



NATIONAL OCCUPATIONAL RESEARCH AGENDA (NORA)

AN IMPLEMENTATION PLAN FOR HEALTHY WORK DESIGN AND WORKER WELL-BEING: *Addressing and Advancing the National Occupational Research Agenda*

December 2022

Developed by the NORA Healthy Work Design and Well-Being (HWD)
Cross-Sector Council

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INTRODUCTION

What is the Healthy Work Design and Well-Being NORA Council?

The [National Occupational Research Agenda](#) (NORA) Healthy Work Design and Well-Being (HWD) Cross-Sector Council focuses on protecting and advancing worker safety, health, and well-being by improving the design of work, management practices, and the physical and psychosocial work environment. Within the healthy work design framework, worker well-being encompasses positive physical, emotional, mental, and economic health, and how these aspects of health relate to work and worker experiences from a comprehensive and holistic perspective. The HWD Council is comprised of members from the National Institute for Occupational Safety and Health (NIOSH), academia, industry, professional societies, and worker organizations and representatives. As partners, members of the Council collaborate to identify and address occupational safety and health needs stemming from the ever-changing nature of work, the economy and related concerns, and the intersection between workers' personal health and lives with the range of risks they encounter in their work and community environments. The Council seeks to facilitate the most important research, understand the most effective intervention strategies, and learn how to implement those strategies to achieve sustained improvements in workplace practice.

In January 2020, the HWD Council published its [research agenda](#) (hereafter referred to by its acronym, as the HWD NORA) which serves as a high-level blueprint for the nation in furthering the most needed research and interventions to advance the safety, health, and well-being of America's workers through healthy work design and related approaches. The NORA's seven research objectives address the most critical HWD-related issues that affect workers' well-being:

Objective 1: Identify and examine the impact of worker demographics on employer or organizational practices and worker safety, health, and well-being.

Objective 2: Improve the safety, health, and well-being of workers with non-standard work arrangements.

Objective 3: Address the safety and health implications of advancing technology.

Objective 4: Reduce work organization-related chronic health conditions among workers.

Objective 5: Decrease the burden of shift work, long hours of work, and sleep deficiency.

Objective 6: Improve the safety, health, and well-being of workers through healthier work design and better organizational practices.

Objective 7: Promote a sustainable work-nonwork interface.

What is the HWD NORA Implementation Plan?

The HWD Council has written this Implementation Plan to motivate *action* and promote *response* to the HWD NORA by researchers and interested parties across the nation. Following the successful approach used to develop the HWD NORA, the Implementation Plan was developed through a series of conference calls, remote meetings, email communications, and council member presentations. Many meetings included the entire council, but the bulk of the effort was carried out by the separate working subgroups that wrote the original NORA objectives (see Appendix). Council members reviewed scientific literature to assess current and proposed work on these subjects and grey literature to gather information about industry trends and review pertinent association research reports. The members reflected upon their own expertise and consulted their networks to delve more deeply into the aims of each objective and to brainstorm ways to encourage action to address the identified research gaps.

The plan identifies achievable next steps to prevent avoidable adverse worker health outcomes and to improve the work experience. It is organized using the key research objectives defined in the HWD NORA. The plan lists possible initiatives, projects, products, or other actions to address research gaps and carry out each objective. The list of proposed actions seeks to address a variety of current and emerging issues pertinent to the design of work.

Worker safety, health, and well-being have been long-standing priorities for those in the occupational safety and health community. The COVID-19 pandemic and related events have brought renewed public attention to recognized risks like economic insecurity (including wages and access to benefits), long work hours, fatigue, work-life challenges, and detrimental psychosocial working conditions. Simultaneously, the relevance of other pre-existing but less-frequently attended-to risks has been clarified as people around the globe have struggled with the pandemic, socioeconomic and racial disparities, political unrest, and rapidly changing employment, work patterns, and conditions.

It is becoming clearer that new forms of more flexible work are likely here to stay. Hybrid work (where workers work both at a physical workplace and at home) has been referred to as the next great disruption. New employment arrangements and platforms are constantly emerging. With a relative shortage of workers in some occupations, there is also a growing recognition that for businesses to succeed, and for the economy to flourish, it is imperative that workers' needs are recognized and addressed. In addition to providing a safe workplace free of recognized hazards, employers must also better address less recognized risks facing workers, such as psychosocial stress, fatigue, harassment, discrimination, unhealthy supervisory practices, and climate stressors. Workers are also demanding more flexibilities related to working hours, adequate wages and benefits, healthier workplace environments, more supportive leaders, and greater opportunities for engaging and more meaningful work, professional development, and work-life fit.

At the same time, we are facing a worsening mental health crisis with approximately one-fifth of adults having reported experiencing mental illness prior to the pandemic [Mental Health America 2022], and nearly two-thirds of adults reporting that their lives were forever changed by the pandemic [American Psychological Association 2022]. Depression and anxiety are among the top risks facing workers today and consequently are the leading causes of disability. As forty-two percent of adults surveyed reported relying on unhealthy habits to cope with recent stressors [American Psychological Association 2022], there has been a rise in alcohol use, substance use, and drug overdose deaths [National Institute on Drug Abuse 2022]. In addition to concerning trends related to mental health conditions and substance use disorders, suicide is a leading cause of death in the United States. Several occupations have some of the highest rates of suicide including agriculture, mining, transportation, construction, and health care [Peterson et al. 2020]. Addressing work-related risks that contribute to poor mental health and promoting safe, healthy, and supportive work through actions outlined in this implementation plan holds promise for protecting and improving worker well-being.

Who will benefit from this implementation plan?

The ultimate goal of the HWD Council is to improve opportunities for workers to find safer, healthier, and more fulfilling employment. The objectives addressed by this implementation plan are diverse, pervasive, and highly applicable across broad populations, industries, and occupations. While we anticipate that this plan primarily will be of interest to researchers, we also envision a wider audience will have interest in it and gain valuable insights from its contents. This audience includes health and safety professionals and practitioners of all types, professional associations, industry and private sector representatives, public health and other public sector officials, labor officials and worker organizations, owner/operators of businesses and organizations, media and media influencers, lay and scientific press outlets, conference planners, futurists, and policy makers. Additionally, others committed to addressing the widest possible set of the social determinants of health, broadly across all scientific and social disciplines, will be valuable partners.

The role of partners, coalitions, advocates, and other interested parties

The ambitions laid out in this implementation plan are to some degree aspirational. The identified opportunities to address the research gaps represent the Council's vision for collaborative efforts to achieve progress in science and practice, in order to improve the design of work and protect and promote worker safety, health, and well-being. Partners could collaborate with the HWD Council workgroups on any of the listed action items. This includes those with an interest in worker well-being broadly as well as those with a significant interest in the specific topics addressed within each objective.

Support from partners and other interested parties is instrumental. Their support is needed during all phases: investigating needs and conducting surveillance; designing and conducting related research; implementing interventions; and especially during the dissemination phases to assure broad communication, outreach, and diffusion of findings and products to the widest audience possible. It is through this dissemination that we hope to inspire application and utilization of the knowledge and products developed through efforts stimulated by this implementation plan. Academic researchers, partner groups, coalitions, advocates and all others who may be interested in assisting with these activities are invited to reach out to the HWD Council to express their interest and explore ways to collaborate.

IMPLEMENTATION PLAN

Objective 1: Identify and Examine the Impact of Worker Demographics on Employer or Organizational Practices and Worker Safety, Health, and Well-being

Research gaps: Potential actions and opportunities

1.1: Enable better sharing of data among state and national agencies to improve the understanding about the nature, source, and consequences of injuries and illnesses among older and younger workers.

- Present at national meetings to increase awareness of this issue among researchers and interested parties and to gauge interest from potential partners.
- Develop models for information sharing among state and national agencies regarding the incidence and consequences of illnesses and injuries among older and younger workers.
- Develop enhanced surveillance systems for better data collection on key variables such as industry, occupation, disability status, work status, race, ethnicity, and gender.

1.2: Gather and disseminate best practices for age- and disability-friendly workplace policies, including job redesign interventions, flexible scheduling models, and anti-discrimination policies.

- Develop new and document existing best practices for age- and disability-friendly workplace policies, including job redesign interventions, flexible scheduling models, and anti-discrimination policies.
- Promote development of policies that address fear of retaliation and promote reporting of workplace injuries and illnesses.
- Conduct outreach efforts to specific populations, including presentations, webinars, and blog and social media posts.

1.3: Conduct intervention research on strategies with an emphasis on youth leadership training programs, community awareness campaigns, and school-based job training programs. These programs can promote awareness among young workers about occupational safety and health and develop necessary skills to advocate for improved working conditions, and encourage efforts to address occupational hazards.

- Initiate such research, which includes facilitating relationships among potential partners, offering consultation to researchers, or actively conducting research.

1.4: Conduct research on the association between gender, gender identity, and sexual orientation, and the experience of discrimination, sexual harassment, pay inequality, work-life conflict, job design, and exposures to reproductive hazards.

- Initiate such research, which includes facilitating relationships among potential partners, offering consultation to researchers, or actively conducting research.

1.5: Conduct research on the impact of racial and ethnic discrimination and disparities in the workplace and its effect on worker safety, health, and well-being.

- Initiate such research, which includes facilitating relationships among potential partners, offering consultation to researchers, or actively conducting research.

1.6: Conduct research on the impact of wages and hours on workers' health status.

- Initiate such research, which includes facilitating relationships among potential partners, offering consultation to researchers, or actively conducting research; publish and present findings.
- Identify data that have information on both wages and health outcomes.

1.7: Conduct research into the extent of underreporting of injuries and illnesses by foreign-born and other workers who live or work in settings that put them at increased risk of being exposed to hazards and by their employers and identify best practices in data collection strategies and systems.

- Initiate such research, which includes facilitating relationships among potential partners, offering consultation to researchers, or actively conducting research.

1.8: Collect and disseminate best practices for addressing the occupational safety and health of foreign-born workers, including policies that prevent workplace discrimination, promote worker involvement in identifying and addressing hazards without fear of retaliation, and education and training efforts that reflect the specific language and literacy needs of diverse workers.

- Develop and document best practices for such policies.
- Promote development of policies that address fear of retaliation and promote reporting of workplace injuries and illnesses.
- Conduct outreach efforts to specific populations, including presentations, webinars, and blog and social media posts.

1.9: Conduct intersectional research that examines the effects of all aspects of worker demographics on worker safety, health, and well-being.

- Initiate such research, which includes but is not limited to facilitating relationships among potential partners, offering consultation to researchers, or actively conducting research.

Objective 2: Improve the Safety, Health, and Well-Being of Workers with Non-Standard Work Arrangements

Research gaps: Potential actions and opportunities

2.1: Describe the characteristics of non-standard work that are detrimental to worker health and the mechanisms of these effects in different economic sectors and for various demographic groups.

- Adopt working definitions of non-standard work arrangements according to characteristics that affect worker safety, health, and well-being.
- Adopt working definitions of the related concepts of contingent work and precarious employment.
- Develop and publish a white paper with working definitions and characteristics of work arrangements and related concepts, based on existing findings.
- Catalogue data collection systems (national, state, local, private) that include metrics on the characteristics of the working definitions of work arrangements (and potentially related concepts) and their effects on worker safety, health, and well-being; include specifics on the available information on arrangement characteristics and their effects on workers.
- Publish the catalogue of data sources and promote it through the HWD Council website, the NIOSH Science Blog, and other outlets.

2.2: Identify and evaluate interventions that improve the safety, health, and well-being of workers in non-standard work arrangements.

- Conduct a scoping review of such interventions.
- Publish the review and present findings at a national conference.

2.3: Disseminate effective interventions that improve the safety, health, and well-being of workers in non-standard work arrangements.

- Convene a virtual workshop during which invited speakers present research on such interventions and attendees discuss strategies for disseminating recent scientific evidence to a diverse audience.
- Publish papers from the workshop as an edited book or in a special issue of a scientific journal.

2.4: Collect and disseminate best practices for addressing the occupational safety and health of workers in non-standard work arrangements. For example, community based participatory research and policies that prevent workplace discrimination, promote worker involvement in identifying and addressing hazards without fear of retaliation, and education and training efforts that reflect the needs of these workers.

- Convene a virtual conference at which invited industry, non-profit, and advocacy groups present promising practices for addressing the occupational safety and health of workers in non-standard work arrangements.
- Develop an applied research white paper for employers and policy makers that highlights promising and best practices for addressing the occupational safety and health of workers in non-standard work arrangements.
- Share findings at professional association conferences and in other outlets.

2.5: Understand specific socioeconomic and other risk factors, such as job insecurity, that affect the prevalence of precarious work and jobs with non-standard work arrangements. Together with information addressing gap 2.4, this can increase awareness and point to prevention guidance for employers, organizations, and policy makers.

- Identify risk and protective factors that affect the prevalence of work and job precariousness, emphasizing the role of technology (e.g., cell phones), laws/rules (e.g., immigration), and social/cultural norms (e.g., work-family role expectations).
- Publish white paper summarizing the findings.

2.6: Improve occupational health surveillance systems' data collection on work arrangements, including information on arrangements in multiple jobs held simultaneously, and associated adverse health outcomes.

- Identify existing or develop new recommended questions that can improve occupational health surveillance systems on work arrangements.
- Offer consultations to facilitate data collection and further our understanding of how work arrangements relate to health and well-being.

2.7: Develop surveillance methods, including those used for community-level surveillance systems that measure the prevalence and characteristics of non-standard work, and identify workers and workplaces with non-standard arrangements.

- Identify existing or develop new recommended questions that can improve surveillance methods to measure stated aspects of non-standard work.
- Offer consultations to facilitate data collection and further our understanding of characteristics of, and workers in, non-standard work arrangements.
- Conduct and publish a systematic review of studies that examine the: characteristics of non-standard work arrangements, exposures to specific hazards and protections of jobs with non-standard work arrangements, and impact of explicitly defined work characteristics on worker safety, health, and well-being.

Objective 3: Address the Safety and Health Implications of Advancing Technology

Research gaps: Potential actions and opportunities

3.1: Develop a taxonomy of types of work-related technological changes and the types and extent of worker interaction with them.

- Examine technology related information from the [NIOSH Future of Work effort that](#) identified nine topics divided among three categories: workplace (topics: organizational design, technological displacement, work arrangements), work (topics: artificial intelligence, robotics, technologies), and workforce (topics: demographics, economic security, skills).
- Develop and publish a report on the taxonomy of work-related technological changes. The report would map the technologies described in the work category to the other two categories (workplace and workforce) and quantify the expected disruption over immediate and long-term time frames.

3.2: Conduct surveillance on the use of different types of technology by industry and occupation over time and the relationship with worker safety, health, and productivity outcomes.

- Catalogue and publish on surveillance systems that capture technology type by industry and occupation and the relationship with worker safety, health, and productivity outcomes.
- Analyze and publish findings on technology-related fatality investigation reports and Bureau of Labor Statistics Census of Fatal Occupational Injuries.
- Interact with other [NORA sector councils](#) to collect information and data on emerging technologies and worker access to appropriate technology in their industries. Synthesize and share the information with other councils and identify and act on synergistic opportunities for research and practice.
- Engage professional organizations in developing and disseminating information and guidance on emerging technologies related to occupational safety and health practice. Identify opportunities to collaborate with those working on other HWD objectives.
- Coordinate the current efforts underway by NIOSH and related partners to assure alignment and synergy and avoid unnecessary duplication.
- Add questions to a future version of the Quality of Work Life Survey that examine the potential impacts of new workplace and work-related technologies on worker well-being.
- Publish findings and present at national conferences.

3.3: Conduct systematic, multidisciplinary research on the impact of different types of technology on workers, including changes in job design, work schedules, training, demands, and safety.

- Compile more thorough information on technology related issues for all NORA objectives to understand specific research needs.
- Catalogue technology related NIOSH-supported projects as well as those supported by other funding organizations, including the National Science Foundation.
- Publish a white paper or journal article summarizing the state of knowledge, research gaps, and connections to emergent thinking about the future of the human-technology interface, e.g., Industry 4.0 and 5.0.
- Submit a panel discussion or research incubator session to future related conferences designed to generate research interest in technology and HWD; such a session should highlight the psychosocial aspects of the human-technology interface.
- Identify potential partners to promote research and demonstration projects. Potential partners include universities, research institutes, industries, trade groups, unions, and professional and service organizations.
- Explore opportunities for the Objective 3 workgroup to act as a research incubator, including identifying potential synergies between this and other objectives in the HWD NORA.

3.4: Research how to best design technology, including how humans interact with technology, to enhance worker safety, health, and productivity.

- Initiate partnerships with technology companies and related enterprises that can accelerate progress in the design and implementation of solutions that will improve work-related human-technology interactions.
- Articulate the current state of knowledge; develop a white paper or presentation that maps technologies to HWD and focuses on how technology should be designed and introduced to support HWD.

3.5: Develop best practices to support worker safety and health in the introduction of new work-related technologies.

- Identify and promote best practices through efforts described above.
- Identify and pursue opportunities to evaluate work practices that involve technology and healthy work design.
- Identify industry groups, occupational health and safety societies, and government organizations that are interested in collaborating with the HWD Council on any of the actions identified above, or in disseminating and promoting HWD Council outputs or products.

- Identify groups with significant interest or influence related to this objective.
- Provide communication and outreach strategies to share findings through multiple channels.

Objective 4: Reduce Work Organization-Related Chronic Health Conditions among Workers

Research gaps: Potential actions and opportunities

4.1: Expand research to understand the work organization-related etiology of chronic health conditions. Examples include obesity and metabolic disorders, cardiovascular disease (CVD), mental health conditions, substance use disorders, and cancers. This will add to current knowledge on possible relationships and mechanisms of action and will help resolve incongruent findings

- Initiate research on the health implications of COVID-19 that include:
 - Worsening mental health outcomes
 - Increasing substance use and overdose risk
 - Missed health screenings or delayed screenings
 - Delayed treatment of chronic conditions related to the pandemic
 - Post COVID-19 infection health effects (long COVID), and their short- and long-term ramifications for chronic disease management
 - Job or benefits loss and related economic losses and uncertainty leading to new or worsening chronic diseases.
- Expand research on mental health conditions related to work, working conditions and work-related stress to include a focus on depression, fatigue, anxiety, suicidality, burnout and post-traumatic stress disorder (PTSD).
- Initiate or expand research on the implications of environmental exposures and climate change for chronic health conditions including drought, heat, hazardous weather events and wildfires. Examine impacts on risks for respiratory disease, CVD, kidney disease, mental health conditions, and occupational injuries.
- Initiate or expand research on psychosocial stress and chronic health conditions to include the role of stress on risks for CVD, diabetes, cancer, musculoskeletal disorders, and mental health conditions.
- Initiate or expand research on emerging chronic conditions and their relationships to work design and implications for worker well-being.
- Publish findings and present at national conferences.

4.2: Expand research to examine the contribution of new forms of work arrangements and designs of work (as further detailed in Objectives 2 and 6) to chronic disease risks in the workforce.

- Initiate research focusing on the intersection between work arrangement and design (employment/working conditions/work demands,) worker well-being, and chronic conditions.

- Initiate research on chronic disease management issues more likely in higher-risk populations including migrant and contingent workers, low-wage workers, or those doing shift work, gig work, or other forms of non-standard work.
- Develop chronic disease management resources to assist people who are at higher risk for developing chronic health conditions.

4.3: Improve the understanding and awareness of work design to decrease risk factors related to chronic health conditions to include comparative effectiveness studies and economic evaluations to compare interventions, policies, and practices.

- Study the intersection between work design, worker well-being and chronic conditions. This would include research on quality of life and disease management within the context of work. Both positive and negative work conditions relating to the management of chronic illness among workers are important to study.

4.4: Research the costs and burdens of unhealthy work design related to disease incidence and prevalence, health care costs, and organizational factors. Examples of organizational factors include absenteeism, presenteeism, productivity loss, turnover, and reputational risk. Evaluate their importance for inclusion in a business case to improve work design.

- Identify relevant datasets and other sources of information that report the economic (monetary and non-monetary) burden or other burden (e.g., absenteeism, presenteeism) of chronic conditions.

4.5: Incentivize employers to improve the design of work and implement healthier work organization principles shown to decrease risks for chronic disease and improve the workplace management of them.

- Identify tools and products that are specific and applicable for small business operators. Address the lack of utilization of such tools and products when they are available.
- Create guidelines for interventions at the organizational or employer level that seek to make organizational change to address, improve or lower risks for chronic conditions. Explore leadership motivations to act and their decision-making processes.
- Develop unique training programs on chronic disease prevention and management for different sizes of employers.

4.6: Identify and establish new networks and collaborations with professionals in chronic disease prevention and management, leadership and management, human resources and employee benefits, occupational health, and other areas to expand the visibility and application of HWD research findings.

- Present at national meetings to identify potential partners and establish new professional relationships.

4.7: Conduct implementation and dissemination research that examines factors that reduce chronic disease outcomes among workers and influences the adoption of work design policies and practices among organizations and industries.

- Initiate research focused on health equity for chronic conditions, by occupation and industry; across various sociodemographic factors (e.g., race, ethnicity, socioeconomic status).

4.8: Develop and evaluate workplace and related clinical interventions that integrate assessment and remediation of work-related contributors to chronic health conditions.

- Catalogue and evaluate existing workplace interventions focused on disease prevention.
- Present at national conferences and proceedings on the need to shift focus to all forms of prevention (primary, secondary, and tertiary) to improve chronic health disease outcomes.
- Create guidelines for managers, leaders, and organizations to support workers in preventing and managing their chronic health conditions.

4.9: Research policies, programs and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness prevention efforts to advance worker well-being. This will help communicate knowledge and effective best practices in collaboration with existing and new partners, including employers and the community.

- Advance *Total Worker Health*^{®1} principles, practices, and policies as an effective way to improve the health and well-being of workers, addressing chronic disease risks both on and off the job.

¹ *Total Worker Health*[®] is a registered trademark of the U.S. Department of Health and Human Services (HHS).

Objective 5: Decrease the Burden of Shift Work, Long Hours of Work, and Sleep Deficiency

Research gaps: Potential actions and opportunities

5.1: Develop surveillance methods that measure the prevalence and characteristics of shift work, long work hour schedules, and other factors that lead to fatigue in the workplace.

- Conduct research to develop and field worker surveys, particularly nationally representative surveys, that include questions on shift work, hours of work, and sleep quantity and quality. The research should consider administering the survey to different samples or administering the survey longitudinally to the same sample.
- Develop an inventory of worker surveys that contain work schedule and sleep questions. Include the following information for each survey:
 - Wording of each work schedule or sleep question
 - Population(s) each survey has been administered to
 - Administration protocol
 - Psychometric information for each survey
 - Validity and reliability for each population the survey was administered to
 - Judged generalizability of each survey across worker populations
- Provide recommendations for health and safety professionals about which surveys might be most suitable to use for their worker populations.
- Determine a core set of questions on shift work, hours of work, and sleep that can be used across worker populations. Work with administrators of nationally representative worker health and safety surveys to include these items.
- Initiate and extend research on shift work, hours of work, and sleep to determine linkages with worker health and safety outcomes across industry and occupation.

5.2: Identify and test interventions that reduce the adverse safety and health consequences of shift work, long work hour schedules, and other factors that lead to fatigue in the workplace.

- Develop a clearinghouse of effective shift work, hours of work, and sleep interventions, categorized by the industry or occupation for which the interventions were developed. Include a battery of effective measurement tools and survey questions in this clearinghouse.

5.3: Develop and test interventions for workers on shift work and long work hour schedules in occupations involving public safety (e.g., health care, law enforcement, transportation, utilities) where the consequences of errors due to fatigue can be especially great to the public.

- Publish and disseminate findings that could promote culture change in occupations related to public safety that prioritizes self-care and management of shift work.
- Utilize special strategies, such as emphasizing the negative impact of shift work on health rather than productivity, for occupations where there is resistance to reducing hours of work for economic reasons.

5.4: Develop implementation and dissemination strategies for effective interventions that reduce the adverse health and safety consequences of shift work, long work hour schedules, and other factors that lead to fatigue in the workplace.

- Publish articles in media outlets read by specific worker populations.
- Publish a review of effective interventions in industry and safety publications.
- Present on effective interventions at industry, safety professional, and scientific conferences.
- Become involved in safety communities and consistently share information.
- Conduct communication campaigns for specific worker populations.
- Provide trainings that offer continuing education credits for state and national certifications.
- Develop an integrated health and safety program that ties together shift work, hours of work, and sleep hygiene.

Objective 6: Improve the Safety, Health, and Well-being of Workers through Healthier Work Design and Better Organizational Practices

Research gaps: Potential actions and opportunities

6.1. Explore and evaluate effective strategies for comprehensive systems-based interventions (i.e., collective sets of organization and work practices and how they relate to and interact with each other in real-world settings).

- Conduct a review of current human resources, management, and health promotion approaches and their alignment with the HWD perspective to identify opportunities and challenges.
- Develop a white paper or journal article summarizing review findings.
- Identify businesses and organizations that are comprehensively addressing worker safety, health, and well-being. Conduct structured interviews with their leaders and develop profiles as case examples for use in articles and presentations.
- Expand the initial set of case examples to a more robust database of organizations engaged in worker safety, health, and well-being efforts.
- Host a webinar series on the collective policies, programs, and practices needed to support employees in the post-pandemic work environment, e.g., telework and hybrid work arrangements, including issues of employee experience (e.g., meaningful work) and the impact of the mix of remote and on-site (i.e., hybrid) work.
- Offer workshops and roundtable discussions at future conferences on strategies for comprehensive system-based interventions for healthy work design and worker well-being.
- Host a series of round-table discussions with human resources and benefits managers, occupational safety and health professionals, and health promotion professionals to explore opportunities for integrating efforts. Develop a review of integration opportunities based on the discussions, summarizing the experience of employers who have already developed comprehensive approaches.
- Create guidance on applying the HWD framework and integrating fragmented HWD efforts within an organization. Develop an employer's guide and host half- or full-day training workshops.

6.2: Develop interventions to improve the impact of management systems, quality improvement methods, leadership styles, and supervisor and co-worker support approaches on employee and organizational outcomes.

- Use the white paper from the review of current human resources, management, and health promotion approaches (see 6.1) to develop a healthy work design checklist to call

attention to worker well-being challenges, pitfalls, and opportunities associated with various popular management tools and approaches.

- Develop an article for organizational leadership on HWD for publication by a popular business press publication.
- Develop and provide training on HWD principles and approaches geared specifically toward organizational leadership.
- Develop and test work organization interventions with cross-group comparisons (e.g., compare outcomes for employees who experienced a single work design modification vs. those exposed to multiple changes).
- Conduct a review of research literature, media reports, and other sources on the negative health outcomes associated with intensive work monitoring to gain a qualitative picture of where these issues are arising. The findings can serve as a basis for designing interview and focus group research.
- Create a short video about the impact of healthy work design practices on systems, methods, and leadership styles, and the effects on employee and organizational outcomes.

6.3: Identify best-practice methods for assessing worker well-being in individual workplaces and identifying deficits that need to be addressed. Special attention should focus on understanding how these best practice methods may vary by worker or organization characteristics such as age, gender, ethnicity, occupational group, and industry sector.

- Scan publications that include data from the General Social Survey Quality of Worklife (QWL) survey. Identify where the QWL has been useful in identifying aspects of worker well-being that are particularly relevant for different worker subgroups and identify opportunities to apply healthy work design practices to address those concerns.
- Evaluate current use, and improve future use, of the [NIOSH WellBQ](#) [NIOSH 2021]. Examine who is currently using it in the applied setting, how it is being used and the level of satisfaction with the tool.
- Identify and highlight variation among businesses and organizations in the NIOSH WellBQ well-being elements found to be most relevant to organizational leadership and workers. Based on these findings, promote its use and provide practical guidance.
- Collect examples of how different businesses and organizations have evaluated well-being interventions, and the outcomes and metrics they used.
- Provide guidance to employers on concise ways to add HWD questions to employee surveys, including actions to take once HWD-related risks to health and safety are identified.

- Develop a short-form version of HWD questions that could be included in employee surveys. Partner with a consultant or vendor to pilot and benchmark with their client base.

6.4: Develop evidence-based HWD design, implementation, and dissemination strategies for best practice assessment, intervention, and program evaluation, critical to the translation of research to practice. Emphasize evidence-based methods that are cost effective and realistic for small- and medium-size organizations without dedicated staff or access to internal experts.

- Create and disseminate a white paper or toolkit for small businesses on practical, low-cost HWD strategies for addressing work design and work practices.
- Invite leaders of small- and medium-size organizations to a roundtable discussion on opportunities, challenges, and barriers to program implementation.
- Conduct presentations on toolkit content at regional business group conferences and events, and no-cost webinars.
- Conduct demonstration projects with small businesses to help identify effective strategies and interventions that are realistic and affordable.

6.5: Evaluate labor-management relationships and involvement in establishing overall work policies and practices and the related implications for worker safety, health, and well-being.

- Recruit additional labor representation including worker groups or affinity groups to the HWD Council to get broader worker perspectives and improve health equity.
- Meet with representatives of labor organizations to hear their concerns about policies, programs, and practices related to worker well-being.
- Deliver HWD presentations at labor meetings.
- Include labor perspective in HWD conference presentations and webinars.
- Review information gathered on comprehensive approaches and integration efforts; summarize the experiences of unions, worker groups or affinity groups, employee representatives, and committees in implementing these approaches.

6.6: Collect and analyze data on differences in worker and organizational needs, preferences, practices, and outcomes by industry, region, size, structure, and job type.

- Identify existing sources for job profile databases that characterize occupations based on their physical, cognitive, and psychosocial needs and demands. Identify available predictive models of injury and illness treatment and recovery to assess differences in HWD needs, practices, and outcomes.
- Collaborate with a large corporation with a multi-region presence and wide range of occupations to evaluate differences.

6.7: Identify characteristics of the built environment (e.g., ergonomics, workspace design) that, in combination with psychosocial work environment characteristics, promote worker safety, health, and well-being.

- Collaborate with the design industry to explore their existing efforts related to psychosocial implications of the built environment (e.g., standards, guidelines, best and promising practices, committees/workgroups/projects, member and public communications). Identify additional elements as needed, and promote best practices that promote worker safety, health, and well-being.
- Conduct case studies of businesses and organizations that have undergone physical renovations to identify HWD considerations that were included and the impact on psychosocial outcomes. Include worker input.
- Publish a white paper on the physical and psychosocial work environment in telework and remote work situations.
- Deliver presentations on how work has changed in the post-COVID work environment, including increased use of hybrid work arrangements.

6.8: Develop and evaluate organizational and managerial strategies to respond to misuse of opioids and illicit drugs by employees. These strategies could include: identifying and correcting demanding work organization factors that increase the risk for substance misuse by workers; identifying ways to assist workers with substance misuse while protecting worker privacy; identifying ways of supporting workers with substance misuse through return-to-work assistance and continued employment while protecting worker and public safety; and facilitating effective treatment through anti-stigma interventions and improved treatment access.

- Develop a white paper that provides an overview of traditional medical and alternative or complementary medicine approaches to pain management for employees with opioid use disorders or chronic pain from work-related injuries.
- Conduct a literature review of organizational factors related to substance misuse.

Create a guide, toolkit, and related presentations for business, industry, human resources, and benefits purchasers on prevention methods, early identification techniques, and optimal management of substance misuse.

Objective 7: Promote a Sustainable Work-Nonwork Interface

Research gaps: Potential activities and opportunities

7.1: Define well-being as it relates to successful management of the work-nonwork interface.² Raise awareness of how workplace experiences across the occupational spectrum can spill over to affect the well-being of families and communities.

- Develop and publish a white paper, written from a cross-disciplinary, international perspective, that summarizes existing definitions of worker well-being. The paper should place particular emphasis on definitions that implicitly or explicitly account for the work-nonwork interface.
- Leverage the white paper to raise awareness of how workplace experiences across the occupational spectrum can spill over to affect the well-being of families and communities. Additionally, develop occupation (or industry) specific infographics that frame worker well-being specific statistics with reference to existing conceptual definitions.
- Promote the use of the NIOSH WellBQ survey to work-nonwork scholars through specialty webinars.
- Hold working meetings with industry groups to discuss how workplace experiences spill over to affect not only worker well-being, but also the well-being of families and communities. Identify more refined areas of future research and practice implementation work.
- Based on results from the working meetings, hold conference calls and webinars with work-nonwork researchers to discuss possible next steps and to facilitate cross-disciplinary collaborations.
- Partner with existing professional societies to conduct specialty workshops for graduate students on foundational issues related to worker well-being and on how their future research endeavors might touch on and inform issues related to the work-nonwork interface.

7.2: Conduct research on contextual factors and their implications for the work-nonwork interface. Examples of organizational contextual factors include job type, industry, organizational culture, leadership, management skills, and available technology. Examples of individual contextual factors include decision-making and demographic considerations, such as age, gender, race and ethnicity, language ability, education, income, marital status, and family make-up.

² The work-nonwork interface refers to the boundaries between work and life. The nonwork domain includes many activities including but not limited to family, leisure, educational, spiritual, and community.

- Leverage data from the QWL and other existing archival data sets to provide greater context and better define occupation-specific research gaps.
- Promote existing work that summarizes current research in this area from influential publications.
- Hold panel sessions at conferences to identify “next stage” research needed specific to job type, industry, organizational culture, leadership, management skills, and available technology.
- Promote the existence of or produce assessment tools and toolkits for field practitioners to better understand contextual factors and their implications for the work-nonwork interface within their field of study.
- Develop and publish a series of white papers that highlight special topic issues as they relate to the work-nonwork interface (e.g., contextual factors related to the COVID-19 pandemic; diversity, inclusion, and equity; and the future of work).

7.3: Include measures that characterize quality of work-life, work-nonwork balance, and worker well-being in ongoing public health surveillance efforts.

- Produce a compendium of measures used and type of data that is currently collected on work-nonwork to help researchers identify and use these and uncover existing gaps.
- Address these gaps by validating existing measures or developing new ones using best practices and current thinking on issues related to quality of work-life, work-nonwork balance, and worker well-being.
- Host a webinar or in-person workshop at conferences to educate businesses, organizations, and practitioners on how to select and use existing validated measures appropriately.

7.4: Investigate the safety and health effects of work-life conflict of workers in jobs without much stability or security and workers in low-paying hourly jobs with limited flexibility to deal with family demands or emergencies and continual financial stress.

- Summarize findings available from ongoing research during the pandemic examining workers in jobs with limited security. This should have the explicit goal of identifying lessons learned and highlight the disproportionate effect of the pandemic on diverse workers.
- Utilize the work precariousness scale developed by NIOSH [Bhattacharya and Ray 2021] to measure well-being implications of work-life conflicts in jobs that are relatively precarious.
- Examine potential ways in which health emergencies like the COVID-19 pandemic adds to both work precariousness and related work-life conflict.

7.5: Examine the safety and health implications associated with commuting, work travel, and work-life conflict.

- Compile a brief review of the research on this topic since the start of the pandemic.
- Disseminate the findings of this review along with evidence-based suggestions to interested parties through a webinar. Market the webinar to organizational leaders seeking guidance on how to best implement policies that would affect worker commuting and travel practices moving forward.
- Document return on investment metrics related to organizations providing resources and incentives for taking alternative forms of transportation that help promote both green travel and potentially reduce stress in their workers.
- Partner with businesses and organizations to develop and test policies that reduce commuting stress and facilitate transition from work to nonwork. Policies should be examined in terms of the degree to which they ensure fair treatment of all workers.
- Develop cross-disciplinary partnerships to conduct research to understand the effect of the commute on a worker's psychological and physiological health, productivity, and behaviors outside of work.

7.6: Design and implement work-nonwork interventions, including policies, programs, and practices, that reduce conflict and support worker and family safety, health, and well-being. These interventions should be sustainable over time, inclusive of all employees with differing non-work needs and demands, promoted by employers, and willingly adopted by organizational members.

- Conduct workshops to help educate work-nonwork scholars on how to communicate with and partner more effectively with organizations. For example, this would include communicating around issues like organizational return on investment concepts as well as how to leverage naturally-occurring field experiments—where employers have implemented work-nonwork policies— to be able to study the effects of those policies.
- Conduct intervention research through collaborative partnerships on evidence-based policy changes intended to reduce work-life conflict.

7.7: Translate science on known work-life risks to increase awareness of those risks and use it to inform practice-based research.

- Develop a research-to-practice book on the work-nonwork interface for organizational leaders who have an interest in work-nonwork issues or practitioners with responsibility for implementing health, safety, and well-being programs in organizations.
- Establish a workgroup to produce and distribute research-to-practice translation materials specific to work-nonwork issues.
- Develop networks to advocate for public policy and workplace intervention strategies that specifically address support, control, and demands of workers who live or work in

settings that put them at increased risk of being exposed to hazards, and their ability to manage the work-nonwork interface.

- Increase STEM education, training, and experience of the future occupational safety and health (OSH) and allied professionals by including undergraduate and graduate students, and post-doctoral fellows from multiple disciplines in work-nonwork interface implementation activities (e.g., in existing or new curricula, future grants).

CONCLUSION

In summary, we reiterate the need to address the seven research objectives and associated gaps identified in the HWD NORA. With this implementation plan, we aim to provide a template that sparks inspiration for the varied audiences that are similarly interested in improving the safety and health of workers and advancing efforts to protect and promote worker well-being.

As we endeavor to implement the actions outlined in this plan, we look forward to working with our existing partners and welcome the opportunity for new collaborations. As noted in the introduction to this document, it is imperative to disseminate scientific findings and implement promising practices. There are innumerable ways we can work together to implement HWD principles. Please contact Council leaders to share your observations and learn more about how you can get involved.

Finally, we would like to acknowledge the invaluable contribution of our Councilmembers; thank you for imparting your expertise and for your continued commitment to the occupational safety and health of our nation's workers.

APPENDIX - NORA Healthy Work Design and Well-Being (HWD) Council Workgroups

Objective 1: Examine the Evolving Diversity and Demography of the Workforce and the Implications for Safety and Health

Carol Brown, PhD, University of Colorado (Co-Chair)
Brian Quay, MS (NIOSH Co-Chair)
Karla Armenti, ScD, MS, University of New Hampshire
Jennifer Cavallari, ScD, CIH, University of Connecticut
Robert Fox, PhD, General Motors
Pamela Hymel, MD, Walt Disney World Parks and Resorts
Kari Kilbride, MPH, RN, COHN-S, 3M
Tapas Ray, PhD, NIOSH
Laura Stock, MPH, UC Berkeley

Objective 2: Improve the Safety and Health of Non-Standard Work

Jennifer Swanberg, PhD, MMHS, OTR, Johnson & Wales University (Chair)
Rene Pana-Cryan, PhD (NIOSH Assistant)
Les Boden, PhD, Boston University
Jennifer Cavallari, ScD, CIH, University of Connecticut
Lorraine Conroy, ScD, University of Illinois at Chicago
Michael Foley, MA, Washington State Department of Labor and Industries
Marie Anne Rosemberg, PhD, University of Michigan

Objective 3: Promote Safety and Health of Advancing Technology

Dave DeJoy, PhD, University of Georgia, Athens (Chair)
Naomi Swanson, PhD (NIOSH Assistant)
Chia-Chia Chang, MBA, NIOSH
Deborah Dickerson, PhD, Virginia Tech
Robert Fox, PhD, Retired
Dave LeGrande, MA, RN, Communications Workers of America
Rene Pana-Cryan, PhD, NIOSH
Candace Schaefer, PhD, New York University
Mindy Shoss, PhD, University of Central Florida

Objective 4: Reduce Work and Job Design-Related Chronic Diseases among Workers

Marie Anne Rosemberg, PhD, University of Michigan (Chair)
L. Casey Chosewood, MD, MPH (NIOSH Assistant)
Katherine James, PhD, MS, MSPH, University of Colorado-Anschutz Medical Campus
Brad Jones, CIH, CSP, CMHH, LyondellBasell

Tara Hartley, PhD, MPA, MPH, NIOSH
Alyssa McGonagle, PhD, University of North Carolina, Charlotte
Lee Newman, MD, MA, University of Colorado Denver
Tapas Ray, PhD, NIOSH

Objective 5: Decrease the Burden of Shift Work, Long Hours of Work and Fatigue

Karen Heaton, PhD, COHN-S, FAAN, FAAOHN
Naomi Swanson, PhD (NIOSH Assistant)
Chris Barnes, PhD, University of Washington
Robert Fox, PhD, General Motors
Brad Jones, CIH, CSP, CMHH, BS, LyondellBasell
David A. Lombardi, PhD, DataCeutics
P. Daniel Patterson, PhD, University of Pittsburgh

Objective 6: Improve the Well-being of Workers through Healthier Job Design and Better Management Practices

David Ballard, PsyD, MBA, GhostNote Consulting (Chair)
Tim Bushnell, PhD (NIOSH Assistant)
Bhargav Chandrashekar, DO, MPH, MHA, GlaxoSmithKline
Lauren Farabaugh, MS, Amazon
Kari Kilbride, MPH, RN, COHN-S, 3M
Jake Lazarovic, MD, MyAbilities Technologies
Jeannie Nigam, MS, NIOSH
Bonnie Rogers, DrPH, COHN-S, FAAN, University of North Carolina at Chapel Hill
Steve Sauter, PhD, Consultant
Candace Schaefer, PhD, New York University
Anita Schill, PhD, MPH, MA, Consultant
Naomi Swanson, PhD, NIOSH
Megan Trainer, MS, Amazon

Objective 7: Improve the Work and Non-Work Interface

Russell Matthews, PhD, University of Alabama (Chair)
Jeannie Nigam, MS (NIOSH Assistant)
Leslie Hammer, PhD, Oregon Health & Science University
Heidi Hudson, MPH, NIOSH
Tapas Ray, PhD, NIOSH
Penney Stanch, CIH, CSP, CPE, WELL AP, Stanch Worker Health LLC
Sara Tamers, PhD, MPH, formerly at NIOSH
Carolyn Winslow, PhD, University of Michigan

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