

A. COVER PAGE

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hESC: NO	Inventions/Patents: NO

B. ACCOMPLISHMENTS

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

The Mission of the Healthier Workforce Center of the Midwest is to protect and preserve worker safety and health through knowledge generation and dissemination of evidence-based Total Worker Health® practices. This will be accomplished through the following goals:

Specific Aim 1: Serve as a leader in research, translation, and dissemination of multidisciplinary Total Worker Health® programs, policies, and practices.

Specific Aim 2: Conduct basic and applied research addressing Total Worker Health® outcomes.

Specific Aim 3: Partner with researchers, employers, and occupational safety and health practitioners to generate, evaluate, and disseminate best practices.

Specific Aim 4: Engage in outreach and education activities to disseminate and speed the adoption of best practices in Total Worker Health®.

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

Serving Federal Region VII (Iowa, Nebraska, Kansas, and Missouri), the Healthier Workforce Center of the Midwest is a Total Worker Health Center of Excellence. The vision of the Healthier Workforce Center is to create a safe, healthy, productive workforce and is carried out through basic and applied research, a participatory approach, and theory driven education and translation activities. The Center is a collaboration between the University of Iowa, Washington University in St. Louis, and the Nebraska Safety Council, a NIOSH Total Worker Health Affiliate. The HWC includes a Planning and Evaluation Core, which provides center coordination, leadership, and evaluation through internal and external advisors; an Outreach Core that translates evidence-based findings and provides education through regional and national channels; and a Research Core which utilizes both basic and applied research and includes the Apprentice Project (*Impacting the safety, health, and well-being of construction apprentices: Using intermediaries to disseminate change*) and a Pilot/Feasibility Project. The Mission of the Healthier Workforce Center is to protect and preserve worker safety and health through knowledge generation and dissemination of evidence-based Total Worker Health practices.

Specific Aim 1: Serve as a leader in research, translation and dissemination of multidisciplinary Total Worker Health programs, policies and practices

Founded in 2006, the HWC is recognized as a national leader in multidisciplinary research, education, and outreach. Since its inception, the HWC has been dedicated to addressing the need to create a safe, healthy, and productive workforce. During the past project period (2016-2021) the Healthier Workforce Center became a regional Total Worker Health center and we have built up strong partnerships with other intermediary organizations (e.g., St. Louis Area Business Health Coalition, WorkWell KS) and the Tippie College of Business at the University of Iowa. We also partnered with regional and national NIOSH/CDC centers, NIOSH Total Worker Affiliates, and other intermediary organizations and employers through our outreach and pilot grant activities.

We continued to build and nurture relationships by sponsoring, co-sponsoring, or serving on the planning boards for regional and national conferences. During the project period these included the Occupational Health Symposium (with the Heartland Center ERC), the Occupational Health and Safety Student Research

Conference (with the Heartland Center ERC, the Great Plains Center for Agriculture Health, and the Injury Prevention Research Center), the Hawkeye on Safety Conference (co-sponsored by the Heartland ERC, the Iowa Building Trades Unions, and others), the Nebraska Safety Council Conference, and the 3rd International Symposium to Advance Total Worker Health.

The Center continually works to identify emerging issues and to address the needs of vulnerable working populations, through targeted outreach and educational activities and research activities. This is demonstrated by our response to the novel coronavirus pandemic. We conducted longitudinal surveys to assess the effects of coronavirus response on work organization, mental health, and other measures of worker well-being at Washington University and the University of Iowa. Findings from worker surveys were presented in remote work webinars, to the Midwestern chapter of the American College of Occupational and Environmental Medicine, multiple employer panel webinars, and to senior leaders at both universities. This survey data was used by the Future of Work at Iowa committee to inform decisions on how to restructure work and informed efforts to improve mental health for employees and trainees at Washington University. Similarly, pilot grant funding to the Nebraska Safety Council, St. Louis Area Business Health Coalition, and WorkWell Kansas was used to develop the *Total Worker Health® Employer Guide: COVID-19 Edition* early in the pandemic. Including employer case studies, the guide provided advice for employers of all sizes on policies and procedures to protect workers during the pandemic. The Guide was disseminated through key intermediary organizations, well-attended webinars, and conference presentations.

As part of our Apprentice Project (*Impacting the Safety, Health, and Well-being of Construction Apprentices: Using Intermediaries to Disseminate Change*), we learned that suicide prevention and opioid use were identified as high priorities among employers, unions, and other intermediary organizations in the construction industry. We used supplemental funding to identify risk factors for chronic opioid use and opioid use disorder through health claims data from a large union health fund (Dale et al., 2019b; Dale et al, 2021). This work has led to supplemental funding (R34 DA050044, Dale) and a project funded in our Center renewal. The Center also partnered with the Associated General Contractors of Missouri and other stakeholders (e.g., St. Louis OSHA) to develop a Suicide Prevention Campaign in 2019, which was promoted at the Hawkeye on Safety conference in 2020. We have continued to promote the campaign at various events and to date have disseminated over 250 packets of campaign materials (e.g., toolbox talks and a facilitators guide, medallions with the suicide prevention hotline number, stickers, posters). The materials have also been translated into Spanish. Based on this work we have established an Alliance Agreement with OSHA Federal Region VII and Iowa OSHA.

Specific Aim 2: Conduct basic and applied research addressing Total Worker Health outcomes

During 2016-2021, the Healthier Workforce Center has supported a total of 14 research projects (one large Center research project, three small Center research projects, one Center emerging issues project, and nine research-focused pilot projects) addressing high priority topics, emerging issues, and vulnerable populations identified in the NIOSH Strategic Plan and the National TWH Agenda topics. These projects have led to numerous outputs and outcomes (e.g., peer-reviewed publications, conference presentations, webinars, additional grant applications) and contributed to research projects proposed in the Center renewal applications.

Impacting the Safety, Health, and Well-being of Construction Apprentices: Using Intermediaries to Disseminate Change (Apprentice Project). The Apprentice Project had two primary components.

Longitudinal surveys were conducted among apprentices in the construction industry to identify relationships between work organization, environmental factors, health behaviors, and health outcomes. We then identified intervention topics among construction contractors and unions, and then used these key intermediary organizations to disseminate TWH interventions. Surveys (over 900 apprentices each year for three years) identified the influence of work organization and environment (supervisor support, job strain, coworker safety behaviors, precarious work, mandatory overtime) on missed work, productivity, and use of pain medications among apprentices (Evanoff et al., 2020). Health behaviors and both health and employment outcomes were related to multiple work organization factors, including job strain, mandatory overtime, precarious work, safety behaviors of coworkers, and supervisor support for safety (Rohlman et al., 2019). Most of these relationships persisted in our longitudinal analyses. Focus groups and interviews with regional construction contractors, trade unions, and apprenticeship programs identified current workplace programs, policies, and practices affecting worker health and well-being, and areas for intervention. Suicide prevention and opioid use were identified as high priorities for intervention by all groups (Evanoff et al., 2020). Our academic team provided content, logistical support, and consultation to these intermediaries (two regional contractor associations, two union health funds, and two union apprentice training programs) to develop and deploy new educational and awareness programs around suicide, mental health, and opioid use.

The interest in opioid use resulted in a supplemental project (described below), as well as an educational program on the dangers of opioid use, tailored to construction workers. This presentation has been used locally (e.g., Carpenters Joint Apprenticeship Program in St. Louis), and by the pre-apprenticeship program at the University of Iowa's Labor Center and is available for other audiences. In 2019, we began to partner with the Associated General Contractors of Missouri (AGC-MO) to address the epidemic of suicide among construction workers. This has led to the development of a week-long suicide prevention campaign (described above), "stand-down for safety" events addressing workplace suicide, monthly toolbox talks addressing a range of mental health topics for presentation on "Mental Health Mondays." AGC-MO expanded this program for the third annual suicide prevention "stand-down" in 2021, which reached an estimated 500 employers and thousands of workers. The Center has disseminated these materials and they have led to collaborations with contractor organizations in Iowa and Colorado. Regional contractors, contractor associations, and employers outside of the construction industry have shown interest in the need to raise awareness, to provide additional training and organizational changes to address these complicated problems in a complex industry.

Opioid Treatment and Work-Related Injuries. Additional funds from the Center (which expanded a pilot grant from the Washington University Institute of Clinical and Translational Science; PI: Dale) examined health claims data from a large union health fund to identify risk factors for chronic opioid use and opioid use disorder (OUD) among construction workers (Dale et al., 2019; Dale et al., 2021). This study found that high rates of chronic musculoskeletal disorders led to new opioid prescriptions and workers prescribed opioids for chronic musculoskeletal disorders had much higher odds of future OUD. Funding from the NIH National Institute for Drug Abuse (R34 DA050044, Dale) was used to develop opioid guidelines for health plans and employers in construction. This work led to a funded project in the current Center renewal. Supplemental funding was also used to support a small research project (*Opioid Treatment and Work-Related Injuries*; PI: Davis). Surveillance data from Nebraska's workers' compensation data and Prescription Monitoring Program will be used to examine how physically demanding jobs impact opioid treatment and opioid related deaths in a variety of high-risk industries (e.g., healthcare, manufacturing, retail, and agriculture).

Changes in the Nature of Work Due to the Pandemic and Employee Well-being. In response to the novel coronavirus pandemic, the Center funded studies at Washington University and the University of Iowa to assess the effects of coronavirus response on work organization, mental health, and other measures of worker well-being through longitudinal surveys. Both universities have administrative and academic activities and house regional medical centers/hospitals which allowed us to examine work arrangements, health and well-being outcomes among clinical workers, onsite non-clinical workers, and remote/hybrid workers. Depression, anxiety, stress, and work exhaustion were associated with potential exposure to COVID-19 in all work groups. Importantly, these outcomes were also associated with poor family-supportive behaviors by supervisors and with family/home stressors (Evanoff et al., 2020b). This work led to an R01 application to the National Institute of Mental Health (unfunded) and study results from the large proportion of remote workers led directly to a funded research project in our Center renewal application. We have also been working with the Information Technology Services (ITS) department at the University of Iowa on a study of ITS employees starting in September 2021 and continuing until summer 2022. We are examining employee experiences around their current work arrangements, productivity, and wellbeing.

The Role of Work Factors Influencing Health Behaviors, Health Interventions, and Health and Employment Outcomes. Another small project focused on the effects of work organization, physical and psychosocial factors in the workplace, and organizational health culture as predictors of changes in body weight, healthy eating, and physical activity. This project expanded a multi-level group-randomized trial of a workplace weight loss intervention in low-income health care workers (NIDDK R01 DK103760) to examine the effects of work-related factors outside the scope of the original proposal. Results at one year showed statistically significant improvements in reported organizational health climate, supervisor support, and job satisfaction in workgroups with better-functioning participatory teams (Strickland et al., 2020). Study findings indicate that participation in workplace health programs may improve based on the health climate at the workplace and awareness of health activities.

Pilot/Feasibility Projects Program. In addition to the Center-funded projects described above, the Pilot/Feasibility Projects Program funded academic research teams (new investigator and student) and community-based organizations throughout Federal Region VII (12 pilot awards totaling \$291,809 from a total of 34 applications), led to the submission of 8 grant applications across multiple funding organizations, impacted workplaces through the implementation of TWH programs, practices and policies, and disseminated results through academic conferences and journals (12 peer-reviewed manuscripts), white papers, policy briefs, media outlets, and through federal testimony. These projects targeted vulnerable populations (healthcare workers, long-haul truck drivers, agricultural workers, corrections officers, office workers) and addressed a range of topics (suicide and mental health, return to work, fatigue, medication use on driving behaviors, the impact of work on health and well-being). The Program expanded the scope and regional reach of the Center to address a range of populations, conducted research developing tools and methods, assessed workplace characteristics that impact health, safety and well-being, identified the needs of vulnerable populations, identified current programs and policies, and evaluated the implementation of TWH programs, policies and practices into the workplace. For a complete description see Pilot/Feasibility Projects Program.

Specific Aim 3: Partner with researchers, employers, and occupational safety and health practitioners to generate, evaluate, and disseminate best practices

The Healthier Workforce Center has partnered with intermediary organizations, including labor organizations, trade associations, and safety and wellness councils, to provide information and expertise to employers. We also work closely with other federally funded centers at the University of Iowa (Great Plains Center for Agricultural Health, Heartland Education and Research Center, and the CDC funded Injury Prevention Research Center), at Washington University (CDC funded Prevention Research Center and CDC funded BJC EpiCenter for Prevention of Healthcare Associated Infections), and nationally (NIOSH Construction Research Center or CPWR, the National Children's Center for Rural and Agricultural Health and Safety, Midwest Center for Occupational Health and Safety, other TWH Centers and Affiliates). We have engaged in conferences and other joint activities that support the missions and promote the goals of multiple centers and organizations. Connections with these organizations informs and facilitates research and training within the Healthier Workforce Center and affords opportunities for our center to influence the education of a wide range of trainees in traditional areas of occupational safety and health. During the past funding period, members of the Healthier Workforce Center have collaborated with other TWH Centers to plan meetings, host joint seminars, and conduct other activities to advance and promote the emerging field of TWH.

Example activities are described below:

- Contributed three manuscripts to the *International Journal of Environmental Research and Public Health* special issue "Worker Safety, Health, and Well-Being in the USA".
- Co-sponsored conferences, workshops, and other educational activities with other NIOSH/CDC centers for trainees, practitioners, and employers (e.g., Hawkeye on Safety, the Heartland Occupational Health Symposium, Occupational Health and Safety Student Conference, Nebraska Safety Council), and offered CEUs for different professional groups. We participated in a joint session at Work, Stress, and Health with the other Total Worker Health Centers.
- Led research projects funded by the CPWR to study safety management in construction and to adapt, implement, and evaluate interventions in safety leadership training for construction foremen, new manual materials handling policies and procedures, and a program integrating musculoskeletal health with traditional safety programs. (NIOSH U60OH009762).
- Funding from the Pilot/Feasibility Projects Program to the Nebraska Safety Council, St. Louis Area Business Health Coalition, and WorkWell KS led to the rapid development of a *Total Worker Health[®] Employer Guide: COVID-19 Edition* during a 5-week period in March/April 2020. The guide included employer case studies and best practices and was disseminated through a regional webinar (604 attended, an additional 421 viewed the recorded webinar) and was disseminated at the American Industrial Hygiene Association 2020 Conference.
- Key informant interviews with unions and trade organizations through the Apprentice Project identified a growing concern about mental health in the construction industry. We partnered with the Associated General Contractors of Missouri (AGC-MO) in 2019 to develop and disseminate a Suicide Prevention Campaign aimed to increase awareness, reduce stigma, and educate individuals about risk factors and warning signs of suicide. In 2020, a broader workplace suicide prevention campaign was launched at the Heartland Education and Research Center (Heartland ERC) Hawkeye on Safety conference. Over 250 packets of campaign materials were disseminated, have had a total of 1500 unique page views on our website, and have already seen evidence of adoption on a number of worksites. Bilingual materials include toolbox talks, a leader's guide, posters, hardhat stickers, and medallions with the suicide prevention hotline number. Materials are available on our website.
- Evaluated the implementation of a comprehensive mental health program within a large, multi-employer construction project. We assessed workers' mental health, workplace stressors, and awareness and use of available health benefits. This work was featured in a video developed by the

Outreach Core to assist other employers interested in implementing programs addressing behavioral health.

- Establishment of an Alliance Agreement with OSHA Federal Region VII and Iowa OSHA to address mental health and substance use. This has led to joint presentations between members of the Healthier Workforce Center and an invitation to present to the OSHA Healthcare Symposium for Federal Regions 2, 5, and 7 in August 2021. We also partnered with members of St. Louis and Federal Region 7, AGC-MO, and other stakeholders during a regional stand-down for safety event in September 2021 which was recognized by Jim Frederick the Acting Assistant Secretary for OSHA.
- Expanded the reach of a bilingual (Spanish/English) online TWH Training for Supervisors of Young Agricultural Workers that was developed and evaluated as part of a research project with the NCCRAHS (U54 OH009568; MPIs Rohlman/Campo).
- Incorporated TWH content into various classroom lectures, seminars for academic and continuing education (CEU) credit, including required courses for ERC trainees.

Specific Aim 4: Engage in outreach and education activities to disseminate and speed the adoption of best practices in Total Worker Health

Working closely with other Center Cores and the research projects, the Outreach Core used multiple communication channels to promote TWH, translate research into practice, communicate and disseminate evidence-based practices and resources through. Evidence-based social science, utilizing communication and health behavior change theories, drove the development, implementation, and evaluation of these activities. These activities included the distribution of eBulletins, the Center's website and social media channels, presentations, conferences, manuscripts, service on committees, partnerships and collaborations, consultations with employers, and training and education. In addition to the activities described above, additional outputs are highlighted below and provided in the Outreach Core report.

These activities:

- Utilized short videos and podcasts designed to increase awareness of TWH as an evidence-based method for advancing worker safety, health, and well-being. These materials have been hosted on regional, national, and international sites of intermediary organizations which together serve more than 90,000 members in 80 countries.
- Developed and hosted materials in Spanish to broaden Center reach.
- Disseminated findings through 15 publications and delivered 28 presentations at local, regional, national, and international meetings during April 2020 through August 2021.
- Expanded the subscribers to our eBulletin and social media platforms to over 2,000 practitioners.
- Presented to small and medium sized businesses and communities through the University of Iowa Business Leadership Network (BLN) and other organizations (e.g., Master Builders of Iowa) and provided hands-on training (e.g., *Essentials of Healthy Work Design: A TWH Approach to Worker Well-being, Make it OK, Addressing Mental Health in Workplace*).
- The Nebraska Safety Council conducted more than 470 in-person and virtual training events from April 2020 through August 2021 (e.g., health coaching, Worker 360° [integrated worker well-being], respirator fit testing, recognizing drug impairment, de-escalation techniques, CPR/AED and first aid training, emotional well-being, heat stress, and radiation safety).
- Members of the Center have incorporated TWH content into various classroom lectures and seminars at the University of Iowa, University of Minnesota, and the University of Missouri Kansas City.

Robust and Unbiased Results

The Planning and Evaluation Core provided overall center planning and oversight and was comprised of key leadership personnel organized into an Internal Advisory Committee (IAC), an External Advisory Committee (EAC), and the Evaluation program. The IAC included the Center leadership team and oversaw daily operations and the implementation of our mission and vision. The EAC, included members representing scientific and stakeholder perspectives, provided valuable input as we prioritized our activities, assisted with strategic planning including defining and implementing our vision, and evaluated Center progress.

The Leadership Team (Rohlman, Fethke, Evanoff, Campo, TePoel), with support from the IAC, oversaw fiscal and resource management, made decisions regarding personnel, and planned, coordinated and monitored all Healthier Workforce Center activities, including evaluation, and soliciting regular input from regional partners and external advisors. Monthly IAC meetings provided opportunities for exchange of scientific and administrative information and discussion on ways to improve ongoing activities. During the meetings center activities and outputs were reviewed to determine progress toward achieving goals. Strategic planning was used to ensure that Center activities were coordinated and focused using the center grant proposal, EAC recommendations, research arising from center research projects and NIOSH intramural and extramural research projects, the National Occupational Research Agenda (NORA), input from the Evaluation Team and the NIOSH Total Worker Health® Program (NIOSH 2015). Since its inception, the Healthier Workforce Center has had the benefit of a strong, diverse EAC. The EAC advised in four areas: center program goals and objectives; outreach communication, education, and research; occupational safety and health needs of the region; and the potential for new, innovative directions consistent with the strengths of the Center.

During the last reporting period, the Planning and Evaluation Core engaged the University of Iowa Center for Evaluation and Assessment in the College of Education for assistance in evaluating our outreach materials and dissemination efforts and analysis of survey results from a survey of our regional partners.

Specific methods to ensure scientific rigor and robust and unbiased results are described in each Center Core (Outreach, Apprentice Project, Pilot/Feasibility). In brief, materials and products developed through the Outreach Core incorporated peer-reviewed research findings and feature national experts. Furthermore, outreach materials (e.g., videos, handouts) underwent significant review by Center members, those featured in the videos and by additional content experts to ensure accuracy. For example, to ensure transparency, experts and employers featured in the videos were clearly identified. In order to assure robust and unbiased results in the Apprentice Project, we followed a set of rigorous procedures beginning with the planning through to the analysis of data. Survey items included published scales, were reviewed by stakeholders and went through a pilot-revise-pilot process to ensure items were understood in the study population. A dedicated data entry form was used for data entry and a data codebook was created concurrent with the programming of the data entry form. Duplicate entry was used to identify errors, which were then addressed and corrected in the dataset. Preliminary review of the data included a review of frequencies distributions for every variable to assess normality and discover outliers. All data cleaning decisions were made with input from members of the research team and documented. Qualitative data from interviews and focus groups was transcribed and compiled into responses for specific questions. This information was then reviewed by members of the research team and coded into common categories and themes. Data was entered into an excel spreadsheet and each step of coding was documented (on a separate worksheet) to ensure transparency in the coding process. The Pilot/Feasibility Program utilized a standardized procedure modeled after those used by federal study sections for evaluation of grant applications. A panel of three reviewers was used for each application to ensure unbiased review. Each reviewer was provided with a copy of the

Review Criteria developed specifically for evaluation of Pilot/Feasibility grant applications which included consideration of the significance, innovation, approach, and scientific environment pertinent to the proposed research. A preliminary impact score based on the NIH scoring system as assigned by each reviewer. All applications were discussed, and reviewers' comments were combined to provide feedback.

B.3. Competitive Revisions/Administrative Supplements

The Healthier Workforce Center received additional funding in Years 13 and 15. This was used to support three small research projects (described above).

Opioid Treatment and Work-Related Injuries (PI: Dale, Year 13). This project expanded a pilot grant from the Washington University Institute of Clinical and Translational Science to examine health claims data from a large union health fund to identify risk factors for chronic opioid use and opioid use disorder (OUD) among construction workers (Dale et al., 2019; Dale et al., 2021). It led to additional funding from NIH National Institute for Drug Abuse (R34 DA050044, Dale) to develop opioid guidelines for health plans and employers in construction. This work led to a funded project in the current Center renewal.

Opioid Treatment and Work-Related Injuries (PI: Davis, Year 15). Surveillance data from Nebraska's workers' compensation data and Prescription Monitoring Program will be used to examine how physically demanding jobs impact opioid treatment and opioid related deaths in a variety of high-risk industries (e.g., healthcare, manufacturing, retail, and agriculture).

The Role of Work Factors Influencing Health Behaviors, Health Interventions, and Health and Employment Outcomes (PI: Evanoff, Year 15). This project expanded a multi-level group-randomized trial of a workplace weight loss intervention in low-income health care workers (NIDDK R01 DK103760) to examine the effects of work-related factors outside the scope of the original proposal.

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

The HWC engaged in several training and professional development activities with students, employers, and health and safety professionals. Additional activities are described in other Cores.

Conferences. The Planning and Evaluation Core, in coordination with the Outreach Core, partnered with the Heartland Center for Occupational Health and Safety to plan and execute the Occupational Health Symposium (Spring) and the Hawkeye on Safety Conference (Fall). These conferences provided CEUs in nursing, occupational safety, and human resource management. The Healthier Workforce Center also partners with the Heartland ERC, the Great Plains Center for Agricultural Health, and the CDC funded Injury Prevention Research Center to host a student conference. Focused on occupational safety and health, NIOSH trainees and other students and postdoctoral scholars are invited to present a poster or a 3-minute research presentation. A national expert in occupational safety and health is also invited to describe their contribution to the field and offer guidance to those new to the field.

Workshops. Members of the Center regularly travel with the University of Iowa College of Public Health's Business Leadership Network to host community forums. These forums are developed with input from community leaders to identify topics of interest. During the past project period we participated in a forum in Spencer Iowa focused on "Making Farming Safer: Resources for Improving Ag Workers' Health and Wellness". These forums have led to additional workshops to promote worker well-being (e.g., *Make it Ok* presentation to Clinton Community College; Healthy Work Design Workshop). We also work with local employers or intermediary organizations to assist with the development of needs assessments (e.g., Cedar Rapids Fire Department), leadership training (e.g., Mental Health Workshop at Cornerstone Academy

offered by Master Builders of Iowa) or promote worksite safety and well-being (e.g., Suicide Prevention Campaign with the Associated General Contractors of Missouri). Working with employers at the local level allows us to be aware of emerging needs and concerns.

Classroom/Seminars. Members of the Healthier Workforce Center have incorporated TWH content into various classroom lectures and seminars. This includes seminars for NIOSH ERC trainees and integration in the classroom setting as a service-learning project or as part of the curriculum.

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

The Healthier Workforce Center is engaged in multiple activities to disseminate findings to communities of interest (described in detail above and throughout other Cores). These include conference presentations at local, national, and international meetings, presentations and forums with community leaders and employers, classroom teaching and seminars, and numerous activities described in the Outreach Core. Materials developed by the Center have been disseminated to our partners and have been incorporated into their outreach activities.

In addition, peer-reviewed publications, presentations at scientific conferences as well as meeting with business, labor and community stakeholders have been used to disseminating findings and provide information and resources to researchers as well as safety and health professionals.

As part of the Apprentice Project, we have taken deliberate steps to increase the awareness of project activities and goals among potential partners/stakeholders (e.g., other construction trades, contractors, developers) and have shared baseline findings with current partners (i.e., Joint Carpenters and Floor Layers Apprentice Program, contractor focus group participants, and occupational safety and health professionals). We continue to partner with the Associated General Contractors of Missouri to promote the workplace Suicide Prevention Campaign. These materials have since been disseminated to other intermediary labor organizations.

All Outreach Core activities are focused on disseminating TWH to communities of interest. We focus most of our efforts on reaching audiences that typically are not aware of research activities in order to speed dissemination of research into practice. The latest research findings, as indicated above, are shared via our website, video and podcast series, e-bulletins, presentations at trade and industry conferences, site visits to employers, and by building partnerships with trusted organizations and employers within Federal Region VII.

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

The Healthier Workforce Center has been renewed for another five years and work will continue in the new project period. In the renewal application, we expanded our current collaboration between the University of Iowa, Washington University in St. Louis, and the Nebraska Safety Council to also include the St. Louis Area Business Health Coalition, WorkWell KS and the University of Kansas Medical Center, and the Tippie College of Business at the University of Iowa. The Center includes an Evaluation and Planning Core, which provides center coordination, leadership, and evaluation through internal and external advisors; an Outreach Core that communicates and disseminates science-based findings and provides education through regional and national channels to promote implementation; and a Research Core which utilizes both basic and applied research and includes two large research projects: *Preventing Suicide and Promoting Mental Health in Construction Workers* (approved but not funded) and *Supervising the Future of Remote Workers: Promoting Supervisor and Worker Well-being*, two small research projects: *Refining Workplace Opioid Guidelines for Dissemination through a Social Marketing Approach* and *Understanding the Implementation of Total Worker Health in Rural Nursing Homes*, and a Pilot/Feasibility Projects Program that promotes career development of academic investigators and capacity building among community partners. The Center will continue to serve as a leader in research, translation and dissemination of TWH programs, policies, and practices; conduct basic and applied research; partner with researchers, employers, and occupational safety

and health practitioners; and engage in outreach and education activities to disseminate and speed the adoption of best practices in TWH.

Robust and Unbiased Results

The procedures described above will continue to ensure rigor and robust and unbiased results.

C. PRODUCTS

C.1. Publications, conference papers, and presentations

PUBLICATIONS

47. Faust K, Casteel C, McGehee DV, Peek-Asa C, Rohlman D, Ramirez MR. Examining the Association Between Age and Tractor Driving Performance Measures Using a High-Fidelity Tractor Driving Simulator. *J Agric Saf Health*. 2021 Jul 9;27(3):159-175. doi: 10.13031/jash.14403. PubMed Central PMCID: PMC8607457. [pilot output]
46. Peek-Asa, C.; Zhang, L.; Hamann, C.; Davis, J.; Schwab-Reese, L. Characteristics and Circumstances Associated with Work-Related Suicides from the National Violent Death Reporting System, 2013–2017. *Int. J. Environ. Res. Public Health* 2021, 18, 9538. PubMed Central PMCID: PMC8465410. [pilot output]
45. Dale AM, Rohlman DS, Hayibor L, Evanoff BA. Work Organization Factors Associated with Health and Work Outcomes among Apprentice Construction Workers: Comparison between the Residential and Commercial Sectors. *International Journal of Environmental Research and Public Health* 18.17 (2021): 8899. PubMed Central PMCID: PMC8430912.
44. Peek-Asa C, Zhang L, Hamann C, Davis J, Casteel C. The prevalence of work-related suicides varies by reporting source from the National Violent Death Reporting System. *American journal of industrial medicine*. 2021 Apr 16. PubMed Central PMCID: PMC 8841116. [pilot output]
43. Rohlman DS, Kelly KM (Eds.) *Using Total Worker Health® to Advance Worker Health and Safety*. International Journal of Environmental Research and Public Health. MDPI: Basel. 2020, 374 pp.
42. Dale AM, Buckner-Petty S, Evanoff BA, Gage BF. Predictors of long-term opioid use and opioid use disorder among construction workers: Analysis of claims data. *Am J Ind Med*. 2021 Jan;64(1):48-57. doi: 10.1002/ajim.23202. Epub 2020 Nov 24. PubMed Central PMCID: PMC7799490.
41. El Ghaziri M, Jaegers LA, Monteiro CE, Grubb PL, Cherniack MG. Progress in Corrections Worker Health: The National Corrections Collaborative Utilizing a Total Worker Health® Strategy. *Journal of Occupational and Environmental Medicine*. 2020. doi: 10.1097/JOM.0000000000002016. PubMed Central PMCID: PMC7864532. [pilot output]
40. Ekenga CC, Kwon E, Kim B, and Park S. Long-Term Employment Outcomes among Female Cancer Survivors. *International Journal of Environmental Research and Public Health*. 2020 17(8), p.2751. PubMed Central PMCID: PMC7763867. [pilot output]
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38. Evanoff BA, Strickland JR, Dale AM, Hayibor L, Page E, Duncan JG, Kannampallil T, Gray DL. Work-Related and Personal Factors Associated with Mental Well-Being During the COVID-19 Response: Survey of Health Care and Other Workers. *J Med Internet Res*. 2020 Aug 25;22(8):e21366. PubMed Central PMCID: PMC7470175.

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Prior to September 2016

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11. Schall MC Jr, Fethke NB, Chen H. Evaluation of four sensor locations for physical activity assessment. *Appl Ergon.* 2016 Mar;53 Pt A:103-9. PubMed PMID: 26674410. [pilot output]
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1. Cherniack M, Henning R, Merchant JA, Punnett L, Sorensen GR, Wagner G. Statement on national worklife priorities. *Am J Ind Med.* 2011 Jan;54(1):10-20. PubMed Central PMCID: PMC5860803.

CONFERENCE PRESENTATIONS (September 2016-August 2021)

Rohlman DS, Clancy G. *Suicide Prevention in Healthcare.* Summer 2021 Occupational Safety & Health Administration Healthcare Symposium, 2021.

Rohlman, DS. *Addressing Mental Health at the Supervisor Level.* International Foundation of Employee Benefit, 2021.

Rohlman, DS. *Stigma, Safety and Policies: Addressing Mental Health in the Workplace,* 2021.

Rohlman, DS. *Mental Health in the Workplace.* Iowa-Illinois Safety Council's 68th Annual Professional Development Conference & Expo, 2021.

Rohlman, DS. *Women and Work, Safety Health and Well-being.* Iowa-Illinois Safety Council's 68th Annual Professional Development Conference & Expo, 2021.

Kinghorn, A. *The Opioid Crisis in Construction.* Associated General Contractors of Missouri, 2021.

Rohlman, DS. *Make It OK!* Clinton Community College, 2021.

Klingner, E. *Make It OK!* University of Iowa Human Resources Virtual Staff Listening Post, 2021.

Livingston, B. *Integrating Work and Life – What Does the Future Look Like for Work Life Management?* Tippie Women Summit, Iowa City, IA. 2021.

Rohlman DS. *You OK? Suicide Prevention Campaign for the Workplace.* Master Builder of Iowa Safety Conference, 2021.

Rohlman DS, *Let's Talk: Work and Mental Health.* Master Builder of Iowa, Cornerstone Academy Talk, 2020.

Rohlman DS, Strickland J. *Lifesaving Strategies for Promoting Mental Health in the Construction Industry.* Master Builder of Iowa Changing the Face of Construction Webinar, 2020.

Rohlman DS. *You OK? Suicide Prevention Campaign for the Workplace.* Iowa Local Technical Assistance Program Webinar, 2020.

Rohlman DS. *Women and Work: Safety, Health and Wellbeing*. 37th Annual Safety & Health Summit, National Safety Council Nebraska, 2020.

Livingston B. *The Science behind Wellness*. Allsteel Panel Webinar, 2020.

Rohlman DS, Campo S, TePoel M. *Protecting the Health of Young Agricultural Workers Through Supervisor Training*. Midwest Rural Agricultural Safety and Health Conference, Midwest Rural Agricultural Safety and Health (MRASH), 2020.

Voelker R. *OSHA response to Covid in Healthcare Environments*. Nebraska Healthcare Association Conference, 2020.

Campo S, Tenney L. *Effective Communication for Motivating Teams*. Health Links Webinar, 2020.

Rohlman DS. *Mental Wellbeing in the Workplace: What Can You Do?* Xchange Summit Virtual Conference, The Wellbeing Partners, 2020.

Rohlman DS. *Farmer Mental Health*. Iowa Psychiatric Society, 2020.

Rohlman DS. *Total Worker Health: Worker Wellbeing & Reputable Resources for Coronavirus Epidemic*. The Wellbeing Partners, 2020.

Evanoff BA, Strickland JR, Kinghorn AM, Rohlman D, Dale AM. *Feasibility of using intermediary organizations to disseminate interventions to improve construction workers' health and well-being: A Total Worker Health approach*. American Public Health Association Annual Meeting & Expo (APHA), 2020.

Evanoff BA, Gage BF, Hayibor L, Colvin R, Strickland JR, Dale AM. *Occupational factors are associated with opioid use among construction workers*. American Public Health Association Annual Meeting & Expo (APHA) virtual meeting, 2020.

Strickland JR, Kinghorn AM, Biver S, Colvin R, Dale AM, Evanoff BA. *Tools for evaluating workplace participatory program implementation*. American Public Health Association Annual Meeting & Expo (APHA) virtual meeting, 2020.

Aung W, Evanoff BA, Strickland JR, Colvin R, Kirk BH, Biver S, Nicol G, Dale AM. *Participant engagement and outcomes in a SMS-text based workplace health behavior change intervention: The Working for You study*. American Public Health Association virtual meeting, 2020.

Rohlman DS. *Improving Our Employee and Family Health: A Community Forum*. University of Iowa Business Leadership Network Community Forum, Clinton, IA. 2020.

Rohlman DS. *Women and Work: Safety, Health, and Wellbeing*. Hawkeye on Safety, Iowa City, IA. 2020.

Keniston L, Strickland J. *Mapping Your Way to a Healthier Workforce*. Missouri Council for Activity and Nutrition (MoCAN) 2020 Virtual Conference, 2020.

Rohlman DS. *Total Worker Health Across the Lifespan*. Building a Healthy and Productive Missouri, Missouri Council for Activity and Nutrition (MoCAN) 2020 Virtual Conference, 2020.

Rohlman DS. *How Can the Total Worker Health® Framework Prepare Organizations for Optimal Pandemic and Disaster Response, Survival, and Recovery?* American Industrial Hygiene Conference and Expo (AIHce), 2020.

Rohlman DS, Campo S, TePoel M. *Protecting and Promoting Health of Young Ag Workers via Supervisor Training*. Agricultural Safety and Health Council of America, 2020.

Rohlman DS, Keniston L. *Make It OK*. Education Research Center (ERC) Occupational Health and Safety (OHS) Spring Symposium, Coralville, IA. 2020.

Voelker R. *Four on the Floor: Personalities Drivers*. Army National Guard/Air National Guard Safety Conference, 2020.

Voelker R. *Fall Protection in the Home Construction Environment*. Home Builders Association of Lincoln, 2020.

Campo S, Henning L. *The Synergistic Relationship Between a Total Worker Health Center of Excellence and a Total Worker Health Affiliate Organization*. NIOSH Total Worker Health Affiliates Meeting, Washington, DC. 2019.

Rohlman DS, Nobrega S, Campo S, Burke L, Tenney L, Welter C, Rameshbabu A. *Approaches that Accelerate Research to Practice: Lessons learned from NIOSH Total Worker Health Centers Panel*. 13th International Conference on Work, Stress and Health 2019, American Psychological Association, Philadelphia, PA. 2019.

Rohlman DS, Evanoff, BA, Kelly KM, Strickland JM, Dale AM. *The Impact of Work Organization and Work Environment on Health Behaviors of Construction Apprentices*. 13th International Conference on Work, Stress and Health 2019, American Psychological Association, Philadelphia, PA. 2019.

Rohlman DS, Parish M, TePoel, M, Aryal A. *Evaluating a Total Worker Health Training for Young Workers: Generalizability and Durability*. 13th International Conference on Work, Stress and Health 2019, American Psychological Association, Philadelphia, PA. 2019.

Campo S, Keniston L, Kelly KM. *The Healthier Workforce Center of the Midwest: Theoretically and data driven*. 13th International Conference on Work, Stress and Health 2019, American Psychological Association, Philadelphia, PA. 2019.

Ekenga C. *Health and employment among working-age cancer survivors*. Work, Stress and Health Poster Session, Philadelphia, PA. 2019. [pilot output]

Henning L. *Traffic Safety at the Workplace*. Nebraska Intergovernmental Risk Management Association, 2019.

Voelker R. *Four on the Floor: Personalities Drivers*. Nebraska Safety Council Conference, 2019.

Henning L, Vanover H. *Using Your Company's Health Status to Create a Safer Workplace*. Nebraska Safety Council Conference, 2019.

Rohlman DS. *Total Worker Health: What it means for your bottom line*. Northeast Safety Council Conference, St. Louis Safety Council, St. Louis, MO. 2019.

Rohlman DS. *(Preventing) Workplace Injuries (and promoting health and well-being)*. Iowa Society of Human Resource Managers, Des Moines, IA. 2019.

Jaegers LA, Pestello E, Dieleman C. *Exploring sanctioned and non-sanctioned hobbies among correctional officers to inform workplace health promotion interventions*. Society for the Study of Occupations: USA Annual Meeting, Scottsdale, AZ. 2019. [pilot output]

Jaegers L, Frank A, Erfe S. *Panel: Bridging Reentry/Transition Services with 18*. Workplace Health. National Corrections Collaborative - National Symposium on Corrections Worker Health, Boston, MA. 2019. [pilot output]

Bolenbaugh M, Hudson J, Andrew N, Kenardy J, Ramirez M. *Programs to reduce stress among hospital workers*. 2019 American Psychological Association Conference, Organizational Health and Employee Well-Being Poster Session, San Francisco, CA. 2019. [pilot output]

- Voelker R. *Four on the Floor: Personalities Drivers*. Nebraska Panhandle Conference, 2019.
- Henning L, Vanover H. *Using Your Company's Health Status to Create a Safer Workplace*. Society for Human Resource Management, 2019.
- Vanover H. *Using Your Company's Health Status to Create a Safer Workplace*. American Society of Safety Professionals, 2019.
- Liang Y, Rohlman DS. *Behavioral Health Needs and Resources among Cooperative Dairy Farmers*. International Society for Agricultural Safety and Health Annual Conference Poster Session, International Society for Agricultural Safety and Health, Des Moines, IA. 2019.
- Henning L, Vanover H. *High Impact Wellness and Safety Incentive Design*. VSP Conference, 2019.
- Voelker R. *Verbal Judo*. American Society of Safety Professionals, 2019.
- Rohlman DS. *Improving Community and Workplace Health*. University of Iowa Business Leadership Network Community Forum, Centerville, IA. 2019.
- Keniston L. *Reducing Workplace Injuries and Promoting Wellbeing*. Mississippi Valley Human Resource Association, West Burlington, IA. 2019.
- Rohlman DS, Kelly KM, Keniston L. *Total Worker Health: The Benefits of Healthy Workplace Design*. Occupational Health Symposium, Heartland Center for Occupational Health & Safety, Cedar Rapids, IA. 2019.
- Aryal A. *Evaluation of Toolbox Talks Among Construction Apprentices*. University of Iowa College of Public Health Department of Occupational and Environmental Health Seminar, 2019.
- Campo S, Jaegers L. *(WISIS) Total Worker Health®: A Population Health and Workplace Resource for You & Your Organizations*. American Occupational Therapy Association Annual Conference, New Orleans, LA. 2019.
- Evanoff BA, Rohlman DS, Strickland JR, Kelly KM, Dale AM. *Influence of work organization and environment on health and productivity outcomes among construction apprentices: A Total Worker Health approach*. 27th International Epidemiology in Occupational Health Conference (EPICOH), Aotearoa, New Zealand. 2019.
- Dale AM, Rohlman DS, Strickland JR, Kelly KM, Evanoff BA. *Contrasting Prevalence of Health and Safety Risks and Controls between Residential and Commercial Construction Apprentices*. Work Wellness Disability and Prevention Institute Webinar, 2019.
- Henning L, Vanover H. *Building Strong Safety and Health Habits*. Home Builders Association, 2019.
- Keniston L. *EE Wellness Programs*. Iowa Sustainable Business Forum, 2018.
- Rohlman DS. *Planning for an Emergency: A Total Worker Health® to Protecting People and Property*. Midwest Rural Agricultural Safety and Health Conference Poster Session, Midwest Rural Agricultural Safety and Health (MRASH), Council Bluffs, IA. 2018.
- Morley EM, Rohlman DS, Leinenkugel K. *Healthcare-Seeking Behaviors Among Midwest Farmers*. Midwest Rural Agricultural Safety and Health Conference Poster Session, Midwest Rural Agricultural Safety and Health (MRASH), Council Bluffs, IA. 2018.
- Rohlman DS, Campo S, TePoel MR. *A Review of Targeted Safety and Health Interventions for Youth Working in Agriculture, 2010-present*. Midwest Rural Agricultural Safety and Health Conference, Midwest Rural Agricultural Safety and Health (MRASH), Council Bluffs, IA. 2018.

Rohlman DS, Strickland JR. *Influence of work organization and environment on health behaviors of construction apprentices*. St. Louis Safety Council Apprentice Talk, St. Louis Safety Council, St. Louis, MO. 2018.

Keniston L. *Total Worker Health: The Hidden Value in Integrating Safety & Wellness Programs*. Hawkeye on Safety, Coralville, IA. 2018.

Evanoff BA, Rohlman DS, Strickland JR, Kelly KM, Dale AM. *Influence of work organization and environment on health and productivity outcomes among construction apprentices: A Total Worker Health approach*. National Occupational Injury Research Symposium (NOIRS), Morgantown, WV. 2018.

Ekenga CC, Perez M, Jeffe D. *Employment and work experiences after breast cancer treatment*. Eleventh American Association for Cancer Research Conference on The Science of Cancer Health Disparities Poster Session, New Orleans, LA. 2018. [pilot output]

Henning L. *National Diabetes Prevention Program*. Nebraska Intergovernmental Risk Management Association, 2018.

Farag A. *Fatigue and Shift Work*. Nebraska Safety Council Conference and Trade Show, York, NE. 2018. [pilot output]

Henning L, Vanover H. *High Impact Wellness and Safety Incentive Design*. Nebraska Safety Council Conference, 2018.

Voelker R. *Domestic Violence in the Workplace*. Nebraska Panhandle Conference, 2018.

Henning L, Vanover H. *High Impact Wellness and Safety Incentive Design*. Society for Human Resource Management, 2018.

Voelker R. *Shots Fired*. OSHA Voluntary Protection Programs, 2018.

Voelker R. *Ambushed: Surviving an Open-Air Active Shooter*. OSHA Voluntary Protection Programs, 2018.

Henning L. *What Works and What Doesn't (W360)*. National Government Finance Officers Association Conference, 2018.

Strickland JR, Evanoff B. *Facilitating the participatory process with front-line workers*. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD. 2018.

Dale AM. *Using Intermediaries to Implement Total Worker Health Interventions in Challenging Industries - Symposium*. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD. 2018.

Evanoff BA, Strickland JR, Dale AM. *TWH as a Strategy to Reach and Engage Low Income Workers in Health Promotion Interventions*. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD. 2018.

Aryal A, Parish M, Rohlman DS. *Promoting U Through Safety and Health (PUSH): Evaluation of an online training for young workers*. 2nd International Symposium to Advance Total Worker Health® Poster Session, National Institute for Occupational Safety and Health, Bethesda, MD. 2018.

Dale AM, Rohlman DS, Strickland JR, Kelly KM, Evanoff BA. *Contrasting Prevalence of Health and Safety Risks and Controls between Residential and Commercial Construction Apprentices*. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD. 2018.

Evanoff B, Rohlman DS, Strickland JR, Kelly KM, Dale A. *Influence of Work Organization and Environment on Health Behaviors of Construction Apprentices*. 2nd International Symposium to

Advance Total Worker Health® Poster Session, National Institute for Occupational Safety and Health, Bethesda, MD. 2018.

Anger WK, Rameshbabu A, Olson R, Bodner T, Hurtado DA, Parker K, Wan W, Wipfli B, Rohlman DS. *How TWH Intervention Research Employs the Hierarchy of Controls*. 2nd International Symposium to Advance Total Worker Health® Poster Session, National Institute for Occupational Safety and Health, Bethesda, MD. 2018.

Rohlman DS, Kelly KM. *Health, Safety and Well-being in Urban and Rural Counties: A Snapshot of Federal Region VII*. 2nd International Symposium to Advance Total Worker Health® Poster Session, National Institute for Occupational Safety and Health, Bethesda, MD. 2018.

Rohlman DS, Thompson J, Freewyn S, Vanover H. *Using a Case Studies Approach to Examine Total Worker Health® in Small Enterprises*. 2nd International Symposium to Advance Total Worker Health®, National Institute for Occupational Safety and Health, Bethesda, MD. 2018.

Anger WK, Dennerlein J, Rohlman DS, Cherniack M, Hammer LB, Newman L, Brosseau LM. *TWH Intervention Strategies: What Works for the Centers of Excellence?* 2nd International Symposium to Advance Total Worker Health®, National Institute for Occupational Safety and Health, Bethesda, MD. 2018.

Tamers SL, Rohlman DS, Kelly KM, Goetzel R, Pronk N, Nigam JA, Luckhaupt SE. *Case Studies, Qualitative, and Mixed-Method Approaches*. 2nd International Symposium to Advance Total Worker Health®, National Institute for Occupational Safety and Health, Bethesda, MD. 2018.

Campo S, Rohlman DS, Kelly KM. *A Regional Survey Assessing Total Worker Health® Engagement among Small Employers in the Midwest*. 2nd International Symposium to Advance Total Worker Health®, National Institute for Occupational Safety and Health, Bethesda, MD. 2018.

Strickland JR, Kinghorn AM, Dale AM, Evanoff BE. *Using participatory methods in a workplace weight loss program for low-wage and hourly healthcare workers*. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD. 2018.

Dale AM, Kibby S. *Exploring Individual and Organizational Stress-reducing Interventions Across Industries*. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD. 2018.

Evanoff BA. *Total Worker Health as an Approach to Improve Population Health – Symposium*. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD. 2018.

Kelly KM. *Occupational Health in Human History: Precarious Work from the Stone Age to the Gig Economy*. 2nd International Symposium to Advance Total Worker Health® Poster Session, Bethesda, MD. 2018.

Rohlman DS, Kelly KM. *Health, Safety and Well-being in Urban and Rural Counties: A Snapshot of Federal Region VII*. 2nd International Symposium to Advance Total Worker Health® Poster Session, Bethesda, MD. 2018.

Ekenga CC, Pérez M, Jeffe DB. *Return to Work after Breast Cancer Treatment in African American Patients*. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD. 2018. [pilot output]

Jaegers L, Ahmad S, Matthieu M, Barnidge E, Werth P, Bixler E, Scheetz G, Nadimpalli S, Vaughn, M. *Rural and urban jail Total Worker Health® needs assessment: Similar health, different workplaces*. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD. 2018. [pilot output]

El Ghaziri M, Jaegers L, Grubb P, Cherniack M. *Correction workers health and wellness: Engagement of research and professional partners through the National Corrections*

Collaborative. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD. 2018. [pilot output]

Henning L, Vanover H. *Total Worker Health in Small Business*. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD. 2018.

Henning L, Vanover H. *Total Worker Health as a Public Health Strategy*. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD. 2018.

Henning L, Vanover H. *The Use of Intermediaries*. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD. 2018.

Evanoff BA, Rohlman D, Strickland JR, Kelly KM, Dale AM. *Influence of work organization and environment on health behaviors of construction apprentices*. 32nd International Congress on Occupational Health, Dublin, Ireland, 2018.

Rohlman DS, Parish M, Elliot DL, Hanson G. *Evolution of a young worker training curriculum: Taking safety from the classroom to the break room*. 32nd International Congress on Occupational Health (ICOH 2018), International Congress on Occupational Health, Dublin, Ireland, 2018.

Levintow N, Rohlman DS, Pellenq C, Juárez-García A, Mittal A. *Protecting young workers in informal and small-scale workplaces from psychological and physical hazards*. 32nd International Congress on Occupational Health (ICOH 2018), International Congress on Occupational Health, Dublin, Ireland, 2018.

Rohlman DS, Campo S, TePoel MR. *Protecting and Promoting the Health of Young Agricultural Workers Through Supervisor Training*. North American Agricultural Safety Summit Poster Session, Agricultural Safety and Health Council of America (ASHCA), Scottsdale, AZ. 2018.

Keniston L. *Total Worker Health: The Hidden Value in Integrating Safety & Wellness Programs*. Iowa-Illinois Safety Council's 65th Annual Professional Development Conference & Expo, 2018.

Voelker R. *Trenching and Shoring*. Nebraska Well Diggers Association Conference, 2018.

Ekenga CC, Perez M, Margenthaler J, Jeffe D. *Employment participation after early-stage breast cancer: patterns and determinants*. Tenth American Association for Cancer Research Conference on The Science of Cancer Health Disparities Poster Session, Atlanta, GA. 2017. [pilot output]

Kelly KM, Campo S, Rohlman DS. *Total Worker Health®: Occupational Safety and Health Policy in a Post-Industrial Economy. Behind Policy: Societal Influences. Anthropology Matters!* 116th Annual Meeting of the American Anthropological Association, Washington, DC. 2017.

Henning L. *Worker 360 Concept - How Safety and Wellness Fit Together*. Nebraska Intergovernmental Risk Management Association, 2017.

Vanover H. *Safety Rehab Breaking the Habits of Natural Human Behavior*. Nebraska Safety Council Conference, 2017.

Rohlman DS, Aryal A, Kelly KM. *Toolbox Talks and Other Hands-on Activities to Promote Worker Safety and Health*. Hawkeye on Safety, University of Iowa, Iowa City, IA. 2017.

Rohlman DS, Campo S, TePoel MR. *Training Supervisors to Protect Youth Working in Agriculture*. Midwest Rural Agricultural Safety and Health Conference, Midwest Rural Agricultural Safety and Health (MRASH), Pella, IA. 2017.

Rohlman DS, Vaughn K, TePoel MR, Anger WK. *Development of a Total Worker Health intervention for Workplace Stress in Farmworkers*. Midwest Rural Agricultural Safety and Health

Conference Poster Session, Midwest Rural Agricultural Safety and Health (MRASH), Pella, IA. 2017.

Rohlman DS. *Total Worker Health in Agriculture*. Midwest Rural Agricultural Safety and Health Conference Poster Session, Midwest Rural Agricultural Safety and Health (MRASH), Pella, IA. 2017.

Rohlman DS, Rudolphi JM. *Youth at Work: What Parents and Supervisors Need to Know*. World Dairy Expo, Madison, WI. 2017.

Jaegers L, Carson J, Edwards R. Collaborative approaches to health needs assessment and identification of workplace health solutions in urban and rural jails of St. Louis, National Corrections Collaborative - National Symposium on Correctional Worker Health, Saint Louis University School of Law, St. Louis, MO. 2017. [pilot output]

Andrew N, Hudson J. *Lending an Ear, Changing a Life: The UIHC Debriefing Program*. Caring for the Human Spirit, Chicago, IL. 2017. [pilot output]

Jaegers L, Dusseschleger J, Cherniack M, El Ghaziri M, Dugan A, Erfe S. *Breaching the Steel Wall: Improving Correctional Staff Health through Participatory Action Research*. American Correctional Association Conference of Correction, St. Louis, MO. 2017. [pilot output]

Voelker R. *The Bullet Proof Employee - Addressing Safety Attitudes*. Nebraska Safety Council Conference, 2017.

Rohlman DS. *Total Worker Health™ in Small Employers*. Expanding Research Partnerships: State of the Science Meeting, CDC/NIOSH, Denver, CO. 2017.

Strickland JR, Kinghorn AM, Evanoff BA, Dale AM. *Process evaluation and implementation results of the Healthy Workplace Participatory Program with grocery store workers*. 12th International Conference on Occupational Stress and Health, Minneapolis, MN. 2017.

Strickland JR, Kinghorn AM, Evanoff BA, Dale AM. *Experience mapping to convey complex data and aid in the design of workplace interventions*. 12th International Conference on Occupational Stress and Health, Minneapolis, MN. 2017.

Campo S, Kelly KM, Rohlman DS. *Total Worker Health™ in Small Employers*. Work, Stress and Health, American Psychological Association & NIOSH, Minneapolis, MN. 2017.

Rohlman DS, Parish M, Elliot D, Hanson G. *The Role of Online Forums in the Development and Dissemination of an Occupational Safety and Health Training for Young Workers*. Work, Stress and Health, American Psychological Association & NIOSH, Minneapolis, MN. 2017.

Campo S, Erickson D, Rohlman DS, TePoel MR. *Development of an Online Training for Supervisors of Young Agricultural Workers*. ISASH Annual Conference Poster Session, International Society for Agricultural Safety & Health (ISASH), Logan, UT. 2017

Rudolphi JM, Rohlman DS. *Family Vs. Non-Family Farms: A Comparison of Organizational Factors and Safety Policies*. ISASH Annual Conference, International Society for Agricultural Safety & Health (ISASH), Logan, UT. 2017.

Rohlman DS, Campo S, Kelly KM. *Discovery and Dissemination of Total Worker Health Practices Among Midwest Small Employers*. Understanding Small Enterprises, Denver, CO. 2017.

Voelker R. *Drugs & Alcohol Recognizing the Symptoms*. Nebraska Safety Council Conference, 2016.

Voelker R. *Violence in the Workplace How to Respond*. Nebraska Safety Council Conference, 2016.

Bass J, Jaegers L. *Buzz 304 – Work & Industry Special Interest Section Buzz Session: Public Health and Workplace Health Promotion-Opportunities to Advance Occupational Therapy*. American Occupational Therapy Association (AOTA) Annual Conference, Chicago, IL. 2016. [pilot output]

Rohlman DS, Aryal A, Campo S, Kelly KM. *Total Worker Health in Agriculture*. Midwest Rural Agricultural Safety and Health Conference, Midwest Rural Agricultural Safety and Health (MRASH) Poster Session, Sioux Center, IA. 2016.

Erickson D, Rohlman DS, Campo S, TePoel MR. *Safety Principles that Apply to Multiple Agricultural Tasks for Youth*. Midwest Rural Agricultural Safety and Health Conference, Midwest Rural Agricultural Safety and Health (MRASH) Poster Session, Sioux Center, IA. 2016.

Bixler E, Scheetz G, Kelly P, Matthieu M, Barnidge E, Ahmad O, Jaegers L. *Community health promotion to support corrections workplace health: A mixed methods needs assessment*. American Public Health Association (APHA) Annual Meeting Poster Session, Denver, CO. 2016. [pilot output]

Nadimpalli S, Jaegers L, Matthieu M, Barnidge E, Ahmad O, Scheetz G, Dick R, Kelly P. *Relationship between social support and depression among jail corrections officers - A pilot study*. American Public Health Association (APHA) Annual Meeting Poster Session, Denver, CO. 2016. [pilot output]

Aung W, Evanoff BA, Strickland JR, Colvin R, Kirk BH, Biver S, Nicol G, Dale AM. Participant engagement and outcomes in a SMS-text based workplace health behavior change intervention: The Working for You study. Presented at the American Public Health Association virtual meeting, October 2020.

Strickland JR, Kinghorn AM, Biver S, Colvin R, Dale AM, Evanoff BA. (2020, October). 'Tools for evaluating workplace participatory program implementation.' Presented at the American Public Health Association Annual Meeting & Expo (APHA).

Walsh R, Strickland J, Colvin R, Dale Am, Evanoff B. Validity and reliability properties of the Multifaceted Organizational Health Climate Assessment for measuring organizational health climate in service, clerical, and health care workers. Abstract presented at the EPICOH (Epidemiology in Occupational Health) meeting 2021.

Dale AM. "Opioid Use and Barriers for Return to Work" presented at the University of Missouri Extension Center, Opioids and the Workplace Conference in St. Louis MO on January 10, 2019.

Dale AM. "Opioid Use and Barriers for Return to Work" presented at the University of Missouri Extension Center, Opioids and the Workplace Conference in St. Louis MO on January 10, 2019.

Biver SF, Buckner-Petty S, Hayibor LA, Strickland JR, Tabak RG, Stein RI, Dale AM, Evanoff BA. (2018, October). 'Socioeconomic Status and Workplace Factors: Association with Health Intervention Compliance.' Presented at the Institute for Public Health 11th Annual Conference, St. Louis, MO.

Evanoff BA, Strickland JR, Dale AM. (2018, May). 'TWH as a Strategy to Reach and Engage Low Income Workers in Health Promotion Interventions.' Presented at the 2nd International Symposium to Advance Total Worker Health, Bethesda, Maryland.

WORKSHOPS AND OTHER EDUCATIONAL ACTIVITIES (September 2016-August 2021)

- University of Iowa: Agricultural Safety and Health, The Core Course: *Behavioral Health Lecture* (OEH:6110); **Summer Terms 2016 – 2021** (Rohlman).

- University of Iowa: Rural Health and Agricultural Medicine: Behavioral Health Lecture (OEH:6110); **Spring Semesters 2016 – 2021** (Rohlman).
- University of Iowa: Topics in Agriculture and Rural Health: *The Rural Mental Health Crisis* (OEH:6120); **Spring 2021, 2020, 2018** (Rohlman).
- University of Missouri Kansas City: Rural Health & Agrimedecine: *Mental Health and Total Worker Health in Agricultural Populations* (PHARM: 7223); **Spring 2019-2021** (Rohlman).
- University of Missouri Kansas City: Rural Health & Agrimedecine: *Pesticide Exposures; Transportation Hazards in Agriculture* (PHARM: 7223); **Spring 2019-2021** (Rohlman).
- University of Missouri Kansas City: Rural Health & Agrimedecine: *Occupational Safety and Health in Agriculture; Introduction to Hierarchy of Controls* (PHARM: 7223); **Spring 2019-2021** (Rohlman).
- University of Missouri Kansas City: Rural Health & Agrimedecine: *Behavioral Health and Total Farmer Health Lecture* (PHARM: 7223); **Spring 2019 – 2021** (Rohlman).
- University of Missouri Extension Labor Law Series: *YOU OK? Suicide Prevention; 2021* (Rohlman, Lorek).
- University of Iowa Rural and Public Health Psychiatry Seminar Series: *Mental Health of Agricultural Workers; 2021* (Rohlman).
- University of Iowa Human Resources Community Meeting: *Employee Well-Being for Remote, Hybrid and Onsite Workers; 2021* (Rohlman, Livingston).
- OSHA Region VII Region-wide Leadership Team Meeting: *Healthier Workforce Center of the Midwest; 2021* (Rohlman).
- Nebraska Safety Council Webinar: *Mental Wellbeing in the Workplace: What can you do?; 2021* (Rohlman).
- Nebraska Safety Council Podcast: *Marijuana in the Workplace; 2021* (Rohlman).
- Midwestern Public Health Training Center: *Share Public Health, Rural Health: You've Gotta Care About People; 2021* (Rohlman).
- Rounding@IOWA: *Health Care Providers' Well-Being During the COVID-19 Pandemic; 2021* (Rohlman)
- Business Leadership Network, Employer Workshop (Clinton, IA): *Workplace Mental Health: Make It OK; 2021* (Rohlman).
- University of Iowa: Occupational Health: *Total Worker Health Lecture* (OEH:5620); **Fall 2020, 2019, 2016** (Rohlman).
- University of Iowa: Occupational Health: *Occupational Stress Lecture* (OEH:5620); **Fall 2020, 2019, 2016** (Rohlman).
- University of Iowa: Occupational Ergonomics Principles (OEH:4310): *Work organization lecture; Fall 2016-2020* (Fethke).
- University of Iowa: Fundamentals of Public Health: *Mental Health and Work Lecture* (CPH: 1400); **Fall 2020** (Rohlman).
- Connections Meeting: *Alzheimer's Resources for the Workplace; 2020* (Nebraska Safety Council).
- Sam Houston State University: Wardens Peer Interaction Program: *COVID-19 Needs Assessment Using the Total Worker Health Strategy; 2020* (Jaegers).
- Connections Meeting: *Supporting a Mentally Healthy Workforce During (& After) the Coronavirus Pandemic; 2020* (Nebraska Safety Council).
- Connections Meeting: *The New Normal: How to Keep Safe and Still Prosper During a Pandemic; 2020* (Nebraska Safety Council).
- Connections Meeting: *Work from Home & Family Friendly Workplace; 2020* (Nebraska Safety Council).
- AGC Safety/Human Resources Forum: *Healthier Workforce Center's roll in the Suicide Prevention Campaign: seriousness of the issue in the construction industry; 2020* (Kinghorn, Dale).
- University of Michigan: Interprofessional Perspectives in Occupational Health and Safety: *A Healthier Workforce: The Total Worker Health Way Lecture* (IOE:837); **Spring 2020** (Rohlman).

- University of Iowa College of Public Health with Hancher Auditorium: *A Change is Coming, Public Health Experts on Reopening Arts Facilities Panel*; **2020** (Rohlman).
- University of Iowa College of Public Health, Week of Wellness: *Make It OK*; **2020** (Rohlman).
- Connections Meeting: *How to Save Money During Your Next Benefit Year*; **2020** (Nebraska Safety Council).
- Connections Meeting: *What to Expect from OSHA in 2020*; **2020** (Nebraska Safety Council).
- Connections Meeting: *April 2020 Connections Meeting*; **2020** (Nebraska Safety Council).
- Connections Meeting: *Ask the Experts: COVID-19 Live Chat*; **2020** (Nebraska Safety Council).
- Connections Meeting: *Don't Forget About Us*; **2020** (Nebraska Safety Council).
- Connections Meeting: *Membership Benefits Webinar*; **2020** (Nebraska Safety Council).
- Connections Meeting: *Walking Down the Aisle; The Wellness and Safety Marriage*; **2020** (Nebraska Safety Council).
- University of Iowa Research Week: Pilot Grant Panel Discussion; **2019** (Fethke).
- AGCMO/MoDOT Co-op Meeting (Lake of the Ozarks, MO): *AGCMO/Washington University Suicide Prevention Campaign Implementation and Dissemination*; **2019** (Strickland).
- Connections Meeting: *Lessons Learned from the Flood with Bryan Tuma - Auburn, Lincoln, and Norfolk*; **2019** (Nebraska Safety Council).
- University of Iowa: Adolescent Health: *Impact on Young Workers Lecture* (CPH:3500); **Spring 2019** (Rohlman).
- University of Iowa: Occupational and Environmental Health Seminar: *The Case for Wellness in the Workplace* (OEH:5010); **Spring 2019** (Gant).
- University of Iowa: Occupational and Environmental Health Seminar: *Total Worker Health: An Example with Construction Apprentices* (OEH:5010); **Spring 2019** (Rohlman).
- University of Iowa: *Students in the Field Promoting Workplace Wellbeing*, (CBH:6220/COMM:6220); **2019** (Campo).
- National Corrections Collaborative - National Symposium on Corrections Worker Health (Boston, MA): *Panel: Bridging Reentry/Transition Services with Workplace Health*; **2019** (Jaegers, Frank, Erfe).
- Kirkwood Community College: *Toolbox Talks with Apprentices*; **2019** (Aryal, Kelly, Keniston, Rohlman).
- Marshfield Clinic Research Institute, Child Agricultural Injury Prevention Workshop (Des Moines, IA): *Working Youth; Non-Working Youth Panel*; **2019** (Rohlman).
- Business Leadership Network, Employer Workshop (Centerville, IA): *Essentials of Healthy Work Design: A Total Worker Health Approach to Worker Wellbeing* **2019** (Rohlman, Keniston).
- Rural PREP: *Rural PREP Grand Rounds: Mental health in rural communities – the example of the Midwest dairy farmer*; **2019** (Rohlman).
- Connections Meeting: *Idea Exchange*; **2019** (Nebraska Safety Council).
- Connections Meeting: *Increasing Safety & Wellness Engagement*; **Jan, Feb, Mar 2019** (Nebraska Safety Council).
- Connections Meeting: *Pending 2019 Wellness Laws*; **2018** (Nebraska Safety Council).
- Connections Meeting: *Specialty Medications*; **2018** (Nebraska Safety Council).
- University of Iowa: Injury and Violence Prevention: *Total Worker Health Lecture* (OEH:4510); **Fall 2016 – 2017** (Rohlman).
- Business Leadership Network, Employer Workshop (Oelwein, IA): *Hazard Mapping*; **2018** (Rohlman, Kelly, Aryal).
- Marshfield Clinic Research Institute, Child Agricultural Injury Prevention Workshop (Marshfield, WI): *Working Youth Panel*; **2018** (Rohlman).
- Connections Meeting: *Introducing the Harvest Award Criteria*; **2018** (Nebraska Safety Council).
- Connections Meeting: *2019 Benefit Plan Considerations*; **2018** (Nebraska Safety Council).
- American Cancer Society Workplace Wellness Event: Panel Discussion; **2018** (Strickland).
- Connections Meeting: *Healthy Vacation/Staycation Webinar*; **2018** (Nebraska Safety Council).
- Connections Meeting: *Engaging Family Members in Wellness*; **2018** (Nebraska Safety Council).

- Connections Meeting: *Getting Beyond Physical Wellbeing - Addressing Your Greatest Source of Lost Productivity*; **2018** (Nebraska Safety Council).
- Connections Meeting: *Leading Wellness 101*; **Mar 2018, Aug, Nov 2017** (Nebraska Safety Council).
- Connections Meeting: *New Worksite Wellness Policy Guide Introduction and Walk-Through*; **2018** (Nebraska Safety Council).
- Connections Meeting: *24 Key Culture Elements: Safety Health and Wellbeing*; **Jan, Feb 2018** (Nebraska Safety Council).
- Connections Meeting: *It Takes Something Other Than Opioids to Manage Pain Webinar*; **2018** (Nebraska Safety Council).
- Connections Meeting: *Workplace Emergency Preparedness & Security*; **2017** (Nebraska Safety Council).
- Connections Meeting: *Beat the Pack Smoking Cessation Facilitator Training*; **2017** (Nebraska Safety Council).
- Connections Meeting: *Best Practice Idea Exchange*; **2017** (Nebraska Safety Council).
- Jaegers L, Frank A, Erfe S. *Panel: Bridging Reentry/Transition Services with 18. Workplace Health*. National Corrections Collaborative - National Symposium on Corrections Worker Health, Boston, MA. 2019. [pilot output]
- Connections Meeting: *Four Considerations for Your 2018 Benefit Plan*; **2017** (Nebraska Safety Council).
- Connections Meeting: *Caring for Older Adults: Options to Allow You to Remain Productive at Work*; **2017** (Nebraska Safety Council).
- Connections Meeting: *Integrating Walking/Biking into the Workplace*; **2017** (Nebraska Safety Council).
- Connections Meeting: *Nebraska Diabetes Worksite Toolkit*; **2017** (Nebraska Safety Council).
- Connections Meeting: *Lactation Support at the Worksite*; **2017**. (Nebraska Safety Council).
- Connections Meeting: *Workplace Stability: Retaining Economically Unstable Employees and Psychological First Aid*; **2017** (Nebraska Safety Council).
- Connections Meeting: *Safe Driving Policies*; **2017** (Nebraska Safety Council).
- Connections Meeting: *Traumatic Brain Injuries at Work, Home, and Play*; **2017** (Nebraska Safety Council).
- Connections Meeting: *What is Acupuncture & How Does it Work*; **2017** (Nebraska Safety Council).
- Connections Meeting: *Making Dollars and Sense of Wellness Incentives*; **2017** (Nebraska Safety Council).
- University of Iowa Family Medicine Resident Seminar: *Agricultural Safety and Health: Protecting Our Farmers*; **2016** (Rohlman).
- Iowa Municipal Professional Academy Seminar: *Total Worker Health: Reasons and Resources for your Organization*, Ames, IA; **2016** (Kelly, Rohlman).
- Canadian Institute for the Relief of Pain and Disability: *Total Worker Health: Evaluating the Evidence*; **2016** (Campo).
- Connections Meeting: *Nebraska Prescription Drug Enforcement*; **2016** (Nebraska Safety Council).
- Connections Meeting: *Healthy Holiday*; **2016** (Nebraska Safety Council).
- Connections Meeting: *Operating with Peak Energy*; **2016** (Nebraska Safety Council).

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

- www.HealthierWorkforceCenter.org
- www.LimerickContest.com
- www.TWHSpecialIssue.com

C.3. Technologies or techniques

EDUCATIONAL AIDS OR CURRICULA

- St. Louis Area Business Health Coalition, *Total Worker Health®: Missing Pieces to the Employee Well-being Puzzle* [pilot output]
- *Total Worker Health® Employer Guide: COVID-19 Edition* (Linked as a *Mental Health and Well-being* resource on the SAIF landing page, *Keeping workplaces safe and healthy during the pandemic.*) [pilot output]
- WorkWell KS, *Well-being Curriculum*
- WorkWell KS, *Strategic Framework*
- Nebraska Safety Council, *Mental Health Training Curriculum* (available to their members)
- St. Louis University, Department of Occupational Science and Occupational Therapy, *Determining the Mental Health Needs of Correctional Officers in Missouri for the Development of a Total Worker Health® Program* [pilot output]

ONLINE TRAINING AND RECORDED WEBINARS

- Total Worker Health® Employer Guide National Webinar: COVID-19 Edition, Healthier Workforce Center of the Midwest, April 2020, Rohlman, DS, Remspecher, L, Blum C, Henning L, Ablah E, Wyatt D, Darnell M, Supple K. (+ Teaser video for social media)
- Managing Remote Workers University of Iowa Webinar, Healthier Workforce Center and Tippie College of Business, October 2020, Rohlman D. Livingston B, Colbert A, Hesler S, Hetrick J, Kulper T, Seaton M.
- Managing Remote Workers Regional Webinar, Healthier Workforce Center and Tippie College of Business, October 2020, Rohlman D. Livingston B, Finnegan M, Thomas R, Walter S, Wheeler A.
- "Protecting Young Workers in Agricultural: A Training for Supervisors, Parents, and Teachers." ¹
- "Protegiendo a los Jóvenes Trabajadores en la Agricultura: un entrenamiento para supervisores, padres, y maestros." ¹

¹Project funded by National Children's Center for Rural Health and Safety U54:OH009568 and hosted on the Healthier Workforce Center of the Midwest website.

IN-PERSON CLASSROOM TOOLKIT

- Agricultural Supervisor Training: Keeping our Young Workers Safe and Healthy [pdf]. ¹
- Entrenamiento de Supervisores Agrícolas: Mantener a nuestro trabajadores juvenes seguros y saludables [pdf]. ¹

¹Project funded by National Children's Center for Rural Health and Safety U54:OH009568 and hosted on the Healthier Workforce Center of the Midwest website.

ELECTRONIC AND PRINT PRODUCTS

Informational Videos

September 2016 – August 2021

- The Multi-Generational Workforce
- An Introduction to Emergency Preparedness
- Suicide Prevention Campaign Introduction

- De-Escalation Approaches for a More Harmonious Workplace
- Opioids Destructive Toll on the Workplace
- Opioid Drug Policy to Protect the Workplace
- Slowing the Spread of COVID-19 in the Workplace
- Social Distancing
- Inclusive Design
- Remote Work: What should you know?
- The Hierarchy of Controls (Video has been incorporated into the European Trade Union Institute's "Online English for Health and Safety" training materials.)
- Sedentary Work and Workplace Design (Video was predominately featured on the American Society of Safety Professionals' *Total Worker Health Resources and Tools* landing page.)
- Violence in the Workplace

Prior to September 2016 (materials are still available on website)

- Stress
- Employer Tips
- Safety
- Ergonomics
- Stress (Part Two)
- Return on Investment
- Total Worker Health Introduction
- Starts with Management
- Program Design
- Low Cost Solutions
- Final Piece
- Evaluation
- Employee Engagement
- Video Series Promo Video
- Video Series Promo Video 2
- Transportation Safety
- Nutrition

Training Videos

September 2016 – August 2021

- "Hazard Mapping Demonstration."
- "Effective Supervision." ¹
- "Modeling Safe Behaviors." ¹
- "Supervisión eficaz." ¹
- "Modelado de comportamientos seguros." ¹
- "Training Workers Using the Teach Back Method." ¹
- "Capacitando a los trabajadores utilizando el "Método de Enseñanza." ¹
- "Enforcing Consequences." ¹
- "Hacer cumplir las consecuencias." ¹
- "Difficult Conversations." ¹
- "Conversación difícil." ¹

¹Project funded by National Children's Center for Rural Health and Safety U54:OH009568 and hosted on the Healthier Workforce Center of the Midwest website.

Podcasts

- Driving Safety
- Opening During COVID-19 (+ Video teaser for social media)
- Marijuana and the Workplace: Policy (+ Video teaser for social media)
- Mental Wellness (+ Video teaser for social media)
- Diversity, Equity and Inclusion in the Workplace (+ Video teaser for social media)
- Mod Factors
- The Participatory Approach
- Visible Felt Leadership
- Marijuana and the Workplace: Introduction
- Mental Health During COVID-19 (+ Video teasers for social media)
- Returning to Work (+ Video teaser for social media)
- Fatigue (+ Video teaser for social media)

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

Nothing to report.

C.5. Other products and resource sharing**GRANT APPLICATIONS ADDRESSING TWH FROM CENTER INVESTIGATORS September 2016-August 2021)**

Evanoff, BA (PI) Adapting and implementing a multi-component intervention to prevent suicide and protect mental health among workers at high risk. National Institute of Mental Health (NIMH), **6/1/22 – 5/30/25**. (Not Funded)

Jaegers, LA (Co-PI, Co-PI's: Schafer, J & Linhorst, D) Understanding and Addressing the Impacts of Organizational Stressors (Topic 2) on Public Safety Personnel: An Examination of Police Patrol Officers, Police Detectives, Communications Personnel, and Jail Corrections Officers in St. Louis City and St. Louis County. National Institute of Justice (NIJ), **01/01/2021 – 12/31/2023**. \$773,219 (Not Funded) [pilot output]

Jaegers, LA (Co-PI, PI: El Ghaziri, M) Development of Evidence Informed Learning Resources for the Reduction of Staff Trauma and Organizational Stress in Prison and Jail Settings. National Institute of Corrections (NIC), **9/2020 – 9/2021**. (Funded) [pilot output]

Jaegers, LA (PI) Enhancing Strategies for Jail Officer Interaction with Individuals Presenting with Mental Illness: A Randomized Controlled Trial. National Institute of Justice (NIJ), **01/01/2020 – 12/31/2023**. \$748,821 (Not Funded) [pilot output]

Evanoff, BA (Co-PI, Co-PI: Kwon, J) Protecting Emotional and Physical Health of Healthcare Workers for COVID-19. Patient-Centered Outcomes Research Institute (PCORI), **2020**. (Not Funded)

Evanoff, BA (Co-PI, Co-PI: Ginger, N) Protecting the Mental Health and Well-being of Frontline Health Care Workers During the Pandemic (PRECISE). R01 National Institutes of Health/National Institute of Mental Health, **2020**. (Not Funded)

Dale, AM (PI) Improving Health and Employment Outcomes Through Workplace Opioid Policies. National Institutes of Health/National Institute on Drug Abuse (R34 DA050044), **2019**. (Funded)

- Dale, AM (PI) Evaluation of the Best Built Plans Manual Material Handling Tool for Construction (BBP). Center for Construction Research and Training (CPWR) CDC/NIOSH, **2019**. (Funded)
- Evanoff, BA (PI) Improving Residential Construction Safety through Leadership and Fall Prevention Training (FSL). Center for Construction Research and Training (CPWR) CDC/NIOSH, **2019**. (Funded)
- Evanoff, BA (PI) Preventing Opioid Misuse Among Young Workers at High Risk. National Institutes of Health/National Institute on Drug Abuse, **2019**. (Not Funded)
- Jaegers, LA (Co-I, PI: El Ghaziri, M) CORSAFE. Corrections Officer Research on Stress and Fatigue Elimination: A Multistate Evaluation of The Effect of Shift Work and Extended Hours on Corrections Officers Physical and Mental Health. National Institute of Justice (NIJ), **01/01/2019 – 12/31/2021**. \$1,300,000 (\$266,044) (Not Funded) [pilot output]
- Jaegers, LA (Co-I, PI: El Ghaziri, M) CORSAFE: a multistate evaluation of the effect of shift work and extended hours on corrections officer physical and mental health. National Institute of Justice (NIJ), **01/01/2019 – 12/31/2021**. \$1,300,000 (\$297,862) (Not Funded) [pilot output]
- Jaegers, LA (PI) Enhancing Jail Officer Interaction with Individuals Presenting with Mental Illness: A Randomized Control Trial. National Institute of Justice (NIJ), **01/01/2019 – 12/31/2022**. \$692,210 (Not Funded) [pilot output]
- Schall Jr., MC (PI) Advancing Workplace Safety Surveillance with Ambulatory Inertial Sensors. Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health Mentored Research Scientist Development Award (K01 OH011183), **09/01/2018 – 08/31/2021**. \$324,000 (Funded) [pilot output]
- Dale, AM (PI) Precipitants of Opioid Initiation and Strategies to Reduce Use Among Carpenters. NIH/ICTS CTSA Pilot Grant (UL1TR002345), **03/01/18 – 02/28/19**. (Funded)
- Rohlman, DS (PI) Online Training Modules for Highway Construction Apprentices, Oregon Bureau of Labor and Industry, **07/22/2016 - 07/1/2021**. (Funded)
- Carr, L (PI) Total Worker Health Intervention to Promote Health and Safety of Sedentary Employees. National Institute for Occupational Safety and Health, **2016**. (Not Funded) [pilot output]

DISSERTATIONS AND THESIS

- Faust K, PhD 2019 University of Iowa: *Use of a Desktop Tractor Driving Simulator to Examine the Impact of Age and Hypertension Medication on Selected Driving Performance Measures*. [pilot output]
- Aryal A, PhD 2020 University of Iowa: *Health, Safety and Turnover Among Long-Haul Truck Drivers* [pilot output]
- Bolenbaugh M, PhD 2020 University of Iowa: *The Role of Social Support in Debriefing Interventions for Hospital Healthcare Workers* [pilot output]
- Mitchard G, MS 2021 University of Iowa: *Association Between Home Office Ergonomics and Musculoskeletal Pain*

FUNDED PILOT GRANTS (September 2016-August 2021)

- Chris Blum (Nebraska Safety Council), Lisa Henning (Nebraska Safety Council), Lauren Remspecher (St. Louis Area Business Health Coalition), Elizabeth Ablah (University of

Kansas School of Medicine – Wichita): *COVID-19 Employer Guide Addressing Employer & Employee Health & Wellness during a Pandemic*. 2019-2020.

Corinne Peek-Asa: *Work and workplace characteristics associated with suicide*. 2019-2020.

Carly Nichols and Silvia Secchi: *Agricultural production practices and stress: a pilot study of women farmers in Iowa*. 2019-2020.

Ashamsa Aryal: *Examining health, safety and retention among truck drivers*. 2017-2018.

Lucas Carr: *Accuracy and acceptability of StandDesk Monitor for measuring time spent sitting and standing at a workstation*. 2017-2018.

Christine Ekenge: *Work after breast cancer: a mixed-methods study of African-American survivors*. 2016-2017.

Amany Farag: *Feasibility study for assessing nurses' occupational fatigue using the Sleep, Activity, Fatigue, and Task Effectiveness (SAFTE) biomathematical model*. 2016-2017.

Kayla Faust: *Detection of environmental hazards by senior farmers using a simulated tractor environment*. 2016-2017.

Lisa Jaegers: *A protective study of health among newly hired corrections officers*. 2015-2016 (carried into 2016-2017).

Jeremy Hudson and Marizen Ramirez: *A comparative effectiveness study of Response, Resiliency & Resources (RRR) and Critical Incident Stress Debriefing: two programs designed to reduce occupational stress among hospital clinic workers*. 2015-2016 (carried into 2016-2017).

Melissa Hogan and Lauren Remspecher: *Dissemination of Total Worker Health® strategies to Midwest employers: addressing Employee health in the 21st century*. 2015-2016 (carried into 2016-2017).

E-BULLETINS

- Take Your Pick of New HWC Products
- Simmer Down Strategies for Stress
- Shifting Gears for Worker Well-Being
- Look Out! Hazard Mapping
- Your Mental Wellness & Work-Life Balance
- Leading the Well-being of a Remote Workforce
- Stay Well, Aware, Prepared
- A Healthier Return to Work
- New Diversity Resources for the Workplace
- Designing Healthier Work
- It's Opening Day. Don't Strike Out!
- Webinar Recording Available for Employer Guide to COVID-19
- Employer Resources for Well-being During COVID-19
- Cannabis, Coronavirus & Work
- Resolve to put TWH in your workplace
- Leadership Matters
- Don't Leave Us Before Raking This In
- Tune in to Engagement
- Summer Updates
- Spring into TWH with HWC
- We Need Your Vote – 'Like' a Limerick!
- New HWC Video Released!
- Happy New Year from the Healthier Workforce Center! September Total Worker Health Opportunities

- We've Got Your Holiday "Lift Guide"!
- New Directions for Wellness Programs
- You'll go blind doing that...
- There's a Lifting App for That!
- 3 Steps to Total Worker Health
- Santa Says, Stay Safe
- HWC Keeps Moving by Design & by Rhyme
- Recognizing Hazards: Don't Be a Tool, Use One!
- Your Opinion Matters! 'Like' A Limerick
- \$afety Pays + Tips from HWC
- Wonder What an Injury Costs? There's an App for That!
- Occupational Safety & Health Limericks
- It's Not Wreckommended
- And the Winner Is...
- Total Worker Health Spring Update
- Missing Pieces for Employee Well-being
- There's a Heat App for That!
- Healthier Workforce Center Expands
- Winter Readiness Tips from Santa

TOOLBOX TALKS

- Let's Talk Agriculture: Effective Supervision [pdf]. ¹
- Hablemos agricultura: supervision efectiva [pdf]. ¹
- Let's Talk Agriculture: Modeling Safe Behavior [pdf]. ¹
- Hablemos agricultura: modelado comportamiento Seguro [pdf]. ¹
- Stress ²
- Hazard Mapping ²
- Chemical Hazards ²
- Reading Food Labels ²
- Recognizing Hazards ²
- Hazard Communication ²
- Controlling Hazards ²
- Suicide and the Workplace ³
- Suicidio y el Lugar de trabajo ³
- Reduce the Stigma ³
- Reduce el Estigma ³
- Recognize the Warning Signs ³
- Recnoce las Señales de Alerta ³
- Start a Conversation ³
- Inicie una Conversación ³
- Suicide Prevention Summary ³
- Resumen de Prevención del Suicidio ³
- Mental Health vs Mental Illness ³
- Reducing Stigma ³
- Stress! ³
- Depression vs Anxiety ³
- Self-Care: More Than a Fad ³
- Awareness of Your Own Mental Health ³
- How to Get Help ³
- Suicide Awareness ³

- Alcohol & Drug Use ³
- Opioids & Other Pain Killers ³
- Feeling Fatigued ³
- Bullying – Beyond the Schoolyard ³

¹Project funded by National Children’s Center for Rural Health and Safety U54:OH009568 and hosted on the Healthier Workforce Center of the Midwest website. Disseminated by HWC Outreach Core.

²Output developed by the HWC Apprentice Research Project.

³Output developed by the HWC Apprentice Research Project and the Association for General Contractors – Missouri. Disseminated by HWC Outreach Core.

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
ROHLMAND	Y	Rohlman, Diane	PhD	Center Director	3.6			N	USA	
	N	Barrera, Marco		Clinical Research Coordinator	0.90			N	USA	
SCAMPO	Y	Campo, Michele (Shelly)	PhD	Outreach Core Director	2.7			N	USA	
	N	Colvin, Ryan	PhD	Statistician	3.6			N	USA	
ANNDALE	Y	Dale, Ann Marie	PhD	Co-Investigator	1.4			N	USA	
DAVISJONATHANA	N	Davis, Jonathan	PhD	Data Analyst / Investigator	3.3			N	USA	
BEVANOFF	Y	Evanoff, Bradley	PhD	Center Associate Director / Site PI	3.0			N	USA	
FETHKE	Y	Fethke, Nathan	PhD	Center Deputy Director	1.2			N	USA	
	N	Guhin, Michael		Videographer / Multimedia	4.8			N	USA	
	N	Hayibor, Lisa		Statistician	7.7			N	USA	
	N	Hildyard, Robert		Videographer / Multimedia	2.0			N	USA	
KELLYKM	N	Kelly, Kevin	PhD	Center Administration	12			N	USA	
	N	Keniston, Laura		Outreach Core Coordinator	12			N	USA	

	N	Kinghorn, Anna		Clinical Research Supervisor	7.0			N	USA	
EALTISER	N	Klingner, Erika		Center Administration	2.0			N	USA	
	N	Kurtz, Samuel		Clinical Research Asst	10.5			N	USA	
M.LAFFOON	N	Laffoon, Megan		GRA	11.5			N	USA	
	N	Rochford, Hannah		Research Asst	3.2			N	USA	
MCHUGH	N	Sickels Sterbenz, Mindy	BBA	Center Administration	1.4			N	USA	
	N	Slabach, Roman		Videographer / Multimedia	3.0			N	USA	
	N	Strickland, Jaime		Clinical Research Supervisor	1.1			N	USA	
MRWILLIA	N	Tepoel, Meg		Center Administration	2.7			N	USA	
	N	Vyn, Reuben		Center Evaluation	2.4			N	USA	
LZHANG115	N	Zhang, Ling		GRA	6.1			N	USA	

D.2 Personnel updates

- a. Level of Effort: **NO CHANGE**
- b. New Senior/Key Personnel: **N / A**
- c. Changes in Other Support: **N / A**
- d. New Other Significant Contributors: **N / A**

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.

Nothing to Report

F. CHANGES

F.1 – Changes in approach and reasons for change, including changes that have a significant impact on expenditures**F.2 - Actual or anticipated challenges or delays and actions or plans to resolve them**

Delays in activities during the last funding cycle occurred primarily because of staffing and the COVID pandemic. Center members were out on FMLA which led to delays in several planned activities described in each core. There were also delays in hiring new staff. Staffing issues have continued during the pandemic due to illness and family leave needs. The cancellation of in-person events and travel plans also resulted in limited opportunities to interview individuals and perform worksite visits for our ongoing podcast series and video channel. This also impacted our research activities. For example, survey data collection in the Apprentice project was postponed because apprentice classes were cancelled. It has also been difficult to recruit employers and other stakeholders who are struggling with return-to-work issues and labor shortages. We anticipate that lower COVID cases will reduce family leave needs by staff members and will enable us to continue our activities.

There were also delays for the supplemental project *Opioid Treatment and Work-Related Injuries in Iowa* (Davis, PI) due to delays in obtaining data. A new data request and review process was implemented which led to delays in approval. Unanimous approval of the data use agreement was received in February 2022 and the project will continue in the next funding cycle.

**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****G.2 Responsible Conduct of Research****G.3 Mentor's Research Report or Sponsor Comments****G.4 Human Subjects**

G.4.a Does the project involve human subjects? **YES – SEE PROJECT COMPONENTS**

G.4.b Inclusion Enrollment Data – **SEE PROJECT COMPONENTS**

G.4.c ClinicalTrials.gov – **N/A**

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

NO CLINICAL TRIALS**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?

N/A

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? **NO**

G.8 Project/Performance Sites

*UNIVERSITY OF IOWA, IOWA CITY, IA – DUNS 062761671 (PRIMARY)
WASHINGTON UNIVERSITY, ST LOUIS, MO – DUNS 068552207
NEBRASKA SAFETY COUNCIL, LINCOLN, NE – DUNS 068661594

G.9 Foreign Component

N/A

G.10 Estimated Unobligated Balance

\$536,034

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?

CARRYOVER REQUEST WAS SUBMITTED VIA ASSIST ON FEBRUARY 22, 2022

G.11 Program Income

Is program income anticipated during the next budget period?

N/A

G.12 F&A Costs

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

N/A

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

The Mission of the Healthier Workforce Center of the Midwest is to protect and preserve worker safety and health through knowledge generation and dissemination of evidence-based Total Worker Health® (TWH) practices. During the past project period (2016-2021) the Healthier Workforce Center of the Midwest has shown a continued trajectory of growth, expansion, and impact. Serving Federal Region VII (Iowa, Missouri, Nebraska, Kansas), the Center was a collaboration between the University of Iowa, Washington University in St. Louis, and the Nebraska Safety Council (a TWH Affiliate). Our activities during the current project period can best be described by our partnerships, evaluation and needs assessment activities, dissemination of best-practices through outreach and education, and research addressing emerging issues and vulnerable populations, and transdisciplinary research projects.

Healthier Workforce Center Partnerships

Partnerships with employers, intermediary organizations (e.g., St. Louis Area Business Health Coalition, WorkWell KS, Associated General Contractors of Missouri), and academic partners (University of Kansas Medical Center, Tippie College of Business at the University of Iowa, National Institute for Occupational Safety and Health and other federal funded centers) have increased the reach and impact of our research, education, and outreach activities. We have assisted organizations with the integration of Total Worker Health (TWH) curriculum and content into their programs, supported the creation of employer guides, developed and implemented workplace mental health promotion campaigns, and established an Alliance Agreement addressing behavioral health with OSHA Federal Region VII and Iowa OSHA.

Evaluations and Needs Assessments

The Healthier Workforce Center has utilized regional surveys, focus groups, site visits, and evaluation tools to identify current health and safety practices and **needs** of workplaces, examine the **burden** on employers and employees, and the corresponding **impact** on productivity and worker health, safety, and well-being. This work is used in strategic planning and has guided all Center activities. The Outreach Core has focused on the development of products that are accessible to a range of employer sizes and tailored to their stage of adoption. Similarly, the Pilot/Feasibility Projects Program has prioritized emerging issues and vulnerable populations identified in our evaluation work. Research projects have addressed the impact of work organization and environmental factors on health and safety, well-being, and productivity. Additional research and outreach activities addressed emerging issues, particularly mental health, substance use, and changes resulting from the COVID-19 pandemic. Longitudinal surveys at Washington University and the University of Iowa examined changes in work and employee well-being due to the pandemic and were used to inform future of work decisions and workplace training and support.

Dissemination and Translation of TWH Best Practices Through Outreach and Education

The Outreach Core worked closely with the other Center Cores to promote TWH, translate research into practice, and communicate and disseminate evidence-based practices and resources. Multiple communication channels were used to speed implementation and adoption of evidence-based practices. The Center also provided TWH training and education to current and future workforces through conferences, continuing education, and classroom lectures. Dissemination and translation of best practices is accomplished through the Center's website and social media channels, presentations, conferences, peer-reviewed publications, editing a special issue focused on *Using Total Worker Health® to Advance Worker Health and Safety*, distribution of eBulletins, service on committees, partnerships and collaborations, consultations with employers, and training and education. Additional outputs and their impact are described in the Outreach Core.

Transdisciplinary Basic and Applied Research Addressing Total Worker Health®

Fourteen research projects (one large Center research project, three small Center research projects, one Center emerging issues project, and nine research-focused pilot projects) were supported during the project period. These projects addressed high priority topics, emerging issues, and vulnerable populations identified in the NIOSH Strategic Plan and the National TWH Agenda topics. In order to examine the impact of work organization and environmental factors on the health, safety, and well-being, Center research projects have followed high risk working populations over time (young workers in the construction trades, clinical workers during the pandemic, remote workers, and low-wage workers). These projects have also implemented and evaluated interventions to improve worker health and well-being. Specific examples are described below.

For example, two of our research projects, *Impacting the Safety, Health, and Well-being of Construction Apprentices: Using Intermediaries to Disseminate Change* and *Opioid Treatment and Work-Related Injuries* were specifically focused on the construction industry. The construction industry has high rates of suicides and substance use, including prescription pain medication. Our work with construction apprentices found that the organization of work in the construction industry was associated with adverse health behaviors and outcomes, low productivity, and increased prescription pain medication use. Furthermore, intermediary organizations in the construction industry also identified mental health, including substance use and suicide prevention, as important emerging topics. We partnered with the Associated General Contractors of Missouri and other organizations to develop resources addressing mental health and substance use, including a suicide prevention campaign designed to raise awareness and reduce stigma (described above) and a training to promote opioid awareness. The Healthier Workforce Center has expanded the materials to include all workplaces, translated materials into Spanish, and disseminated the campaign regionally. This has led to the formation of an OSHA Alliance Agreement. We also worked with a large construction contractor to evaluate their implementation of a workplace mental health program. A video describing this process and lessons learned was developed by the Outreach Core. Another project used health claims data to examine risk factors for chronic opioid use and opioid use disorder among construction workers. This led to an NIH grant (R34 DA050044, Dale) to develop opioid guidelines for employers. An additional project is examining opioid use among workers employed in other high-risk, physically demanding jobs (e.g., agriculture, healthcare, manufacturing, retail).

Studies examining the effects of coronavirus response on work organization, mental health, and other measures of worker well-being were conducted at the University of Iowa and Washington University in St. Louis. Longitudinal surveys were used to examine changes in work due to the pandemic and employee well-being among clinical workers, onsite non-clinical workers, and remote/hybrid workers. We found that work changes related to the pandemic had negative effects on the mental health and well-being of both clinical and nonclinical employees. In all work groups, anxiety, stress, depression, and work exhaustion were associated with poor family-supportive behaviors by supervisors, family/home stressors, and potential exposure to COVID-19. These associations persisted in longitudinal analyses of both the Iowa and Missouri data. Survey findings were disseminated to leaders at both institutions, university employees, national employers, and academic audiences with support from the Outreach Core.

Our research, pilot grant, and outreach activities demonstrate our success in designing, implementing, evaluating, and translating evidence-based practices throughout the region and beyond, impacting the health, safety, and well-being of America's workforce. Through our research, outreach, and educational activities we have: expanded our partnerships and developed an extensive network of partners in our region, disseminated research findings through presentations at local, regional, and national meetings and peer-reviewed publications, contributed to the expansion of the TWH knowledge-base through our own research as well as the engagement of researchers throughout the region and through the submission of multiple grant applications to federal agencies, hosted workshops and conferences that convened researchers as well as practitioners and trainees, translated scientific findings into resources for employers utilizing multiple communication channels and media, evaluated the effectiveness of integrated interventions, and developed collaborations with employers, labor, healthcare providers, researchers, and other intermediary organizations throughout our region.

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A. COVER PAGE

Project Title: HEALTHIER WORKFORCE CENTER OF THE MIDWEST – PLANNING AND EVALUATION CORE	
Grant Number: U19 OH008868	Project/Grant Period: 09/01/2016 – 08/31/2021
Reporting Period: 09/01/2020 – 08/31/2021	Date Submitted: 03/14/2022
Program Director/ Principal Investigator UNIVERSITY OF IOWA DIANE S. ROHLMAN Professor Dept. of Occupational & Environmental Health 100 College of Public Health Building Iowa City, IA 52242-2007 (319) 384-4007 Email: diane-rohlman@uiowa.edu	Administrative Official Information UNIVERSITY OF IOWA WENDY BEAVER Executive Director Division of Sponsored Programs 2 Gilmore Hall Iowa City, IA 52242-1320 (319) 335-2123 Email: era@uiowa.edu
Change of Contact PD/PI: N / A	
Human Subjects: NO	Vertebrate Animals: NO
hESC: NO	Inventions/Patents: NO

B. ACCOMPLISHMENTS**B.1. What are the major goals of the project?****Evaluation and Planning Goals:**

Specific Aim 1: Provide leadership, and an efficient, effective leadership structure to coordinate, manage, and evaluate all Center activities.

Specific Aim 2: Coordinate Center Advisory Committees and facilitate communication among Center personnel and between Center personnel and stakeholders throughout the region and nationally, and other NIOSH-funded centers.

Specific Aim 3: Oversee the continual improvement of all center activities based on systematic evaluation including monitoring trends in data to assist with strategic planning.

Supplemental Project: Opioid Treatment and Work-Related Injuries in Iowa (Davis, PI)

The goal of this research is to analyze which workplace injuries and physical job exposures are more likely to result in long-term opioid treatment and how this risk has changed over time.

Supplemental Project: The Role of Work Factors Influencing Health Behaviors, Health Interventions, and Health and Employment Outcomes (Evanoff, PI)

The overall goal of the study was to measure the effects of work organization, workplace physical and psychosocial factors, and organizational health culture as predictors of health behaviors and participation in a workplace weight loss intervention. This supplemental project leveraged existing data from a large workplace weight loss study to better understand key questions about the role of work factors influencing health behaviors, health interventions, and health/employment outcomes.

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

Founded in 2006, the Healthier Workforce Center of the Midwest was a Total Worker Health[®] Center of Excellence primarily focused on the needs of Iowa employers and workers. During the past project period (2016-2021), the Healthier Workforce Center became a regional TWH center focused on Federal Region VII by creating a partnership between the University of Iowa, Washington University in St. Louis, and the Nebraska Safety Council, a NIOSH TWH Affiliate. The Healthier Workforce Center has three core components: Planning and Evaluation, Outreach, and Research (which included a large transdisciplinary research project [*Impacting the Safety, Health, and Well-being of Construction Apprentices: Using Intermediaries to Disseminate Change*; short title: Apprentice Project], and the Pilot/Feasibility Projects Program. Additional funding for the Center was used in 2018 to fund a small research project addressing *Opioid Prescription Use among Union Construction Workers*. In 2020, additional funding was used for two small research projects examining *Opioid Treatment and Work-Related Injuries in Iowa* and *The Role of Work Factors Influencing Health Behaviors, Health Interventions, and Health and Employment Outcomes*. Additionally, in 2020 funds from Planning and Evaluation were used to conduct longitudinal employee surveys at Washington University and the University of Iowa to examine changes in work due to the pandemic and the impact on employee well-being.

Specific Aim 1: Provide leadership and an efficient, effective administrative structure to coordinate, manage, and evaluate all Center activities.

The Planning and Evaluation Core was responsible for coordinating Healthier Workforce Center activities, developing effective methods to communicate with members of the Center and evaluating current activities. The Planning and Evaluation Core organized bi-weekly meetings of the Center Leadership Team, monthly Internal Advisory Committee (IAC) meetings, which included all members of the Healthier Workforce Center, and annual meetings with the External Advisory committee (EAC) who were also consulted on an as-needed basis. Meeting minutes were recorded and sent out following the meeting. During the monthly IAC meetings updates were provided on Center activities, outputs and outcomes from each core were collected and

discussed, and information about NIOSH TWH program activities was disseminated. In addition, members of the Center traveled to other sites (e.g., Outreach to Nebraska, PI/Deputy Director to Washington University, Washington University to Iowa for planning meetings) and our annual EAC meeting rotated throughout our region. The Leadership Team enlisted the services of external evaluators to document the Center's outputs and outcomes, and to measure the reach and impact of its activities.

In 2020 the Center received supplemental funding for two small research projects examining *Opioid Treatment and Work-Related Injuries in Iowa* (Davis, PI) and *The Role of Work Factors Influencing Health Behaviors, Health Interventions, and Health and Employment Outcomes* (Evanoff, PI).

Supplemental Project: Opioid Treatment and Work-Related Injuries in Iowa (Davis, PI)

Central nervous system depressants such as opioids are commonly used to treat pain. *Long-term treatment with opioid medications can become problematic for workers by increasing their risk of developing a substance use disorder or experiencing an overdose.* The goal of this research is to analyze which workplace injuries and physical job exposures are more likely to result in long-term opioid treatment and how this risk has changed over time. In March 2021, a collaborative request was submitted to CyncHealth for use of Nebraska prescription drug monitoring data. In April 2021 the collaborative request was accepted. Methods for completing the data linkage and delivering the data were developed with CyncHealth collaborators. In May 2021 a proposal for linkage and use of data was submitted to CyncHealth's Internal Data Governance Board. The proposal was reviewed and deemed acceptable by the internal review committee in July 2021. The project required final review by the state mandated Health Information Technology (HIT) Board. The board was to convene in spring of 2021 but was unable to meet until December of 2021. The project was reviewed by and presented to the HIT board and received unanimous approval. In February 2022 the data use agreement was received.

Supplemental Project: The Role of Work Factors Influencing Health Behaviors, Health Interventions, and Health and Employment Outcomes (Evanoff, PI)

This project is based on data collected from an NIH-funded cluster-randomized trial of a healthy weight intervention tailored to lower low-socioeconomic-status (SES) workers, who have a higher burden of obesity and can be difficult to reach in community settings. Partnering with a large healthcare system and affiliated university, this project tested a multi-level intervention ("Working for You") adapted from existing group- and individual-level intervention models to promote healthy weight among low-wage workers. The individual-level component was an interactive obesity treatment approach (iOTA) program that involves assessment of behavior risks, collaborative goal setting with a health coach, and interactive SMS text-messages for ongoing support and self-monitoring. This mHealth intervention was embedded in a group-level component, consisting of a workplace participatory program that involved worker teams engaged in the design and implementation of interventions to change their workplace environments. This intervention was based on the Healthy Workforce Participatory Program pioneered by the New England Center for a Healthier Workforce, another NIOSH funded TWH Center of Excellence. These nested interventions were tested in a group-randomized trial among 22 work groups (11 intervention, 11 control) among ~1200 total workers, ~400 of whom were obese. The primary outcome of this pragmatic clinical trial was effects on weight at 2-year follow-up, compared to control. Through our supplement we conducted several secondary analyses of study data relevant to TWH.

In order to study the effects of organizational climate on engagement and success in workplace health interventions, we also tested the validity and reliability properties of the Multifaceted Organizational Health Climate Assessment (MOHCA), a relatively new instrument that assesses general health climate and three climate subfactors (workgroup, supervisor, and organizational health climate). The MOHCA has not been previously tested in lower income populations. We examined the structural validity of the MOHCA's general and subfactor scales in 1,283 generally low-income employees (46% Caucasian; 78% <Bachelor's degree; 32% annual household income <\$30,000). We found that the MOCHA worked well in this lower SES

population. We also found that splitting the responses to add a new subscale assessing organizational responsiveness resulted in better model fit.

In order to assess the success of implementing interventions within the group level participatory intervention, we developed a modified process measure for workplace participatory programs by modifying the Healthy Workforce Participatory Program Process Evaluation Rating Sheet (PERS). We scored 11 worker participatory groups using the modified PERS and other implementation process measures. Baseline organizational health climate, supervisory support, and job satisfaction did not predict future team function scores. However, at 12 months the better functioning participatory teams showed meaningful improvements in reported organizational health climate, supervisor support, and job satisfaction, indicating that successful interventions led to measurable changes in cultural and organizational factors.

We also studied associations between health climate and awareness of work unit health activities with use of workplace health supports. Workplace health programs often have low employee participation rates, especially among workers of lower socioeconomic status (SES). We evaluated 1) associations between health climate, awareness of work unit health activities, and use of workplace health supports in low SES workers and 2) how sociodemographic and worker factors influenced these associations. We used our baseline survey data including the MOHCA, questions on workers' awareness of work unit health activities, and their use of employer-provided workplace health supports. Among 1283 workers from 22 work units, we found that health climate and awareness of work unit health activities were associated with workers' use of workplace health supports. In addition, employees working irregular shifts were less likely to use workplace health supports, while younger workers and non-Caucasian workers were more likely to use workplace health supports. Creating workplaces that address work organizational factors such as health climate and awareness of health activities may improve program participation. Additional outreach may be required for some worker groups.

Specific Aim 2: Coordinate Center Advisory Committees and facilitate communication among Center personnel and between Center Personnel and stakeholders throughout the region and nationally, and other NIOSH-funded centers.

The Planning and Evaluation Core coordinated and facilitated communication among and between Healthier Workforce Center personnel through weekly center administrative meetings (Rohlman, Kelly/TePoel; [Megan TePoel took over as the HWC Center Coordinator in June 2020]), biweekly leadership meetings (Rohlman, Fethke, Evanoff, Campo, Kelly/TePoel), monthly center-wide meetings (IAC), and annual EAC meetings. In addition, we regularly met with stakeholders throughout the region and nationally, and with other NIOSH-funded centers (AgFF, ERC, TWH). Monthly IAC meetings included representation from Nebraska, Missouri, and Iowa. During these meetings, center activities, outputs and outcomes were collected and discussed. Center pilot grantees were invited to provide project updates to the IAC. Information and queries from NIOSH or other TWH Centers were also discussed during the meetings.

During the past funding cycle, the EAC included representation from labor, employers, intermediary organizations, and academic advisors who have led federally funded centers with expertise in occupational injury prevention, behavioral change and population health improvement, development and translation of integrated employee benefit models, occupational medicine, human resources and business worksite health promotion, and business management. Reflecting our view that the Healthier Workforce Center serves all of Region VII, annual meetings of the EAC meeting rotated throughout our region, with in-person meetings in Iowa (2016, 2019), Missouri (2017), and Nebraska (2018). The 2020 in-person EAC meeting was cancelled due to the COVID-19 pandemic. Instead of hosting an EAC meeting, email updates were provided, and we conducted a survey of EAC members (described below in Aim 3). This information was used to inform our renewal application. Similar to IAC meetings, updates were provided from the research projects and Cores with targeted questions to the EAC to solicit feedback on specific topics, including emerging issues.

The Planning and Evaluation Core facilitated communication with other federally-funded centers, including the University of Iowa's Great Plains Center (GPCAH), a NIOSH-funded Agricultural Safety and Health

Center, the University of Iowa's Heartland Center, a NIOSH-funded Education and Research Center (ERC), the CDC-funded Injury Prevention Research Center (IPRC) at the University of Iowa, and the NIH funded Clinical and Translational Science Awards (CTSA) programs at Washington University and the University of Iowa, known as the Institute for Clinical and Translational Sciences (ICTS) at both institutions. Specifically, Center investigators led research projects, reviewed pilot grant applications, provided academic training and continuing education, and provided research and practicum opportunities for trainees. Through these activities we were able to integrate TWH content into ERC conferences and required classes for ERC trainees. This ensures that all ERC trainees have at least basic TWH literacy upon graduation. ERC trainees have also received funding from the pilot grant program for their thesis/dissertation research. We assist with the planning and execution of several ERC conferences, including the annual Hawkeye on Safety Conference, Spring Occupational Health Symposium, and the Occupational Health and Safety Student Symposium. In 2021, the HWC hosted the Student Symposium and invited Dr. Lorraine Conroy from the Center for Healthy Work at the University of Illinois Chicago to provide the Keynote Presentation. In addition to student presentations, there was a session focused on interview skills for the students. In May 2021, Lisa Henning from the Nebraska Safety Council joined the External Advisory Board for the Heartland Center. The ICTSs have provided statistical consultation and REDCap database support for Center research projects. ICTS funding from Washington University and a supplement from the Center was used to examine health claims data on opioid use among construction workers (Dale, PI) which led to additional funding from the NIH National Institute for Drug Abuse (R34 DA050044, Dale) and several publications. This was the foundational work for a project funded in the renewal application. We also jointly hosted a networking reception showcasing our research and activities addressing rural and agricultural health and safety with the GPCAH, and the Occupational Health and Safety Student Research Symposium. Dr. Rohlman is part of the IPRC executive committee.

As part of the College of Public Health Business Leadership Network, members of the HWC participate in community forums throughout Iowa. Local business leaders and faculty from the University of Iowa discuss their work to promote health and safety in the communities, including at the workplace. In 2020 we held a virtual forum with business leaders from Clinton, Iowa. The focus of the meeting was on mental health. This led to a follow-up presentation to leaders from Clinton Community College in April 2021 by the Center on *Make it Ok!*, a statewide program designed to reduce the stigma around mental health. We have offered this presentation several times to different organizations.

The HWC also partnered with NIOSH and the other TWH Centers on several joint activities, including quarterly Total Workers Health Center directors' conference calls (e.g., Work, Stress, and Health), NIOSH sponsored webinars, the NIOSH edited volume on Total Worker Health, and special journal issues. Dr. Rohlman partnered with the Oregon Healthy Workforce Center on an article comparing health and safety risk factors across five occupational samples. Center members (Campo) also partnered on the development of TWH Competencies with the other TWH Centers. Center members have also participated in the NIOSH COVID-19 Task Force (Dale), served on NIOSH study section (Fethke, Dale), and NORA cross-sector council (Evanoff).

Planning and Evaluation also led efforts to address emerging issues. For example, in response to the COVID-19 pandemic, a pilot grant was used to develop the *Total Worker Health® Employer Guide: COVID-19 Edition* and to conduct surveys assessing employee well-being at two universities. The *Employer Guide* launched in April 2020 with a national webinar showcasing employers throughout our region. It was also promoted at the American Industrial Hygiene Association Conference and Expo. In order to understand the impact of work organization changes on well-being among clinical and non-clinical essential workers, remote workers, and supervisors, longitudinal surveys were conducted between April 2020 and June 2021. Faculty from the Tippie College of Business at the University of Iowa collaborated on longitudinal surveys conducted at Washington University and the University of Iowa, who both have large regional hospitals as well as large and diverse employee populations outside of healthcare. Findings from the survey were shared with leaders at both institutions and disseminated through local and regional webinars focusing on managing remote workers. The survey data (preliminary data) was used to support a project in the current renewal application led by Dr. Livingston in the Tippie College of Business (Research Project 2, *Supervising the Future of*

Remote Workers: Promoting Supervisor and Worker Well-being). Findings from the initial Washington University survey (first of 4 waves) included the negative impact of the pandemic on the well-being of clinical and non-clinical workers (Evanoff et al., 2020a).

Planning and Evaluation established connections between research, evaluation, and outreach activities to maximize relevance and increase the reach of the Healthier Workforce Center. This included the dissemination and translation of Center research findings and products. For example, focus groups and interviews with stakeholders in the construction industry (e.g., union representatives, contractors, employers) identified mental health as a major concern. The Healthier Workforce Center partnered with the Associated General Contractors of Missouri (AGC-MO) to develop and launch week-long suicide prevention efforts in 2019. This was kicked off by a “stand-down for safety” event addressing workplace suicide. In 2020 and 2021, we worked with AGC-MO to develop additional materials (e.g., toolbox talks, playing cards) to promote safety, stress reduction, and mental health that are available on their website. The campaign and materials were promoted at the August 2020 Hawkeye on Safety conference, expanding the reach to Iowa and adjacent states. A video featuring AGC-MO was developed by the Outreach Core. Materials were also translated into Spanish and are available on our website. Over 250 packets (i.e., toolbox talks, posters, medallions with the suicide prevention hotline, hard hat stickers, and leader guides) were sent to employers throughout the region. This work led to a new partnership with the Master Builders of Iowa, who incorporated content on mental health and suicide prevention into their leadership training. In March 2021, we formed an OSHA Alliance Agreement with Federal Region VII OSHA and Iowa OSHA. The goal was to raise awareness on the impact of behavioral health (mental health and substance use) in the workplace. We partnered with OSHA to promote mental health at an OSHA Healthcare Symposium for Federal Regions 2, 5, and 7 in August 2021. We also partnered with members of OSHA in St. Louis and Federal Region 7, AGC-MO, and other stakeholders at a regional stand-down for safety event in September 2021 which was recognized by Jim Frederick the Acting Assistant Secretary for OSHA. We have also provided numerous presentations on workplace mental health at different venues (e.g., Iowa Local Technical Assistance Program, American Society of Safety Professionals in St. Louis, Florida Nursing Association, Missouri Extension, the Wellbeing Partners, Iowa/Illinois Safety Conference, Nebraska Safety Conference, International Foundation of Employee Benefits, Governors Safety Conference).

Specific Aim 3: Oversee the continual improvement of all center activities based on systematic evaluation including monitoring trends in data to assist with strategic planning.

The Planning and Evaluation Core oversaw continual improvement of Healthier Workforce Center activities through our regular meetings (Center leadership meetings, IAC and EAC meetings). The Center used external evaluation to for strategic planning and to inform priorities. Based on feedback from the EAC, preliminary findings from the Apprentice Project, and existing Outreach relationships, we recognized the need to engage academic partners with ties to employers and immediate access to emerging business trends that would allow us to make a stronger case between the business side (e.g., productivity) and health and safety (e.g., injury and worker well-being). As a result, we expanded our partnerships to include faculty from the Tippie College of Business at the University of Iowa. In response to the COVID-19 pandemic, there was considerable interest in supporting employers, particularly small employers, and learning about the impact of changes to work organization and well-being among clinical and non-clinical essential workers, remote workers, and supervisors. This led to the development of the *Total Worker Health® Employer Guide: COVID-19 Edition* and longitudinal surveys among employees at two universities (described above).

The Center works with the University of Iowa Center for Evaluation and Assessment in the College of Education for a range of evaluation activities (e.g., assistance in evaluating our outreach materials and dissemination efforts, analysis of results from a survey of our regional partners). Specific activities are described included:

- Analyzed the data from an online survey of Healthier Workforce Center eBulletin members aimed at eliciting participant feedback about their experience with the Center, their familiarity with and use of its outreach materials, as well additional topics of interest to them and their organizations.

- Evaluated the overall reach and impact of the *Total Worker Health*® *Employer Guide: COVID-19 Edition*. Administered a series of surveys to collect feedback about the contents of the webinar launching the *Employer Guide* and to learn how participants used the information in their own contexts. Monitored monthly metrics related to the promotion and dissemination of the *Employer Guide*, as well as the extent to which end users accessed it over time. Evaluation data found that the project was timely and had a strong impact on employers in the Midwest region. Response to the webinar was overwhelmingly positive, and the best practices, case studies, and resources were deemed to be highly relevant.
- Conducted interviews with EAC members to: 1) determine the overall efficacy of the Center and quality of their education and outreach efforts, 2) gather input on the emerging issues that the Center could address, and 3) collect feedback on improvements the center could make moving forward. The EAC found the Center to be a highly valued resource in the region. Interviews identified the Center's strong leadership as an asset and described ways that the Center has demonstrated a strong connection between research and practice and been responsive to the practical needs of stakeholders.
- Provided input on the agenda and focus of the EAC meetings and assisted with the analysis of data collected from attendees during the meetings
- Conducted interviews with Region VII leaders and directors of centers with similar missions and visions. The purpose was to identify opportunities for increased collaboration (for education/outreach, as well as research), and to gather input on emerging needs related to worker and workplace safety, health, and wellbeing.

Members of the HWC regularly interact with our EAC and other intermediary organizations to learn more about their needs, share resources from the Healthier Workforce Center, and identify emerging issues. This includes forums with business leaders, representatives from safety and well-being organizations, employers and labor representatives, and workers. These meetings lead to additional presentations and workshops to promote worker well-being (*i.e.*, Hazard Mapping activity, mental health in the workplace, Suicide Prevention Campaign with the AGC-MO). Working with employers and other intermediary organizations at the local level allows us to be aware of emerging needs and concerns.

Scientific Rigor and Robust, Unbiased Results

The procedures described above were implemented by the Planning and Evaluation Core to review and track all Healthier Workforce Center activities, including progress towards meeting the specific aims for each Core and research project. We worked with the Center for Evaluation and Assessment (CEA) to engage in regular evaluation activities. The CEA conducted systematic evaluation to assess the impact of Center activities and to provide a continuous feedback loop to inform strategic planning. Both qualitative and quantitative data collection activities were used to examine the *quality, effectiveness, and impact* of all Center activities. Meeting agendas and minutes were used to track Center communications and a history of Center decisions was archived in a shared location. Data was collected for the purpose of evaluating Center activities, outreach products, and through research projects, and the Pilot/Feasibility Projects Program. Data included information reported by pilot project awardees regarding pilot project outputs/outcomes, responses to questions on surveys of pilot project awardees and reviewers about the merit review process, qualitative feedback from HWC Internal and External Advisory Committees regarding Center performance and opportunities, feedback from employers, intermediaries, and other stakeholders on outreach materials, and responses to short surveys of various activities (e.g., conference presentations). This qualitative and quantitative data will be collected by each Core and the CEA at the University of Iowa.

For the supplemental opioid project, Nebraska was identified as a data provider because they had newly developed a formal data request and review process. The review process was intensive requiring several levels of review. This review assured safe, accurate, and uniform use of the data. By collaborating with CyncHealth, we are able to use their expertise with the data to provide linked and cleaned data. This removes the potential for errors or misuse of the data.

B.3. Competitive Revisions/Administrative Supplements

The Healthier Workforce Center received additional funding in Years 13 and 15. This was used to support three small research projects (described above).

Opioid Treatment and Work-Related Injuries (PI: Dale, Year 13). This project expanded a pilot grant from the Washington University Institute of Clinical and Translational Science to examine health claims data from a large union health fund to identify risk factors for chronic opioid use and opioid use disorder (OUD) among construction workers (Dale et al., 2019; Dale et al., 2021). It led to additional funding from NIH National Institute for Drug Abuse (R34 DA050044, Dale) to develop opioid guidelines for health plans and employers in construction. This work led to a funded project in the current Center renewal.

Opioid Treatment and Work-Related Injuries (PI: Davis, Year 15). Surveillance data from Nebraska's workers' compensation data and Prescription Monitoring Program will be used to examine how physically demanding jobs impact opioid treatment and opioid related deaths in a variety of high-risk industries (e.g., healthcare, manufacturing, retail, and agriculture).

The Role of Work Factors Influencing Health Behaviors, Health Interventions, and Health and Employment Outcomes (PI: Evanoff, Year 15). This project expanded a multi-level group-randomized trial of a workplace weight loss intervention in low-income health care workers (NIDDK R01 DK103760) to examine the effects of work-related factors outside the scope of the original proposal.

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

In 2020 the Healthier Workforce Center funded a supplemental project, *Opioid Treatment and Work-Related Injuries in Iowa* led by Dr. Jonathon Davis, a postdoctoral fellow. Dr. Davis was also a co-investigator on a Center pilot project examining work and workplace characteristics associated with suicide which led to three publications, he was also part of the University of Iowa team examining the impact of workplace changes due to the COVID-19 pandemic on the well-being of university employees. In 2021 Dr. Davis was hired as a Research Assistant Professor in the Department of Occupational and Environmental Health (OEH).

The Center supported Megan Laffoon as a graduate research assistant (GRA). Ms. Laffoon was a graduate student in OEH and a NIOSH trainee in the Heartland Center for Occupational Health and Safety. She assisted the Planning and Evaluation Core by conducting literature reviews, contributed to the development of materials used in outreach and educational activities with employers and intermediary organizations, and assisted with the development of data collection tools and analysis. In addition to the Individual Development Plans (IDP), the academic progress of doctoral students in the department of OEH at the University of Iowa is reviewed annually. To be in good standing, a doctoral student must satisfy all departmental and Graduate College requirements and deadlines and must make reasonable progress toward completion of the degree as judged by the student's advisor. Students are required to develop and maintain two documents, a departmental plan of study and a curriculum vitae (CV) that is updated annually. The plan of study is developed by the end of the student's first semester in consultation with their advisor. In addition to courses, the plan includes a timeline for completion of the preliminary assessment and comprehensive examination. These documents are updated annually by the student and reviewed by the advisor. At this time, the advisor will meet with the student to assess progress, provide feedback, and then submit a letter to the Director of Graduate Studies summarizing the assessment of progress. This letter is shared with the student. If a student fails to meet expectations for reasonable progress a written plan is implemented which states the requirements needed to meet expectations.

Mr. Arthur Aung was a summer student at Washington University who worked on the project, *The Role of Work Factors Influencing Health Behaviors, Health Interventions, and Health and Employment Outcomes*. His worked resulted in an abstract presented at the American Public Health Association annual meeting. Mr. Aung subsequently graduated from St. Louis University with MD and MPH degrees and is now completing an internal medicine residency; he is interested in pursuing a career in preventive medicine and public

health. Mr. Ryan Walsh is now a PhD student in Occupational Therapy working with these same data. He has presented or submitted several abstracts related to this study, which will form the basis of his PhD thesis.

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

The Healthier Workforce Center engaged in multiple activities to disseminate findings to communities of interest (described in detail above and in the Outreach Core). These included conference presentations at local, national, and international meetings, presentations and forums with community leaders, employers, and other intermediary organizations (e.g., Extension, OSHA, safety councils, wellbeing organizations, labor), classroom teaching and seminars, and other activities described in the Outreach Core. Center outputs have included numerous print and other multimedia products (e.g., videos and podcasts), recorded webinars and conference presentations, face-to-face and virtual presentations, workshops, other educational curriculum, and peer-reviewed publications. Meeting with business, labor and community stakeholders have been used to disseminate findings and provide information and resources to researchers as well as safety and health professionals. TWH content has been incorporated into classes addressing occupational safety and health at the University of Iowa, the University of Missouri Kansas City, University of Minnesota, University of Michigan). Because of our close relationship with the Great Plains Center for Agricultural Health we have been able to promote utilizing a TWH approach in the prevention of agricultural injury and illness. This included the dissemination of an online training for supervisors of young agricultural workers developed with funding from the National Children's Center for Rural and Agricultural Health and Safety. These materials are available on the Center website and promoted through various activities.

We also have delivered workshops for employers and supervisors to promote healthy work design or to address mental health in the workplace. Publications and presentations from the pilot grant program and Apprentice Project have been developed. Members of the Healthier Workforce Center participated in the development of a manuscript with NIOSH, the TWH Centers, and others to outline TWH competencies in the Journal of Occupational and Environmental Medicine. We also contributed three manuscripts to the special issue "Worker Safety, Health, and Well-Being in the USA" in the International Journal of Environmental Research and Public Health.

Through the Apprentice Research Project, we have established partnerships with the Associated General Contractors of Missouri (AGC-MO) and other stakeholders in the construction industry to develop materials to address suicide prevention (described above). Planning and Evaluation has taken the lead on disseminating these resources throughout the region. This has led to the OSHA Alliance Agreement with Federal Region VII OSHA and Iowa OSHA focused on behavioral health (mental health and substance use) in the workplace.

During the COVID-19 pandemic, the Planning and Evaluation Core coordinated activities with the Pilot Grant Program and Outreach Core to address this emerging workplace hazard. We leveraged regional partnerships to develop the *Total Worker Health® Employer Guide: COVID-19 Edition* and administer surveys that assessed employee well-being at two universities over time. These activities led to regional and national webinars (recordings are available on our website). Findings from the employee well-being surveys were shared with university leaders and disseminated through executive reports to the community. The Outreach Core has also developed videos and podcasts addressing worker well-being.

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

The Healthier Workforce Center was funded for an additional five years. The renewed Center consists of a Research Core to conduct basic and applied research in TWH through four research projects: *Mental Health in Construction* (approved but not funded, Years 1-5), *Supervising Remote Work* (Years 1 to 5), *Opioid Use Guidelines* (Years 1 and 2), *Implementation of TWH in Nursing Homes* (Years 4 and 5) and a Pilot/Feasibility Projects Program, an Outreach Core that includes intermediary organizations to translate, disseminate and speed adoption of evidence-based TWH programs, policies, and practices, and an Emerging Issues Program.

During the next reporting period, Evaluation and Planning will pursue these activities through four specific aims that address **Center Administration** (Aims 1 and 2), the **Evaluation Program** (Aim 3) and the **Emerging Issues Program** (Aim 4):

- Specific Aim 1:** Provide strategic leadership and an efficient, effective administrative structure to coordinate, manage, and evaluate all Center activities.
- Specific Aim 2:** Foster communication and collaboration between Center advisory committees, Center personnel, regional and national stakeholders, and other NIOSH-funded centers.
- Specific Aim 3:** Conduct systematic evaluation of all Center activities, through partnership with external evaluators, to document outputs and outcomes and inform ongoing strategic decision-making to maximize continual improvement of all Center activities.
- Specific Aim 4:** Identify, prioritize, and address emerging issues by regularly convening a Regional Collaborative Learning Community consisting of regional and national research and practice partners to advance outreach activities, define emerging issues in TWH, and develop targeted opportunities through Center outreach and pilot grant activities.

Supplemental Project: Opioid Treatment and Work-Related Injuries in Iowa (Davis, PI)

Because of the delays with the approval process (described above), this project will continue into the current funding cycle. In February of 2022, the data use agreement was approved. During the next reporting period the Prescription Drug Monitoring Program Data will be linked with the Workers' Compensation data. The analysis will examine the likelihood of long term-opioid use (defined as opioid use on most days in the 90 days following an injury) by various characteristics of the injury over time. We will also classify physically demanding jobs using a job exposure matrix and analyze if opioid treatment differs by levels of physical demand.

Robust and Unbiased Results

The procedures described above will continue to ensure rigor and robust and unbiased results.

C. PRODUCTS

C.1. Publications, conference papers, and presentations

See Center Overall for full list of publications, conference papers, and presentations.

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

- www.HealthierWorkforceCenter.org
- www.LimerickContest.com
- www.TWHSpecialIssue.com

C.3. Technologies or techniques

See Center Overall for full list of technologies or techniques.

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

Nothing to report.

C.5. Other products and resource sharing

See Center Overall for full list of other products and resource sharing.

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.

Nothing to report.

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**Planning and Evaluation**

In general, the Healthier Workforce Center was able to carry out their proposed activities during the project period although there were some delays and changes. The COVID-19 pandemic did impact several activities. For example, in-person meetings (EAC, conferences) were cancelled or delayed. Members of the Center have also had to take time off for family caregiving activities. However, the Center was able to address the impact of this emerging threat to worker health and safety with new initiatives (e.g., the employer guide and well-being surveys). These products were disseminated directly to employers and shared with leaders to inform return to work and future of work decision making.

Supplemental Project: Opioid Treatment and Work-Related Injuries in Iowa (Davis, PI)

This project experienced delays in accessing data for the project. The project history and reasons for the project delays are the following:

1. Project involved linkage of Iowa's workers' compensation data with prescription drug monitoring program data (PDMP). Logistics for linking the data were being discussed with Iowa's workers compensation division and were halted in October 2020. Workers' compensation was burdened with an increase in benefit requests and would no longer be able to fulfill our request for data.
2. Nebraska was identified as an alternative state to complete this research. After discussion with data holders a collaborative request was submit for use of state data to CyncHealth, the agency that oversees the state's health information exchange and PDMP data. The project collaboration was voted on by the CyncHealth Board and endorsed in April 2021.
3. CyncHealth had initiated a new collaborative agreement project process in 2021. As part of this process all projects using patient data, such as the PDMP data used in our project, would require review by the Health Information Technology (HIT) Board. The HIT Board was projected to meet in April 2021 to review project proposals. There were delays in establishing the HIT Board by Nebraska with the Board ultimately not scheduled to review project requests until December 2021.

While the delays in the project are in part due to delays in the CyncHealth collaborative agreement process, this is a new process for requesting Nebraska data. CyncHealth and Nebraska are unique in their creation of a formal process for accessing state PDMP data. This project is the first collaboration between CyncHealth and the Healthier Workforce Center of the Midwest and will likely lead to additional collaborations in the future.

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

G.2 Responsible Conduct of Research

G.3 Mentor's Research Report or Sponsor Comments

G.4 Human Subjects

G.4.a Does the project involve human subjects? **NO**

G.4.b Inclusion Enrollment Data **N/A**

G.4.c ClinicalTrials.gov

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

N/A

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?

N/A

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?

NO

G.8 Project/Performance Sites

SEE CENTER OVERALL FOR PROJECT/PERFORMANCE SITE INFORMATION

G.9 Foreign Component

N/A

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

The Planning and Evaluation Core provided a structure that supported, guided, and evaluated all research, education, and outreach activities in the Healthier Workforce Center. Specific activities addressing center administration, planning, and evaluation are described below.

Center Administration

The Center Administration identified distinct roles and well-defined lines of communication. Planning and evaluation activities during the past project period were carried out through bi-weekly meetings of the Center Leadership Team, monthly meetings with the Internal Advisory Committee (IAC), and annual meetings with

the External Advisory Committee (EAC). Additionally, we worked with external evaluators to document the Center's outputs and outcomes, and to measure the reach and impact of its activities.

Planning

Integrated research, outreach, and evaluation activities to maximize relevance and increase reach, leading to dissemination and translation of Center research findings and products. Behavioral health was identified by the Apprentice Research Project as a major concern among our stakeholders in the construction industry. We collaborated with the Associated General Contractors in Missouri (AGC-MO) to develop and launch week-long suicide prevention efforts in 2019 kicked off by a "stand-down for safety event" addressing workplace suicide. In 2020 we partnered with AGC-MO to develop monthly toolbox talks addressing a range of mental health topics ("Mental Health Mondays") and expanded the suicide prevention campaign to Iowa and adjacent states at the Hawkeye on Safety conference (hosted by the Heartland Education and Research Center). To date, over 250 packets, which included toolbox talks, posters, medallions with the suicide prevention hotline number, hard hat stickers, and leader guides, have been sent to employers throughout the Midwest. To promote the campaign, the Outreach Core developed a video featuring AGC-MO. Materials were also translated into Spanish and a central repository on the Healthier Workforce Center website was created to make the materials easily accessible. This has led to new partnerships with the Master Builders of Iowa and other organizations who have worked with the Center to incorporate content on mental health and suicide prevention as part of their leadership trainings. An OSHA Alliance Agreement addressing behavioral health (mental health and substance use) was established with OSHA in Federal Region VII and Iowa OSHA.

The Center also received additional funding that allowed us to expand our work. One project utilized health claims data from a large union health fund to assess changes in opioid prescribing practices. This work led to publications (Dale et al., 2019, 2021), an R34 grant funded by NIH National Institute for Drug Abuse (R34 DA050044), and a project funded in our Center renewal. A second project will examine how physically demanding jobs impact opioid treatment and opioid related deaths in a variety of high-risk industries (e.g., healthcare, manufacturing, retail, and agriculture). We also were able to use data from workplace weight loss intervention in low-income health care workers to examine the effects of work organization, organizational health culture, and workplace physical and psychosocial factors as predictors of changes in body weight and health behaviors.

Identified opportunities to partner with NIOSH, other TWH Centers of Excellence, federal and state funded centers, and community partners. The Healthier Workforce Center regularly partnered with NIOSH and other TWH Centers on joint activities. We participated in the quarterly TWH Center Directors conference calls and NIOSH-sponsored webinars, and members of the Center contributed to the quarterly TWH Outreach Directors conference calls. We worked with other TWH centers to host a Methods Workshop (Tamers et al., 2018) and to develop core competencies for TWH (Newman et al., 2020). We contributed to the NIOSH edited volume on TWH (Hudson, et al., 2019), edited a special volume, *Using TWH to Advance Worker Health and Safety* in the International Journal of Environmental Research and Public Health which was printed as a bound volume (Rohlman and Kelley, 2020), and submitted three articles to a NIOSH special issue on TWH. The Center has organized joint panels that included all TWH Centers or our partners. We also partnered with other NIOSH (Education and Research Centers [ERC] and Agricultural Safety and Health Centers). This allowed us to integrate TWH content into ERC conferences and required classes for ERC trainees, ensuring that all ERC trainees have at least basic TWH literacy upon graduation. ERC trainees also conducted thesis/dissertation projects that addressed TWH, several were supported by funding from the pilot grant program. We also jointly hosted networking receptions at Iowa showcasing our research and activities addressing rural and agricultural health and safety. These events were attended by policy makers, students, community organizations, and researchers. An online training for supervisors of young agricultural workers, utilizing a TWH approach, was developed and evaluated as a funded research project in the National Children's Center for Rural and Agricultural Health and Safety (NCCRAHS; U54 OH007548 MPIs Rohlman/Campo). The Center partnered with NCCRAHS to disseminate the bilingual (Spanish/English) materials (online training, classroom curriculum, demonstration videos, and toolbox talks).

Selected opportunities to disseminate research findings and promote TWH at regional, national, and international forums. In summary, between September 2016 and August 2021, the Center outputs included numerous print and other multimedia products including videos and podcasts, recorded webinars and conference presentations, workshops and other educational curriculum, and peer-reviewed publications.

Evaluation

Evaluation has played a key role in the Center's ongoing operation. The Center for Evaluation and Assessment (CEA) in the College of Education provided assessment of all activities, including feedback from the external and internal advisory committees. This information was used to guiding strategic planning and identify emerging issues. For example, the CEA conducted three major evaluation initiatives for the Center beginning in 2020. In response to the COVID pandemic, they led the evaluation of the *Total Worker Health® Employer Guide: COVID-19 Edition*, a collaboratively developed resource funded through our pilot grant program. Evaluation data indicated that the *Employer Guide* was timely and had a strong impact on employers in the Midwest region. Responses to the webinar launching the guide was overwhelmingly positive, and the best practices, case studies, and resources were deemed to be highly relevant. The CEA also conducted interviews with Pilot Grant awardees to document outputs and impact of funded projects, and to provide feedback on the strengths and weaknesses of the Pilot Program. This information was used to inform our renewal application. Finally, the Evaluation Team interviewed EAC members to identify the Center's strengths, opportunities for growth, and emerging issues they felt should be addressed. The Center was considered to be a highly valued resource in the region and felt the Center had demonstrated a strong connection between research and practice and had been responsive to the practical needs of stakeholders.

A. COVER PAGE

Project Title: HEALTHIER WORKFORCE CENTER OF THE MIDWEST – OUTREACH CORE	
Grant Number: U19 OH008868	Project/Grant Period: 09/01/2016 – 08/31/2021
Reporting Period: 09/01/2020 – 08/31/2021	Date Submitted: 03/14/2022
Program Director/ Principal Investigator UNIVERSITY OF IOWA MICHELE (SHELLY) CAMPO Professor and Associate Dean Graduate College 201 Gilmore Hall Iowa City, IA 52242-1320 (319) 335-2136 Email: shelly-campo@uiowa.edu	Administrative Official Information UNIVERSITY OF IOWA WENDY BEAVER Executive Director Division of Sponsored Programs 2 Gilmore Hall Iowa City, IA 52242-1320 (319) 335-2123 Email: era@uiowa.edu
Change of Contact PD/PI: N/A	
Human Subjects: NO	Vertebrate Animals: NO
hESC: NO	Inventions/Patents: NO

B. ACCOMPLISHMENTS

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

Specific Aim 1: Increase awareness of Total Worker Health® as an evidence-based method for addressing and integrating worker safety and health. Activities include a website, newsletter, social media messages, presentations, and joint seminars with the University of Iowa Departments of Occupational and Environmental Health and Community and Behavioral Health and the Injury Prevention Research Center, the Education and Research Centers for Occupational Safety and Health, and Washington University.

Specific Aim 2: Build and nurture stakeholder partnerships to address regional and national needs for evidence-based Total Worker Health® programs, policies, and practices. Activities include conference and meeting presentations, joint conferences, workshops, and serving on advisory boards.

Specific Aim 3: Facilitate education, translation, and adoption of evidence-based Total Worker Health® findings from research and practice and approaches to enhance worker safety and health. Activities include developing active learning opportunities including case studies, a certificate program, and expansion of the employer-to-employer and expert practices video training module series.

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

Specific Aim 1: Increase awareness of Total Worker Health® as an evidence-based method for addressing and integrating worker safety and health. Activities include a website, newsletter, social media messages, presentations, and joint seminars with the University of Iowa Departments of Occupational and Environmental Health and Community and Behavioral Health and the Injury Prevention Research Center, the Education and Research Centers for Occupational Safety and Health, and Washington University.

Between April 2020 and late August 2021, the Outreach Core released seven podcasts. The topics included opening during COVID-19, fatigue, marijuana in the workplace, mental health, and diversity, equity, and inclusion. The podcast channel received over 1,100 plays during this time.

During the same timeframe, the Healthier Workforce Center released six informational videos, one demonstration video (Hazard Mapping), and four recorded webinars. The topics of the videos included de-escalation approaches, multi-generational workforces, inclusive design, emergency preparedness, remote work, and suicide prevention. The webinars addressed mental health, remote work, and COVID-19 in the workplace. The YouTube videos received more than 38,000 views. The YouTube channel added 335 new subscribers.

Our website serves as a clearinghouse for information about research projects, pilot programs, employer-focused resources (including videos and podcasts), and advertisements of regional and national events and webinars. The website has had 38,511 total pageviews during this time, compared to 18,862 in the previous timeframe. The most popular landing pages were *UI Employee Well-Being Survey* (6,073), *Moving More in the Workplace* (2,753), *COVID-19* (1,740), *Protecting Young Ag Workers* (1,653), *Employer Guide* (1,352), and the *You OK? Suicide Prevention Campaign* (1,105). Resources and reports on the *UI Employee Well-Being Survey* page were downloaded 2,646 times. The *Total Worker Health® Employer Guide: COVID-19 Edition* was downloaded from our landing page 777 times. Total resource downloads were 4,305 during this timeframe.

The eBulletin had more than 2,000 subscribers during this timeframe. We released twelve issues. In every issue we released a new HWC Outreach product, shared upcoming events, listed and/or described recent Center publications, and addressed timely employee well-being issues.

The Nebraska Safety Council also continued to disseminate Center resources and Worker 360° (integrated worker well-being) topics through a monthly email newsletter to more than 450 member organizations, reaching thousands of individuals throughout Nebraska.

From April 2020 through August 2021, our social media efforts across Twitter, Facebook, and LinkedIn focused on the dissemination of Outreach videos and podcasts, research translation, best practices, events. Facebook generated more than 11,500 impressions and 75 engagements with a post reach of over 8,600. Twitter activities resulted in more than 22,000 impressions and 427 engagements.

Despite limited opportunities for in-person presenting due to the COVID-19 pandemic, the HWC gave 28 presentations during this timeframe. In addition, the Center released 15 publications.

Specific Aim 2: Build and nurture stakeholder partnerships to address regional and national needs for evidence-based Total Worker Health® programs, policies, and practices. Activities include conference and meeting presentations, joint conferences, workshops, and serving on advisory boards.

All Aim 1 activities stated above also contribute to Aim 2.

The Center continued to sponsor, co-sponsor, and serve on planning boards for annual conferences, awards, and organizations. In partnership with the Heartland Center ERC, the Healthier Workforce Center serves on the planning committee for the Occupational Health Symposium and Hawkeye on Safety (August 2020). The annual Occupational Health and Safety Student Research Conference was held in collaboration with the Heartland Center ERC, the Great Plains Center for Agriculture Health, and the CDC-funded Injury Prevention Research Center. In April 2021, the conference was held virtually with keynote provided by Dr. Lorraine Conroy, Director of the Center for Healthy Work at the University of Illinois Chicago. Members of the Center also served on the following committees: Missouri Council for Activity and Nutrition (MOCAN) Worksite Work Group, MOCAN conference planning committee, BJC Healthcare's THRIVE Wellness Committee, BJC Healthcare's THRIVE Strategic Planning Committee, Washington University Wellness Committee and Champion Network, and Heartland Center ERC Advisory Board.

Specific Aim 3: Facilitate education, translation, and adoption of evidence-based Total Worker Health® findings from research and practice and approaches to enhance worker safety and health. Activities include developing active learning opportunities including case studies, a certificate program, and expansion of the employer-to-employer and expert practices video training module series.

All Aim 1 and Aim 2 activities stated above also contribute to Aim 3.

The Nebraska Safety Council conducted more than 470 in-person and virtual training events from April 2020 through August 2021. Topics included health coaching, Worker 360° (integrated worker well-being), respirator fit testing, recognizing drug impairment, de-escalation techniques, CPR/AED and first aid training, emotional well-being, COVID-10 preparedness, heat stress, and radiation safety. In addition, HWC members hosted 44 active learning workshops, training opportunities, and educational activities.

Robust and Unbiased Results

The approach we take on ensuring robust and unbiased for all results of all aims remains the same as previous years. We include peer-reviewed research findings and feature national experts (e.g., industry/business, research, government, non-profits) in all our products and activities. We ensure that our contact information is prominently featured to ensure transparency. We regularly conduct evaluations and elicit feedback from our users. Outreach staff and the center evaluator are engaged in these processes.

B.3. Competitive Revisions/Administrative Supplements

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

Outreach Director, Dr. Shelly Campo completed the *Resilience 101* training series through the University of Iowa liveWELL program and the *Influence of Unconscious Bias in Our Work and Lives* course in the Building University of Iowa Leadership for Diversity program between April 2020 and August 2021.

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

All Outreach Core communication and dissemination efforts are informed by Center evaluation, theoretical approaches, and social science research. Focusing on small employers, researchers, and practitioners who do not have an awareness of research related to improving worker wellbeing, we speed the dissemination of research to practice through the development and distribution of concise communications that are available 24/7 online. Outreach products are freely available to all through the Center website, YouTube, SoundCloud, and social media platforms. Additional communication channels include the Center email bulletin, intermediary email newsletters, and in-person/virtual presentations and training opportunities. Worker well-being education has also been incorporated into classes and seminars for occupational safety and health trainees, graduate student Occupational Health classes at the University of Iowa, the Rural Health and Agricultural Medicine class, and Agricultural Safety & Health: The Core Course.

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

The Specific Aims of the Outreach Core were revised during the grant renewal for 2021-2026. Plans for the next reporting period will accomplish the following goals:

Specific Aim 1: Increase awareness of Total Worker Health® as an evidence-based method for addressing and integrating worker safety and health through communication and dissemination. Multimedia approaches will include a website, newsletter, social media messages, videos, podcasts, presentations, and joint in-person and virtual seminars with academic, research, industry, policy, and other community partners that address current and emerging issues.

Specific Aim 2: Provide training and educational opportunities addressing Total Worker Health® competencies for current and future health and safety professionals, human resource managers, academics, CEOs, policymakers, and others who influence worker well-being including the health protection and health promotion of underserved populations.

Specific Aim 3: Build and nurture stakeholder partnerships and a regional collaborative learning community to promote the systematic uptake of research and evidence-based practice by addressing regional and national needs for Total Worker Health® programs, policies, and practices. Working with intermediary organizations, we will expand their capacity to train and consult with employers on engagement, adoption, implementation, and sustainability of Total Worker Health® principles.

Specific Aim 1:

- 1) Improve and maintain website
 - a) Evaluate website and social media analytics, quarterly
- 2) Develop and evaluate video and podcast series
 - a) Videos, new releases quarterly
 - b) Podcasts, new releases every 8-10 weeks
- 3) Develop print materials
 - a) One Pagers
 - i) HWC Center Overview, updated annually

- b) Print Resources
 - i) Multimedia handout, update as needed
 - ii) Resources for Teaching, update as needed
 - iii) Display Panels, new panels produced as needed
- 4) Grow and continue eBulletin
 - a) Review of analytics and plan changes, quarterly
- 5) Expand social media presence
 - a) Facebook, post/share weekly
 - b) Twitter, post/share bi-weekly
 - c) YouTube, post videos as available
 - d) LinkedIn, post video and podcast links as available
 - e) Review of social analytics and plan changes, quarterly
- 6) Develop presentations & joint seminars that promote TWH for: academic audiences, intermediary organizations, employers, other stakeholder groups/partners
 - a) *Occupational Health Symposium*, co-sponsored with Heartland ERC, Spring 2022
 - b) *Occupational Health & Safety Student Research Symposium*, co-sponsored with Heartland ERC, Great Plains Center for Agricultural Health, and University of Iowa Injury Prevention & Research Center, Spring 2022
 - c) *Nebraska Safety Council Conference and Trade Show*, Spring 2022
 - d) *Business Leadership Network Community Forums*, Spring 2022
 - e) *Iowa Illinois Safety Council Professional Development Conference*, Spring 2022
 - f) *Hawkeye on Safety*, September 2021
- 7) Other activities
 - a) *NIOSH TWH in Action! eNewsletter*, quarterly updates
 - b) *NIOSH Research Rounds eBulletin*, bi-annual research feature
 - c) *Manuscripts/Publications*, TBD
 - d) *Lincoln Journal Star Newspaper* - Company success stories, quarterly

Specific Aim 2:

- 1) Develop new active learning activities
 - a) Hazard Mapping, ongoing
- 2) Create new ways to engage current students in TWH
 - a) Incorporate TWH into existing classes, ongoing
- 3) Assess reach and use of HWC materials among current partners and e-Bulletin members, ongoing
- 4) Integrate TWH into intermediary's training curriculum
 - a) Nebraska Safety Council TWH integrated trainings
 - i) Link HWC resources to Nebraska Safety Council website
 - ii) Link Nebraska Safety Council resources to HWC website
 - b) WorkWell Kansas
 - i) Link HWC resources to WorkWell KS website
 - ii) Link WorkWell KS resources to HWC website

Specific Aim 3:

- 1) Prepare local/regional/national conference & meeting presentations (Described above in Aim 1)
- 2) Develop joint conferences to promote TWH
 - a) *Occupational Health Symposium*, co-sponsored with Heartland ERC, Spring 2022

- b) *Occupational Health & Safety Student Research Symposium*, co-sponsored with Heartland ERC, Great Plains Center for Agricultural Health, and University of Iowa Injury Prevention & Research Center, Spring 2022
 - c) *Nebraska Safety Council Conference and Trade Show*, Spring 2022
 - d) *Business Leadership Network Community Forums*, Spring 2022
 - e) *Iowa Illinois Safety Council Professional Development Conference*, Spring 2022
 - f) *Hawkeye on Safety*, September 2021
- 3) Engage the External Advisory Committee for input on emerging stakeholder needs
 - a) Virtual meetings, Fall 2021 and Spring 2022
 - 4) Continue growing the professional network through partnerships with labor, health & safety councils, government organizations, professional associations, & academic centers.
 - a) IAC Outreach meetings, weekly
 - b) HWC Center meetings, monthly
 - c) Regional Outreach Partners meetings, monthly
 - d) NIOSH Outreach and Communication Working Group meetings, quarterly
 - 5) Conduct site visits across the region, TBD

C. PRODUCTS

C.1. Publications, conference papers, and presentations

See Center Overall for a complete list of publications, conference papers, and presentations.

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

- www.HealthierWorkforceCenter.org
- www.LimerickContest.com
- www.TWHSpecialIssue.com

C.3. Technologies or techniques

EDUCATIONAL AIDS OR CURRICULA

- St. Louis Area Business Health Coalition, *Total Worker Health®: Missing Pieces to the Employee Well-being Puzzle* [pilot output]
- *Total Worker Health® Employer Guide: COVID-19 Edition* (Linked as a *Mental Health and Well-being* resource on the SAIF landing page, *Keeping workplaces safe and healthy during the pandemic.*) [pilot output]
- WorkWell KS, *Well-being Curriculum*
- WorkWell KS, *Strategic Framework*
- Nebraska Safety Council, *Mental Health Training Curriculum* (available to their members)
- St. Louis University, Department of Occupational Science and Occupational Therapy, *Determining the Mental Health Needs of Correctional Officers in Missouri for the Development of a Total Worker Health® Program* [pilot output]

ONLINE TRAINING AND RECORDED WEBINARS

- Total Worker Health® Employer Guide National Webinar: COVID-19 Edition, Healthier Workforce Center of the Midwest, April 2020, Rohlman, DS, Remspecher, L, Blum C, Henning L, Ablah E, Wyatt D, Darnell M, Supple K. (+ Teaser video for social media)
- Managing Remote Workers University of Iowa Webinar, Healthier Workforce Center and Tippie College of Business, October 2020, Rohlman D. Livingston B, Colbert A, Hesler S, Hetrick J, Kulper T, Seaton M.
- Managing Remote Workers Regional Webinar, Healthier Workforce Center and Tippie College of Business, October 2020, Rohlman D. Livingston B, Finnegan M, Thomas R, Walter S, Wheeler A.
- "Protecting Young Workers in Agricultural: A Training for Supervisors, Parents, and Teachers." ¹
- "Protegiendo a los Jóvenes Trabajadores en la Agricultura: un entrenamiento para supervisores, padres, y maestros." ¹

¹Project funded by National Children's Center for Rural Health and Safety U54:OH009568 and hosted on the Healthier Workforce Center of the Midwest website.

IN-PERSON CLASSROOM TOOLKIT

- Agricultural Supervisor Training: Keeping our Young Workers Safe and Healthy [pdf]. ¹
- Entrenamiento de Supervisores Agrícolas: Mantener a nuestro trabajadores jóvenes seguros y saludables [pdf]. ¹

¹Project funded by National Children's Center for Rural Health and Safety U54:OH009568 and hosted on the Healthier Workforce Center of the Midwest website.

ELECTRONIC AND PRINT PRODUCTS

Informational Videos

September 2016 – August 2021

- The Multi-Generational Workforce
- An Introduction to Emergency Preparedness
- Suicide Prevention Campaign Introduction
- De-Escalation Approaches for a More Harmonious Workplace
- Opioids Destructive Toll on the Workplace
- Opioid Drug Policy to Protect the Workplace
- Slowing the Spread of COVID-19 in the Workplace
- Social Distancing
- Inclusive Design
- Remote Work: What should you know?
- The Hierarchy of Controls (Video has been incorporated into the European Trade Union Institute's "Online English for Health and Safety" training materials.)
- Sedentary Work and Workplace Design (Video was predominately featured on the American Society of Safety Professionals' *Total Worker Health Resources and Tools* landing page.)
- Violence in the Workplace

Prior to September 2016 (materials are still available on website)

- Stress
- Employer Tips

- Safety
- Ergonomics
- Stress (Part Two)
- Return on Investment
- Total Worker Health Introduction
- Starts with Management
- Program Design
- Low Cost Solutions
- Final Piece
- Evaluation
- Employee Engagement
- Video Series Promo Video
- Video Series Promo Video 2
- Transportation Safety
- Nutrition

Training Videos

September 2016 – August 2021

- "Hazard Mapping Demonstration."
- "Effective Supervision." ¹
- "Modeling Safe Behaviors." ¹
- "Supervisión eficaz." ¹
- "Modelado de comportamientos seguros." ¹
- "Training Workers Using the Teach Back Method." ¹
- "Capacitando a los trabajadores utilizando el "Método de Enseñanza." ¹
- "Enforcing Consequences." ¹
- "Hacer cumplir las consecuencias." ¹
- "Difficult Conversations." ¹
- "Conversación difícil." ¹

¹Project funded by National Children's Center for Rural Health and Safety U54:OH009568 and hosted on the Healthier Workforce Center of the Midwest website.

Podcasts

- Driving Safety
- Opening During COVID-19 (+ Video teaser for social media)
- Marijuana and the Workplace: Policy (+ Video teaser for social media)
- Mental Wellness (+ Video teaser for social media)
- Diversity, Equity and Inclusion in the Workplace (+ Video teaser for social media)
- Mod Factors
- The Participatory Approach
- Visible Felt Leadership
- Marijuana and the Workplace: Introduction
- Mental Health During COVID-19 (+ Video teasers for social media)
- Returning to Work (+ Video teaser for social media)
- Fatigue (+ Video teaser for social media)

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

Nothing to report.**C.5. Other products and resource sharing****E-BULLETINS**

- Take Your Pick of New HWC Products
- Simmer Down Strategies for Stress
- Shifting Gears for Worker Well-Being
- Look Out! Hazard Mapping
- Your Mental Wellness & Work-Life Balance
- Leading the Well-being of a Remote Workforce
- Stay Well, Aware, Prepared
- A Healthier Return to Work
- New Diversity Resources for the Workplace
- Designing Healthier Work
- It's Opening Day. Don't Strike Out!
- Webinar Recording Available for Employer Guide to COVID-19
- Employer Resources for Well-being During COVID-19
- Cannabis, Coronavirus & Work
- Resolve to put TWH in your workplace
- Leadership Matters
- Don't Leaf Us Before Raking This In
- Tune in to Engagement
- Summer Updates
- Spring into TWH with HWC
- We Need Your Vote – 'Like' a Limerick!
- New HWC Video Released!
- Happy New Year from the Healthier Workforce Center! September Total Worker Health Opportunities
- We've Got Your Holiday "Lift Guide"!
- New Directions for Wellness Programs
- You'll go blind doing that...
- There's a Lifting App for That!
- 3 Steps to Total Worker Health
- Santa Says, Stay Safe
- HWC Keeps Moving by Design & by Rhyme
- Recognizing Hazards: Don't Be a Tool, Use One!
- Your Opinion Matters! 'Like' A Limerick
- \$afety Pays + Tips from HWC
- Wonder What an Injury Costs? There's an App for That!
- Occupational Safety & Health Limericks
- It's Not Wreckommended
- And the Winner Is...
- Total Worker Health Spring Update
- Missing Pieces for Employee Well-being
- There's a Heat App for That!
- Healthier Workforce Center Expands
- Winter Readiness Tips from Santa

TOOLBOX TALKS

- Let's Talk Agriculture: Effective Supervision [pdf]. ¹
- Hablemos agricultura: supervision efectiva [pdf]. ¹
- Let's Talk Agriculture: Modeling Safe Behavior [pdf]. ¹
- Hablemos agricultura: modelado comportamiento Seguro [pdf]. ¹
- Stress ²
- Hazard Mapping ²
- Chemical Hazards ²
- Reading Food Labels ²
- Recognizing Hazards ²
- Hazard Communication ²
- Controlling Hazards ²
- Suicide and the Workplace ³
- Suicidio y el Lugar de trabajo ³
- Reduce the Stigma ³
- Reduce el Estigma ³
- Recognize the Warning Signs ³
- Reconoce las Señales de Alerta ³
- Start a Conversation ³
- Inicie una Conversación ³
- Suicide Prevention Summary ³
- Resumen de Prevención del Suicidio ³
- Mental Health vs Mental Illness ³
- Reducing Stigma ³
- Stress! ³
- Depression vs Anxiety ³
- Self-Care: More Than a Fad ³
- Awareness of Your Own Mental Health ³
- How to Get Help ³
- Suicide Awareness ³
- Alcohol & Drug Use ³
- Opioids & Other Pain Killers ³
- Feeling Fatigued ³
- Bullying – Beyond the Schoolyard ³

¹ Project funded by National Children's Center for Rural Health and Safety U54:OH009568 and hosted on the Healthier Workforce Center of the Midwest website. Disseminated by HWC Outreach Core.

² Output developed by the HWC Apprentice Research Project.

³ Output developed by the HWC Apprentice Research Project and the Association for General Contractors – Missouri. Disseminated by HWC Outreach Core.

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.

NOTHING TO REPORT

F. CHANGES

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

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

In 2020 and 2021, the Healthier Workforce Center continued to be impacted by the COVID-19 pandemic due to the cancellation of in-person events and travel plans. Employer site visits, conference travel, and travel to out-of-state partners in Nebraska, Kansas, and Missouri were not possible. These changes also resulted in limited opportunities to film workplaces and interview individuals for our ongoing video channel and podcast series. In response to these limitations we conducted interviews virtually over Zoom, mined quality stock images and video, and developed supplemental motion graphics and animations. Ultimately, these changes negatively impacted the pace of resource production.

A reduction in staffing due to retirement and planned family leave also contributed to production delays during this timeframe.

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

N/A

G. Special Reporting Requirements

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

G.2 Responsible Conduct of Research

G.3 Mentor's Research Report or Sponsor Comments

G.4 Human Subjects

G.4.a Does the project involve human subjects? **NO**

G.4.b Inclusion Enrollment Data **N/A**

G.4.c ClinicalTrials.gov

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

N/A

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?

N/A

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?

NO

G.8 Project/Performance Sites

SEE CENTER OVERALL FOR PROJECT/PERFORMANCE SITE INFORMATION

G.9 Foreign Component

N/A

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

The Healthier Workforce Center Outreach Core produced and disseminated a wide variety of resources to a growing audience during the 2016-2021 grant cycle. A total of 54 videos were added to the Center website and YouTube channel, contributing to more than 49,000 views, 1,700 hours of watch time, and 400 subscribers from across the globe. The newly established podcast series released 14 tracks with more than 1,300 plays. Video and podcast products featuring research findings and best practices were developed through collaborations with industry leaders, practitioners, and researchers from the four-state region (Iowa, Nebraska, Kansas, and Missouri). These multimedia products translated research to practice with an emphasis on resources highlighting low-cost solutions for small employers. The videos and podcasts were disseminated widely through intermediary organizations including the American Society of Safety Professionals (ASSP), Oregon Workers' Compensation Insurance Company (SAIF), the Nebraska Safety Council, Associated General Contractors of America in Missouri (AGC-MO), the St. Louis Area Business Health Coalition, the Great Plains Center for Agricultural Health, and the European Trade Union Institute. Additional resources hosted and disseminated via the Center website and YouTube channel include the Suicide Prevention Campaign developed with the AGCO-MO, and resources for protecting young agricultural workers developed by the University of Iowa and the National Children's Center for Rural and Agricultural Health and Safety.

The Outreach Core achieved several noteworthy successes during the 2016-2021 grant cycle. Support from the Outreach Core has contributed to the integration of *Total Worker Health* concepts into the training resources, presentations, and organizational approaches for the Nebraska Safety Council, the St. Louis Area Business Health Coalition, and WorkWell Kansas. Together, these intermediary organizations serve more than 2,000 employers based in Federal Region VII, ranging in size from small to multi-national.

Prior to 2016, the Nebraska Safety Council (NSC) was a Center Pilot Grantee which led to them becoming a *NIOSH Total Worker Health® Affiliate*. In 2016, the NSC became a formal member of the Outreach Core for the Healthier Workforce Center. Since that time, the Nebraska Safety Council has adopted a *Total Worker Health* approach (*Worker 360°*) to all their training and education programs, including live and virtual trainings, membership meetings, annual conferences, awards, and consultations. During the 2016-2021 grant cycle, more than 14,000 individuals in Nebraska were reached by their integrated training and education programs.

The St. Louis Area Business Health Coalition (BHC) was funded through a Center Pilot Grant to develop the *Total Worker Health® Employer Guide* in 2016. The guide was disseminated to more than 60 member organizations at a forum event and presented at the 2nd International Symposium to Advance Total Worker Health. This led to the BHC becoming a *NIOSH Total Worker Health® Affiliate* in 2017 and HWC External Advisory Board member.

In 2018, WorkWell Kansas was funded through a Center Pilot Grant to integrate *Total Worker Health* approaches into a worker well-being training. Subsequently, WorkWellKS incorporated *Total Worker Health* approaches into their redesigned strategic framework. WorkWellKS also became a member of the HWC External Advisory Board.

The continued collaboration with regional intermediaries has enabled with Outreach Core to quickly identify and address emerging issues. One such example was the emergence of COVID-19 in March 2020. In six weeks, the Center Outreach Core and intermediaries at the NSC, BHC, and WorkWellKS developed and disseminated best practices via the *Total Worker Health® Employer Guide: COVID-19 Edition* and accompanying webinar. The webinar was viewed more than 1000 times, and the guide was downloaded

thousands of times and shared through members of SAIF Corporation and attendees at the American Industrial Hygiene Conference and Expo.

In response to COVID-19 and the rise in remote work and concerns about worker well-being, Washington University at St. Louis and the University of Iowa initiated longitudinal surveys to track employee well-being at both institutions including both their academic and healthcare employees. Following the wave 2 data collections, the HWC and the University of Iowa Tippie College of Business organized two webinars to share survey findings and best practices. One webinar was focused on translating findings for workplaces across the region and the second one focused on University of Iowa employees. The webinars drew more than 700 views live and recorded. The regional webinar included employers sharing on-the-ground best practices for handling quickly emerging issues and for practices to best support remote workers.

A. COVER PAGE

Project Title: HEALTHIER WORKFORCE CENTER OF THE MIDWEST – PILOT / FEASIBILITY PROJECTS PROGRAM	
Grant Number: U19 OH008868	Project/Grant Period: 09/01/2016 – 08/31/2021
Reporting Period: 09/01/2020 – 08/31/2021	Date Submitted: 03/14/2022
Program Director/ Principal Investigator UNIVERSITY OF IOWA NATHAN FETHKE Associate Professor Dept. of Occupational & Environmental Health 100 College of Public Health Building Iowa City, IA 52242-2007 (319) 467-4563 Email: nathan-fethke@uiowa.edu	Administrative Official Information UNIVERSITY OF IOWA WENDY BEAVER Executive Director Division of Sponsored Programs 2 Gilmore Hall Iowa City, IA 52242-1320 (319) 335-2123 Email: era@uiowa.edu
Change of Contact PD/PI: N/A	
Human Subjects: YES	Vertebrate Animals: NO
hESC: NO	Inventions/Patents: NO

B. ACCOMPLISHMENTS

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

Specific Aim 1: Maximize the impact of the Midwest Center for a Healthier Workforce on Total Worker Health® within HHS Federal Region VII by funding up to four pilot/feasibility projects per year.

Specific Aim 2: Support the development of future Total Worker Health® professionals by providing pilot funding to graduate students, post-graduate trainees, qualified early career academic scholars, and established scholars from disciplines outside of traditional occupational safety and health who clearly demonstrate a commitment to Total Worker Health® research.

Specific Aim 3: Enhance the scope of services and expand the capabilities of community-based occupational safety and health practitioners and organizations by providing pilot funding to practitioners and organizations demonstrating a clear commitment to Total Worker Health®.

Specific Aim 4: Provide scientific consultation and technical support to Pilot/Feasibility Program applicants to improve the quality of pilot/feasibility project applications.

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

The HWC's Pilot/Feasibility Program is a vital and vibrant component of the Center's overall portfolio and has enabled growth of its profile within HHS Region VII. The primary activities relate to the creation/dissemination of Requests for Proposals (RFP), receipt and review of submitted applications, allocating funds to award recipients, and ongoing program evaluation.

The Program supports two distinct pilot award types: The academic track is designed to support innovative, hypothesis-driven or hypothesis-generating TWH research. The required application content closely resembles that used for smaller NIH-style investigator-initiated awards (i.e., R03 and R21). Consistent with current NIOSH practices, the requests for proposals (RFPs) advise investigators to establish the burden of the occupational health problem to be addressed, the need for the proposed research, and the potential impact of the research. Furthermore, applicants are required to identify specific NIOSH strategic priorities for extramural research and/or specific goals/objectives within the NORAs for TWH or Healthy Work Design and Well-being (or other relevant NORA) to be addressed by the proposed scope of work. The community track is designed to support the development and evaluation of innovative TWH-based tools, educational programs, organizational programs/policies, and the like that can be implemented in workplaces and disseminated. Applications are considered from individuals affiliated with non-profit, for-profit, or public organizations (e.g., state or local departments of public health). Intermediary organizations are of particular interest, based on prior successes of the HWC and this Program with such groups. *For example, two past community track awardee organizations – the Nebraska Safety Council and the St. Louis Area Business Health Coalition – are now Total Worker Health® Affiliates and formally engaged in the HWC Outreach Core in the Center's current competing renewal application.*

Program RFPs and all related materials were made accessible on a Center web page. In collaboration with HWC Outreach Core, promotion of the RFPs involved using (i) online networks: distribution to email contacts (research administration offices of regional universities, regional members of the Association of University Programs in Occupational Health and Safety, regional occupational safety and health intermediary organizations), social media, the Center website, and the Center's eBulletin, and (ii) professional networks: notifying HWC External Advisory Committee members, the Center's outreach partners (Nebraska Safety Council, St. Louis Area Business Health Coalition, WorkWell KS), other NIOSH and CDC centers at the University of Iowa, through channels emerging from the Center's partnership with the University of Iowa's Tippie College of Business, through the Center's proposed Regional Collaborative Learning Community, through channels established by the Washington University Healthy Work Center (led by the HWC Associate

Director, Dr. Evanoff), and through professional networks of HWC personnel at the University of Iowa, Washington University, and the University of Kansas Medical Center.

The rolling application submission and review processes implemented during the previous reporting period were carried into the current reporting period. At the time of the previous RPPR, merit review was underway for four applications received (three academic and one community). None of the four were funded; however, the rapid turnaround of reviews and feedback to the applicants allowed for revised applications to be submitted and reviewed relatively quickly. This is a major benefit of our process, since applicants with unfunded applications do not need to wait another year for a new program announcement.

Concurrently with the new rolling application submission and review processes, we launched a “concept review” mechanism that potential applicants may use to rapidly obtain feedback from the HWC regarding their proposed project(s). Concept reviews are not used to “select” projects and do not supersede the full application. Rather, the HWC provides feedback regarding (i) the extent to which the proposed project aligns with the objectives of the Pilot/Feasibility Program, (ii) the relevance of the proposed project to Total Worker Health®, and (iii) the proposed aim(s) and approach. We received and reviewed four project concepts during the reporting period, and each investigator ultimately prepared a full application package.

In total, we received nine applications for pilot funding during the reporting period. Applications were received from each of the four Region VII states (IA – 5 applications [2 original, 3 revised]; KS – 3 applications [1 original, 2 revised]; and 1 application [original] from a consortium of organizations in NE, KS, and MO). Pilot funding was awarded to four applicants, summarized below:

COVID-19 Employer Guide Addressing Employer & Employee Health & Wellness during a Pandemic. Elizabeth Ablah (University of Kansas Medical Center), Lisa Henning (Nebraska Safety Council), and Lauren Remspecher (St. Louis Area Business Health Coalition). **Community track** (original application funded).

This project seeks to increase the awareness of the Total Worker Health® program and recognize the opportunities to address the TWH topics in response to the COVID-19 Global Pandemic and the challenges faced by businesses and their employees in Iowa, Kansas, Missouri and Nebraska. This will be achieved through the creation of a concise and easy to read COVID-19 Employer Guide which will be an electronic document and will include (1) Best Practices, (2) Case Studies, and (3) Electronic Resources available to address COVID-19. Dissemination of this new tool will occur at a one-hour educational Webinar and the communication channels of the partner organizations.

Agricultural production practices and stress: a pilot study of women farmers in Iowa. Carly Nichols (University of Iowa). **Academic track** (revised application funded).

This project uses mixed methods to investigate the relationships between the way farming is organized and farmer stress among lowan women farm operators. Farming is organized in many ways depending on modifiable practices such as crop diversification, livestock integration, or conservation practices. This project innovates in examining how these different modifiable practices may serve as protective or risk factors for stress. Moreover, previously developed farm stressor and occupational hardiness inventories have been developed and validated to assess stress among predominantly male farmer populations. Yet, the lowan women farmer population is increasing rapidly, so there is need to develop versions of these tools that reflect women’s experiences. This project uses semi-structured interviews with women farmers and service providers to develop a farm stressor inventory and occupational hardiness scale relevant to lowan women farmers. The survey will be administered to lowan women farm operators, and analysis will include principal component analysis of inventories to identify latent factor structure and structural equation modeling to refine the hypothesis that demographic and structural farm characteristics have both direct and indirect (through production practices) effects on stress, with hardiness acting as a mediating variable.

Work and workplace characteristics associated with suicide. Corrine Peek-Asa (University of Iowa). **Academic track** (revised application funded).

Suicide prevention programs are increasingly being implemented in workplaces because of the psychological and financial burden a suicide can have on a workplace. The workplace can play an important role in preventing suicides, and most emerging programs involve steps to first recognize high risk individuals and refer them to services. Little evidence informs these programs, including the frequency and circumstances of the workplace that contribute to suicide risk. Detailed information to tie suicide to work-related factors are scarce in existing databases. The National Violent Death Reporting System (NVDRS) offers the first opportunity to examine specific circumstances that tie suicide to occupational and workplace factors. The NVDRS is a CDC-based national surveillance system that provides a comprehensive review of suicides using death certificates, autopsy reports, and death investigations. This project will use data from the NVDRS to identify the prevalence of work-related suicide and compare circumstances between work and non-work-related suicide. Work-relatedness will be identified through variables such as the injury-at-work designation on the death certificate, documentation from the death investigation that occupational factors were either the precipitating factor or an underlying factor for the suicide. This information can be used to inform workplace-based suicide prevention programs.

Work-related exposures and occupational burden on laboratory professionals in rural/urban practice settings. Leticia Nuñez-Argote (University of Kansas Medical Center). **Academic track** (original application funded).

This research explores the work-related health burdens on laboratory professionals working in rural and urban laboratory settings and will assess the impact that work-related stress and physical injuries may have on their health and well-being. This will be done by looking at first-person accounts of stress and injuries suffered by LPs through collection and analysis of focus group data. Using data generated from the focus groups, we will work together with the American Society for Clinical Pathology to build on prior research on the 2018 job satisfaction, well-being, and burnout survey of laboratory professionals, and collect information on common work-related injuries and burdens using an online survey of LPs. The long-term goal of this research is to ensure timely access to quality, safe and cost-effective health care for all Americans while protecting the health and well-being of the critically important healthcare workforce performing needed clinical laboratory testing.

Robust and Unbiased Scientific Proceedings

All applications submitted in response to the HWC Pilot/Feasibility Program RFPs are evaluated for Total Worker Health® significance and technical merit. To ensure unbiased review, the Pilot/Feasibility Program PI (Fethke) assigns a panel of three reviewers to each application. Reviewers are selected from among a core pool of potential reviewers, including members of the HWC's Internal and External Advisory committees with appropriate academic credentials (i.e., PhD) and expertise. Additional reviewers were solicited from outside the HWC, particularly for proposals addressing research topics outside the areas of expertise represented among those within the core pool. To avoid conflicts of interest, potential reviewers are expected to recuse themselves from evaluation and discussion of applications for which they had provided significant mentoring and assistance (e.g., pre-submission review of aims and/or research plan).

Review and discussion of each application proceed using procedures modeled after those used by federal study sections for evaluation of grant applications. Each application is discussed and given an overall impact score, regardless of the average preliminary scores from the three reviewers (i.e., no application is triaged unless it is deemed unresponsive to the RFP). Review criteria are consistent with those used by federal study sections (i.e., reviewers provide a preliminary impact score and separate scores for significance, investigator(s), innovation, approach, and environment). The review criteria are included with the RFP.

The following scoring criteria are used to make the final selection of project(s) to fund:

1. No application with an overall impact score of 60 or greater is considered for funding (using the NIH scoring system, the overall impact scores range from 10 [best] to 90 [worst]; a score of 60 implies the presence of some moderate but no major weaknesses).

2. Assuming sufficient numbers of applications with overall impact scores less than 60, applications are selected for funding regardless of track (academic or community) until all Program funds are allocated.
3. In the event of a tie between an application from an investigator with no prior history of Program funding and an application from a previous awardee, the former receives priority.
4. In the event of a tie between an application from an investigator affiliated with an institution/organization within Region VII and an application from an investigator affiliated with an institution/organization outside Region VII, the former receives priority.
5. If criteria #3 and #4 cannot resolve the tie (e.g., identically scored applications from two investigators with no prior history of Program funding and from institutions/organizations within Region VII), the Program director (Fethke), the Center Director (Rohlman), the Center Associate Director (Evanoff), the Center Outreach Director (Campo), and one member of the HWC External Advisory Committee discuss the merits of the tied applications with respect to the needs and mission of the Center and make the final determination based on simple majority vote.

B.3. Competitive Revisions/Administrative Supplements

Nothing to report

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

The HWC Pilot/Feasibility Program is not designed as an explicit training or professional development activity, and no Pilot/Feasibility Funding can be used to support conference travel. However, because graduate students and junior faculty are often principal investigators of funded pilot projects, the Pilot/Feasibility program offers an opportunity to build research skills among early career investigators. During the current reporting period, two PhD dissertations resulting from pilot projects were completed: one from a pilot project PI (Aryal) and one from a PhD student who was on a pilot project research team (Bolenbaugh). The PIs of two of the four pilot projects awarded during the reporting period are junior faculty.

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

Pilot/Feasibility Program applicants are required to describe their plans for disseminating results of their funded projects. Dissemination plans typically include activities consistent with communication to scientific audiences, such as peer-reviewed journal articles and presentations and posters at local, regional, and/or national meetings. These pilot project outputs are tracked through mid-year and final progress reports submitted to the HWC. In addition, we disseminate the results of the HWC's pilot projects to lay audiences is through the creation of "Success Stories," crafted by the HWC's outreach team (Campo, PI) and posted to the Center's website. *The following is an example success story from a past pilot project posted on the HWC website during the current reporting period.*

Detection of Environmental Hazards by Senior Farmers Using a Simulated Tractor Environment.

Kayla Faust, PhD, formerly a graduate student in the College of Public Health, used the University of Iowa's National Advanced Driving Simulator (NADS) for a research study on how age and factors associated with age, such as hypertension and medication use, affect driving performance. In order to put farmers in situations researchers cannot ethically put them in real life, she developed a miniSim™, a virtual reality simulator that mimics the operation and feel of a real tractor cab and one of only two in the world. Senior farmers were asked to drive the miniSim™ and provide feedback on how realistic it felt, with the goal of making it as close to real life as possible. Dr. Faust then measured farmers' responses in dangerous situations, finding that aging farmers took longer to respond. This finding is significant because in these types of situations, every second counts.

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

The Healthier Workforce Center has been renewed for another five years and work will continue in the new project period. The Pilot/Feasibility Projects Program will continue to promote career development of academic investigators and capacity building among community partners.

C. PRODUCTS**C.1. Publications, conference papers, and presentations****PUBLICATIONS**

Faust K, Casteel C, McGehee DV, Peek-Asa C, Rohlman D, Ramirez MR. Examining the Association Between Age and Tractor Driving Performance Measures Using a High-Fidelity Tractor Driving Simulator. *J Agric Saf Health*. 2021 Jul 9;27(3):159-175. doi: 10.13031/jash.14403. PubMed Central PMCID: PMC8607457. [pilot output]

Peek-Asa, C.; Zhang, L.; Hamann, C.; Davis, J.; Schwab-Reese, L. Characteristics and Circumstances Associated with Work-Related Suicides from the National Violent Death Reporting System, 2013–2017. *Int. J. Environ. Res. Public Health* 2021, 18, 9538. PubMed Central PMCID: PMC8465410. [pilot output]

Peek-Asa C, Zhang L, Hamann C, Davis J, Casteel C. The prevalence of work-related suicides varies by reporting source from the National Violent Death Reporting System. *American journal of industrial medicine*. 2021 Apr 16. PubMed Central PMCID: PMC 8841116. [pilot output]

El Ghaziri M, Jaegers LA, Monteiro CE, Grubb PL, Cherniack MG. Progress in Corrections Worker Health: The National Corrections Collaborative Utilizing a Total Worker Health® Strategy. *Journal of Occupational and Environmental Medicine*. 2020. doi: 10.1097/JOM.0000000000002016. PubMed Central PMCID: PMC7864532. [pilot output]

Ekenga CC, Kwon E, Kim B, and Park S. Long-Term Employment Outcomes among Female Cancer Survivors. *International Journal of Environmental Research and Public Health*. 2020 17(8), p.2751. PubMed Central PMCID: PMC7763867. [pilot output]

Faust K, Casteel C, McGehee D, Ramirez M, Rohlman DS, Peek-Asa C. Examination of Realism in a High-Fidelity Tractor Driving Simulator. *Journal of Agricultural Safety and Health*. 2020 26. 123-137. 10.13031/jash.14043. PubMed Central PMCID: PMC8112449. [pilot output]

Jaegers LA, Ahmad SO, Scheetz G, Bixler E, Nadimpalli S, Barnidge E, Katz IM, Vaughn MG, Matthieu MM. Total Worker Health[®] Needs Assessment to Identify Workplace Mental Health Interventions in Rural and Urban Jails. *Am J Occup Ther*. 2020 May/Jun;74(3):7403205020p1-7403205020p12. PubMed Central PMCID: PMC7198237. [pilot output]

Ekenga CC, Wang X, Pérez M, Schootman M, Jeffe DB. A Prospective Study of Weight Gain in Women Diagnosed with Early-Stage Invasive Breast Cancer, Ductal Carcinoma *In Situ*, and Women Without Breast Cancer. *J Womens Health (Larchmt)*. 2020 Apr;29(4):524-533. PubMed Central PMCID: PMC7194326. [pilot output]

Jaegers LA, Matthieu M, Werth P, Ahmad SO, Barnidge E, Vaughn MG. Stressed out: Predictors of depression among jail officers and deputies. *The Prison Journal*. 2019 December; 100(2):240-261. [pilot output]

Ekenga CC, Yeung CY, Oka M. Cancer risk from air toxics in relation to neighborhood isolation and sociodemographic characteristics: A spatial analysis of the St. Louis metropolitan area, USA. *Environ Res*. 2019 Dec;179(Pt B):108844. PubMed Central PMCID: PMC6901107. [pilot output]

Jaegers LA, Matthieu MM, Vaughn MG, Werth P, Katz IM, Ahmad SO. Posttraumatic Stress Disorder and Job Burnout Among Jail Officers. *J Occup Environ Med*. 2019 Jun;61(6):505-510. PubMed Central PMCID: PMC6557353. [pilot output]

Ekenga CC, Pérez M, Margenthaler JA, Jeffe DB. Early-stage breast cancer and employment participation after 2 years of follow-up: A comparison with age-matched controls. *Cancer*. 2018 May 1;124(9):2026-2035. PubMed Central PMCID: PMC5910179. [pilot output]

CONFERENCE PRESENTATIONS

Ekenga C. *Health and employment among working-age cancer survivors*. Work, Stress and Health Poster Session, Philadelphia, PA. 2019. [pilot output]

Jaegers LA, Pestello E, Dieleman C. *Exploring sanctioned and non-sanctioned hobbies among correctional officers to inform workplace health promotion interventions*. Society for the Study of Occupations: USA Annual Meeting, Scottsdale, AZ. 2019. [pilot output]

Jaegers L, Frank A, Erfe S. *Panel: Bridging Reentry/Transition Services with 18. Workplace Health*. National Corrections Collaborative - National Symposium on Corrections Worker Health, Boston, MA. 2019. [pilot output]

Bolenbaugh M, Hudson J, Andrew N, Kenardy J, Ramirez M. *Programs to reduce stress among hospital workers*. 2019 American Psychological Association Conference, Organizational Health and Employee Well-Being Poster Session, San Francisco, CA. 2019. [pilot output]

Ekenga CC, Perez M, Jeffe D. *Employment and work experiences after breast cancer treatment*. Eleventh American Association for Cancer Research Conference on The Science of Cancer Health Disparities Poster Session, New Orleans, LA. 2018. [pilot output]

Farag A. *Fatigue and Shift Work*. Nebraska Safety Council Conference and Trade Show, York, NE. 2018. [pilot output]

Ekenga CC, Pérez M, Jeffe DB. *Return to Work after Breast Cancer Treatment in African American Patients*. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD. 2018. [pilot output]

Jaegers L, Ahmad S, Matthieu M, Barnidge E, Werth P, Bixler E, Scheetz G, Nadimpalli S, Vaughn, M. *Rural and urban jail Total Worker Health® needs assessment: Similar health, different workplaces*. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD. 2018. [pilot output]

El Ghaziri M, Jaegers L, Grubb P, Cherniack M. *Correction workers health and wellness: Engagement of research and professional partners through the National Corrections Collaborative*. 2nd International Symposium to Advance Total Worker Health, Bethesda, MD. 2018. [pilot output]

Ekenga CC, Perez M, Margenthaler J, Jeffe D. *Employment participation after early-stage breast cancer: patterns and determinants*. Tenth American Association for Cancer Research Conference on The Science of Cancer Health Disparities Poster Session, Atlanta, GA. 2017. [pilot output]

Jaegers L, Carson J, Edwards R. Collaborative approaches to health needs assessment and identification of workplace health solutions in urban and rural jails of St. Louis, National Corrections Collaborative - National Symposium on Correctional Worker Health, Saint Louis University School of Law, St. Louis, MO. 2017. [pilot output]

Andrew N, Hudson J. *Lending an Ear, Changing a Life: The UIHC Debriefing Program*. Caring for the Human Spirit, Chicago, IL. 2017. [pilot output]

Jaegers L, Dussetschleger J, Cherniack M, El Ghaziri M, Dugan A, Erfe S. *Breaching the Steel Wall: Improving Correctional Staff Health through Participatory Action Research*. American Correctional Association Conference of Correction, St. Louis, MO. 2017. [pilot output]

Nadimpalli S, Jaegers L, Matthieu M, Barnidge E, Ahmad O, Scheetz G, Dick R, Kelly P. *Relationship between social support and depression among jail corrections officers - A pilot study*. American Public Health Association (APHA) Annual Meeting Poster Session, Denver, CO. 2016. [pilot output]

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

Ablah E, Remspecher L, Henning L. 2020 Apr. *Total Worker Health® Employer Guide: COVID-19 Edition*. (https://hwc.public-health.uiowa.edu/wp-content/uploads/TWH-Employer-Guide_COVID-19-Edition.pdf)

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**FUNDED PILOT GRANTS**

Letycia Nunez-Argote: *Work-related exposures and occupational burden on laboratory professionals in rural/urban practice settings*. 2021-2022.

Chris Blum (Nebraska Safety Council), Lisa Henning (Nebraska Safety Council), Lauren Remspecher (St. Louis Area Business Health Coalition), Elizabeth Ablah (University of Kansas School of Medicine – Wichita): *COVID-19 Employer Guide Addressing Employer & Employee Health & Wellness during a Pandemic*. 2019-2020.

Corinne Peek-Asa: *Work and workplace characteristics associated with suicide*. 2019-2020.

Carly Nichols and Silvia Secchi: *Agricultural production practices and stress: a pilot study of women farmers in Iowa*. 2019-2020.

Ashamsa Aryal: *Examining health, safety and retention among truck drivers*. 2017-2018.

Lucas Carr: *Accuracy and acceptability of StandDesk Monitor for measuring time spent sitting and standing at a workstation*. 2017-2018.

Christine Ekenga: *Work after breast cancer: a mixed-methods study of African-American survivors*. 2016-2017.

Amany Farag: *Feasibility study for assessing nurses' occupational fatigue using the Sleep, Activity, Fatigue, and Task Effectiveness (SAFTE) biomathematical model*. 2016-2017.

Kayla Faust: *Detection of environmental hazards by senior farmers using a simulated tractor environment*. 2016-2017.

Lisa Jaegers: *A protective study of health among newly hired corrections officers*. 2015-2016 (carried into 2016-2017).

Jeremy Hudson and Marizen Ramirez: *A comparative effectiveness study of Response, Resiliency & Resources (RRR) and Critical Incident Stress Debriefing: two programs designed to reduce occupational stress among hospital clinic workers*. 2015-2016 (carried into 2016-2017).

Melissa Hogan and Lauren Remspecher: *Dissemination of Total Worker Health® strategies to Midwest employers: addressing Employee health in the 21st century*. 2015-2016 (carried into 2016-2017).

GRANT APPLICATIONS ADDRESSING TWH FROM CENTER INVESTIGATORS

Jaegers, LA (Co-PI, Co-PI's: Schafer, J & Linhorst, D) Understanding and Addressing the Impacts of Organizational Stressors (Topic 2) on Public Safety Personnel: An Examination of Police Patrol Officers, Police Detectives, Communications Personnel, and Jail Corrections Officers in St. Louis City and St. Louis County. National Institute of Justice (NIJ), **01/01/2021 – 12/31/2023**. \$773,219 (Not funded) [pilot output]

- Jaegers, LA (Co-PI, PI: El Ghaziri, M) Development of Evidence Informed Learning Resources for the Reduction of Staff Trauma and Organizational Stress in Prison and Jail Settings. National Institute of Corrections (NIC), **9/2020 – 9/2021**. (Funded) [pilot output]
- Jaegers, LA (PI) Enhancing Strategies for Jail Officer Interaction with Individuals Presenting with Mental Illness: A Randomized Controlled Trial. National Institute of Justice (NIJ), **01/01/2020 – 12/31/2023**. \$748,821 (Not funded) [pilot output]
- Jaegers, LA (Co-I, PI: El Ghaziri, M) CORSAFE. Corrections Officer Research on Stress and Fatigue Elimination: A Multistate Evaluation of The Effect of Shift Work and Extended Hours on Corrections Officers Physical and Mental Health. National Institute of Justice (NIJ), **01/01/2019 – 12/31/2021**. \$1,300,000 (\$266,044) (Not funded) [pilot output]
- Jaegers, LA (Co-I, PI: El Ghaziri, M) CORSAFE: a multistate evaluation of the effect of shift work and extended hours on corrections officer physical and mental health. National Institute of Justice (NIJ), **01/01/2019 – 12/31/2021**. \$1,300,000 (\$297,862) (Not funded) [pilot output]
- Jaegers, LA (PI) Enhancing Jail Officer Interaction with Individuals Presenting with Mental Illness: A Randomized Control Trial. National Institute of Justice (NIJ), **01/01/2019 – 12/31/2022**. \$692,210 (Not funded) [pilot output]
- Schall Jr., MC (PI) Advancing Workplace Safety Surveillance with Ambulatory Inertial Sensors. Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health Mentored Research Scientist Development Award (K01 OH011183), **09/01/2018 – 08/31/2021**. \$324,000 (Funded) [pilot output]
- Carr, L (PI) Total Worker Health Intervention to Promote Health and Safety of Sedentary Employees. National Institute for Occupational Safety and Health, **2016**. (Not funded) [pilot output]

DISSERTATIONS AND THESIS

- Faust K, PhD 2019 University of Iowa: *Use of a Desktop Tractor Driving Simulator to Examine the Impact of Age and Hypertension Medication on Selected Driving Performance Measures*. [pilot output]
- Aryal A, PhD 2020 University of Iowa: *Health, Safety and Turnover Among Long-Haul Truck Drivers* [pilot output]
- Bolenbaugh M, PhD 2020 University of Iowa: *The Role of Social Support in Debriefing Interventions for Hospital Healthcare Workers* [pilot output]

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.

Nothing to report.

F. CHANGES

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

No changes in approach from the previous reporting period.

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

Impact of COVID on Pilot Projects: There were three main negative impacts experienced by HWC pilot PIs because of the policies and restrictions related to COVID-19.

The first and most frequently cited disruption was the need to transition toward virtual meetings and remote data collection procedures. The limited ability to travel for in-person meetings or conduct interviews and focus groups negatively affected three funded projects. Two of these were research studies that reported making changes to their study design to overcome the restrictions. As reported by one such scholar, “COVID-19 significantly reshaped our plans for exploratory in-depth interviews prior to the survey. The team pivoted to telephone rather than in-person interviews, which may have impacted the quality of information obtained.” Similarly, a second scholar noted, “Although the ability to conduct focus groups via teleconference has provided flexibility and the opportunity to connect multiple people from remote locations, some of the disadvantages [...] include difficulty connecting due to low Internet bandwidth and limited webcam and microphone functionality, dropped calls and lost call connection or lag, and presence of background noise and distracting elements in participant’s location.” This same PI also experienced difficulty in recruiting participants for their study, “because medical laboratory professionals are essential workers [and] many of them have continued working uninterrupted throughout the pandemic.”

Two different PIs reported that collaborations they had previously established did not continue as anticipated. For one of them, the PI recalled that her data analysis was impacted because she was not able to meet regularly with her collaborator. Another PI shared that their collaborator was an infectious disease doctor, and his attention naturally and necessarily shifted toward the pandemic response. While they were still able to finish the study, their plans for continuing the line of research were ended.

This inability to continue an existing or growing line of research was also the complaint of still another two PIs. For one, the planned follow-up study was put on hold because the participant group was not able to sign up for and take the course in which the research would have taken place. The other reported that the facility at which they had planned to continue their research experienced limited staffing.

Only one PI, whose pilot project was directly related to COVID and employers’ response to the pandemic, indicated that COVID actually “enhanced our opportunities to support employers.”

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
G.2 Responsible Conduct of Research
G.3 Mentor's Research Report or Sponsor Comments
G.4 Human Subjects G.4.a Does the project involve human subjects? YES G.4.b Inclusion Enrollment Data INCLUDED WITH FRPPR G.4.c ClinicalTrials.gov Does this project include one or more applicable clinical trials that must be registered in ClinicalTrials.gov under FDAAA? N/A
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? N/A
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? NO
G.8 Project/Performance Sites SEE CENTER OVERALL FOR PROJECT/PERFORMANCE SITE INFORMATION
G.9 Foreign Component

N/A

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

The HWC Pilot/Feasibility Projects Program directly addressed Strategic Goal 1 (“Advance and conduct... research that builds the evidence base” for Total Worker Health®) and Intermediate Goal 4.2 (“Develop partnerships and collaborations to create the infrastructure and environment for expanding organizational capacity to adopt TWH policies, program, and practices in the workplace”) of the NIOSH National Occupational Research Agenda for Total Worker Health®.

During the award period (September 2016 to August 2021), the Program allocated \$291,809 across 12 pilot projects (10 academic, 2 community). We received and reviewed 34 applications during that time, yielding an overall success rate of 35%. Of the 34 applications, 29 were from individuals affiliated with organizations within Region VII. More than 50% of the applications received originated from organizations outside the Center’s administrative home (the University of Iowa), an increase from 23% during the previous award period (September 2011 to August 2021). The Center shifted to a “regional” entity with the start of the 2016-2021 funding cycle, and so the increase in the proportion of applications from outside the University of Iowa demonstrates the Program’s success in broadening its regional impact.

Funded pilot projects addressed a broad range of occupational safety, health, and well-being issues of relevance both regionally and nationally. Examples include: examining work and workplace characteristics associated with suicide; examining the effects of agricultural production practices on stress among women farm operators; organizational barriers and facilitators to returning to work among African-American breast cancer survivors; temporal patterns of sleep and fatigue among nurses; and providing evidence-based guidance for employers to help them manage work and workplace challenges associated with the COVID-19 pandemic; among others. Pilot projects have generated 11 peer-reviewed publications, 16 conference presentations/posters, and three doctoral dissertations. Our pilot project PIs (from the 2011-2016 and 2016-2021 award periods) also generated more the \$800k in additional funding to support their ongoing Total Worker Health® research efforts. Importantly, two past community track awardee organizations – the Nebraska Safety Council and the St. Louis Area Business Health Coalition – are now Total Worker Health® Affiliates and formally engaged with the HWC Outreach Core in the Center’s 2021-2026 funding cycle.

A. COVER PAGE

Project Title: HEALTHIER WORKFORCE CENTER OF THE MIDWEST – RESEARCH PROJECT A: IMPACTING THE SAFETY, HEALTH, AND WELL-BEING OF CONSTRUCTION APRENTICES: USING INTERMEDIARIES TO DISSEMINATE CHANGE

Grant Number: U19 OH008868	Project/Grant Period: 09/01/2016 – 08/31/2021
Reporting Period: 09/01/2020 – 08/31/2021	Date Submitted: 03/14/2022
Program Director/ Principal Investigator UNIVERSITY OF IOWA DIANE S. ROHLMAN Professor Dept. of Occupational & Environmental Health 100 College of Public Health Building Iowa City, IA 52242-2007 (319) 384-4007 Email: diane-rohlman@uiowa.edu	Administrative Official Information UNIVERSITY OF IOWA WENDY BEAVER Executive Director Division of Sponsored Programs 2 Gilmore Hall Iowa City, IA 52242-1320 (319) 335-2123 Email: era@uiowa.edu
Change of Contact PD/PI: N/A	
Human Subjects: YES	Vertebrate Animals: NO
hESC: NO	Inventions/Patents: NO

B. ACCOMPLISHMENTS

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

Apprentice Project Goals:

Specific Aim 1: Evaluate the impact of work organization and work environment factors on the health and health behaviors of apprentices in three construction trades. *Hypothesis: Work organizational factors common in the construction sector (multiple employers, commuting, job hazards, lack of prevention programs) will be associated with adverse outcomes, including unhealthy behaviors, musculoskeletal symptoms, and unsafe work practices.*

Specific Aim 2: Identify workplace programs, policies, and practices affecting worker health and well-being that are currently implemented by construction contractors and trade unions and determine readiness for adoption of new interventions to improve worker health. *Hypothesis: Few construction contractors will have programs directed at worker well-being beyond basic safety; factors influencing willingness or feasibility of adoption of health interventions will be similar to those that affect adoption of safety measures.*

Specific Aim 3: Assess the feasibility of using intermediary organizations to disseminate interventions to improve the health and well-being of apprentice construction workers. *Hypothesis: Diffusion of interventions to construction contractors can be achieved through unions, employer associations, safety councils, and other key intermediary organizations.*

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

Apprentice Project Accomplishments:

Evaluate the impact of work organization and work environment factors on the health and health behaviors of apprentices in three construction trades. (Aim 1) The goals of this project were to evaluate the impact of multiple work organization and environmental factors on the health and well-being of workers in the construction trades, identify current practices relevant to Total Worker Health® implemented by employers and unions, and to develop and evaluate the feasibility of interventions targeting apprentices through programs, policies and practices in small employers. Construction is among the most dangerous industries. In addition to traditional hazards for workplace injury and illness, other threats to health and well-being may occur from work organization and work environment factors, including irregular employment, long commutes, long work hours, and employer policies regarding health and safety. These nontraditional hazards may affect work and health outcomes directly, or through effects on health behaviors. The cumulative impacts of both traditional and nontraditional hazards on health-related outcomes among construction workers are largely unknown.

We conducted annual cross-sectional surveys in a dynamic cohort of apprentice construction workers to identify both cross-sectional and longitudinal relationships between work organization factors and health behaviors and outcomes. We developed questionnaire for construction apprentices that included work environment factors (e.g., job tenure, stability of employment, hours worked per week, predictability of schedule, and workplace physical demands), workplace safety culture (e.g., relationships with employer and fellow-workers, reported safety behaviors of co-workers and safety policies of the employer), health behaviors (e.g., alcohol consumption, use of pain medications, physical activity, and sleep habits), and health outcomes including health-related quality of life (e.g., general health perceptions, musculoskeletal, respiratory, and hearing symptoms, psychological stress, work injuries, and work disability due to injuries and health problems). The questionnaire was based on existing scales and surveys used in past studies among construction workers and general population studies. The questionnaire was reviewed by the

directors of our partner construction apprenticeship programs and pilot tested in Year 1. Apprentices from the carpentry and floor-layer trades completed the questionnaire.

We received surveys from 929 male construction apprentices (response rate 90%) in this young (mean age 28) working cohort. Analyses identified relationships between work organization and environmental factors with five outcomes of economic relevance to employers: missed work due to work-related injury, missed work due to any pain or injury, self-reported workability, health-related productivity, and use of prescription medications for pain. Multivariate Poisson regression models found associations between these outcomes of interest and multiple work factors, including job strain, safety behaviors of coworkers, and mandatory overtime. Univariate analysis showed additional associations, including precarious work, and supervisor support for safety. Findings from this cross-sectional study of baseline data suggest that work organization and environment factors influence health and work outcomes among young construction trade workers.

Longitudinal analyses were carried out over two subsequent survey waves. Despite high turnover in the apprenticeship programs, we achieved longitudinal follow up of 425 apprentices. We used univariable Poisson regression models with robust sandwich estimators to look at the effect of individual changes of multiple work factors (between baseline and follow up) on health and work outcomes at follow up (missed work due to work-related injury, missed work due to any pain or injury, self-reported workability, health-related productivity, and use of prescription medications for pain). We found that increase in job strain over time was associated with worsened health and work outcomes and follow up, while increases in supervisor or coworker support, job satisfaction, and job security were all associated with improvements in the measured health and work outcomes. Those who remained in residential construction from baseline to follow up were more likely to miss days due to work related injury or miss days due to any injury or pain than those who remained in commercial construction.

Our study addressed additional differences in work organization and outcomes between the residential and commercial construction sectors. We examined differences in work factors between construction sectors and the associations between construction sector and health behaviors, health outcomes, and work outcomes. Among our 929 male construction apprentices 44% worked in residential construction, and 56% in the commercial sector. We found that residential apprentices reported fewer workplace safety policies, higher frequency of heavy lifting, and greater likelihood of reporting musculoskeletal pain compared to apprentices in commercial work. Residential apprentices reported higher job strain, lower supervisor support, more lost workdays due to pain or injury, and lower productivity related to health than commercial apprentices. Multivariate Poisson regression models controlling for multiple work factors showed that residential construction work, high job strain, heavy lifting, low coworker support, and low supervisor support were each independently associated with one or more work or health outcomes.

Overall, our findings suggest that TWH interventions (programs, policies, and procedures) in construction should seek to improve coworker and supervisory supportive behaviors, decrease job strain, and reduce organizational stressors, such as mandatory overtime work. Our study also showed marked disparities in health and safety between construction sectors and highlight the need for interventions tailored to the residential sector.

Identify Workplace Programs, Policies and Practices (Aim 2): We conducted a series of employer surveys and key informant interviews to identify existing efforts to protect worker health and promote health and well-being and identify factors influencing feasibility of intervention adoption. Focus groups were held with regional construction partners including contractors, trade unions, and apprenticeship programs. We sought to identify workplace programs, policies, and practices affecting worker health and well-being that are currently being implemented by construction contractors and trade unions. In general, there was a high level of programs within employers to address traditional safety hazards at work, but a relatively low level of existing programs to address chronic health issues, particularly those not seen to be directly work-related. Participants were also asked about readiness for adoption of new interventions to improve worker health. Two focus groups were held and included representatives from the Carpenters Regional Council, general

contractors, and subcontractors. A card sort task and other focus group activities were used to identify current activities addressing health and safety and plans to implement new programs. Cards containing traditional (e.g., hearing protection, heat stress, fall protection) and non-traditional (e.g., smoking, work stress, prescription drug abuse) health and safety topics were sorted into four categories based on the Transtheoretical or Stages of Change Model (i.e., currently addressing, plan to address, haven't thought about it, and no interest in addressing). This was followed by a discussion around the responses. In general, participants reported addressing most traditional safety and health hazards that were relevant in their industry. However, there were fewer activities addressing non-traditional hazards. Among these potential safety and health topics, there was very little interest expressed for addressing alcohol use, tobacco use, or improved sun protection – these topics were seen as “personal behaviors” that should not be addressed through workplace policies or programs. There was moderate interest in improving health policies and programs around financial planning, fatigue, and exercise/nutrition. The strongest interests, consistent across groups, were for interventions to address opioid use and mental health including stress and suicide.

Assess the Use of Intermediary Organizations to Disseminate Interventions (Aim 3): Results from the apprentice/journeyman surveys (Aim 1) and information from employer and intermediary focus groups and interviews (Aim 2) were compiled to identify potential intervention topics and approaches. Given the strong interest expressed in addressing the opioid crisis and the suicide crisis among construction workers, we directed our efforts toward developing and disseminating interventions in these areas, and assessed the feasibility of using intermediary organizations to disseminate these interventions.

The interest in opioid use resulted in the supplemental opioid project described below, as well as an effort to provide education on opioid use and misuse to young construction workers. We worked with educators at the Carpenters Joint Apprenticeship Program in St. Louis to develop a 30-minute PowerPoint presentation on the dangers of opioid use, tailored to construction workers. This presentation has been used locally, and by the pre-apprenticeship program at the University of Iowa's Labor Center and is available for other audiences.

Our efforts to reduce the epidemic of suicide among construction workers led to a partnership with the Association of General Contractors in Missouri (AGC-MO) to develop and launch a week-long suicide prevention campaign in 2019, including a “stand-down for safety” event addressing workplace suicide. Working together, we expanded this effort in 2020 to develop monthly toolbox talks addressing a range of mental health topics for presentation on “Mental Health Mondays.” We used videos and other materials to promote this campaign and made all program materials freely available. AGC-MO expanded this program for the third annual suicide prevention “stand-down” in 2021, which reached an estimated 500 employers and thousands of workers. These efforts in Missouri have led to collaborations with contractor organizations in Iowa and Colorado, where similar efforts have been launched. These efforts have created strong interest among regional contractors and contractor associations in more effective mental health and suicide prevention interventions and raised awareness of the need to provide additional training and organizational changes to address these complicated problems in a complex industry.

We found that partnerships with trusted intermediary organizations can be an effective way to disseminate health information to high-risk worker groups. Intervention topics must align with the priorities of the intermediaries. Implementing education and awareness programs around health behaviors was more acceptable to intermediaries than changing workplace policies and practices.

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

Nothing to report.

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

We have taken deliberate steps to: 1) increase the awareness project activities and goals among potential partners/stakeholders (e.g., other construction trades, contractors, developers) and 2) share baseline findings with current partners (i.e., Joint Carpenters Floor Layers Apprentice Program, Contractor focus group participants, occupational safety and health professionals).

Outreach to potential partners/stakeholders has also included multiple regional presentations as described in the Planning and Evaluation section. Activities to share knowledge with other occupational safety and health professionals includes multiple abstracts from this project that have been presented at national and international meetings, as well as several published papers.

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

We will publish the longitudinal follow-up paper. We have applied for future grant funding for pursuing an intervention to improve mental health and decrease suicide risk among construction workers. This project was “approved but not funded” in our TWH center renewal. We currently have grants pending with CDC and with NIMH to pursue an intervention based on the results of the current study.

C. PRODUCTS

C.1. Publications, conference papers, and presentations

Apprentice Project:

Presentations:

Evanoff BA, Rohlman D, Strickland JR, Kelly KM, Dale AM. (2018, April-May). 'Influence of work organization and environment on health behaviors of construction apprentices.' Presented at the 32nd International Congress on Occupational Health, Dublin, Ireland.

Dale AM. (2018, May). 'Using Intermediaries to Implement Total Worker Health Interventions in Challenging Industries - Symposium.' Presented at the 2nd International Symposium to Advance Total Worker Health, Bethesda, Maryland.

Evanoff BA. (May, 2018). 'Total Worker Health as an Approach to Improve Population Health - Symposium.' Presented at the 2nd International Symposium to Advance Total Worker Health, Bethesda, Maryland.

Evanoff BA, Rohlman DS, Strickland JR, Kelly KM, Dale AM. (2018, May). 'Influence of work organization and environment on health behaviors of construction apprentices.' Presented at the 2nd International Symposium to Advance Total Worker Health, Bethesda, Maryland.

Evanoff BA, Rohlman DS, Strickland JR, Kelly KM, Dale AM. (2018, October). 'Influence of work organization and environment on health and productivity outcomes among construction apprentices: A Total

Worker Health approach.' Presented at the National Occupational Injury Research Symposium (NOIRS), Morgantown, WV.

Dale AM, Rohlman DS, Strickland JR, Kelly KM, Evanoff BA. (2019, February). 'Contrasting Prevalence of Health and Safety Risks and Controls between Residential and Commercial Construction Apprentices.' Presented at a webinar hosted by Work Wellness Disability and Prevention Institute.

Evanoff BA, Rohlman DS, Strickland JR, Kelly KM, Dale AM. (2019, April). 'Influence of work organization and environment on health and productivity outcomes among construction apprentices: A Total Worker Health approach.' Presented at the 27th International Epidemiology in Occupational Health Conference (EPICOH), Aotearoa, New Zealand.

Rohlman, D. (2019, October). 'Total Worker Health: What it means for your bottom line.' Presented at the St. Louis Safety and Health Conference, St. Louis, MO.

Evanoff BA, Strickland JR, Kinghorn AM, Rohlman D, Dale AM. (2020, October). 'Feasibility of using intermediary organizations to disseminate interventions to improve construction workers' health and well-being: a Total Worker Health approach.' Presented at the American Public Health Association Annual Meeting & Expo (APHA), October 2020.

Publications:

Evanoff BA, Rohlman DS, Strickland JR, Dale AM. (2019). Influence of work organization and work environment on missed work, productivity, and use of pain medications among construction apprentices. American Journal of Industrial Medicine, 63(3):269-276. doi: 10.1002/ajim.23078. PMID: 31774191. PMCID: PMC7069495. [Epub: 2019 Nov 26].

Dale AM, Rohlman DS, Hayibor L, Strickland JR, Evanoff BA. Work Organization Factors Associated with Health and Work Outcomes among Apprentice Construction Workers: Comparison Between the Residential and Commercial Sectors. Int J Environ Res Public Health. 2021 Aug 24;18(17):8899. doi: 10.3390/ijerph18178899

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

- www.HealthierWorkforceCenter.org
- Suicide Prevention Campaign: <https://hwc.public-health.uiowa.edu/you-ok-campaign/>

C.3. Technologies or techniques

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

C.5. Other products and resource sharing

Opioid Awareness Training Program

E. IMPACT

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

NA

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 study showed that work organization and environmental factors were associated with important health and economic outcomes among young construction workers. Specifically, multiple work factors, including job strain, safety behaviors of coworkers, mandatory overtime, precarious work, and supervisor support for safety were associated with outcomes including missed work due to work-related injury, missed work due to any pain or injury, self-reported workability, health-related productivity, and use of prescription medications (predominantly opioids) for pain. Overall, our findings suggest that TWH interventions (programs, policies, and procedures) in construction should seek to improve coworker and supervisory supportive behaviors, decrease job strain, and reduce organizational stressors, such as mandatory overtime work. Our study also showed marked disparities in health and safety between construction sectors and highlight the need for interventions tailored to the residential sector. These findings and partnerships created during the project initiated subsequent efforts to reduce opioid use and misuse among construction workers, and to intervene to improve mental health and reduce suicide among construction workers.

We found that partnerships with trusted intermediary organizations can be an effective way to disseminate health information to high-risk worker groups. Intervention topics must align with the priorities of the intermediaries. Implementing education and awareness programs around health behaviors was more acceptable to intermediaries than changing workplace policies and practices. These findings add to a growing body of work relevant to dissemination and implementation of Total Worker Health policies and practices.

Our Suicide awareness and prevention efforts have led to collaborations with contractor organizations in Missouri, Iowa, and Colorado. These efforts have created strong interest among regional contractors and contractor associations in more effective mental health and suicide prevention interventions and raised national awareness of the need to provide additional training and organizational changes to address these complicated problems in a complex industry. There is a strong need for evidence-based interventions to improve mental health and prevent suicide that can be implemented at multiple levels in the challenging culture and organization of construction work. In subsequent work we have proposed interventions to address personal, cultural, and organizational factors that make construction a high-risk industry, and to fill the need for an evidence-based multi-component mental health intervention in the construction workforce, which has strikingly high rates of suicide and mental health disorders.

F. CHANGES

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

None
F.2 - Actual or anticipated challenges or delays and actions or plans to resolve them
None
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
G.2 Responsible Conduct of Research
G.3 Mentor's Research Report or Sponsor Comments
<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 INCLUDED WITH THIS FRPPR REPORT</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>N/A</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?</p> <p>NO</p>
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?

NO

G.8 Project/Performance Sites

SEE CENTER OVERALL FOR PERFORMANCE SITE INFORMATION

G.9 Foreign Component

N/A

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 study showed that work organization and environmental factors were associated with important health and economic outcomes among young construction workers. Specifically, multiple work factors, including job strain, safety behaviors of coworkers, mandatory overtime, precarious work, and supervisor support for safety were associated with outcomes including missed work due to work-related injury, missed work due to any pain or injury, self-reported workability, health-related productivity, and use of prescription medications (predominantly opioids) for pain. Overall, our findings suggest that TWH interventions (programs, policies, and procedures) in construction should seek to improve coworker and supervisory supportive behaviors, decrease job strain, and reduce organizational stressors, such as mandatory overtime work. Our study also showed marked disparities in health and safety between construction sectors and highlight the need for interventions tailored to the residential sector. These findings and partnerships created during the project initiated subsequent efforts to reduce opioid use and misuse among construction workers, and to intervene to improve mental health and reduce suicide among construction workers. We found that partnerships with trusted intermediary organizations such as unions and contractor groups can be an effective way to disseminate health information to high-risk workers. Intervention topics must align with the priorities of the intermediaries. These findings add to a growing body of work relevant to dissemination and implementation of Total Worker Health policies and practices.

Study findings specific to opioid use among construction workers showed that opioids initiated for musculoskeletal pain were strongly associated long-term opioid use and opioid use disorders. Musculoskeletal pain from physically demanding work, and the treatment of this pain, are important drivers of the opioid epidemic in occupations like construction. Prevention of work injuries and non-opioid pain management strategies are needed for workers at risk for musculoskeletal injuries.