disruption in data collection, but are on track for publication this year.

F.3 - Significant changes to human subjects, vertebrate animals, biohazards, and/or select agents

Not applicable

G. Special Reporting Requirements

G.1 Special Notice of Award Terms and Funding Opportunities Announcement Reporting Requirements

Not applicable

G.2 Responsible Conduct of Research

Not applicable

G.3 Mentor's Research Report or Sponsor Comments

Not applicable

G.4 Human Subjects

G.4.a Does the project involve human subjects?

Yes

G.4.b Inclusion Enrollment Data

See attached table.

G.4.c ClinicalTrials.gov

Registration #NCT03556670

Does this project include one or more applicable clinical trials that must be registered in ClinicalTrials.gov under FDAAA?

No

G.5 Human Subject Education Requirement

Are there personnel on this project who are newly involved in the design or conduct of human subject's research?

Not applicable

G.6 Human Embryonic Stem Cells (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

Not applicable

G.7 Vertebrate Animals

Does this project involve vertebrate animals?

Not applicable

G.8 Project/Performance Sites

Not applicable

G.9 Foreign Component

Not applicable

G.10 Estimated Unobligated Balance

Not applicable

G.10.a Is it anticipated that an estimated unobligated balance (including prior year carryover) will be greater than 25% of the current year's total approved budget?

This information is reported within Overall report.

G.11 Program Income

Is program income anticipated during the next budget period?

Not applicable

G.12 F&A Costs

Is there a change in performance sites that will affect F&A costs?

Not applicable

Cumulative Inclusion Enrollment Report

This report format should NOT be used for collecting data from study participants.

Study Title: Multilevel Intervention to Improve Safety and Health in Sedentary Occupations (Active Workplace Study)

Comments:

Racial Categories	Ethnic Categories									Total
	Not Hispanic or Latino			Hispanic or Latino			Unknown/Not Reported Ethnicity			
	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	
American Indian/ Alaska Native	3	1	0	2	0	0	0	0	0	6
Asian	4	1	0	0	0	0	0	0	0	5
Native Hawaiian or Other Pacific Islander	7	0	0	0	0	0	0	0	0	7
Black or African American	24	2	0	0	2	0	0	0	0	28
White	174	37	1	11	6	0	0	0	0	229
More Than One Race	7	2	0	5	0	0	0	0	0	14
Unknown or Not Reported	3	1	0	23	7	0	1	1	1	37
Total	222	44	1	41	15	0	1	1	1	326

I. OUTCOMES

I. Provide a concise summary of the outcomes or findings of the award, written for the general public in clear and comprehensible language, without including any proprietary, confidential information or trade secrets

Note: project outcome information will be made public in NIH RePORTER

Providing pedal stands to employees in a sedentary workplace led to less sitting time, reductions in pain, better sleep, and a reduction in body fat. Providing pedal stands to employees and supporting the use of pedal stands with training, goal setting, health and safety discussions, and team competitions led to additional benefits, including more physical activity, more use of pedal stands, and reduced resting heart rate.

A. COVER PAGE

Project Title: Engineering and Behavioral Controls for Truck Drivers' Sleep, Safety, and Health (Tech4Rest Study)	
Grant Number: U19OH010154	Project/Grant Period: 9/1/2016 to 8/31-2021
Reporting Period: 9/1/2016 to 8/31/2021	Date Submitted:
Program Director/ Principal Investigator Ryan Olson, PhD olsonry@ohsu.edu 503-494-2501	Administrative Official Information Mark Derby derbym@ohsu.edu 503-494-8893
Change of Contact PD/PI: No change	
Human Subjects: Yes	Vertebrate Animals: Not applicable
hESC:	Inventions/Patents: Behavioral intervention

B. ACCOMPLISHMENTS

B.1. What are the major goals of the project?

Aim 1: Pilot test intervention and experimental procedures.

Aim 2: Determine the effectiveness of the cab engineering and behavioral interventions alone and in combination for improving sleep and reducing fatigue.

Aim 3: Conduct cost utility analyses for interventions

B.2. What did you accomplish under these goals?

Aim 1: Pilot test intervention and experimental procedures.

Formative research, protocol and measures development, and intervention development:

With the support of a trucking company in Portland, OR, three driving teams (n=6 drivers) participated in formative research with Actiwatch Spectrum and Actigraph GT3x+BT devices for measuring sleep. Research staff also tested the Sleep Profiler device (single channel EEG device). The accelerometer (and associated analysis software) that was least affected by truck vibrations was the Actigraph GT3x+BT. Active suspension seats and therapeutic mattresses were purchased and procedures for measuring whole body vibrations were developed for each. Additional study measures and protocols were developed and finalized. The Fit4Sleep behavioral intervention was developed as an adaptation of the established SHIFT weight loss and health promotion intervention for commercial truck drivers. Fit4Sleep is facilitated and implemented on a mobile adaptive website. The intervention involves an inter-team walking competition that is supported with goal setting, behavioral self-monitoring of physical activity and sleep hygiene behaviors (including individual and team feedback), and health coaching.

Pilot study results:

The Tech4Rest intervention pilot study manuscript is published (see Olson et al., 2020). Drivers (n=16) were exposed to Condition A: a new innerspring mattress, and Condition B: a novel therapeutic mattress. A subsample of drivers (n=8) was also exposed to Condition C: use of their preferred mattress (all chose to keep B), switching to an active suspension driver's seat, and completing a behavioral sleep-health program. Primary outcomes were sleep duration, sleep quality, and fatigue. Behavioral program targets included physical activity and sleep hygiene. Self-reported sleep and fatigue improved with mattress A and improved further with mattress B which altered vibration exposures and was universally preferred and kept by all drivers. The active suspension seat reduced whole body vibration exposures to a degree highly similar to prior studies by other investigators. Condition C improved additional study targets, including physical activity, and produced larger effect sizes for most outcomes. Results support these interventions as promising for advancing team truck drivers' sleep, health, and well-being.

Olson, R., Johnson, P., Shea, S., Marino, M., Rimby, J., Womack, K., Wang, F., Springer, R., Donovan, C., & Rice, S. (2020). Advancing the Total Worker Health® of commercial driving teams who sleep in moving semi-trucks: The tech4rest pilot study. *Journal of Occupational and Environmental Medicine*, 62 (12), 1082-1096. doi: 10.1097/JOM.0000000000002063

Aim 2: Determine the effectiveness of the cab engineering and behavioral interventions alone and in combination for improving sleep and reducing fatigue.

Study and intervention procedures were adjusted based on pilot study results, and in response to impacts of the COVID-19 pandemic. This included adjustments to the duration of conditions in the randomized controlled trial and the number of recruitment and implementation waves that were feasible.

Randomized Controlled Trial:

Between October 2020 and July 2021 we enrolled 49 team drivers (from 25 teams) in the Tech4Rest randomized controlled trial in collaboration with a corporate partner. Recruitment and implementation were completed in two separate waves at our corporate partner's terminal in southern California. Each driving team was randomly assigned to participate in either the control or intervention arm. Intervention teams participated in baseline (two weeks), cab enhancements (two weeks), and cab enhancements plus the Fit4Sleep intervention (one month). Cab enhancements were the active suspension seat and therapeutic mattress studied in the pilot. Control teams drove as usual during the same time period. Participants in both the control and intervention arms met with researchers 4 times over the 2-month period at the beginning of each phase and at the end of the final phase. At the end of the final phase we offered control participants access to components of the Fit4Sleep program. For the second wave of teams, we also gave control participants a therapeutic mattress. All teams completed a final self-report survey (virtual visit 5) at this less formal period where control participants had access to some of the intervention. Primary measures included self-reported and actigraphy measures of sleep duration and quality, and fatigue. Additional measures included self-reported and actigraphy measures of physical activity, as well as measures of body composition, safety, and wellbeing. Objective measures of whole-body vibration exposures were collected for both seat and mattress tops relative to the truck floor. We requested additional objective safety and performance data (hard brakes, load shifts) from the corporate partner, and data sharing is partially complete at the time of this report.

Of the 49 drivers enrolled, 32 drivers continued their participation for the duration of the study. Data analyses for the randomized controlled trial are in process as of January 2022. A carryforward request to move non-obligated funds into the current award segment will be submitted. The request will provide detailed information about the use of remaining funds for completion of remaining planned scientific analyses and papers for the Tech4Rest study.

Aim 3: Conduct cost-utility analyses for the interventions.

Due to project delays created by the withdrawal of one corporate partner, COVID-19 related project timeline delays (see section F.2), it is uncertain whether we will be able to complete our full planned research and analyses related to Aim 3. A carryforward request to move non-obligated funds into the current award segment will be submitted. The request will provide detailed information about the use of remaining funds for completion of remaining planned scientific analyses and papers for the Tech4Rest study.

B.3. Competitive Revisions/Administrative Supplements

Not applicable

B.4. What opportunities for training and professional development did the project provide?

Masters of Public Health (MPH) Field Placement (200 hrs): Julia Threadgill, an Environmental Systems and Human Health MPH student from the Oregon Health & Science University-Portland State University School of Public Health completed a field placement with the study as part of her advanced degree requirements. With supervision and mentoring from the Tech4Rest study team Julia completed 1) a literature review of

walking and physical activity interventions for improvement of sleep quality and duration; 2) developed and followed standardized protocols to test 30 Actigraph GT3x – BT devices prior to field deployment; 3) executed and developed a data validation procedure for psychomotor vigilance task (PVT) data; and 4) calculated A(8) and VDV(8) standard measures of whole body vibration exposure for pilot participants. Taken together, Julia's field placement gave her practical knowledge that will allow her to advance occupational safety and health in a variety of workplace environments.

Undergraduate Summer Research Internship (40 hours per week for ~3 Months): Peter Lahti from Lewis & Clark College was selected by the study team to complete the Oregon Institute of Occupational Health Sciences' Undergraduate Summer Internship Program. With supervision and mentoring from the Tech4Rest team, Peter developed a mixed methods poster presentation on team truck drivers' sleep environments. In addition to statistically describing drivers' sleep environments, he was also trained and conducted thematic analysis on qualitative data gathered in semi-structured interviews with team drivers.

Motivational Interviewing Training and Experience for Study Staff: With funding from the project, Jarred Rimby (former study project manager and senior research assistant) completed an intermediate Motivational Interviewing workshop lead by Denise Ernst, a member the Motivational Interviewing Network of Trainers (MINT). Continued Motivational Interviewing training of research team members Jarred Rimby and Caitlyn Trullinger-Dwyer, led by MINT trainer Carol DeFrancesco, was also provided. The team met bi-weekly during intervention implementation to discuss and hone motivational interviewing methods. Both research team members are now pursuing master's degrees in Clinical Psychology and Global Health, respectively. Jarred then participated as a coach delivering health coaching in the randomized controlled trial.

Post-Baccalaureate Research Volunteer: The Tech4Rest Study supported the training of a post-bac volunteer intern, Taryn Thompson, who worked on the study for 5 hours per week over the course of 1 year. Taryn aided the project and developed her research skills in data entry (REDCap and Excel), data management/organization, and data processing. Taryn also had the opportunity to observe fieldwork at a truck company terminal in Oregon. She also participated as an author for a presentation given at Oregon Public Health Association 2019.

B.5. How did you disseminate the results to communities of interest?

- Olson, R. Health intervention research with commercial drivers. Invited presentation to the Commercial Driver Health and Wellness Sub Committee of the Transportation Research Board; January 14, 2019, Washington, DC.
- Olson, R. Health intervention research with commercial drivers. Invited webinar presentation to the Transportation, Warehousing, and Utilities subsector group (sponsored by NIOSH); December 10th, 2018, Portland, OR.
- Rimby, J. and Olson, R. Partner company results and debrief session, February 14th, 2020, Brooks, OR.
- Donovan, C., Rimby, J., Olson, R. Weekly Partner Coordination and Briefing Meeting, Fridays from September, 2020 to September, 2021, Virtual (hosted in Portland, OR).
- Johnson, P. W. (June 15, 2021). Bedrooms on 18 wheels: Improving sleeping conditions for truck driving teams. *Oregon and the Workplace Blog*.

- Schuckers, H., Olson, R., Donovan, C., Johnson, P. W. (2022). *Benefits of Active and Semi-Active Suspension Seat Technologies for Commercial Drivers*. Two-page outreach document for the trucking industry published on the Yourworkpath website.

B.6 - What do you plan to do during the next reporting period to accomplish the goals?

A carryforward request to move non-obligated funds into the current award segment will be submitted. The request will provide detailed information about the use of remaining funds for completion of remaining planned scientific papers for the Tech4Rest study.

C. PRODUCTS

C.1. Publications, conference papers, and presentations

- Khoury, J., Parker, K., Bettencourt, K., & Olson, R. Validity of Accelerometer and Single-channel EEG for measuring sleep in team truck drivers. Poster presented at: Oregon Institute of Occupational Health Sciences Summer Intern Poster Session; August 10, 2016; Portland, OR.
- Olson, R., Johnson, P., Shea, S., Marino, M., Parker, K., Wang, F., Malach-Fuller, J., Mansfield, L., & Springer, R. (2018, May). The Tech4Rest pilot study: Engineering and behavioral controls to improve sleep, fatigue, and well-being among team truck drivers. In Olson, R.(chair), Total trucker health revisited: Surveillance and intervention research. Symposium to be conducted at the 2nd International Symposium to Advance Total Worker Health®, Bethesda, MD.
- Sisley, J., Parker, K., & Olson, R. Sleep device fatigue evaluation for team truck drivers (2017, August). Poster presented at the Oregon Institute of Occupational Health Sciences Summer Intern Poster Session, Portland, OR.
- Rimby, J., Parker, K., Mansfield, L., Johnson, P., Shea, S. A., Marino, M., Wang, F., Malach-Fuller, J., Springer, R., Olson, R., Team Truck Drivers: A Vulnerable Working Population. Oral presentation at the 2018 Oregon Public Health Authority (OPHA) Annual Conference & Meeting; October 8th, 2018; Corvallis, OR.
- Olson, R. Health intervention research with commercial drivers. Invited presentation to the Commercial Driver Health and Wellness Sub Committee of the Transportation Research Board; January 14, 2019, Washington, DC.
- Olson, R. Health intervention research with commercial drivers. Invited webinar presentation to the Transportation, Warehousing, and Utilities subsector group (sponsored by NIOSH); December 10th, 2018, Portland, OR.
- Olson, R., Johnson, P., Shea, S., Marino, M., Parker, K., Rimby, J., Rhyou, F., Wang, F. The Tech4Rest Intervention for Team Truck Drivers' Sleep, Health, & Well-being: A Pilot Study. Presentation at the International Work, Stress, and Health Conference, November 6-9, 2019, Philadelphia, PA.
- Rimby, J., Johnson, P., Shea, S. A., Marino, M., Wang, F., Ryou, F., Springer, R., Thompson, T., Olson, R., Increasing Team Truck Drivers' Walking Time and Sleep Hygiene Behaviors to Improve Sleep Quality. Presentation at Oregon Public Health Association Conference and Meeting, 15 Oct. 2019, Corvallis, OR. www.oregonpublichealth.org/2019-program-agenda
- Olson R, Johnson P, Shea SA, Marino M, Rimby J., Womak K, Wang F, Springer R, Donovan C, Rice SPM. Advancing the Safety, Health, and Well-Being of Commercial Driving Teams Who Sleep in

Moving Semi-Trucks: The Tech4Rest Pilot Study. J Occup Environ Med. 2020 Dec;62(12):1082-1096. doi: 10.1097/JOM.0000000000002063. PMID: 33105402.

- Johnson, P. W. (June 15, 2021). Bedrooms on 18 wheels: Improving sleeping conditions for truck driving teams. *Oregon and the Workplace Blog*.
- Schuckers, H., Olson, R., Donovan, C., Johnson, P. W. (2022). *Benefits of Active and Semi-Active Suspension Seat Technologies for Commercial Drivers*. Two page outreach document for the trucking industry published on the Yourworkpath website.

C.2. Website(s) or other Internet site(s) – include URL(s)

Fit4Sleep intervention website: www.fit4sleep.net

C.3. Technologies or techniques

Olson, R., Rimby, R., Parker, K., & Wipfli, B. (Designed March 2017; Published February 2019). Fit4Sleep intervention website:

Adapted from the SHIFT intervention website (Olson and Wipfli, 2012) the Fit4Sleep intervention website facilitates a one-to-three month long sleep health program involving an interteam walking competition supported with goal setting and self-monitoring of sleep hygiene and physical activity behaviors, computer-based training, and health coaching.

C.4. Inventions, patent applications, and/or licenses

Not applicable

C.5. Other products and resource sharing

Not applicable

D. PARTICIPANTS

D.1. What individuals have worked on the project? Please include calendar, academic, and summer months.

Commons ID	S/K	Name	Degrees(s)	Role	Cal	Aca	Sum	Foreign	Country	SS

This information is reported within Overall report.

D.2 Personnel updates

- a. Level of Effort:**
- b. New Senior/Key Personnel:**
- c. Changes in Other Support:**
- d. New Other Significant Contributors:**

This information is reported within Overall report.

E. IMPACT

E.1 - What is the impact on the development of human resources, if applicable?

Not Applicable

E.2 - What is the impact the Public Health Relevance and Impact? The investigator should address how the findings of the project relate beyond the immediate study to improved practices, prevention or intervention techniques, legislation, policy, or use of technology in public health.

The Tech4Rest research project has addressed the Oregon Healthy Workforce Center themes of intervention strength and integration. Integration of safety, health, and well-being is a central value proposition of *Total Worker Health*® (TWH) approaches to interventions. We addressed integration by targeting the cross-cutting TWH factor of sleep deficiency in a priority population, and prioritized hazard reduction according to the hierarchy of controls. Our intervention led to improvements in driver sleep, fatigue, and physical activity, which may reduce the risk of fatigue-related crashes and chronic disease if adopted by the commercial truck driving industry. Supplemental benefits may be expected, including reduced musculoskeletal symptoms through enhanced cab features, especially through reductions in whole body vibration exposures via active suspension seats, as well as potential economic returns for employers.

F. CHANGES

F.1 – Changes in approach and reasons for change, including changes that have a significant impact on expenditures

The duration of study conditions was reduced for participants in the randomized controlled trial by three months total in order to make it feasible to complete study implementation within the fifth year of the project. This adjustment was implemented due to prior delays during the project period related to partner organizations and the COVID-19 pandemic. For these same reasons it is also uncertain whether we will be able to complete our full planned research and analyses related to Aim 3.

F.2 - Actual or anticipated challenges or delays and actions or plans to resolve them

Completion of the pilot study was delayed by about 6 months when a partner company withdrew just prior to implementation. A replacement partner was recruited and the pilot was completed, but this delay had a downstream impact on the randomized controlled trial timeline. Recruitment of a larger corporate partner for the trial was challenging and time consuming due to the small number of companies that employ large numbers of team drivers. A larger company that employed a relatively large number of teams ultimately agreed to participate, but the beginning of the study was delayed by the COVID-19 pandemic. To respond to

these challenges we sought and obtained permission from our University to conduct field research and initiate the trial during the pandemic. The scientific team also proposed a shortened study protocol, including an abbreviated behavioral intervention timeline, to the Design and Analysis Core of the Oregon Healthy Workforce Center. This approach was approved and reduced the randomized trial protocol for each team by three months. Recruitment and implementation for the randomized controlled trial began in October of 2020 and continued through August 2021. A carryforward request to move non-obligated funds into the current award segment will be submitted. The request will provide detailed information about the use of remaining funds for completion of remaining planned scientific papers for the Tech4Rest study.

F.3 - Significant changes to human subjects, vertebrate animals, biohazards, and/or select agents

None

G. Special Reporting Requirements

G.1 Special Notice of Award Terms and Funding Opportunities Announcement Reporting Requirements

None

G.2 Responsible Conduct of Research

Not applicable

G.3 Mentor's Research Report or Sponsor Comments

Not applicable

G.4 Human Subjects

G.4.a Does the project involve human subjects?

Yes

G.4.b Inclusion Enrollment Data

See attached table

G.4.c ClinicalTrials.gov

Registration #NCT03108599

Does this project include one or more applicable clinical trials that must be registered in ClinicalTrials.gov under FDAAA?

No

G.5 Human Subject Education Requirement

Are there personnel on this project who are newly involved in the design or conduct of human subject's research?

Not applicable

G.6 Human Embryonic Stem Cells (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

Not applicable

G.7 Vertebrate Animals

Does this project involve vertebrate animals?

Not applicable

G.8 Project/Performance Sites

Not applicable

G.9 Foreign Component

Not applicable

G.10 Estimated Unobligated Balance

G.10.a Is it anticipated that an estimated unobligated balance (including prior year carryover) will be greater than 25% of the current year's total approved budget?

This information is reported within Overall report.

G.11 Program Income

Is program income anticipated during the next budget period?

Not applicable

G.12 F&A Costs

Is there a change in performance sites that will affect F&A costs?

Not applicable

Cumulative Inclusion Enrollment Report

This report format should NOT be used for collecting data from study participants.

Study Title: Engineering and Behavioral Controls for Truck Drivers' Sleep, Safety, and Health (Tech4Rest Study)

Comments: Inclusive of: Formative Research, Pilot Study, and RCT Participants

Racial Categories	Ethnic Categories									Total
	Not Hispanic or Latino			Hispanic or Latino			Unknown/Not Reported Ethnicity			
	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	
American Indian/ Alaska Native	0	3	0	0	0	0	0	0	0	3
Asian	0	1	0	0	0	0	0	0	0	1
Native Hawaiian or Other Pacific Islander	0	1	0	0	0	0	0	0	0	1
Black or African American	1	8	0	0	1	0	0	0	0	10
White	9	24	0	0	2	0	0	2	0	37
More Than One Race	1	2	0	0	4	0	0	0	0	7
Unknown or Not Reported	0	2	0	1	2	0	0	1	0	6
Total	11	41	0	1	9	0	0	3	0	65

I. OUTCOMES

I. Provide a concise summary of the outcomes or findings of the award, written for the general public in clear and comprehensible language, without including any proprietary, confidential information or trade secrets

Note: project outcome information will be made public in NIH RePORTER

Active suspension seats reduce commercial truck drivers' exposures to whole body vibrations, and present a major opportunity to reduce this hazardous exposure and its consequences. A therapeutic mattress was strongly preferred by drivers, improved their sleep duration, and reduced fatigue. The combination of an active suspension seat, therapeutic mattress, and a behavioral program improved drivers' sleep and physical activity, and reduced fatigue.